EMERGING EUROPEAN ECONOMIES AFTER THE PANDEMIC

László Mátyás, Editor

Foreword

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Preface

Between 2004 and 2013, eight Central and Eastern European countries with an overlapping historical background (Bulgaria, Croatia, Czechia, Hungary, Poland, Romania, Slovakia, and Slovenia), joined the European Union. These Emerging European Economies (EEE) have since gone through radical, uneven, and sometimes controversial, economic, social and political changes, which are not yet fully appreciated or understood. Some of them should even be considered advanced rather than emerging economies. The success of these countries will have a fundamental effect on the future of the European Union (EU) with far reaching consequences well beyond their borders. It is therefore of paramount importance to understand the events and phenomena they have been experiencing. Although there are a large number of articles, studies, and papers available on these economies, information and analyses are frequently partial, superficial, incomplete and no more than distorted political and policy noise.

Based on wide comparative data analysis, the main aims of this volume are to provide reliable information about the state of the economy in the EEE before the unprecedented Covid pandemic, and to identify the main problems, difficulties, similarities, and differences between them. Following this, the likely shorter- and longer-term effects of this shock are considered together with policy options. Special attention is given to the so-called ‘middle income trap’ as this seems to be one of the most important dangers the region is facing. Unless credible and viable solutions are implemented to be more in line with the European Union’s averages and mainstream in the most important factors of the economy and society, centrifugal anti-EU forces may gain heavy influence among the people of the EEE.

This volume is data driven. Great emphasis is placed on presenting facts through the lens of available data. This approach also shows where data is missing, incomplete or misleading. Data may quickly become outdated; nevertheless, the general patterns, trends, and relationships seem to be remarkably stable. A great deal can be learned from them. Our policy recommendations are also data-driven, often presented in alternative forms, without any political or other preferential bias.

We frequently talk about the EEE, which linguistically may seem odd, but is perfectly acceptable when meaning a group of countries. Although the volume aims at consistency, the use of American, Australian, or British English is consistent only within one chapter, given the highly diverse background of the contributors. The chapters can be read and interpreted individually, but special attention is given to proper cross-referencing. and the book provides as complete a picture of the Emerging European Economies as possible.

Overall, the general state of the economies within the EEE group does not look rosy. Despite their difficulties, most countries have at least one area, however small or narrow, where clever policy, original thinking, and decisive action have resulted in substantial and impressive progress. We hope that this volume will offer help in designing and implementing further forward-looking policies.

Budapest and Vienna *Laszlo Matyas*
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The book benefited substantially from the comments and feedback received from Barbara Dutzler, Liviu Matei, Stefanie Peer, Balázs Váradi, Thomas Wiesner, ...

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The final camera–ready copy of the volume has been prepared with LaTeX and Overleaf by the authors, the editor, and the tireless and always helpful Polad Gulushov.

Contents

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Chapter 1
Convergence to the Centre

Péter Benczúr and István Kónya

Abstract This chapter focuses on the main macroeconomic developments in the Emerging European Economies (EEE) group leading up to and during the Covid-19 pandemic, and also on the longer term outlook after the crisis. The emphasis is on economic convergence and crisis resilience, with a comparison of economic and social indicators during the current pandemic and the previous large economic shock, the global financial crisis of 2008-2012. The goal here is to set the stage for the more detailed analyses of subsequent chapters, and provide a context in which those details can be interpreted. Our main message is that while the EEE overall has exhibited significant convergence to the more advanced European Union (EU) member states, gaps remain, especially when we look at various social indicators. Crisis resilience also improved after the global financial crisis, so there is hope that the EEE will emerge faster and stronger from the current crisis than it did from the previous one. To complete the convergence process, to reap the benefits of a potential relocation of global value chains to Europe, and to avoid persistent negative consequences of the economic shocks, it is important to boost productivity, increase innovation, and invest in human capital.

1.1 Introduction

This introductory chapter[1] presents the overall macroeconomic situation in the various countries, compares them to each other and to their experience during the

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[1] The opinions expressed are those of the authors only and should not be considered as representative of the European Commission's official position.

2008-2012 global financial crisis,[2] and puts this in the long-term context of convergence. The specific, thematic chapters of the book then explore the full complexity of the events and developments, uncovering the circumstances, country features, and policy reactions that are behind them.

The chapter connects the aspects of convergence (catching up in economic and social development) and resilience (crisis response and coping capacities). The historical convergence process is particularly relevant, because that is the trend relative to which the Covid shock and the longer-term outlook need to be interpreted. Moreover, potentially long-lasting implications of the shock can come from their impact on the main engines of convergence (like investment, human capital accumulation, and productivity). The global financial crisis apparently undid much of the convergence of Southern Europe. If shocks are weathered systematically differently by individual EU countries, that poses a challenge for the overall convergence of the bloc. Fortunately, the past experience of the EEE was mostly the contrary; their convergence might have even accelerated (though often only in relative terms). But convergence should not be taken for granted.

1.2 Convergence

The goal of this section is twofold. First, we discuss a few key methodological and conceptual issues that help us interpret the data we present in this chapter, and throughout the book. Second, we provide a very brief historical overview of the region. While the main purpose of the volume is to understand the impact of the Covid epidemic and the longer term outlook of the region, the historical context is important to understand where the countries are coming from and where they are expected to go.

An important concept when looking at economic growth in the EEE is the so-called Middle Income Trap (MIT) coined by the World Bank (Gill & Kharas, 2007, 2015). The MIT is an empirical statement about the inability of many countries over a long period to raise their income levels (measured by Gross Domestic Product, GDP, per capita) above a certain threshold. The classical examples are Latin-American economies, which have consistently lagged behind rich countries for at least a century. Many view the EEEs as further examples of the MIT, mostly based on historical performance. Indeed, this is a recurring central theme in many chapters of this volume.

As we show in the next section, however, basic macroeconomic indicators are at best ambiguous about the presence of MIT in the EEE. The region has exhibited strong convergence to Western European economies, and most countries in the EEE

[2] The global financial crisis usually refers to the period between mid 2007 and early 2009. In Europe, it was followed by a wave of sovereign debt crises. For simplicity, we will refer to this combined period of 2008-12 as the global financial crisis.

are now considered high-income by the World Bank and the IMF.[3] The historical record is also problematic, since the region was buffeted by large shocks (two World Wars, and decades of central planning) that interrupted earlier convergence periods. Based on economic growth and income levels alone, there is so far little decisive evidence for the EEE to be in a middle income trap.

That said, subsequent chapters add many more details that qualify this statement. Chapter 11 argues that the EEE has to rely more on innovation to continue its convergence towards the European centre. We also briefly comment on broader indicators of development, which show that the EEE is further behind if one also takes into account these measures, especially on health. Chapters 8, 9, 10 and 12 present a less flattering picture on issues of health, ageing, public education and income distribution, respectively. Chapter 5 highlights the role of transport and mobility for further convergence (and thus avoiding the MIT). These detailed analyses strongly hint at the possibility that while not in the original sense of MIT, convergence of the EEE may stop prematurely, before the group fully catches up with Western Europe.

1.2.1 A Brief Theory

Our interpretation of the region's historical experience draws heavily on *neoclassical growth theory* (NGT) (Solow, 1956; Mankiw, Romer & Weils, 1992). To understand the main assumptions and results from the NGT framework, we first need to define the concept of the *neoclassical production function*. The basic idea is that the productive capacity of an economy – as measured by GDP – depends on (i) the amount of inputs into the production process, and (ii) the efficiency with which these inputs are used. While this approach may seem restrictive, both inputs and efficiency can and will be interpreted broadly to accommodate other factors such as human capital, institutions and social capital. Therefore, we mainly use NGT to provide a convenient categorisation of the many different factors that determine economic performance.

The main inputs of production are labour and capital. Both are combinations of various components, which together determine the overall quality and quantity available in a country at any given point of time. Labour is a combination of the number of employed, the average hours worked per worker, and the skill level of workers. Countries can thus increase their labour inputs by increasing employment, hours worked, or the skills level of the workforce. The last component is particularly important as economies mature, and it is what economists call *human capital*. The main sources of human capital accumulation are formal schooling through the education system, and the experience and training people receive on the job. Successful economies provide broad-based opportunities for learning both for children and for

[3] For the World Bank: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups. The exceptions are Bulgaria and Romania, which are still classified as upper middle income. For the IMF: https://www.imf.org/-/media/Files/Publications/WEO/2021/April/English/stasapp.ashx. Here Croatia, Hungary, and Poland are also exceptions.

adults through life-long education. General skills, such as computer literacy, that can be adapted flexibly are particularly useful during times of big shocks and economic realignments, such as the Covid epidemic.

Capital stock is a composed of all the equipment, buildings and infrastructure used in production, broadly defined. While the measurement of capital at the aggregate level is problematic, conceptually it is accumulated via *investment*. Capital accumulation plays a crucial, if limited role in the neoclassical framework. Countries that start with an initial level of capital stock that is lower than in comparable countries will grow faster for a while. This is highly relevant for the EEE as a group, where central planning may have led to fast capital accumulation, but much of that became obsolete during the transition to a market economy in the early 1990s (Campos & Coricelli, 2002). Replacing rusty factories and inefficient machines was therefore an important source of economic growth during the first decade of the transition period.

The key contribution of neoclassical growth theory was to point out that capital accumulation on its own cannot be the source of long-run growth (Solow, 1956). The reason is that while investment and new capital increases GDP, it is subject to *diminishing returns*. Building a bridge or roads, or buying an industrial robot is extremely useful when these are scarce. But once there are many bridges and roads and robots, adding an extra one is unlikely to be very productive. In other words, sustained economic growth requires investment returns to remain broadly stable over time. Cautionary examples to the contrary include the Soviet Union and its former satellites, where high rates of capital investment were unable to keep the economies from stagnation.

To prevent returns from investment from falling over time, countries have to improve the efficiency of how they use labour and capital. This is the elusive, but extremely important goal of increasing *productivity*. It is crucial to stress that productivity is a very broad concept. At its core, it includes technology and innovation: the discovery of new knowledge and its adaptation for production purposes. But aggregate productivity also comes from well-functioning institutions, financial intermediation, management and organisational solutions, public goods, social capital and trust, and many other aspects of well-functioning, complex economies and societies (Hall & Jones, 1996).

To understand the experience of the EEE, we therefore need to look at changes on the labour market, the capital market, and the various aspects of productivity. A final, but crucial part of the picture is that almost all economies – and the EEE in particular – are highly open. Besides the obvious role of international trade in these economies, capital accumulation and productivity growth are also highly dependent on international conditions and interactions with the rest of the world. Therefore, in our introductory overview we also take a quick look at a few key measures of openness.

This overview also connects to and sets the stage for practically all consecutive chapters in this volume. We look at convergence and the historical context, while most other chapters concentrate more on the Covid-19 shock and the decade preceding it. Many of our broad findings are elaborated in depth by other chapters (or come from them), which we indicate throughout the text.

1.2.2 Development and Growth

Central-Eastern European economies, including the EEE, have long compared themselves to the more advanced countries of the continent. In this section we provide a brief overview of the region's experience, starting from 1980. We use Austria as a comparison point, since it has many common features with the EEE: it is a small, open economy with many current and historic links to our eight countries. We start in 1950 to put the region's more recent economic performance into perspective.

Fig. 1.1: Relative development in the EEE, 1949-2018
Data: Maddison Project Database 2020 (Bolt & van Zanden, 2020)
Note: GDP per capita: 2011 international dollars.

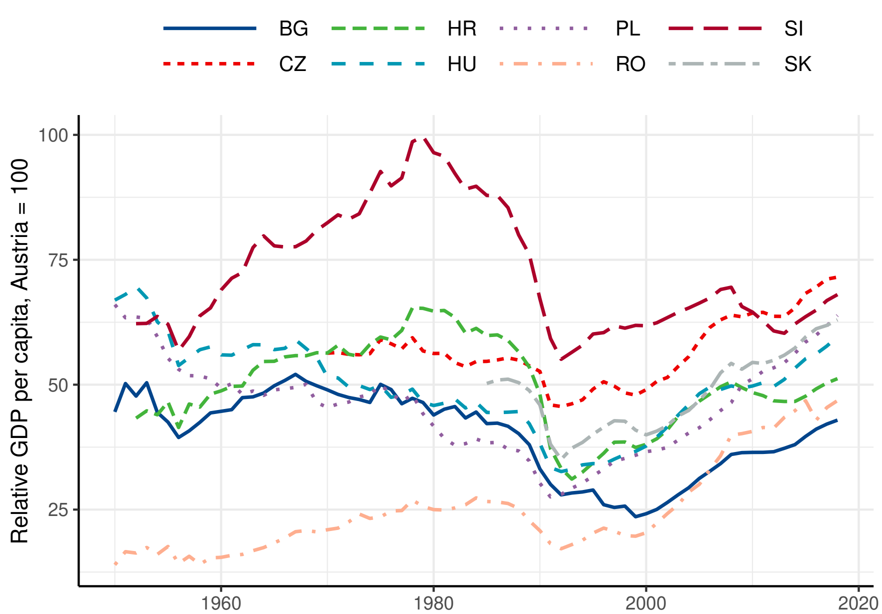


Figure 1.1 plots the relative GDP per capita levels, adjusted for purchasing power parity (i.e. the fact that less developed countries typically have lower price levels; PPP) in the eight economies between 1950-2018, measured at constant 2011 international US dollars.[4] Each year, Austrian GDP per capita serves as a reference point,

[4] It is important to note that Croatia, Czechia, Slovakia, and Slovenia did not exist as independent states before the 1990s. Since the Madison database provides separate data earlier, we just use them without questioning how they were constructed. That said, data for some of the countries start later, as the figure shows.

so for each country the figure plots the cross-sectional gap between Austria and the particular country.

There are four important observations that we intend to make from the chart. First, while the EEE grew under central planning, in general there was very little convergence to Austria (and more generally, to Western Europe). The causes of this are well documented, and generally follow from the inefficient specialisations and resource allocations that characterised central planning (Kornai, 1986, 1992). The three exceptions are Croatia, Romania and Slovenia. As Romania started from a very low level, it is not surprising that at least for a while, the country experienced convergence. The case of Croatia and Slovenia is more interesting, and has to do with the relatively more liberal Yugoslavian economic system that allowed more autonomy to individuals and corporations (Estrin, 1991).

Second, the 1980s were characterised by relative decline and economic stagnation[5]. Sources of *extensive growth* were exhausted, and capital investment was no longer sufficient to compensate for a lack of productivity growth (Easterly & Fischer, 1994). In some countries, the 1980s saw economic and social crises, which ultimately led to political and economic transition in 1989-1990 (Kornai, 1992).

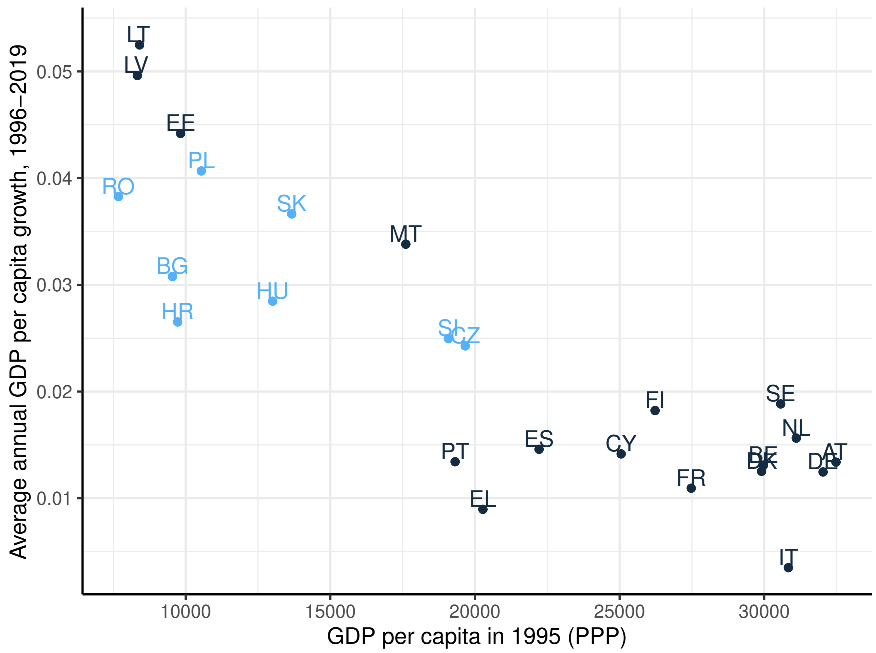
Third, the first years of transition saw major recessions in most countries, and the region as a whole fell significantly behind. Some of this may be due to measurement problems. Since relative prices were very misleading under central planning, GDP data before and after 1990 are not directly comparable (Maddison, 1998). But transition undeniably led to significant losses in employment and output, and it was a major disruption to economic activity.

The fourth and final observation is that after about 1995 the region experienced convergence. With respect to Austria, by 2018 all countries had surpassed their relative position in 1990. To add more details to the recent convergence process, Figure 1.2 plots average annual growth rates in the 27 current members of the European Union against initial GDP per capita, measured at current PPP in 1995. Neoclassical growth theory predicts that countries starting out at a lower level of development grow faster subsequently. This prediction assumes that the countries in question are fundamentally similar, and it is only some historical accident that caused some to fall behind, and others to pull ahead. By and large we expect this to hold for the EU27 countries. Thus the expectation is that we do find convergence between the EEE and the older, more advanced EU member states.

The figure strongly confirms this prediction, as the EEE (in blue) grew significantly faster between 1995-2019 than the older member states. The other fast-growing economies were the Baltics, who started out the poorest and managed to grow the fastest subsequently. Moreover, there was also convergence within the group: countries that started out poorer caught up faster. This is particularly clear for the economies of the Visegrad countries (Czechia, Hungary, Poland, and Slovakia). The convergence process was briefly interrupted by the global financial crisis in some cases, but resumed relatively quickly afterwards. Interestingly, there was no convergence within

[5] Throughout the entire period Austrian GDP per capita grew at an average annual rate of 1.8%. Austrian growth was fairly stable over the four decades, so the relative positions in Figure 1.1 are not driven by the denominator.

Fig. 1.2: The convergence process between 1995 and 2019
Data: Penn World Table 10.0 (Feenstra, Inklaar & Timmer, 2015).



the 'old' EU, which is mostly explained by the global financial crisis experience of the Mediterranean member states (Greece, Italy, Portugal, and Spain) (Lane, 2012; Frankel, 2015).

We calculated average growth rates for 1995-2008, 2009-2012, and 2013-2019, presented in Table 1.1. It is clear that the growth gap between the EEE and Austria remains in the third sub-period. Although all countries grew somewhat slower, the decline is more pronounced for Austria than for the EEEs. Convergence, if anything, sped up in the past few years. There are two main exceptions: Croatia and Slovakia, but it is beyond the scope of this chapter to explain individual reasons.

1.2.3 The Sources of Growth

As we discussed earlier, we can think about economic growth – especially the convergence process – in terms of the main factors of production (labour and capital) and total factor productivity. It is beyond the scope of this chapter to provide a

Table 1.1: Growth rates in three periods (%)
Data: Eurostat (2021d), Annual National Accounts.

	1995-2008	2009-2012	2013-2019
Austria	2.46	1.79	0.50
Bulgaria	2.81	1.08	2.20
Croatia	3.83	-1.31	0.87
Czechia	3.26	1.12	2.10
Hungary	3.17	0.55	2.71
Poland	4.43	3.21	3.20
Romania	3.84	-0.02	3.23
Slovakia	5.05	3.46	1.94
Slovenia	4.11	-0.16	2.07

rigorous analysis, but we try to shed some light on this issue with a few simple observations.[6]

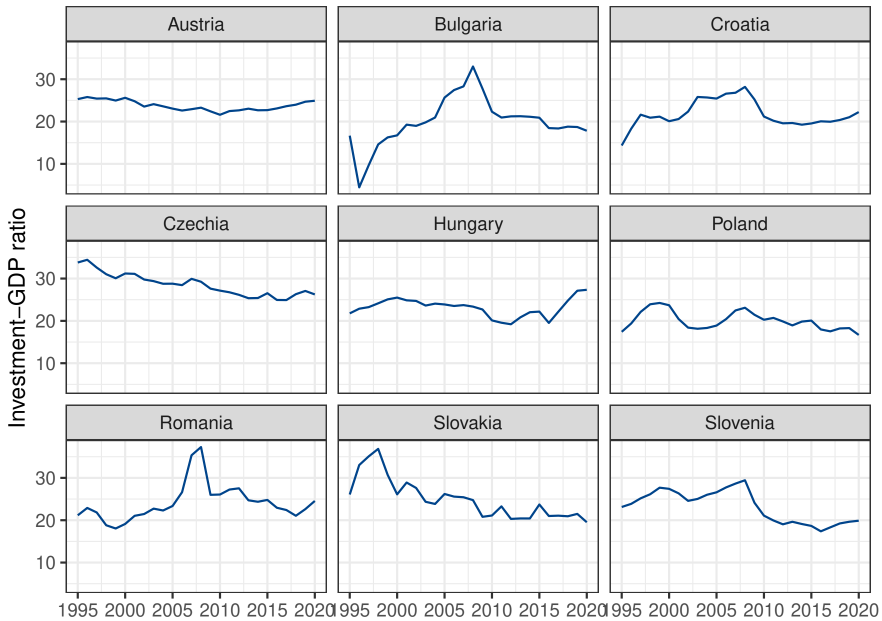
Capital accumulation is driven by capital investment. Figure 1.3 plots investment-GDP ratios for the EEE and for Austria between 1995-2019, which is one way to see how much growth is driven by capital accumulation. This ratio has been very high in many East Asian countries, and is particularly high in China (Prasad, 2011; Chang, Chen, Waggoner & Zha, 2016). An interesting debate that analysed the East Asian experience highlights the difficulties of measuring productivity, and the potentially crucial role of factor accumulation and mobilisation in economic development over an extended period of time (Young, 1995; Hsieh, 1999).

As the figure shows, and in contrast with the East Asian experience, investment rates were not particularly high in the EEE, both compared to Austria and in a global context. Investment rates of 20-30% are consistent with the steady accumulation of physical capital, but do not indicate a growth process driven by capital. Part of the reason for this may be that capital accumulation was in fact fast under central planning, especially before the 1980s. Much of the capital stock became obsolete after transition (Gerling & Schmidt, 1997; Kónya, 2018), but overall the task was upgrading and replacing existing capital. There is some evidence that capital-output ratios were inefficiently high before 1990, so not all of the existing capital stock had to be replaced.[7]

[6] For detailed studies on the convergence process in the European Union, see Estrada, Galí and López-Salido (2013), Cuaresma, Doppelhofer and Feldkircher (2014) and Borsi and Metiu (2015), (among many others).

[7] The Penn World Table 10.0 reports capital-output ratios for Czechia and Poland for 1990 that are higher than in the United States. For measurement problems and some new evidence that questions these figures, see (Vonyó & Klein, 2019).

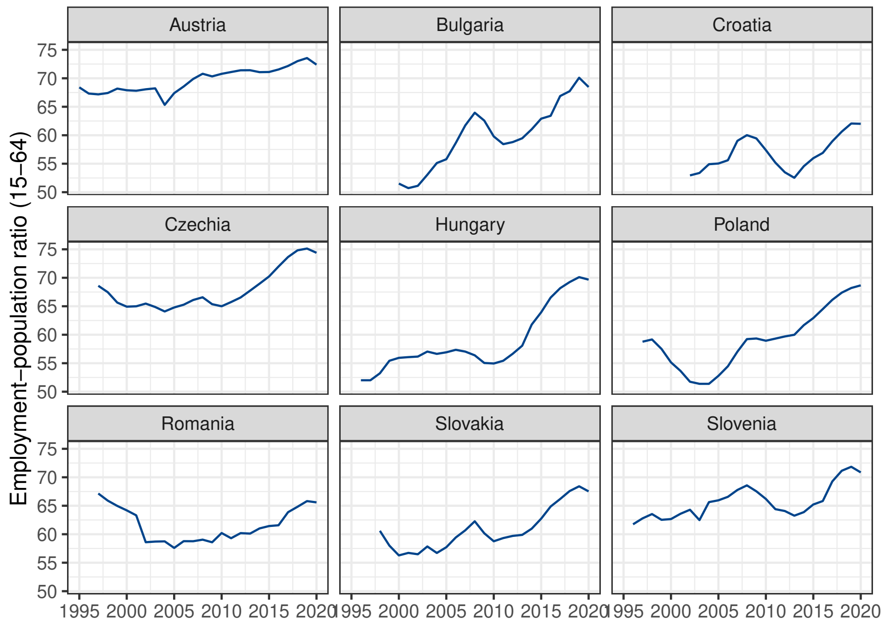
Fig. 1.3: Investment shares in the EEE (%)
Data: Eurostat (2021d).
Note: Investment share % GDP at current prices.



The second important contributor to economic growth and convergence is the labour market. While we leave the detailed analysis of recent developments and structural features to Chapter 4, we briefly present the broad historical patterns here. Figure 1.4 plots employment rates (as a share of the population aged 15-64 years) from 1995. The impact of the transition recession (not shown) was huge in most of of our countries, also driven by the 'hidden unemployment' of the socialist era.[8] In Bulgaria and Hungary, the employment rate dropped by about 15 percentage points, and in Poland by about 10 percentage points. Czechia is the only economy where employment held up reasonably well throughout the entire period. While each country is different, employment broadly increased in the years before the global financial crisis, fell again during the crisis, and increased again significantly after 2012. By 2019, employment had reached levels last seen at the beginning of economic transition. Note that employment rates are still mostly below the Austrian level, with the exceptions of Czechia and Slovenia, and with Bulgaria and Hungary catching up quickly. Also, while not shown explicitly, hours worked tend to be higher

[8] It was a frequent practice to keep workers in their jobs although they were not or no longer needed.

Fig. 1.4: Employment rates relative to the population (15-64 years old, %)
Data: Eurostat (2021u).



in the EEE, so total hours worked are more similar to the Austrian values than the employment rates suggest.[9]

An interesting feature of the labour market is that employment growth was much stronger in many countries in the 2010s, after the global financial crisis was over. Bulgaria, Czechia, Hungary, Poland, and Slovakia saw substantial increases in their employment rates between 2013-2019. Hungary is a particularly interesting case, where the employment rate increased by around 10 percentage points. There are some statistical problems that qualify this statement, but the main message remains: employment growth was particularly strong in the last decade in Hungary and in many other countries.[10]

A major determinant of labour input is the skills level – or *human capital* – of workers. Workers with better skills are more productive, and contribute more to production than their less skilled counterparts. One way that this statement can be

[9] Measuring hours worked, however, is subject to more measurement error, so we decided to include employment rates instead.

[10] The figure uses data from the Labour Force Survey, which includes some workers who still have residence in their home country, but work abroad. At least in Hungary, this led to a potential overestimation of domestic employment growth in the mid-2010s. For more details, see Bodnár and Szabó (2014).

verified empirically is to observe that higher levels of education lead to substantial wage premia (Katz & Murphy, 1992). In fact, one way to measure levels of human capital is to use (relative) wages at different levels of education (Mulligan & i Martin, 1997). Here we follow a simpler approach, and show two measures of average education levels directly. As discussed in depth in Chapter 10, education attainment is an imperfect proxy of human capital. First, learning outcomes may diverge from years of schooling. Second, much skill acquisition happens at the workplace, either formally (through training) or informally (via experience). Since measuring these aspects is even more difficult than quantifying formal education, we focus only on the latter. Third, the general level of health in a population also influences how efficiently and how long skills can be utilised in the workplace. Therefore, we also present a very simple measure of health in addition to two indicators of human capital (leaving the detailed analysis to Chapter 8).

Table 1.2: Education and health indicators
Data: Barro-Lee dataset (Barro & Lee, 2013) and Eurostat (2021n).
Notes:
(1) Years of schooling: ages 15 and above.
(2) Higher education: % of population with some tertiary education.
(3) Life expectancy: at birth, in years.

	Years of schooling			Higher education			Life expectancy		
	1990	2000	2010	1990	2000	2010	1990	2000	2010
Austria	8.36	8.97	9.60	5.09	11.80	15.36	75.8	78.3	80.7
Bulgaria	8.42	9.28	11.24	13.07	15.99	21.11	71.2	71.6	73.8
Croatia	8.57	9.71	11.30	5.37	10.10	17.58	NA	NA	76.7
Czechia	10.83	12.69	12.80	11.70	10.29	14.83	71.5	75.1	77.7
Hungary	8.79	11.20	11.85	8.77	10.98	17.18	69.4	71.9	74.7
Poland	9.06	10.26	11.32	5.89	10.76	18.98	70.7	73.8	76.4
Romania	9.32	10.04	10.67	5.59	7.81	10.63	69.9	71.2	73.7
Slovakia	10.69	11.20	12.82	7.90	9.71	18.32	71.1	73.3	75.6
Slovenia	10.77	11.35	11.89	9.00	12.90	19.86	73.9	76.2	79.8
Sweden	10.58	11.38	11.64	18.05	22.57	24.89	77.7	79.8	81.6

Table 1.2 shows average years of education and the fraction of population with at least some tertiary education (ages 15 and above). Since Austria – the reference country before – is somewhat atypical with its relatively low levels of average school years, we also added a leading nation, i.e. Sweden. Data come from the Barro-Lee dataset (Barro & Lee, 2013), which contains these measures for every 5 years.

Fortunately, the yearly variation is low for these variables, so the table shows values for 1990, 2000 and 2010 (the last data point). Our measure of health is life expectancy at birth.

The general message is that the EEE are quite well educated, at least according to average years of education. This is true not only relative to Austria – a laggard in years of schooling –, but relative to Sweden as well. Cross-country differences are sizeable, but Poland and Slovakia are ahead, and Romania is somewhat behind the group average. As Chapter 10 demonstrates, however, the situation is less favourable once learning outcomes are taken into account (standardised test scores of students).

Average years of education and even student test scores might be somewhat misleading, however, if different skills levels are not perfect substitutes. One can make an argument that convergence in today's skill-intensive environment requires a significant number of highly educated workers, and not necessarily a large number of employees with average education levels. Therefore, we also look at the fraction of over 15-year-olds who have completed at least some tertiary education. Here the picture is more mixed: relative to Austria, the region is still doing quite well. But relative to Sweden, there is a considerable gap, especially for Romania, but also for the other countries. This is further confirmed by the detailed analysis of Chapter 11. We conclude that while well suited to the types of tasks required for the first, more extensive phase of convergence, members of the EEE are less prepared to enter the second, more intensive phase, where knowledge generation and absorption are increasingly important.

Life expectancy is not only a direct measure of welfare itself, but it is also related to human capital investment, since a longer life span means more years to enjoy the returns of higher skills. Overall, the EEE are still lagging behind Austria, and there are no obvious signs of convergence. In fact, due to stagnation in the 1980s – before transition –, and at least in some countries due to the transition shock, the gap is often larger than it was in 1990.[11] Relative to its level of economic development, Hungary is doing particularly badly. We leave the detailed analysis of health conditions and the health system for Chapter 8, but this is an area where the region is not doing well relative to its economic performance.

To summarise our indicative findings on the supply side, the EEE – after a deep transition recession – experienced fairly strong growth and convergence since 1995. The global financial crisis interrupted this process, but when the crisis was over convergence resumed. Relative to the Austrian level of development, our countries have closed on average about 20 percentage points of the initial gap in 1995. The most successful one, Czechia, started at about 45% of the Austrian level and reached almost 75% of Austrian GDP per capita by 2018.

The two phases of convergence – before 2008 and after 2012 – differ in one notable aspect. Capital investment was not a major driver on its own in either period, but employment growth became a strong contributor to economic growth only after 2012. This implies that in the first phase, it was mostly productivity growth – the

[11] Coupled with low fertility rates and intra-EU migration, the overall increase of life expectancy clearly indicates the challenge of ageing for the EEEs. See Chapter 9 for a detailed analysis of ageing and developments of pension systems.

residual – that drove convergence. After 2012, employment growth became a major driver of growth, and as a flip-side, productivity growth declined.[12] If we calculate labour productivity growth for the pre-2009 and post-2012 periods, we see a clear and significant decline in most countries.[13] It is premature to draw strong conclusions from a simple statistical observation, but as successful convergence ultimately depends on productivity growth, one of the challenges after the Covid crisis will be to increase its currently low level. Innovation, public and higher education should play a key role in this, and the EEE have important gaps to address in these areas (see Chapters 10 and 11).

1.2.4 External Finance and the Demand Side

While in the long run GDP and economic development are determined by the supply side, in the short run demand conditions are also important. Economic growth can also be temporarily driven by cyclical factors, such as consumption or investment booms. Such growth is unsustainable if it leads to the build-up of various imbalances, either or both external and internal. In this section we briefly look at the main trends of a few key indicators, such as budget balance, the net foreign asset position, and the main items on the expenditure side of GDP. We also briefly discuss the possible role of EU funds in the growth performance of the EEE.

An important aspect of capital accumulation concerns the extent to which it is financed from abroad. As we noted above, the EEE are highly open to international capital flows. Figure 1.5 gives a broad overview of the evolution of net foreign assets (NFA)[14]. The NFA position (relative to GDP) summarises the external position of a country, including various asset types such as foreign direct investment (FDI) stocks, debt, and central bank reserves.[15] Overall, three observations stand out. First, in each country the NFA position has worsened over time, indicating substantial capital inflows. This is in line with our conceptual framework, which predicts that in open economies foreign sources of funding (and in the case of FDI, know-how) can contribute significantly to the convergence process.

The second observation is that initial positions in the early 1990s were quite different across the eight economies. Bulgaria, Hungary and Poland were already relatively indebted, while the other five countries had hardly any net liabilities. These

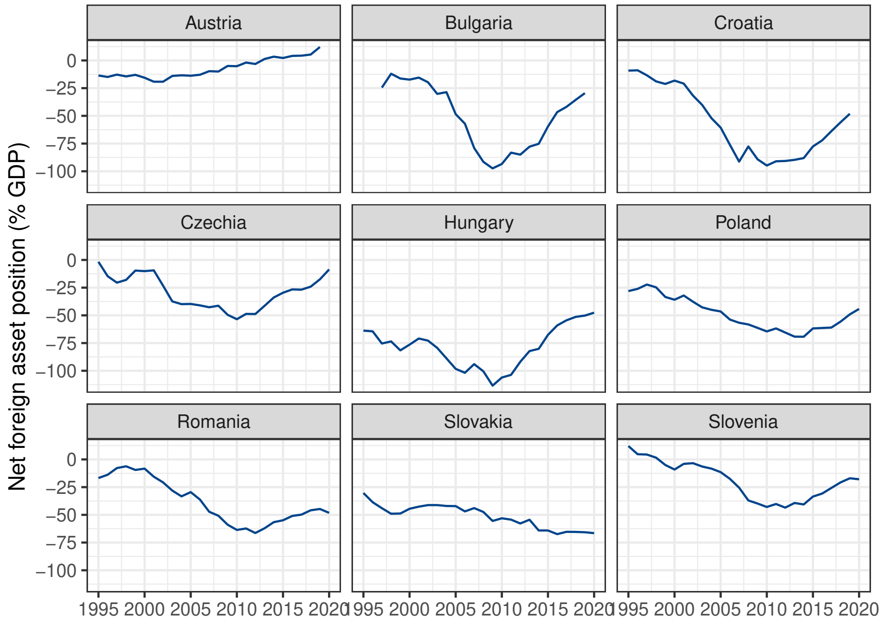
[12] Chapter 3 looks at the role of firm size distribution in shaping productivity. Though the analysis focuses only on the recent period, it uncovers a major potential drag on productivity growth in the EEE.

[13] The growth rates of labour productivity in the two sub-periods are the following. Bulgaria: 2.18 -> 2.08, Croatia: 2.94 -> -0.69, Czechia: 3.11 -> 1.36, Hungary: 2.96 -> 0.805, Poland: 3.96 -> 2.38, Romania: 5.5 -> 3.38, Slovakia: 4.55 -> 0.65, and Slovenia: 3.48 -> 0.48.

[14] We plot the NFA positions from 1997 for Bulgaria, because the numbers for 1995 and 1996 seem particularly unreliable.

[15] A negative value means that the country has a negative overall position with respect to the rest of the world. A somewhat oversimplified but broadly accurate interpretation is that the country is a net debtor to the rest of the world.

Fig. 1.5: Net foreign asset positions (%)
Data: Eurostat (2021c).



relative positions remained largely unchanged over time. The external position thus seems highly persistent and may be an important determinant of how economies respond to shocks, and what policy space is available to them during economic difficulties like the Covid crisis.

Third, these inflows did not always fund investment, but were also used for consumption purposes. This was especially true in the years preceding the global financial crisis (IMF, 2010; Coudert & Pouvelle, 2010). While investment shares were similar across the countries (see Figure 1.3), debt dynamics were quite different. The net foreign asset positions deteriorated much more in Bulgaria, Croatia, and Hungary than they did in Czechia, Poland, or Slovakia. The former three economies reached quite high debt levels by 2008, which was especially problematic in light of the subsequent crisis. Not surprisingly, these countries experienced the largest reversals in their current account positions, which then led to a significant reduction of foreign exposure by the end of the 2010s.

To shed more light on these developments, Table 1.3 presents information on private consumption, investment, and the trade balance for the three sub-periods defined earlier. The main finding is that the trade balance swung from significant deficits in the first period to surpluses or much lower deficits in the third. This is consistent with Figure 1.5, and indicates a strong balance sheet adjustment. In most

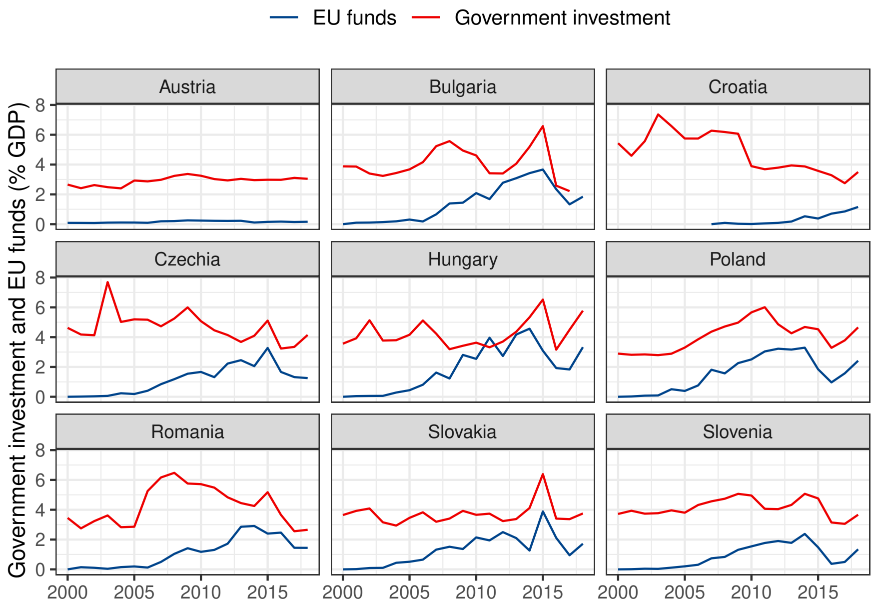
Table 1.3: Main GDP components
Data: Eurostat (2021d)
Notes:
(1) Consumption: household and non-profit institution serving households, chain-linked growth rate in %.
(2) Investment: gross fixed capital formation, chain-linked growth rate in %.
(3) Trade balance: % of GDP, based on nominal values.

	Consumption			Investment			Trade balance		
	95-08	09-12	13-19	95-08	09-12	13-19	95-08	09-12	13-19
Austria	1.84	0.95	-0.51	1.81	1.57	1.71	1.76	3.11	3.38
Bulgaria	2.74	2.04	3.37	12.42	-7.37	0.98	-5.62	-3.48	2.03
Croatia	3.85	-0.96	0.62	9.40	-7.50	3.18	-8.20	-2.66	-1.09
Czechia	3.26	0.22	2.00	3.63	-0.66	2.51	-0.61	3.87	6.50
Hungary	3.08	-0.89	3.31	5.07	-4.76	6.09	-1.45	5.54	5.77
Poland	4.49	1.95	2.81	7.59	2.19	2.22	-3.30	-1.52	3.42
Romania	6.53	-0.72	4.83	10.28	2.07	4.50	-8.37	-6.06	-2.21
Slovakia	4.72	-0.24	2.65	5.02	3.50	1.67	-4.65	1.43	2.72
Slovenia	2.94	-0.15	1.12	6.61	-9.47	2.21	-1.45	1.77	7.97

countries, this was accompanied by a slowdown in investment growth (Hungary is an exception, at least after 2015 – see also Figure 1.3). Household consumption growth also declined in most of our countries, but less than investment (again, Hungary – along with Bulgaria – are exceptions). Overall, these numbers suggest that the global financial crisis launched the EEE on a more export-oriented growth path. This is a welcome development for some of the countries whose external position had been particularly vulnerable before the global financial crisis. The slowdown of investment and low productivity growth discussed in the previous section casts some doubt on the sustainability (and return to) the high growth rates of the second half of the 2010s, once the Covid recession is over.

We now turn to EU funds, which became significant in the EEE after 2010. We collect data on EU funds from the European Commission, using the dataset "Historic EU payments – regionalised and modelled". Data are presented in annual payments in Euros for NUTS2 regions, which we aggregate up to the country level and express the resulting figure as a percentage of annual GDP. We combine this information with data on government investment (also as a percentage of GDP), downloaded from the Eurostat Annual Sector Accounts. Figure 1.6 plots the two time series for each country.

Fig. 1.6: Government investment and EU funds (%)
Data: Eurostat (2021s) and Commission (2021).



Two striking observations emerge. First, EU funds received reached 2-4% of GDP by the mid-2010s in the EEE (with the exception of Croatia, who joined the EU only in 2013). The relationship between external funds and growth is complex (Easterly, 2002; Becker, Egger & von Ehrlich, 2012), but at least in the short run, EU support must have contributed positively to GDP growth. This qualifies the earlier statement that the EEE turned towards a domestically financed, export-oriented model of economic development after the global financial crisis. The fact that growth slowed down somewhat in the 2013-2019 period also questions the efficacy of EU funds to speed up convergence.

The second striking feature of the data is the very strong co-movement of annual EU funds and government investment expenditure. There is not such relationship in Austria, mostly because it receives very little EU support as a developed economy.[16] In the seven members of the EEE that joined the EU before 2010, EU funds and government investment mirror each other very closely. This means that about 10% of annual investment expenditure is basically driven by the availability of EU support.[17] There is general agreement among economists that public investment financed by

[16] Also, it is too early to see this pattern in Croatia, where EU funds are just starting to arrive in significant numbers.

[17] A major component is transport infrastructure, which is analysed in Chapter 5.

foreign aid is less effective than investment disciplined by financial markets (Pritchett, 2000). A leading source of inefficiency is corruption and the misuse of such funds, which is one of the main topics of analysis in Chapter 3.

The extent of this inefficiency is difficult to quantify, but it is very likely that the post-2012 investment figures overstate the true increase in useful capital stock. The good news is that in a 'correct' growth accounting exercise, the measured role of capital would decline, and that of productivity would increase. The bad news is that at least some, and perhaps a large share of measured capital expenditure may fuel GDP growth in the short run, but expands the productive capacity of the economy less than the headline numbers suggest.

1.2.5 Social Convergence

Broadening the analysis from macroeconomic developments to social and distributional aspects is an important extension, as there is an increasing recognition that policies need to look beyond averages, transitioning towards an economy that is felt to be fair and works for the people.[18] Moreover, there are important differences relative to the dynamics of the usual macroeconomic aggregates. In terms of levels, while some of the EEE are already at par with EU averages, most of them still fall behind.

Table 1.4 displays a bird's-eye assessment of the social performance of the EEE in the period. The variables span important socio-economic areas: employment and activity patterns of specific subgroups (the young and the long-term unemployed), income inequality, poverty, and access to health care. Many of these areas are analysed in depth in other chapters: Chapter 4 analyses the labour market, Chapter 8 explores the causes of underperformance in the health sector, while Chapter 12 looks at patterns of income distributions. The table adopts the methodology of the Social Scoreboard, introduced in 2017 by the European Pillar of Social Rights.[19] As explained in the Annex of every year's Joint Employment Report, every country-year cell (of the Pillar's main indicators) is assigned into five categories, based on the underlying distribution of the variable at hand.[20] The table presents classifications

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[18] As indicated among the priorities of the 2019-2024 European Commission, see https://ec.europa.eu/info/strategy/priorities-2019-2024_en

[19] The Pillar sets out 20 key principles which represent the beacon guiding us towards a strong social Europe that is fair, inclusive, and full of opportunity in the 21st century. On May 7, 2021, during the Social Summit in Porto, partners signed up to the three 2030 headline targets set in the Commission's European Pillar of Social Rights Action Plan.

[20] The intervals are defined by the standardised value (distance from the EU27 average value, divided by the standard deviation of all country values). The cutoffs are -1, -0.5, 0.5, 1. The actual Joint Employment Report methodology is one step more complicated, as it takes into account the change in the latest year as well. Though the cutoffs are defined separately for every year, here we employ their latest values (2021 Joint Employment Report) for the entire period. This means that we normalise all country-year values with the latest annual distribution's mean and standard deviation. This distribution includes the last year's value of all EU countries.

for 2008, the worst crisis year, and the latest pre-Covid year, 2019. In its last three columns, it also reports the average values across the five variables.

In 2008, there were three main groups within the EEE. Czechia and Slovenia were doing much better than the EU average, exceeding even the performance of Austria. Slovakia was around the EU average with Hungary and Poland closely following. Bulgaria, Croatia, and Romania were exhibiting a much worse performance. With the exception of Bulgaria (almost all indicators in the bottom category in 2008), all members of the EEE recorded an overall deterioration in these five variables during the 2008-2012 global financial crisis. Hungary and Slovenia showed a larger worsening than Austria or the EU average, while the other four countries fared similarly to EU patterns. By 2019, all members of the EEE had returned to their pre-crisis performance, or had even improved. Bulgaria, Croatia and Poland improved the most, with the latter two reaching or even exceeding the EU27. Despite its improvement, Bulgaria still lagged behind the EU27 levels, together with Romania.

1.3 Potential Lessons from the 2008-2012 Global Financial Crisis: a Resilience Analysis

Recently, the notion of resilience has been receiving an increasing role in policy and business thinking. The narrow concept of economic resilience refers to an economy's vulnerability to shocks, its capacity to absorb them and its ability to quickly recover from them.[21] Relative to this original concept, the focus has extended to include aspects beyond recovery, in particular to 'bounce forward' and accelerate the ongoing green and digital transitions and the drive towards 'an economy that works for people'.[22] This broader notion of resilience underlies the narrative of Next Generation EU (EC, 2020a), the Recovery and Resilience Facility (EC, 2020b), and has been expressed in the 2020 Strategic Foresight Report (SFR) of the European Commission (EC, 2020c). It defines resilience as the ability not only to withstand and cope with challenges, but also to undergo transitions, in a sustainable, fair, and democratic manner. This way it establishes a clear link between the concept of resilience, ongoing societal transformations, and the notion of sustainable development.[23]

This new focus on resilience makes its measurement and monitoring a key imperative. To this end, the SFR proposes the development of resilience dashboards. These tools present a holistic collection of key vulnerabilities and resilience capacities of EU countries. Their ready-to-use indicators mostly reflect expert judgement and consensus, informed by qualitative assessments of observed behaviour during distress episodes. Instead of looking at these tools under development, we draw on

[21] See ECB (2016); IMF (2016); OECD (2016); EC (2017).

[22] Though it would be premature to assess how crisis-hit economies use this opportunity to transform and bounce forward, it is a widely-shared view that this will be a key task for policymakers and society at large. See, for example, Giovannini, Benczur, Campolongo, Cariboni and Manca (2020).

[23] This notion can be traced back to Manca, Benczur and Giovannini (2017). It is also closely related to the specific, more environment-oriented notion adopted in Chapter 7.

Table 1.4: Assessment of social performance
Data (in order of appearance): Eurostat (2021y), Eurostat (2021o), Eurostat (2021k), Eurostat (2021t), Eurostat (2021v).
Notes:
(1) NEET: young people (aged 15-24) who are neither in employment nor in education and training.
(2) Long-term unemployment: people aged 15-74 who have been unemployed for at least 12 months.
(3) Income inequality: the ratio of total income received by the top and bottom income quintiles.
(4) Poverty: share of people who are at risk of poverty (equivalised disposable income below 60% of the national median), severely materially deprived or living in households with very low work intensity.
(5) Unmet health needs: a self-assessment of health care need not received or sought, due to financial reasons, waiting lists, or distance from the service.
(6) The colours refer to social performance, ranging from the weakest (red, a score of one) to the strongest (blue, a score of five), through orange, yellow and green. The total is the average of individual scores.

	NEET			Long-term unemployment			Income inequality			Poverty			Unmet health needs			Total		
	08	Peak	19	08	Peak	19	08	Peak	19	08	Peak	19	08	Peak	19	08	Peak	19
Austria																3.8	3.4	4.0
EU27																3.0	2.0	3.0
Bulgaria																1.4	1	2.0
Croatia																2.0	1.2	3.0
Czechia																4.4	4.0	4.6
Hungary																2.6	1.8	3.0
Poland																2.4	1.8	3.4
Romania																1.8	1.2	1.6
Slovakia																3.0	2.6	3.4
Slovenia																4.2	2.8	4.2

the results of a two-step measurement strategy, propagated by Alessi et al. (2020), among others.

The objective is to understand whether differences in some pre-crisis country features can be associated with the observed differences in crisis performance. Such variables would then inform about the status of the resilience of countries: were a (similar) crisis to hit a country, should one expect it to weather the storm better or worse than previously? Naturally, these are rather weak signals, but they can nevertheless highlight important developments or vulnerabilities.

This emerging literature typically employs regression analyses of observed crisis performance (like the maximum impact of a shock, or the speed of recovery) in EU countries and candidate resilience characteristics. Due to the small number of potential observations (one per country per crisis episode), such studies have important limitations, and their results should be interpreted with caution.[24] One can nevertheless select a couple of plausible candidates for resilience characteristics from them. Table 1.5 shows the situation for ten characteristics from Jolles, Meyermans and Vasicek (2018), WB (2019) and Alessi et al. (2020), before the two crises.[25]

Given that Croatia and Romania were hit particularly hard and long during the global financial crisis, it is comforting that they have improved the most along these ten indicators (for them, out of 8 and 9, since some of the indicators are missing). Bulgaria also seems to be in a stronger position than previously. It is nevertheless alarming that three core measures of institutional quality (government effectiveness, regulatory quality, and control of corruption) have deteriorated in Hungary and Slovakia.[26]

The situation has improved substantially in terms of financial sector liabilities,[27] product market regulation, active labour market policies, and resolving insolvencies. Patterns of wage developments (in terms of changes in the Unit Labour Cost), the net international investment position, and overall institutional quality are rather mixed.

As a final element, we present some additional factors that are important determinants of how households may cope with losses of income, or other emergencies. In terms of liquid financial buffers, households in the EEE were not in a particularly strong position before the onset of the Covid-19 shock.[28] The median value of the number of monthly incomes saved was rather low (first block of Table 1.7). Not surprisingly, the share of citizens in the EEE who agree with the statement that they can return to normal quickly when things go wrong in their life is in the lower half of all

[24] One can try to look at regions instead. There is indeed a burgeoning literature on regional economic resilience, summarised, for example, by Bristow and Healy (2020). During the 2008-2012 global financial crisis, however, the dominant part of data variation was at the between-country level (Benczur, Joossens, Manca, Menyhert & Zec, 2020). This means that a regional extension has a limited potential to improve the estimates.

[25] The sources are Jolles et al. (2018) for characteristics 6-9, WB (2019) for characteristics 2, 9-10, and Alessi et al. (2020) for characteristics 1, 3-5.

[26] As argued in Chapter 3, corruption and EU funds may have important linkages in the EEEs.

[27] Chapter 2 discusses in depth how financial markets have evolved in the EEE.

[28] Unfortunately, this measure is not available for the 2005-2007 period, as the first wave of the ECB's HFCS survey was conducted in 2019 and released in 2013.

Table 1.5: Resilience characteristics
Data (in order of appearance): Eurostat (2021f), EC (2021), Eurostat (2021r), Eurostat (2021q), Eurostat (2021w), WB (2021b), WB (2021b), WB (2021b), OECD (2013), WB (2021a).
(1) Expenditures on category 2-7 LMP per person wanting to work.
(2) Improvement means a decline.
(3) A scale from -2.5 (weak) to 2.5 (strong).
(4) The corresponding sub-score of the World Bank's Doing Business index.

	BG	CZ	HR	HU	PL	RO	SK	SI
Expenditures on social protection (% of GDP)								
2005-07	10.50	11.97	14.17	17.00	16.50	10.03	13.43	17.03
2017-19	11.93	12.43	14.50	13.17	16.43	11.73	14.47	16.73
Active labour market policies (ALMP, (1))								
2005-07	340	385		548	416	138	250	483
2017-19	387	1486	998	3213	1705	514	577	675
Unit labour cost (nominal, 3-year change, (2))								
2005-07	12.37	3.53	6.77	13.33	-0.67	38.27	7.57	7.27
2017-19	17.10	11.10	0.27	10.93	6.73	23.97	11.30	5.93
Net international investment position (% of GDP)								
2005-07	-58.57	-29.03	-75.90	-94.47	-45.33	-37.47	-60.60	-17.73
2017-19	-37.40	-23.07	-57.80	-52.00	-55.50	-44.93	-68.03	-19.53
Financial sector liabilities (annual percentage growth, (2))								
2005-07	30.47	10.23	21.63	25.50	20.27	38.50	12.33	19.87
2017-19	6.60	12.10	5.07	6.70	4.07	7.30	10.50	6.43

member states in both periods, with a stable or weakly declining trend. For most of the EEE, the situation of household finances was nevertheless more favourable than before the 2008-2012 global financial crisis: except for Romania, the ratio of households who would be unable to face unexpected difficulties was significantly lower in 2017-2019 than in 2005-2007. The values, however, have remained alarmingly high in Bulgaria, Croatia (with no information available before 2010) and Romania. Arrears show a slightly different situation: their frequency has increased in Bulgaria and Romania, declined in Czechia, Hungary, and Poland, and stayed nearly flat in Slovakia and Slovenia. The levels are the highest for Bulgaria and Croatia (again, with no data before 2010).

The Covid-19 crisis has underlined the importance of local communities, trust, and social cohesion. It is interesting to see that interpersonal trust (fifth block of Table 1.7) among citizens in the EEE was below the EU median for both periods, with the exception of Czechia (both periods) and Hungary (2017-2019). Voluntary

Table 1.6: Cont: Resilience characteristics
Data (in order of appearance): Eurostat (2021f), EC (2021), Eurostat (2021r), Eurostat (2021q), Eurostat (2021w), WB (2021b), WB (2021b), WB (2021b), OECD (2013), WB (2021a).
(1) Expenditures on category 2-7 LMP per person wanting to work.
(2) Improvement means a decline.
(3) A scale from -2.5 (weak) to 2.5 (strong).
(4) The corresponding sub-score of the World Bank's Doing Business index.

	BG	CZ	HR	HU	PL	RO	SK	SI
Government effectiveness (3)								
2005-07	0.04	0.97	0.50	0.78	0.41	-0.28	0.85	0.93
2017-19	0.29	0.94	0.48	0.50	0.64	-0.24	0.73	1.13
Regulatory quality (3)								
2005-07	0.62	1.08	0.47	1.16	0.78	0.40	1.11	0.83
2017-19	0.58	1.25	0.52	0.61	0.93	0.46	0.88	0.75
Control of corruption (3)								
2005-07	-0.07	0.38	0.11	0.65	0.28	-0.20	0.42	0.98
2017-19	-0.16	0.53	0.15	0.05	0.66	-0.09	0.30	0.86
Product market regulation (2)								
2005-07		1.51		1.54	2.04		1.62	1.89
2013	1.57	1.41	2.08	1.33	1.65	1.69	1.29	1.70
Resolving insolvencies (4)								
2005-07	52.56	42.34	52.93	51.58	56.71	47.01	58.06	59.50
2017-19	56.89	79.80	55.64	54.72	76.85	59.60	67.84	83.78
Number of improvements								
	6	7	7	6	7	8	5	6

work is less frequent than in typical EU countries and tended to decline, with a few exceptions. Finally, trust in institutions is rather low, though it has increased or stayed constant since 2005-2007. The highest value is observed in Hungary in 2017-2019, well above the EU median but still below the level observed in Austria.

1.4 The Covid Shock

In this section, we shift our focus to the impact of the Covid shock on the main macroeconomic variables. Since changes during 2020 were fast and dramatic, we

Table 1.7: Household finances and social cohesion
Data (in order of appearance): Le Blanc and Thiemann (2021), using the ECB's Household Finance and Consumption Survey. European Social Survey (for 2006) and Special Eurobarometer 471 (for 2017). Eurostat (2021j). Eurostat (2021a). European Social Survey. European Quality of Life Survey. Eurobarometer, various issues.
Notes:
(1) Household savings refers to the median number of monthly incomes saved.
(2) Ability to get back to normal: those who disagree or strongly disagree with the statement "When things go wrong in my life it takes a long time to get back to normal" (European Social Survey 2006). and those who agree or strongly agree with the opposite statement.
(3) Inability to face unexpected difficulties: self-assessment.
(4) Arrears: self-reported arrears in mortgage or rent, utility bills or hire purchase.
(5) Trust in people: European Social Survey, answers 7-10 to the question "Most people can be trusted or you can't be too careful".
(6) Voluntary work: Share of the population participating in formal or informal voluntary activities.
(7) Trust in institutions: Average of the share of people who tend to trust the national legal system,the national government, and the national parliament.

	BG	CZ	HR	HU	PL	RO	SI	SK	AT	EU27
Households with little liquid savings										
2017			72.65	57.33	38.28		54.62	41.09	17.15	34.07
Ability to get back to normal										
2006	26.00			39.70	46.90		37.60	38.10	45.2	49.10*
2017	22.90	32.34	36.14	28.78	34.32	33.55	43.98	31.10	40.1	39.80*
Inability to face unexpected difficulties										
2005-07	77.60	40.57		58.90	58.00	46.20	42.63	50.57	27.27	
2017-19	40.60	24.53	53.60	32.60	31.93	47.57	34.40	32.03	19.73	32.37

switch to a quarterly frequency. It is important to stress that the shock may still not be completely over, and every quarter brings new developments or important turns. Still, a preliminary analysis and stock-taking of the impact is already possible. We also try to see whether the lessons from the global financial crisis on the resilience of the EEE are informative about the current experience.

Table 1.8: Cont: Household finances and social cohesion
Data (in order of appearance): Le Blanc and Thiemann (2021), using the ECB's Household Finance and Consumption Survey. European Social Survey (for 2006) and Special Eurobarometer 471 (for 2017). Eurostat (2021j). Eurostat (2021a). European Social Survey. European Quality of Life Survey. Eurobarometer, various issues.
Notes:
(1) Household savings refers to the median number of monthly incomes saved.
(2) Ability to get back to normal: those who disagree or strongly disagree with the statement "When things go wrong in my life it takes a long time to get back to normal" (European Social Survey 2006). and those who agree or strongly agree with the opposite statement.
(3) Inability to face unexpected difficulties: self-assessment.
(4) Arrears: self-reported arrears in mortgage or rent, utility bills or hire purchase.
(5) Trust in people: European Social Survey, answers 7-10 to the question "Most people can be trusted or you can't be too careful".
(6) Voluntary work: Share of the population participating in formal or informal voluntary activities.
(7) Trust in institutions: Average of the share of people who tend to trust the national legal system,the national government, and the national parliament.

	BG	CZ	HR	HU	PL	RO	SI	SK	AT	EU27
					Arrears					
2005-07	25.07	8.33		17.77	22.43	10.70	14.47	9.70	3.60	
2017-19	31.50	3.00	18.73	13.23	8.47	16.40	13.67	9.17	5.03	8.80
					Trust in people					
2005-07	13.71	30.25	19.34	17.76	17.01		20.95	19.49	31.48	25.31*
2018	12.05	30.74	19.01	27.67	18.48		24.11	19.43	38.68	27.99*
					Voluntary work					
2007	10.73	21.52	6.98	20.22	9.33	13.48	30.12	26.34	42.08	21.52*
2019	10.46	21.30	23.47	12.02	14.08	14.87	24.63	16.25	35.30	23.47*
					Trust in institutions					
2005-07	17.72	25.94	20.50	35.94	19.22	27.22	35.17	29.89	29.28	41.50*
2017-19	21.06	31.06	17.72	46.94	31.78	27.94	23.94	27.83	58.72	36.56*
					Number of improvements					
	2	3	1 (of 3)	4	5	2 (of 4)	4	2	3	2 (of 4)

1.4.1 Cyclical Positions

Before we turn to the shock, we present a quick overview of a few key indicators that describe the starting positions the countries were in when the crisis hit. This is important because the cyclical positions in 2019 influenced how much (real or perceived) fiscal and monetary space each country had to fight the recession. This complements the lessons learned from the global financial crisis about the possible resilience (ability to resist, cope with and recover from crises) status of our eight economies (see Section 1.3). These latter factors can be viewed as more deep-seated features of these countries, capturing their ability to act and cope, at the level of governments, households, and society at large.

Table 1.9: Cyclical indicators in 2019 (in %)
Data: Eurostat (2021d), Eurostat (2021i), Eurostat (2021x), Eurostat (2021m), Eurostat (2021p).
Notes:
(1) GDP growth: chain-linked measure. Unemployment rate: 15-64. Trade balance: % nominal GDP.
(2) Inflation: HICP. Wage growth: labour cost index, % change. Interest rate: day-to-day money market rate, annual averages of monthly data.
(3) Budget balance: % nominal GDP. Public debt: gross debt, general government, % GDP.

	AT	BG	CZ	HR	HU	PL	RO	SI	SK
Real									
GDP growth	1.40	3.70	2.30	2.90	4.60	4.70	4.10	3.20	2.50
Unemp. rate	4.60	4.30	2.10	6.70	3.50	3.30	4.00	4.50	5.80
Trade balance	3.37	3.21	6.02	-0.25	2.81	4.76	-4.14	8.46	0.40
Monetary									
Inflation	1.50	2.50	2.60	0.80	3.40	2.10	3.90	1.70	2.80
Wage growth	2.30	10.80	6.60	3.20	10.10	6.10	12.30	4.80	7.30
Interest rate	-0.39	-0.49	1.92	0.29	0.06	1.56	2.52	-0.39	-0.39
Fiscal									
Budget bal.	0.60	2.10	0.30	0.30	-2.10	-0.70	-4.40	0.40	-1.30
Public debt	70.50	20.20	30.30	72.80	65.50	45.60	35.30	65.60	48.20

Table 1.9 contains indicators of the real economy, the nominal stance, and the fiscal stance for 2019 for the EEE and for Austria (as a comparison). The first block shows that the region entered the Covid recession with moderate to strong

growth, and generally low unemployment. The external position – as measured by the trade balance – does not indicate significant external imbalances, with the possible exception of Romania.

The picture is more heterogeneous if we look at monetary indicators. After years of very low inflation, price pressures were increasing in most countries. The inflation rate was above 2% in six economies, and exceeded 3% in two. Wage growth (measured by the labour cost index of Eurostat based on the compensation of employees plus taxes minus subsidies) indicates signs of overheating in at least Bulgaria, Hungary, and Romania. The latter two are also the ones with the highest inflation figures. Short-term interest rates remained very low in most cases, with Czechia, Poland, and Romania being the exceptions.

The budget balance was above the Maastricht limit of -3% (with the exception again being Romania), but coupled with strong growth the deficit in Hungary indicates a loose fiscal stance. Public debt was not particularly worrying in the EEE, but Croatia, Hungary, and Slovenia showed relatively high figures. These are still lower than Austria, but sustainable levels of public debt seem to increase with the level of development (Konya & Maduko, 2020). This means that financial markets may be less tolerant with similar levels of indebtedness for the EEE than for the older, richer EU member states.

To sum up, there seems to be a clear case that by 2019 Romania was overheating with significant external and fiscal imbalances (and under an Excessive Deficit Procedure, which was lifted temporarily during the pandemic). The country, with its relatively low public debt and high interest rate, however, entered 2020 with some fiscal and monetary space to fight the recession. The other country with signs of overheating, i.e. Hungary, had less favourable options. With an interest rate still close to zero and with relatively high public debt, its policy options appeared more limited. That said, the external and internal balance in Hungary is better, so some fiscal policy measures were likely to be affordable.

Croatia and Slovenia entered 2020 with low growth, relatively high public debt, and low interest rates. These economies are in a less favourable cyclical position, and have relatively little policy room available. Again, there are more options on the fiscal side, since their budgets were balanced in 2019. The same is true for Bulgaria, where the currency board arrangement means no monetary independence, but there is ample room for fiscal measures. Czechia, Poland, and Slovakia all had fiscal options, and for the latter two economies – who are not in the Euro Area – there is also some scope for monetary loosening.

It is important to make a few additional observations. First, in hindsight we know that what seemed to be tight fiscal constraints at the beginning of 2020 turned out not to constrain fiscal policy so much, at least at the time of writing.[29] If and when interest rates return to higher levels, fiscal considerations again become more pressing. Second, we restricted attention to a few headline indicators, which may paint a partial or possibly misleading picture of the true cyclical positions of our countries. This was intentional, since Chapter 6 of this volume provides a

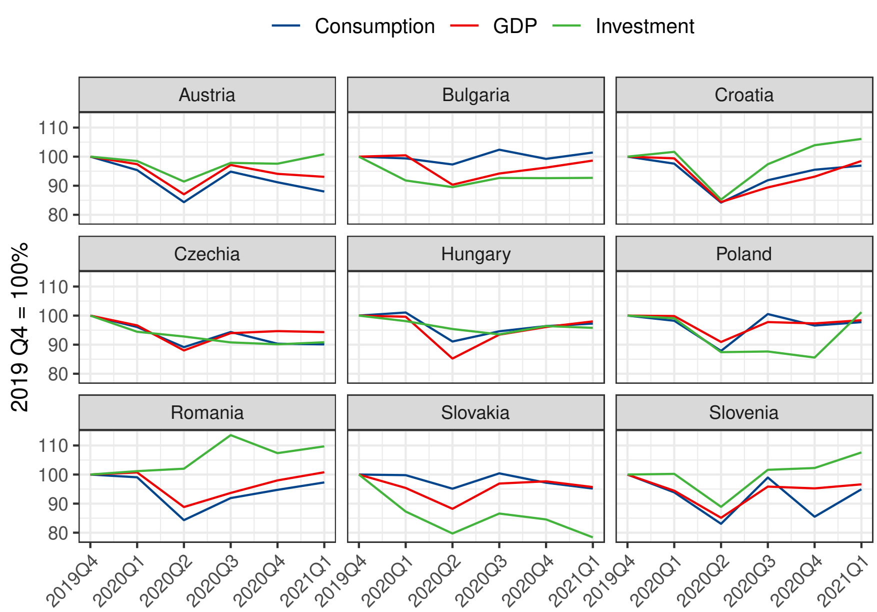
[29] This was certainly facilitated by the March 2020 suspension of the Stability and Growth Pact, as discussed in Chapter 6.

detailed description and analysis of monetary and fiscal policy before and during the pandemic. For more details and nuances, we refer the reader to the discussion in Chapter 6.

1.4.2 Macroeconomic Developments

We now turn to several macroeconomic indicators to highlight the main developments in the EEE during the pandemic. As already indicated, we use quarterly data wherever possible to zoom in onto the key developments. The first set of variables includes GDP and its two domestic components: household consumption and gross fixed capital formation (investment). Figure 1.7 presents the details.

Fig. 1.7: GDP and its components
Data: Eurostat, Quarterly National Accounts (Eurostat, 2021e).
Note: Chain-linked volumes.



GDP fell significantly in all eight economies (and in Austria). The magnitudes are quite similar: GDP was 10-15 percent lower in the second quarter of 2020 than in the last quarter of 2019. The largest declines were seen in Croatia and Hungary. The Covid epidemic, therefore, led to a major fallback in economic activity.

The bottom of the recession was the second quarter of 2020, where major restrictions were imposed on households and many sectors of the economy simply seized up. The recovery so far has been relatively quick but uneven. There was a sharp rebound in most countries in the third quarter, but with the second wave of infection in the Fall, output growth again slowed down or even turned negative (Czechia and Slovakia). Overall, GDP growth was negative for 2020, but the first quarter of 2021 brought major improvements. With no data yet available beyond the first quarter of 2021, it is unclear how the recovery will continue. The third wave of the pandemic has been just giving way to the fourth at the time of writing. Though vaccinations are progressing steadily, their uptake is less than complete. Normal GDP growth is unlikely to restart before 2021Q3 or possibly 2021Q4.

The main GDP components mostly fell along with total GDP. Consumption held up better in Bulgaria, Hungary, and Slovakia; Romania is the only country where it fell significantly more than GDP. In Croatia, investment fell along with GDP and consumption, but rebounded much more quickly. This is also true for Slovenia, especially from the fourth quarter of 2020. Interestingly, investment growth in Romania remained strong throughout the year, a major exception to the general picture.

Fig. 1.8: Employment and hours worked
Data: Eurostat (2021b, 2021l).
Note: ages 15-74 (hours worked are not available for 15-64).

The next step is to look at what happened on the labour market. Figure 1.8 plots two measures of labour input to highlight some interesting issues. First, the blue line shows total employment relative to the level of employment in 2019Q4. Second, we also plot the change in average actual weekly hours worked. The motivation is to see the extent to which employers have responded to the crisis by cutting hours instead of firing workers (Gaudecker, Holler, Janys, Siflinger & Zimpelmann, 2020; Gros & Ounnas, 2021). We expect the adjustment of hours to be particularly important in this recession, since in many sectors the decline was expected (and proved) to be temporary.

As expected, in the majority of our countries hours fell much more strongly than employment. There is a clear 'seesaw' pattern in hours: a sharp fall in 2020 Q2, a strong rebound in the third quarter, a pause or a second decline in Q4, and varying degrees of slow improvements afterwards. With the exception of Poland, by 2021 Q1, hours worked were still about 5-10 percentage points below their pre-Covid levels.

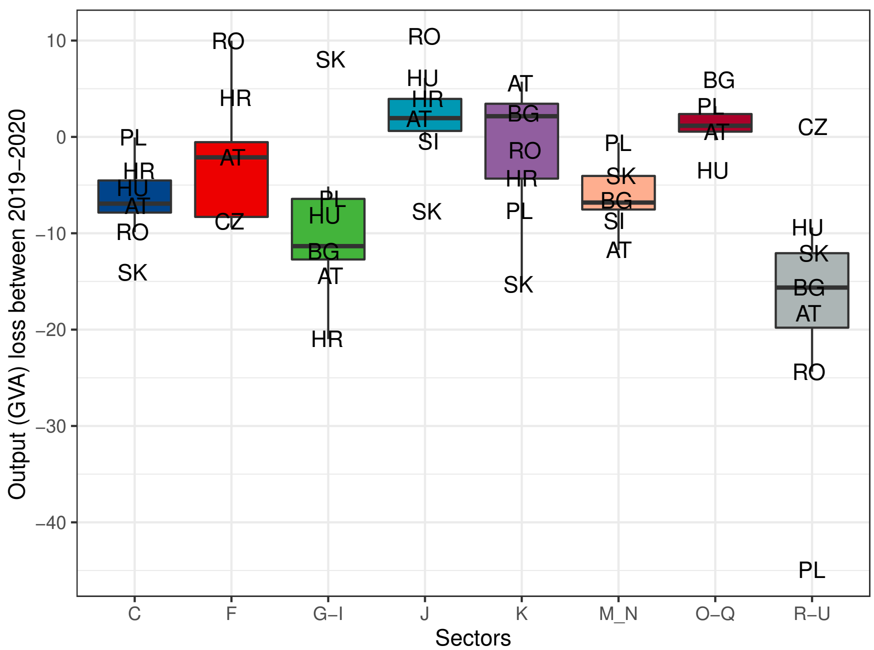
While hours responded more strongly, employment also fell significantly, but less dramatically. There is significant heterogeneity across countries in both the decline on impact and the overall fall. In Hungary, Poland and Slovenia, employment almost recovered by the beginning of 2021. In Bulgaria, Croatia, Romania, and Slovakia it was still well below the pre-Covid level. Overall, the labour market adjustment appears to have been dramatic, with a still tentative but promising recovery in most countries.

The recession was also strongly imbalanced across different sectors of the economy (Papanikolaou & Schmidt, 2020). The first wave in the Spring hit both manufacturing and personal services (hospitality, travel, and entertainment) hard. The Summer brought general improvements, but the second and third waves again led to a selective decline in many service industries. This was due to recurring and continued lockdowns, to which manufacturing was able to adjust much more, so the sectoral gap widened significantly.

Figure 1.9 provides an overview of sectoral developments by presenting the distribution of gross value added (GVA) changes between 2019 and 2020. Data for 2020 are available for the basic disaggregation seen on the figure, so we cannot distinguish some service industries within the category G-I. The chart shows boxplots by industries, which summarise the distribution of output (measured by GVA) loss across countries for each industry. The coloured boxes represent the middle 50% of countries. We also show some individual countries, mostly those that are considered outliers in either direction.

As expected, there is strong heterogeneity across sectors. The worst affected sectors are R-U, dominated by arts, entertainment and recreation. These activities – with a brief summer break – were essentially closed throughout 2020. Sector G-I also declined significantly, driven mostly by transport, accommodation and food services. Manufacturing declined as well, but overall much less than these two broad service activities (R-U and G-I). Sectors J and O-Q, on the other hand, even grew on average (the median is slightly positive). This is not surprising, since info-communication

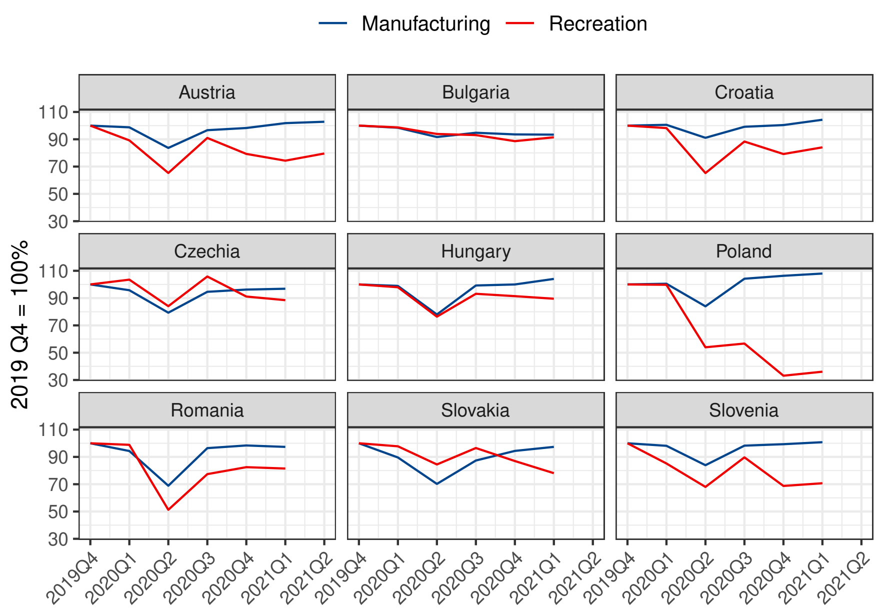
Fig. 1.9: Changes in sectoral value added between 2019-2020 (%)
Data: Eurostat (2021h).
Note: (1) Chain-linked volumes.
(2) The available industries are as follows. A: Agriculture, forestry and fishing; B-E: Industry (except construction); C: Manufacturing; F: Construction; G-I: Wholesale and retail trade, transport, accommodation and food service activities; J: Information and communication; K: Financial and insurance activities; L: Real estate activities; M_N: Professional, scientific and technical activities; administrative and support service activities; O-Q: Public administration, defence, education, human health and social work activities; R-U: Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organisations and bodies.
(3) We omit sectors A, B-E and L from the figure: manufacturing is mostly representative of sectors B-E, while agriculture and real estate were relatively unaffected by the crisis.
(4) For each industry, the boxplot shows the middle two quartiles (the coloured boxes), and 1.5 times above and 1.5 times below the interquartile range (the 'whiskers'). Countries outside this overall range are considered outliers and are labelled individually (along with some, but not all the other countries).



powered home office work for many other activities, and the public sector acted as an automatic stabiliser in most economies.

Given these average developments, however, we also see significant heterogeneity across countries. Manufacturing did not decline in Poland, but in Slovakia it fell by 14%. The likely explanation is the car industry. Unfortunately we do not yet have detailed data for 2020 to see what happened inside manufacturing. Construction fell in Hungary, but grew in Romania. Even within the public sector, where dispersion is relatively low, there was a decline in Hungary, as opposed to the other countries. Arts and entertainment declined dramatically in Poland, which held up better in many other industries.

Fig. 1.10: Value added in two sectors: manufacturing (C) and recreation (R-S)
Data: Eurostat (2021g).
Note: Chain-linked volumes.



To shed more light on the divergent sectoral patterns, we plot the quarterly evolution of GVA in two sectors, i.e., manufacturing (C) and recreation (R-U). Figure 1.10 visually confirms the patterns discussed above. In 2020 Q2, manufacturing fell significantly, but rebounded over the Summer, and continued – albeit more slowly – its recovery over the Fall and Winter. However, while also rebounding in 2020 Q3, recreation experienced a 'double-dip' in 2020 Q4 and 2021 Q1. At the time of writing, while the sector is again expected to recover over the Summer of 2021, there are still many question marks considering a possible fourth wave in 2021 Q4 and beyond. We therefore expect the service sectors, where personal contact is important, to recover only slowly, with a very uncertain speed and timing.

1.4.3 Social Developments: a First View

Drawing also on Chapter 12, we try to make a preliminary assessment of the social impact of the Covid crisis. Unfortunately, information on social and distributional aspects usually requires detailed micro-level data, the collection of which tends to be slower than that of macroeconomic statistics. This is particularly true about aspects of the distribution of income, like inequality or poverty indicators: those are based on EU-SILC,[30] and the data from the 2020 fieldwork are only released in the Fall of 2021. Moreover, its income variables refer to the previous full year (i.e., 2019).[31] There are nevertheless many preliminary results using simulations or innovative data to nowcast social developments (see e.g. Caperna, Colagrossi, Geraci and Mazzarella (2020), using Google search data). Inequality and poverty are expected to rise (Furceri, Loungani, Ostry & Pizzuto, 2020; Palomino, Rodríguez & Sebastian, 2020), much more than in the 2008-2012 global financial crisis. The simulations often show that extraordinary transfer steps might have substantially cushioned the income loss of households (Almeida et al., 2020).

Employment-related indicators come from the quarterly LFS data collection, which is more frequent and hence its lags are shorter. It is thus already possible to look at the 2020 behaviour of three indicators from Section 1.2.5: youth unemployment, long-term unemployment and young people who are neither in employment nor in education and training (NEET, Figure 1.11). Not surprisingly, long-term unemployment did not show a clear pattern on such a short horizon; therefore, in order to save space, we do not report its behaviour. The NEET indicator increased at least slightly in most countries, except for Croatia, and to a smaller degree, Romania (two countries with particularly high starting values). The initial increase was quickly reversed in Bulgaria, Slovakia and Slovenia, while it has stayed high in Czechia, Hungary and Poland. Youth unemployment exhibited an even more marked pattern: except for Romania (who had the second highest starting value among the EEE), it has increased substantially in all the EEE; and except for Hungary, it has not yet reversed.

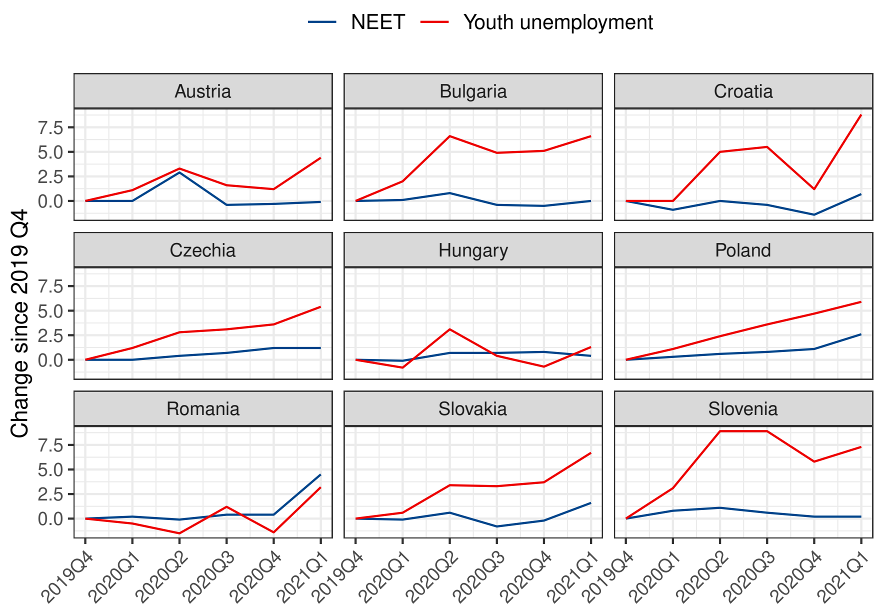
1.4.4 Comparing the 2008-2012 and the Covid-19 Shocks

In this section we compare the trajectories of a few key indicators during the Covid crisis and the global financial crisis. While the causes of the two events are very

[30] European Union Statistics on Income and Living Conditions.

[31] Except for Ireland, see https://ec.europa.eu/eurostat/cache/metadata/en/ilc_esms.htm

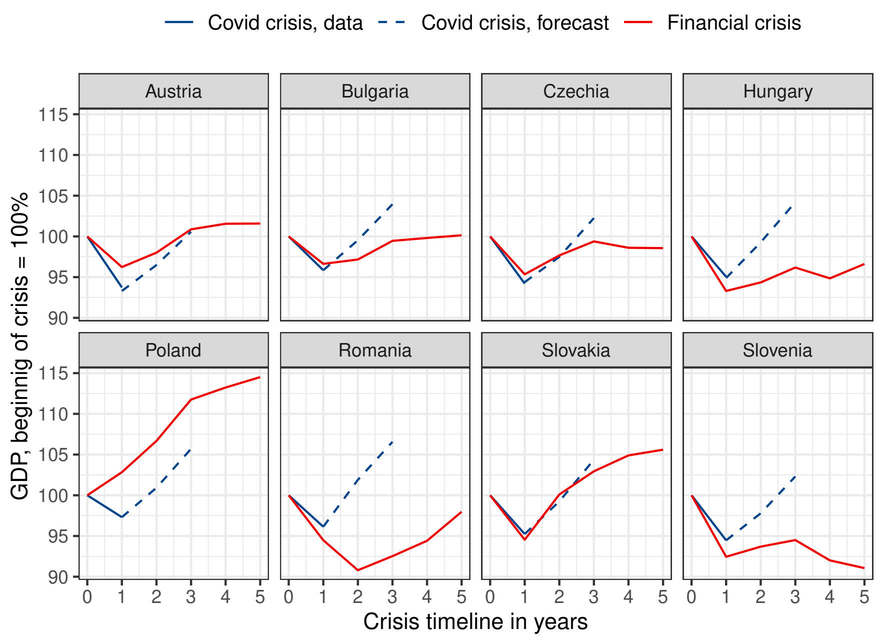
Fig. 1.11: NEET and youth unemployment (%)
Data: Eurostat (2021y) and Eurostat (2021z).
Notes:
(1) NEET: young people (aged 15-24) not in education, employment, or training.
(2) Youth unemployment: ages 15-24.



different, it is still illuminating to contrast the two recessions. The global financial crisis originated in the United States, and was caused by an overextended financial market and housing sector. Its main propagation channels were global banks and other financial institutions. In Europe, a second wave of sovereign crises started in 2011. Empirically, financial crises tend to lead to deeper recessions and slower and more protracted recoveries than other economic disturbances (Schularick & Taylor, 2012). The Covid crisis, in contrast, can be viewed as an exogenous event, with a strong but indirect effect on economic conditions.

We present the evolution of GDP and employment as outcome variables, and the evolution of government expenditure and the short-term interest rate as policy variables. For the latter two, Chapter 6 provides many more details. Since data for the current crisis are still lagging behind events, we include forecasts from the OECD 2021 June Economic Outlook (OECD, 2021) to complement the short time series. There are two reasons why we think this is useful. First, we can compare the expected trajectory to the actual one during the global financial crisis. Second, since the OECD forecast is also behind current data (it was prepared during the second quarter of 2021), we can see how actual events evolved relative to expectations based on mid-2020 data.

Fig. 1.12: The evolution of GDP in the global financial crisis and the Covid crisis
Data: Eurostat (2021d) and OECD (2021).
Note: Chain-linked volumes.

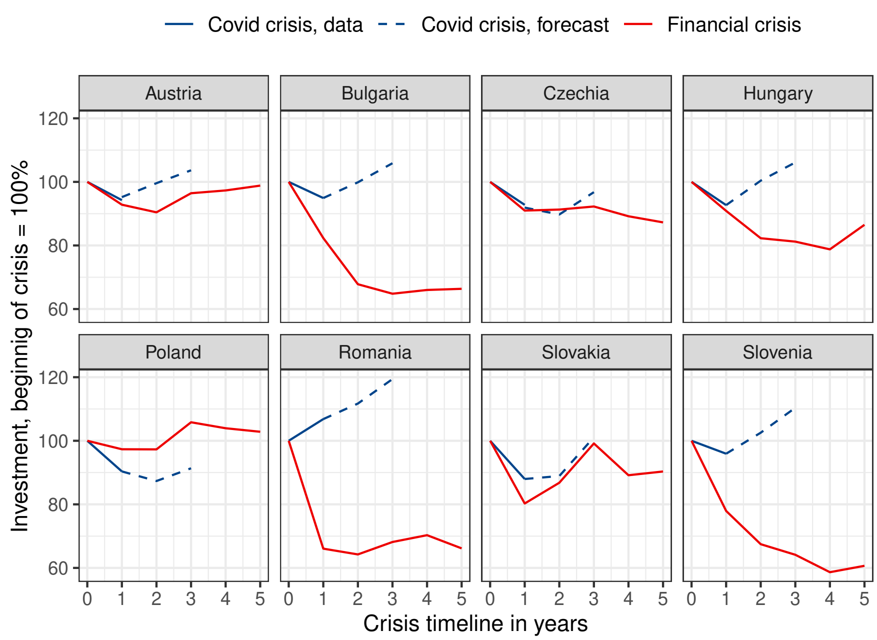


It is not clear when the two recessions began. We experimented with various starting points, and settled on 2008 Q3 for the global financial crisis, and 2020 Q1 for the Covid crisis. The reference points, where applicable, will be therefore 2008 Q2 and 2019 Q4 as the last 'peaceful' periods. For GDP, employment, and government expenditure we normalise values such that they equal 100 in these pre-crisis quarters ($t = 0$). We leave the short-run interest rate as it is, since there we are also interested in the levels. Since there is no OECD forecast for Croatia, we omit it from this analysis. We use annual data because they are available for all other countries. Quarterly forecasts are only available for some countries and some variables. Another option would be to interpolate the annual data to fill in for the missing observations. Eventually, we opted for the simpler option, since we had already presented quarterly facts for the current recession.

Figure 1.12 presents the paths of GDP for the EEE and Austria. For most countries, the impact of the recession was similar in the current crisis to that of the previous one. There are differences in the quarterly paths (not shown), but these seem to have smoothed out at the annual frequency. The main exception is Poland, where GDP performance is significantly worse in the current crisis than in the previous one. Note, however, that Poland did exceptionally well in 2008-2009, and its output drop in 2020 is still lower than for most other countries.

The OECD expects recovery to be quick in most countries. In Bulgaria, Hungary, Romania and Slovenia GDP performance is forecasted to be significantly better, than after the global financial crisis. In Czechia and Slovakia, the GDP path is projected to be roughly similar to the earlier episode. For Poland, the pace of recovery is expected to be similar to the pace starting in 2009.

Fig. 1.13: The evolution of investment in the global financial crisis and the Covid crisis
Data: Eurostat (2021d) and OECD (2021).
Note: Chain-linked volumes.



Note that the countries doing relatively better this time mostly had deeper recessions in 2009 and afterwards. These economies were particularly vulnerable to the shock of the global financial crisis. This time is different both because of substantial balance sheet adjustments in the 2010s, and also because the Covid recession is of a different nature. Financial factors are less important, and the short-run disruptions to supply chains and international trade proved to be highly temporary. Their overall resilience characteristics have also improved, including active labour market policies, financial sector liability growth, and to a smaller degree, net international investment positions.

To further highlight these differences, we present additional comparisons. Figure 1.13 looks at the trajectory of investment in the two crises. The differences are dramatic for Bulgaria, Hungary, Romania, and Slovenia. After 2008, these countries experienced massive drops in investment activity, due to the balance sheet adjustment required by financial markets. This time no such adjustment is necessary, and investment is expected to recover much faster. With the exception of Hungary, data for 2020 already show a much smaller drop, or even an increase (Romania).

Fig. 1.14: The evolution of exports in the global financial crisis and the Covid crisis
Data: Eurostat (2021d) and OECD (2021). Note: Chain-linked volumes.

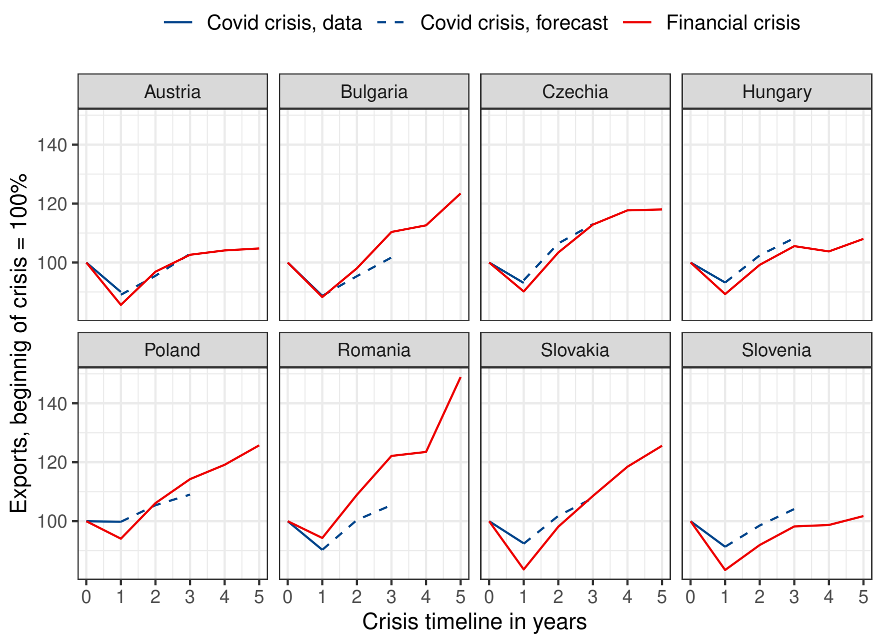


Figure 1.14 shows that over the two crises exports behaved – and are expected to evolve – in a remarkably similar manner. After a significant drop in the first year, they rebounded quickly in the global financial crisis, and are projected to follow the same pattern in the current Covid recession. While the causes of the two crises are different, both led to short-run disruptions in international trade. During the global financial crisis, the channel through which this happened was trade credit. In the current crisis, it is through supply chain disruptions due to the restrictions in the movement of goods and people. Once these short-run disruptions are dealt with, export activity in the EEE region is expected to recover.

Fig. 1.15: The evolution of imports in the global financial crisis and the Covid crisis
Data: Eurostat (2021d) and OECD (2021).
Note: Chain-linked volumes.

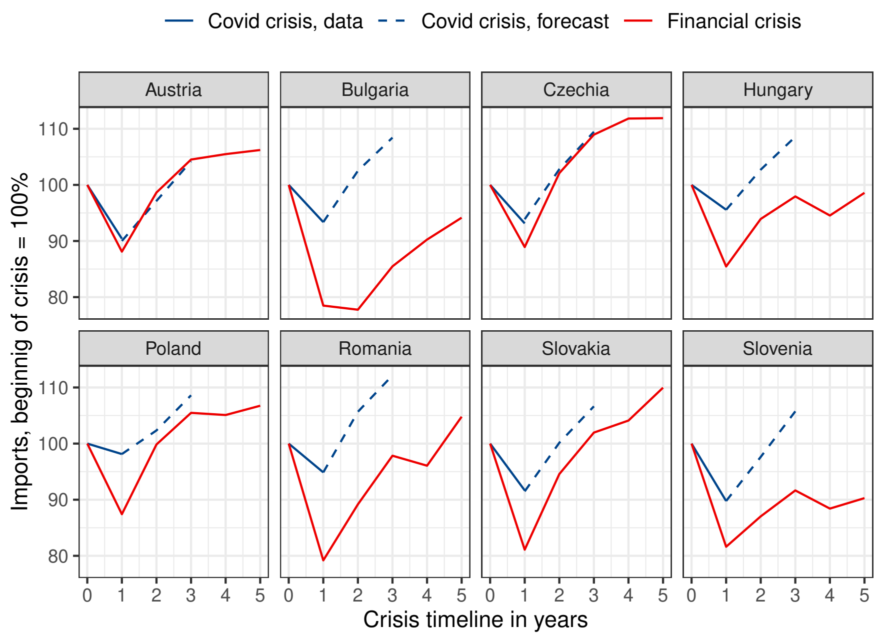


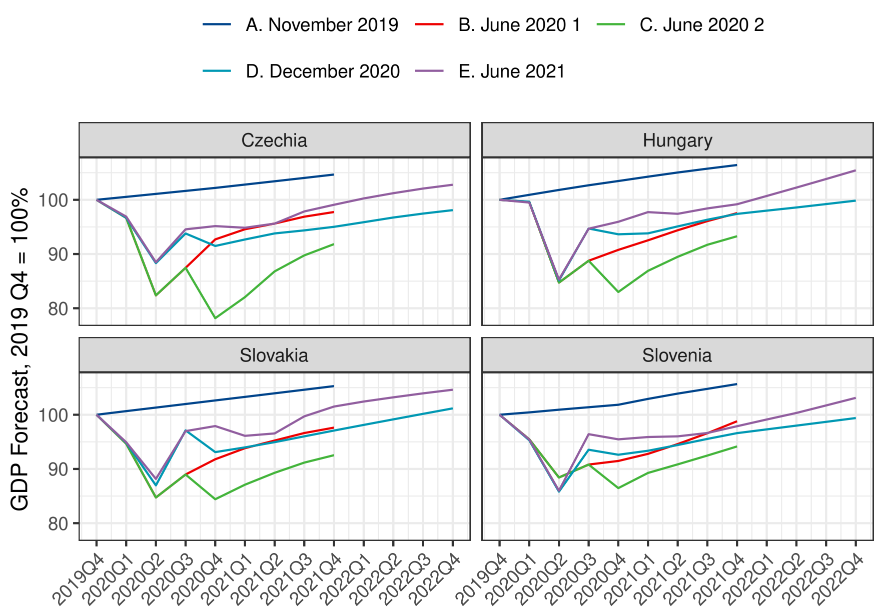
Figure 1.15 plots the evolution of imports, painting a very different picture, especially over the global financial crisis. Imports dropped in all countries on impact but the decline was particularly persistent in the previously identified four economies. Besides investment, imports were the main channel of balance sheet adjustment in Bulgaria, Hungary, Romania, and Slovenia. The situation is very different in the current crisis for these countries compared to 2008-2012: during the Covid recession, heterogeneity across economies is low. In fact, import growth is projected to be very strong, and compared to exports on the previous figure, indicates a potentially significant worsening of the trade balance.

1.5 Looking Beyond: Expected Recovery

1.5.1 Forecasting Uncertainty

At this stage, it is premature to assess the eventual speed and degree of recovery. New infection waves in the EEE or in their trade partners may lead to new setbacks for certain sectors and activities. There are nevertheless many forecasts at a national or global scale. These are informative about likely outcomes, conditional on the information set at the time of their creation, and of course the adopted assumptions and methodologies.

Fig. 1.16: The evolution of the OECD forecasts
Data: OECD (2021).
Note: Chain-linked volumes.



Not surprisingly, these forecasts have been continuously revised as the crisis has enfolded and new waves and lockdowns emerged. Figure 1.16 shows the last four editions of the OECD Economic Outlook. To highlight the changes, we now switch to a quarterly frequency, which restricts the analysis to four countries: Czechia, Hungary, Slovakia and Slovenia. We only show GDP, as our goal here is to illustrate the forecasting process and not to draw conclusions on the forecasts themselves.

Relative to the November 2019, pre-shock forecast, the first two quarters of 2020 brought a decline in GDP. The two scenarios from the June 2020 projections showed a reasonably quick recovery (single hit scenario), or a second hit and then a parallel recovery path. Recovery has proved to be even faster than expected. Still the December 2020 forecasts expected a slight reversal and then relatively slow progress. This has materialised for some but not all members of the EEE. By May 2021, the situation and the outlook seemed brighter. The forecasts were even heading back towards the original, pre-shock path. As of July 2021, it seems that the aggregate impact of the Covid recession will be temporary, and recovery much faster than in the global financial crisis. That said, these conclusions are still fragile. Additionally, there are many changes at the more disaggregated level that are likely to prove more persistent. In the next section we finish the chapter by commenting on some of these changes, and their likely impact on the EEE.

1.5.2 Persistent Changes

As the previous section highlighted, it is difficult to forecast with any precision during an economic crisis, when external circumstances change constantly. Nevertheless, broad outlines of the post-Covid economic world are already visible, both globally and in the EEE. In addition, history teaches important lessons that are worth briefly discussing. We start with what we can learn from the past, and then move on to what we can expect for the future.

1.5.2.1 Past pandemics

In an interesting study, Jordà, Singh and Taylor (2020) collected the key lessons from past pandemic induced recessions, starting from the 14^{th} century. What is particularly useful is that the authors use long time series to focus on the subsequent decades after a large disease outbreak. They study 19 pandemics, which include their so-called ‘super pandemics’, the Black Death in medieval Europe and the Spanish Flu that followed World War I.

Jordà et al. (2020) evaluate the impact of past pandemics by looking at two price variables. First and foremost, they use real interest rates for a selection of European countries. Real interest rates are useful guides because they signal persistent, but not necessarily permanent changes that result from significant health crises. These are most likely to come from changes in labour supply, and the desire to save and invest. Neoclassical growth theory, discussed at the beginning of the chapter, has strong implications on how the real interest rate responds to such shocks. It is important to look at medium-run behaviour, since short-term interest rate movements are contaminated by high frequency events. As an additional, but more limited source of data, the authors also use real wages for the United Kingdom. The economic mechanisms linking real wages to pandemics are analogous to those influencing the real interest rate.

Using local projection methods (Jorda, 2005) to identify the natural real interest rate (which can be thought of as a medium-term average of short-run rates), Jordà et al. (2020) find that pandemics lead to a large and persistent decline in this indicator. The average estimate is a decline of 1.5 percentage points, which lasts for up to four decades. Real wages in the United Kingdom are estimated to have risen by a cumulative 15% over 40 years. Moreover, economic growth (as measured by GDP per capita) is estimated to be higher in the medium run after pandemics, in contrast to wars that destroy physical capital.

How can these results be interpreted, and what can we learn from them during the current crisis? Taking neoclassical growth theory as a guide, Jordà et al. (2020) argue that the observed effects come from (i) the large-scale decline in labour supply due to high death rates, and (ii) depressed demand for investment, and (ii) an increased desire to save due to precautionary motives. Fortunately, while the Covid epidemic has led to many unnecessary deaths, the overall toll is much lower than in previous pandemics. Labour supply is unlikely to decline significantly, which attenuates the large historical decline in the real interest rate. Precautionary motives, however, may well operate and prove to be significant. It is therefore likely that the natural rate of interest remains low for the foreseeable future. A key indicator of debt sustainability, the difference between the natural interest rate and the growth rate of real GDP per capita, is expected to remain low (and possibly negative) for many years to come. Overall, this indicates that fiscal sustainability will not be a strong constraint on governments, and timely and sustained fiscal action to restart economies will be financially feasible.

1.5.2.2 Global value chains

One of the initial impacts of the Covid crisis was a severe disruption of global supply chains (Meier & Pinto, 2020). This raised the possibility that at least some manufacturing activity that European multinationals have outsourced to Asian countries (typically China) might be brought back to Europe ('reshoring'). The majority of the EEE are already major suppliers of Western European firms (Pellényi, 2020), so they seem likely targets for such reshoring activities.

That said, there are some reasons to be sceptical about the large-scale relocation of industrial jobs to the region. Pellényi (2020) discusses the advantages and disadvantages of the main members of the EEE as participants in global supply chains (Czechia, Hungary, Poland, Romania, Slovakia and Slovenia). Their membership of the European Union, geographical closeness to the main European markets and producers, relatively skilled workforce and light regulation makes them attractive as assembly locations. Low innovation activity and the relative lack of high-skilled workers,[32] however, prevent the region from upgrading into higher value-added activities (see Chapter 11 for in-depth analyses and discussions).

Darvas (2020) also casts doubt on the extent to which the EEE can benefit from reshoring. Using international trade data during the first wave of the pandemic, Darvas (2020) finds that trade volumes declined more between members of the EEE and Western Europe than they did between Western Europe and China. He also raises the issue of quality upgrading and the lack of necessary innovation activities and higher education spending that would facilitate this in the EEE.

[32] Recall Table 1.1 which noted that while average education levels in the EEE are relatively high, the picture is less favourable when we focus on tertiary education.

Finally, in a survey of leading companies, Maqui and Morris (2021) report that those firms for whom supply chains are important do not foresee major changes in their current arrangements. In particular, the majority of the survey companies did not plan on making their supply chains more diverse or more localised. All these indicate that major reshoring is unlikely to benefit the EEE, at least in the short run.

1.5.2.3 Scarring

There are many reasons why deep recessions may have a persistent impact on economies. Perhaps the most important is what the literature calls ‘scarring’: those who experience protracted unemployment see their job prospects and wages persistently deteriorating (Arulampalam, Booth & Taylor, 2000). Long-term unemployment spells lead to a loss of human capital, either general or specialised, which lead to lower employability for the affected (Ljungqvist & Sargent, 1998). As we saw earlier (see Figure 1.8), employment has rebounded in some of the EEE, but it is still – in some cases, significantly – below pre-pandemic levels. The upcoming quarters will be crucial to see whether long-term unemployment remains a threat for a sizeable proportion of the labour force. The observed increase in the use of labour market policies relative to the global financial crisis (see Table 1.5) may warrant some optimism, though the overall low level of social performance (see Table 1.4), household financial buffers and social cohesion (see Table 1.7) may indicate severe social consequences.

Another reason why loss of human capital may be expected is that some of the new jobs may be in different sectors (Hensvik, Le Barbanchon & Rathelot, 2021). This means that specialised human capital may be lost due to job switches. A waiter who turns to food delivery is likely to experience lower pay and worse job conditions. Again, the coming months will reveal how persistent the observed sectoral reallocation will be. Tourism was a major source of income for Bulgaria and Croatia before the Covid crisis, and it was also significant for other economies (Czechia, Hungary, and Slovenia). The summer of 2020 saw a quick rebound, but after two additional waves of infections, and a possible fourth one due to new mutations, foreign travel may remain persistently depressed for a while.

A third reason why we may expect a lasting impact on labour markets and human capital is through education and training (Agostinelli, Doepke, Sorrenti & Zilibotti, 2020). The protracted closure of schools and universities affected all students, but there was a disproportional impact on children from low-income families, for whom digital learning options and the home environment were less supportive or were often completely missing (Bacher-Hicks, Goodman & Mulhern, 2021). The lack of company training for more than a year and the reduced scope for personal interactions must also have reduced skills usually acquired on the job. Unfortunately, detecting these effects will be difficult, and especially when operating through the quality, and not the quantity of education.

Past evidence offers some guidelines, and we already discussed historical data earlier. Fuentes and Moder (2021) provide a brief overview of the possible channels through which scarring occurs, and also look at evidence from past crises. The good news is that potential output seems to have recovered relatively quickly after previous epidemics, in contrast to financial crises that left a more persistent mark. They also caution, however, that given the unusual natural and global scope of the Covid crisis, labour market effects may prove more lasting.

Overall, the IMF's April 2021 World Economic Outlook warns that the prospects of scarring from Covid-19 are sizeable, though smaller than after the global financial crisis (IMF, 2021). Sectoral asymmetries, spillovers and future reallocations are likely to play a crucial role in this. To contain permanent losses, effective policy support will remain necessary, particularly in the human capital domain.

1.6 Summary and Implications

1.6.1 Convergence

Based on economic growth and income levels alone, there is so far little decisive evidence that the EEE are in a middle income trap. This said, subsequent chapters add many more details that qualify this statement. These detailed analyses strongly hint at the possibility that while not in the original sense of the middle income trap, convergence of the EEE may stop prematurely, before the group fully catches up with Western Europe.

Implications:

- Productivity growth, innovation, and investment in human capital are crucial for keeping up and eventually completing the convergence process.
- The EEEs have achieved major improvements in employment since the 2010s. Broad social convergence nevertheless requires additional emphasis, especially on the health sector.
- EU funds represent an important source of extra funding for convergence. Their efficient use, however, requires particular attention.

1.6.2 Convergence and resilience

Convergence and resilience to shocks are strongly connected, as shocks may have long-lasting impacts on the main engines of convergence (like investment, human capital accumulation, and productivity). For example, the global financial crisis has undone much of the convergence of Southern Europe. If shocks are weathered systematically differently by individual EU countries, this poses a challenge for the overall convergence of the bloc. Fortunately, the past experience of the EEE was mostly to the contrary, their convergence might have even accelerated (though often only in relative terms). Crisis resilience also improved after the global financial crisis, so there is hope that the EEE will emerge faster and stronger from the current crisis than it did from the previous.

Implications:

- Crisis resilience may depend on specific policies and actions, but also on broader and deeper institutional features.
- The external position of a country (both private and government) is an important element of vulnerabilities and resilience capacities. Avoiding excessive dependence on external flows is important.
- The EEE were in general less vulnerable and better prepared before the Covid shock than before the global financial crisis. However, certain aspects of institutional quality have stayed relatively low, or even deteriorated.
- In terms of household resilience, household finances, and social cohesion, the EEE are doing worse than most Western European countries. Good aggregate economic performance may thus hide some social or distributional shortcomings. Resilience also needs to look 'beyond GDP'.
- Reducing vulnerabilities and improving resilience capacities should receive a major emphasis in the national recovery and resilience plans, and needs close monitoring.

1.6.3 The Covid shock and its comparison to the global financial crisis

In terms of fiscal and monetary policy space, some of the EEE showed signs of overheating (inflation, wage growth) before the Covid shock. In hindsight, what seemed to be tight fiscal constraints at the beginning of 2020 turned out not to significantly constrain fiscal policy.

The broad macroeconomic impact of the Covid shock was similar to the global financial crisis. GDP was 10-15 percent lower in the second quarter of 2020 than in the last quarter of 2019. The bottom of the recession was the second quarter of 2020. The recovery so far has been relatively quick but uneven. The main GDP components mostly fell along with total GDP, though investment and imports behaved differently than during the global financial crisis. This latter may indicate a future worsening of the trade balance. The recession was also strongly imbalanced across different sectors of the economy (manufacturing and personal services were hit particularly hard).

In the majority of our countries, hours fell much more strongly than employment. There is significant heterogeneity across countries in both the decline on impact and the overall fall. Though data do not yet allow a proper assessment of the social impact of the Covid shock, certain indicators already reveal some adverse, though often temporary developments (NEET, youth unemployment).

Implications:

- The countries that are doing relatively better this time mostly had deeper recessions in 2009 and afterwards. These economies were particularly vulnerable to the shock of the global financial crisis, mostly due to financial factors, which are less important now.

- In general, there were important differences between the two shocks. Financial factors are less important now, and the short-run disruptions to supply chains and international trade proved to be highly temporary. These differences may play out differently in future (economic) shocks.
- The overall resilience characteristics have also improved for most of the EEEs, but they may deteriorate in the future. Monitoring vulnerabilities and resilience capacities is important.

1.6.4 Future prospects

Forecasts have been continuously revised as the crisis has unfolded. Recovery has proved to be even faster than expected. For now, it seems that the aggregate impact of the Covid recession will be temporary, and recovery will take place much faster than in the global financial crisis.

Past pandemics point to three important factors for persistent impacts. (i) A large-scale decline in labour supply due to high death rates. (ii) Depressed demand for investment. (iii) Increased precautionary savings. The last factor may also prove to be significant after the Covid crisis. The difference between the natural interest rate and the growth rate of real GDP per capita is expected to remain low (and possibly negative) for many years to come. This indicates that fiscal sustainability will not be a strong constraint on governments.

Some manufacturing activity that European multinationals have outsourced to Asian countries (typically China) might be brought back to Europe ('reshoring'). The low innovation activity in the EEE and their relative lack of high-skilled workers may prevent the region from upgrading into higher value-added activities.

There are many reasons why deep recessions may have a persistent impact on economies. Perhaps the most important is what the literature calls 'scarring': those who experience protracted unemployment see their job prospects and wages persistently deteriorating. Overall, the IMF's April 2021 World Economic Outlook warns that the prospects of scarring from Covid-19 are sizeable, though smaller than after the global financial crisis. Sectoral asymmetries, spillovers and future reallocations are likely to play a crucial role in this.

Implications:

- To contain permanent losses, effective policy support will remain necessary, particularly in the human capital domain.
- The interest rate environment may remain favourable for public debt sustainability for a long time. This can provide easy funding for the necessary policy actions.
- Though the EEE may benefit from reshoring, they need to boost their innovation activities and human capital.

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Chapter 2
Financial Markets: Banks and Capital Markets

Katalin Mérő and András Bethlendi

Abstract This chapter provides an overview of the financial markets in the Emerging European Economies. The financial systems of these countries are less deep and less advanced than those of the more developed countries of the European Union. Generally, the lag is more substantial in capital markets. Nevertheless, due to the significant foreign ownership of all eight countries' financial sectors, they are highly integrated into the EU's financial markets. As the activity of financial market participants seriously contributed to the Global Financial Crisis (GFC), and several financial institutions failed during this period, after the crisis, the approach to and the tools of banking and capital markets regulation, as well as the business practice of financial institutions changed significantly. The capital base and the funding structure of banks became significantly more robust. However, the process of re-regulation and the strengthening of the financial system had not yet been fully completed when the Covid-induced financial crisis hit the financial system. On the one hand, this means that the banking system was not fully equipped with all the necessary tools to be able to absorb shocks. On the other hand, the Covid-related crisis management, which included the widespread use of the loan repayment moratorium, regulatory forbearance, direct state grants to non-financial companies and private persons, and monetary easing, significantly relieved the banks' burdens and contributed to the fast recovery of capital markets. The chapter analyses the post-GFC structural changes to financial intermediation in the EEE, and the main regulatory changes, risks, and vulnerabilities of the financial systems of the region in two periods: between the GFC and Covid, and during the Covid pandemic. We find that besides similarities, country specific factors play a major role, that is, the EEE do not constitute a homogenous region from the point of view of financial markets.

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2.1 Introduction

According to the generally accepted view, before the global financial crisis (GFC) the financial sector played an important role in promoting economic growth (Levine, 1997; Schumpeter, 1934), however, the role of the financial sector in fueling economic crises by its inherently procyclical behavior also appeared in economic thinking (Minsky, 1986). Nevertheless, only in the late 1990s did the systemic risk of the financial sector and the need for macro prudential regulation become common in the academic and policy literature (Mérő, 2017). At the core of the GFC there were securitization-based subprime lending and the emergence of a shadow banking system, i.e., financial innovations that are not solely bank-related or capital market-related but are based on the interconnectedness of the two. Several financial institutions failed; governments had to spend a lot of public money on saving the financial industry. In Europe, this resulted in the emergence of a vicious circle between banks' and their sovereigns' problems. Access to finance for private sector entities, i.e., the smooth operation of the economy, also became difficult. This is why post-GFC reforms covered almost the whole universe of the financial industry: the role of financial markets and institutions, as well as their riskiness and the need for reforming their regulation became hot topics. The lessons learned from the GFC are multidimensional (Acharya, Richardson et al., 2009; Admati & Hellwig, 2013). Besides the global lessons, for the EU and specifically for the EEE, questions related to cooperation between parent institutions and their subsidiaries, the sustainability of parent banks' finance for subsidiaries, as well as the home – host supervisory cooperation emerged as important issues (De Haas, Korniyenko, Loukoianova & Pivovarsky, 2012).

In the wake of the crisis, wide-scale academic and policy debates unfolded about the desirable structure of the financial system, its operation and regulation on global, regional, and national levels, which resulted in wide-scale regulatory reform, covering almost all actors and aspects of the financial industry (Adair, 2009; De Larosière et al., 2009; Dewatripont, Rochet & Tirole, 2010). Globally, its centerpiece is the so-called Basel III regulation for banks, which is complemented by several capital market-related items, such as regulating credit rating agencies, several capital market products (e.g., in Europe the money market funds and the covered bonds), and the entire financial supervision system.

The financial sector of the EEE is significantly less developed than that of the developed world. All members of the EEE have a bank-based financial system, with deeper banking and less deep capital market intermediation and limited market-based banking, that is, for the non-financial companies of these countries the main source of finance is the bank loan while capital markets are less dominant. Since all eight are member states of the European Union, their financial industry is regulated by EU regulations and directives, but because these items leave room for using several national options and discretions, the national regulations are not unitary.

Despite their definite similarities, there are several differences between the EEE' financial systems and their governments' policies toward the financial industry. Out of the eight countries, Slovakia and Slovenia are Eurozone members, while the six others are not. In 2020, Bulgaria and Croatia joined the ERMII mechanism and the Banking Union, while the remaining four did not. Except for Slovenia, at the time of the GFC, all other financial systems in the EEE were dominated by foreign owners, primarily by large financial institutions of the Euro area. However, after the GFC, Hungary and Poland preferred to reestablish the dominance of domestic ownership, while the others did not take steps in this direction. Before the GFC, in several countries foreign interbank funded FX mortgage lending became widespread (in Croatia, Hungary, Poland, and Romania), while in the others it did not. Some countries were seriously hit by the GFC, with their financial institutions suffering significant losses (Hungary, Romania, and Slovenia), while others were only moderately hit (Czechia, Poland, and Slovakia). Consequently, their recovery path in the 2010s was also different.

From the point of view of the financial sector, the crisis induced by the Covid-19 pandemic was markedly different from the GFC. It did not originate from the financial sector; the banks did not fuel it by their misbehavior. Moreover, banks, although on their governments' initiative, contributed to the management of the crisis. The Covid crisis has been unique in the sense that from the very beginning governments implemented measures to mitigate the effect of the crisis, including mitigating the burden of indebted private persons and companies involving the banking systems. Another specialty of the Covid-related crisis is that the trends in banking and capital markets diverged. While for the smooth operation of banks governments had to introduce regulatory easing, capital markets – except for a very short period in Q2 2020 – have not been depressed. The reasons are the very significant monetary easing that central banks poured into the markets, the direct grants provided to companies and households, and the wide-scale moratoria that increased wealthy people's disposable income available for investments. Covid-related effects and measures in the EEE are very similar to those in the core European Union member states, however with some special features.

Section 2.2 analyses the basic characteristics of the financial intermediation in the EEE, the similarities and differences in the main structural characteristics, including the depth and development of financial industries, the specialties of shadow banking, and the ownership structure of the banking system. In this section, we compare the financial structure immediately after the GFC in 2010 with the structure just before Covid hit in 2019.

This is followed by an analysis of the post-GFC financial system in the EEE from stabilization to the Covid shock. In Section 2.3, we use 2014 as the initial point in time for our analysis. The reasons for this choice are as follows: the main European post-GFC regulatory package, the Capital Requirements Regulation/Capital Requirements Directive (CRR/CRD) framework was accepted in 2013 and came into force in 2014. The main institutional change in European banking supervision, the establishment of the European Banking Union also took place in 2014. It was also the year when the Slovenian banking and sovereign crisis was almost over. This period is too short for analyzing structural changes, nevertheless, it is appropriate for analyzing what happened in banking and on the capital markets of the EEE between the two crises and to assess how prepared (or not) these countries' financial industry was for the Covid crisis. In this section, we introduce the main post-GFC regulatory and institutional changes for banks and capital markets and analyze the balance sheet developments, the portfolio quality, and the profitability of the EEE banking sectors, as well as the capital markets' developments, typical investment products, and the main market players on the capital markets. In Section 2.4, the effects of Covid on the banking and capital markets are analyzed. This section also introduces the regulatory changes and industry developments due to the pandemic.

Throughout the chapter, depending on data availability, we conduct peer analysis to compare the EEE with core EU countries. As peer countries, we use developed European economies that are the home countries of the main owners of the financial systems in the EEE and which, similarly to the EEE, traditionally have bank-based financial systems: Austria, France, and Germany.

In the conclusion, we evaluate financial developments in the EEE in the light of the two crises and the countries' responses to them, and try to identify some longer-term trends.

2.2 Basic Characteristics of Financial Intermediation in the EEE

Analyzing the financial structure in the EEE, we first use the traditional bank-based vs. market-based dichotomy approach, followed by using the market-based banking concept and some structural ratio analysis. This is followed by the analysis of the role and structure of the shadow banking system in the region. The last part of the section overviews the ownership structure of the financial system of the EEE with special regard to the banking system.

2.2.1 Depth and Structure of Financial Intermediation

The two different systems of financial intermediation are the bank-based and the market-based ones. In bank-based systems, banks are the most important actors in financing companies, while the issuance of bonds and shares plays a minor role. In countries with a market-based financial system, securities play a greater role in financing companies, while banks are dominant actors in financing retail customers and small and medium-sized enterprises. Austria, Germany, and Japan are textbook cases of the bank-based financial system, while the US and the United Kingdom are the best-known examples of the market-based system (Allen, Gale et al., 2000; Beck, Demirgüç-Kunt & Levine, 1999). Nevertheless, the late 1990s and the early 2000s were characterized by the convergence of the two systems to the extent that even in traditionally bank-based countries, the role of capital market-based intermediation developed faster than banking intermediation (Beck, Demirgüç-Kunt & Levine, 2009). Nowadays, developed countries are characterized by both deep banking and market-based intermediation, but with the dominance of the type consistent with local traditions. All eight members of the EEE have bank-based financial systems, where the role of bank credit in financing the private sector - households and corporates - is dominant. However, even the role of bank credit is much lower than in the peer countries or in the euro area on average. For detailed figures of different segments of financial intermediation in the EEE, their peer countries, and the euro area, see Table 2.9 and 2.10 of Annex.

In 2010, the level of financial intermediation was much less deep in the EEE than in their West-European peers or the euro area on average. The backlog was observed in all segments of financial intermediation, the largest for bonds issued by financial and non-financial corporations, the lowest for stock market capitalization, where some of the EEE approached or, in the case of Czechia and Poland, even outstripped the relatively low level of Austria. At that time, the member of the EEE with the deepest financial intermediation was Slovenia, where the private credit of banks to GDP ratio was very close to the level of peer countries. However, even in the case of Slovenia, the depth of financial intermediation, measured as the sum of the intermediary segments to GDP, was about half of the peer countries' level. By 2019, due to the Slovenian crisis, Slovenia had lost its outstanding role, and Czechia became the country with the deepest financial intermediation within the EEE.

In 2010, the banks' private credit to GDP ratio was about 100% in the euro area, while it ranged between 39% (Romania) and 68% (Bulgaria and Croatia) in the EEE. In this respect, the structural developments of the 2010s were different. In most euro area countries, the GFC and the following euro area sovereign crisis resulted in large-scale deleveraging by 2019. Within the EEE, in some countries, the private credit to GDP ratio decreased significantly. That is, the pre-GFC trend of credit deepening broke and reversed in the wake of the GFC. The largest deleverage of bank credit-based financial intermediation took place in Slovenia, which was involved in the euro area sovereign crisis of the early 2010s. Accordingly, by 2019, its banking sector provided about half as much credit to the private sector to GDP than in 2010. In Croatia, Hungary, and Romania, the three countries that were hardest hit by the GFC starting immediately in 2008, the private credit to GDP ratio also decreased significantly. In the case of Bulgaria, the banking system's problems resulted in large-scale credit relapses from 2014. However, in the countries moderately hit by the GFC (Czechia, Poland, and Slovakia), the role of bank credit continued to increase in the 2010s.

Regarding the role of bonds in private sector finance, one can distinguish between bonds issued by financial companies and ones by non-financial corporations. Their role in funding financial corporations is mainly threefold.

First, depending on the housing finance tradition of the countries, banks can issue covered bonds for funding the retail mortgage loans. The covered bonds are long-term stable funds for banks that represent lower risk for the investors than the banks' unsecured senior debts. This is because of the dual recourse, i.e., the fact, that the pool of collaterals is separated within the banks' balance sheet, and accordingly, in case of failure of the issuing bank the investors have a priority claim on the pool of collaterals besides the general claim on the banks' assets. In Eurozone, Germany and France are the largest covered bond issuers, while within the EEE countries, Czechia, Hungary, Poland, and Slovakia are the countries where covered bond issues finance a significant part of the retail mortgage loans. The GFC differently affected the covered bonds' outstanding amount in these four countries. While in Czechia, Slovakia, and Poland, it continued to increase, in Hungary, it radically decreased due to the high proportion of FX retail mortgage lending before the GFC, that become non-performing or were rescued by different government actions after the GFC.

Second, the banking regulation allows some strictly regulated types of bonds to be considered as part of banks' regulatory capital. Third, due to the low-interest environment, households' demand shifted from bank deposits to higher return investment opportunities. Banks should replace deposits with bond issues in which institutional investors are keen to invest. The second and third reasons for banks' bond issues are characteristics of the euro area member states with highly developed financial markets, but they are rare in the EEE. It happens only in some EU-based mother banks' practice to grant capital to their subsidiaries in the EEE in the form of bonds eligible for regulatory capital purposes. Replacing deposits with bond issues as a tool for raising funds is not widespread in the EEE, either due to the highly bank-based nature of their financial system on the one hand, and, on the other, the practice of foreign mother banks financing their subsidiaries in the EEE dominantly through interbank markets and less through buying their bonds. All-in-all, in the 2010s, except for Czechia, the bonds issued by banks show a decreasing trend in the EEE, as well as in the euro area.

The bonds issue plays a much less dominant source in funding non-financial corporates than in the case of banks. However, this is not an EEE-specific characteristic, as it is true for the euro area and the peer countries. In 2010, the corporate bond-to-GDP ratios were in a range of 0.7 - 4.4% in the EEE, while they were between 5 and 18% for the peer countries. During the 2010s, the role of corporate bonds did not follow a clear pattern either in the EEE or in their peer countries. We find countries with increasing, and ones with decreasing corporate bond-to-GDP ratios. However, by 2019 in the euro area, the role of corporate bonds on average increased significantly, and its ratio to GDP increased to 12%. At the same time, in the EEE - considering the very low initial values in 2010 - even despite the significant increase rates, the corporate bond-to-GDP ratio remained in the 1.5 - 6.5% range.

Besides the developments of credit-related and capital market-related financial intermediation, another important change concerning the structural developments of financial intermediation is the emergence of market-based banking. As shown in Section 2.2.2, the emergence of the shadow banking system made the basic types of financial intermediary structures less and less separable. This is why Hardie, Howarth, Maxfield and Verdun (2013) argue that the degree of the penetration of market-based banking is a better indicator of financial structures. Market-based banking reflects the changes in both the banks' asset and liability structures. On the asset side, the loan securitization and selling, while on the liability side, the increasing role of non-depository funding, contribute more and more to the interconnectedness of banks and markets. According to their case studies, France and Germany moved significantly towards market-based banking. However, in the EEE, as we point out in analyzing shadow banking, we cannot speak of significant market-based banking, that is, the traditional bank-based vs. market-based dichotomy appropriate for the analysis of the region.

Studying the region's financial development in a slightly broader perspective than the depth of financial intermediation, we can look at the IMF's Financial Development Index (Svirydzenka, 2016),which measures on a scale of 0 (least developed) to 1 (most developed) the development of financial institutions and that of financial markets as composite indices. The index for financial institutions' development includes three items: the depth of financial intermediation through banks and institutional investors, access to services, and the efficiency of financial institutions. The index for financial markets includes three similar, but market related items: the depth of capital market-based intermediation, access to capital markets, and market efficiency. With the reconciliation of financial institutions and the financial markets sub-indices, a financial development index has been produced. Figure 2.1 shows the composite index for the countries under analysis. It gives a more synthetic picture of the financial development of the EEE than the detailed structural analysis based on the Tables 2.9 and 2.10.

Fig. 2.1: Financial Development Index (2010-2018)
Data: IMF (2021)

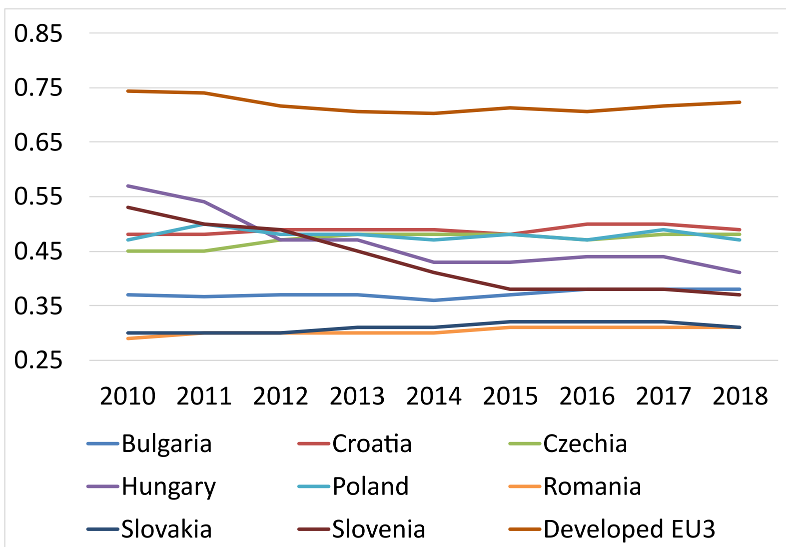


Figure 2.1 reinforces that all the EEE have significantly less developed financial systems than their EU peers. It also highlights the significant differences within the financial development in the EEE. Romania and Slovakia have the lowest financial development. Before 2015, Bulgaria was the distant third lowest. However, due to the Slovenian crisis, the Slovenian financial development index started a rapid fall in 2013, by 2015 it decreased to the Bulgarian level. In 2010, Hungary used to be the

member of the EEE with the most developed financial system. However, between 2013 and 2018, Croatia, Czechia, and Poland overtook it.

Among the structural characteristics, market concentration is the one that is fully in line with the level of the EU's bank concentration levels. Measured by the Herfindahl–Hirschman Index (HHI), by squaring the individual banks' market share and summing them up, the Finnish, Greek, and the Estonian banking systems are the most, while the Luxembourgish, German, and the Austrian are the least concentrated. All the EEE are somewhere in-between. Measuring the banking market concentration with the market share of the five largest banks, the order of countries is modified; however, the intermediate position of the EEE does not change.

2.2.2 Specificities of the Shadow Banking System in the EEE

In the early 2000s, a significant non-bank sub-system of the financial industry evolved in the United States' credit intermediation process, called the shadow banking system. The underlying phenomenon of this process was the emergence of securitization, that is pooling the credits, primarily residential mortgages, into securities and selling them on the markets. Due to increasingly sophisticated financial engineering, securitization became very complex. Accordingly, securities were increasingly detached from the underlying loan portfolios, i.e., simple securitization was replaced by structured securitization in issuing so-called collateralized debt obligations (CDOs). CDOs became popular, as they received high ratings and seemed to be associated with very good risk/return characteristics. Securitization also became a practice in Europe, however, to a lesser extent. Based on securitization, a whole chain of non-bank credit intermediation has evolved, reshaping the structure of financial intermediation. The main institutions of the shadow banking system are the special purpose vehicles (SPVs), which were established to manage the securitization process, the different types of investment funds that are active on fixed income markets, and the so-called other financial institutions (OFIs), which are non-bank financial institutions active in lending. However, the non-bank credit intermediation system was also built in the EEE with significant differences.

The shadow banking system was much less regulated than traditional banking, which opened the floor to extensive regulatory arbitrage and risk-taking (Adrian, Ashcraft, Boesky & Pozsar, 2012), which in turn greatly contributed to the emergence of the GFC. In line with the topic's novelty, there is no consensus even in the definition of shadow banking. There are three different approaches to shadow banking: institutional, activity-based, and network-based (Nesvetailova, 2017). The institutional approach is most widely used because of its simplicity. Besides the Financial Stability Board (FSB) and the European Systemic Risk Board (ESRB), most available statistics use this approach. The activity-based approach is also used by the FSB and in some academic studies that focus on particular activities within shadow banking (Gabor, 2018; Harutyunyan, Massara, Ugazio, Amidzic & Walton, 2015).

Finally, the network-based approach focuses on the interconnectedness of banking and shadow banking (Guttmann, 2017).

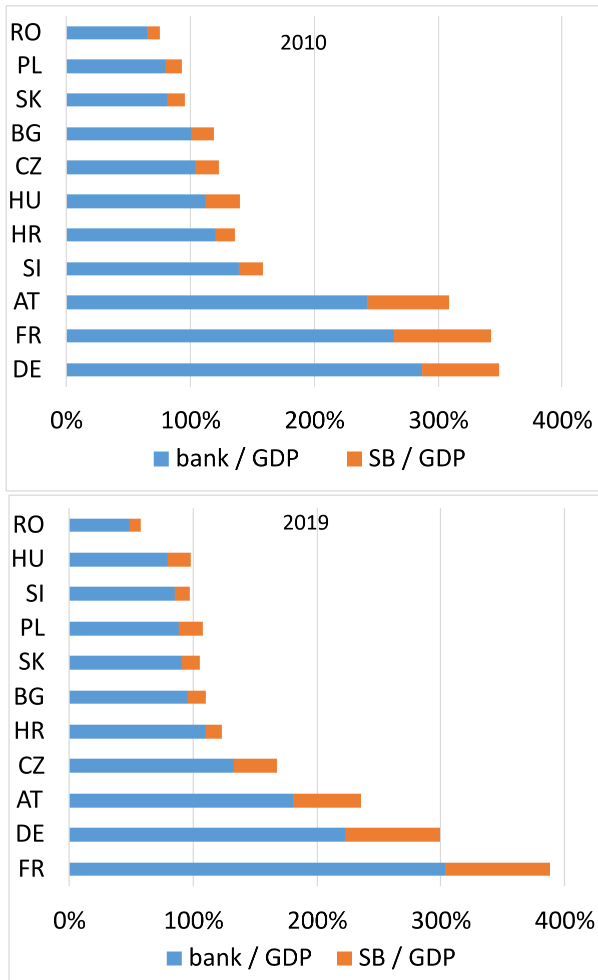
There are some sporadic analyses of shadow banking systems within individual members of the EEE Hodula, Macháček and Melecký (2020) on Czechia, Buszko and Krupa (2016) on Poland and Zéman (2018) on Hungary. However, systematic study of shadow banking in the EEE is minimal. Apostoaie and Bilan (2020) analyze some aspects of the region's shadow banking system, while Bethlendi and Méro (2020a) give some structural analysis of five EEE countries' (namely Czechia, Hungary, Poland, Slovakia, and Slovenia) shadow banking. They have found differences in shadow banking size and structure between the developed world and the five members of the EEE. Namely, that the shadow banking system is much smaller in the EEE, but not marginal. Besides, while in developed countries, the most crucial shadow banking institutions are non-money market mutual funds, in the EEE, other financial institutions (OFIs, i.e., leasing, factoring, and debt collection service companies) dominate the shadow banking sector.

While the Financial Stability Board (FSB) collects data on the shadow banking system of countries with the most advanced financial systems, and the ECB collects data on the shadow banking system of the member states of the European Monetary Union, currently, there is no data collection on the shadow banking system of non-Eurozone countries in the EEE. The first systemic data collection on shadow banking in the EEE is performed by Bethlendi and Mérő (2020b). They use a mostly institutional-based approach with some activity-based adjustments for 11 countries that, besides the eight members of the EEE, covered the three Baltic states. We use this statistical approach and dataset and lengthen their database with data for 2019.

Based on the database, it is clear that the importance of the shadow banking system in the EEE lags far behind that of the three peer developed European countries. However, the significance of the shadow banking system varies from country to country. Looking at structural development between 2010 and 2019, we find that, on average, the banking penetration in the EEE decreased (from 101% of GDP to 91%), while the shadow banking penetration stayed at 17% of GDP. Deleveraging has affected the banking sector significantly more. Accordingly, the relative importance of the shadow banking sector has increased. In the three developed EU peer countries, the situation is the same.

In terms of country specifics, in those members of the EEE that experienced stagnating or decreasing financial intermediation, it can be seen that, in parallel with a significant decline in banking intermediation, the role of shadow banks decreased only slightly or increased (Figure 2.2). This is because in these countries, banks typically sell en masse their non-performing loans to debt collecting companies (which belong to the shadow banking system), decreasing their assets and increasing shadow banking assets (Bethlendi & Mérő, 2020b). Within the EEE, the largest increase in the size of the shadow banking system to GDP ratio took place in Czechia (+16% points) and Poland (+7% points). The largest drop of shadow banking penetration to GDP happened in Hungary (-9% points) and Slovenia (-7% points). However, the extent of this decrease was much smaller than the fall in banking intermediation.

Fig. 2.2: Banking and shadow banking total assets / GDP
Data: Sources listed in Table F1 of Bethlendi and Mérő (2020b)



Not only the size, but also the structure of the shadow banking system of the EEE differs significantly from that of the developed countries in Europe. The only similarity is that money market funds (MMFs) have had a weak and decreasing role in both regions, and as a result of regulatory changes in effect from 2019, they have become even more marginalized. In our database, the only exception is France, where MMFs remained significant even after the regulatory changes. In the EEE, MMFs used to play a significant role in several countries. However, the asset structure of MMFs significantly differs from that of Western Europe. While in Western Europe, most of the assets are debt-type securities, in the EEE bank deposits have the most significant share. Moreover, if funds are managed by asset managers belonging to a bank group, deposits are typically placed within the own group (Bethlendi & Mérő, 2020b).The regulatory changes introduced in 2019 have decreased the potential for MMF investment in non-diversified bank deposits, which results in a regression of MMFs in the region.

Non-MMF mutual funds (without the equity investments that are not part of the credit intermediary system of shadow banking) represent a much smaller share in the financial intermediation and shadow banking of the EEE than in developed countries, resulting from underdeveloped capital markets in the EEE and, within them, asset management markets. However, by 2019 we see a catching-up process. The share of non-MMF mutual funds increased significantly (Table 2.1).

Table 2.1: The structure of the shadow banking system
Data: Sources listed in Table F1 of Bethlendi and Mérő (2020b)

	2010				**2019**			
	MMFs	**Non-MMF mutual funds**	**OFIs**	**Total**	**MMFs**	**Non-MMF mutual funds**	**OFIs**	**Total**
Austria	1.2%	53.2%	45.6%	**100%**	0.0%	59.4%	40.6%	**100%**
Germany	0.6%	51.4%	48.0%	**100%**	0.1%	66.9%	33.0%	**100%**
France	22.8%	29.5%	47.7%	**100%**	14.7%	36.3%	49.0%	**100%**
Average developed	**8.2%**	**44.7%**	**47.1%**		**4.9%**	**54.2%**	**40.9%**	
Bulgaria	0.0%	1.5%	98.5%	**100%**	0.0%	8.7%	91.3%	**100%**
Czechia	5.9%	13.2%	80.9%	**100%**	0.0%	23.4%	76.6%	**100%**
Croatia	14.6%	7.3%	78.1%	**100%**	0.0%	42.1%	57.9%	**100%**
Hungary	17.8%	23.5%	58.7%	**100%**	0.8%	47.0%	52.2%	**100%**
Poland	8.3%	39.0%	52.7%	**100%**	NA	50.1%	49.9%	**100%**
Romania	9.8%	5.1%	85.1%	**100%**	0.0%	24.1%	75.9%	**100%**
Slovenia	0.2%	8.6%	91.3%	**100%**	1.7%	15.3%	83.1%	**100%**
Slovakia	19.2%	16.9%	63.9%	**100%**	0.0%	40.9%	59.1%	**100%**
Average EEE8	**9.5%**	**14.4%**	**76.1%**		**0.4%**	**31.5%**	**68.2%**	

Securitization is of minimal importance in the region. According to a survey by the World Bank (World Bank, 2019), there was no residential real estate loan securitization in the region at all between 2011 and 2016. The securitization of SME loans in the EU was evaluated by the European Investment Bank (EIB) from 2004 to 2015. The EIB placed five out of the eight members of the EEE into the category of 'minimally active markets', which means that there was essentially no SME loan securitization in these countries, while Bulgaria, Czechia, and Poland were placed into the 'less active markets' category (EIB, 2017). Securitization plays a special role in Poland, where primarily non-performing assets are securitized, and the resulting securities are purchased by specialized securitization investment funds (Buszko & Krupa, 2016). This means that the debt collection market in Poland operates through these special investment funds and not through debt collection companies.

In the context of the relative underdevelopment of the asset management market, OFIs play a more influential role in the shadow banking system of the region than in developed countries. OFIs include special institutions participating in securitization itself, and also companies that grant finance directly. Due to the dominance and structure of OFIs within the EEE shadow banking system, they are used to finance corporations and households directly more than in developed countries (Table 2.2). Regarding the country-by-country experience of the proportion of shadow banking lending to bank lending, the 2010s resulted in some convergence between the EEE and the peer countries, this time not typically, as the French and German proportions approached that of the EEE. Within the EEE, shadow banking lending is highest in Romania and Bulgaria, while lowest in Poland.

Table 2.2: Loans of shadow banking sector compared to that of the banking sector
Data: Sources listed in Table F1 of Bethlendi and Mérő (2020b)

	2010	**2019**
Austria	3%	2%
Germany	6%	10%
France	7%	10%
Average developed	**5%**	**7%**
Bulgaria	11%	13%
Czechia	12%	11%
Croatia	7%	7%
Hungary	15%	13%
Poland	2%	5%
Romania	13%	15%
Slovenia	13%	11%
Slovakia	12%	10%
Average EEE8	**11%**	**10%**

2.2.3 Ownership Structure of the Banking System in the EEE

By the time of the GFC, the banking systems in the EEE, except for Slovenia, had become dominantly foreign-owned. The main owners were the large banks of the euro area that had built a network of their EEE subsidiaries and branches. With the presence of several members of the EEE, the most active banks were the Austrian Erste and Raiffeisen, the Italian Intesa Saopaolo and UniCredit, the Belgian KBC, the French Societé Generale, and the German Commerzbank. Besides, from outside the euro area, the Hungarian OTP and, to a lesser extent, the Russian Sberbank are also among the owners with multiple bank holdings within the EEE. In this regard, the Bulgarian and Romanian banking sectors were unique, as Greek banks acquired significant market share there.

By 2010, the highest foreign ownership, with an above 90% market share in banking assets, characterized the Czech and the Slovak banking systems. This was partly due to the special structural characteristics of the former Czechoslovak banking system, i.e., in 1953, cooperative banks were nationalized and merged with the Czech National Savings Bank. From 1995, it was possible to establish local cooperative banks in Czechia, although their role remained limited (Hunčová & Mikeska, 2016). In the other members of the EEE, the cooperative banking sector survived socialist times with a different but significant market share. The other structural peculiarity of the Czech and Slovak banking systems is that in these countries, even the largest retail bank of socialist times was sold to foreign owners, while that of Romania (CEC) is still state-owned, the Polish (PKO) and the Hungarian (OTP) are publicly listed banks with dispersed ownership. Slovenia is the only country that followed a different policy toward foreign bank ownership and had preserved the majority of domestic ownership (Lindstrom & Piroska, 2007). The other five countries were in-between, with a majority foreign ownership in their banking systems.

The post-GFC period brought several changes in the banking ownership structure. First, several large Western European banks that were seriously hit by the crisis, as a condition of the state reconstruction funds, had to streamline their international subsidiary network, and sold several of their subsidiaries in the EEE. Examples are the exit of Raiffeisen Bank from Poland and Slovenia, and the Bayerische Landesbank from Bulgaria, Hungary, and Romania. Second, due to the Greek crisis, troubled Greek banks had to sell their subsidiaries in the EEE. Third, as the financial nationalist governments of Hungary and Poland intended to regain dominant ownership in their banking sector (Méró & Piroska, 2016), in these two countries, the majority of the banking system became domestic owned. As a consequence of these processes, by 2019, the market share of foreign banks remained above 90% in Czechia and Slovenia, moderately increased in Bulgaria and Slovenia, and besides Hungary and Poland, significantly decreased also in Romania. For the number of foreign branches and subsidiaries and their market share in the total assets of the banking sectors in the EEE, see Tables 2.11 and 2.12 of Annex.

2.3 Post-GFC Financial System in the EEE – from Stabilization to the Covid Shock (2014-2019)

2.3.1 Banks

2.3.1.1 Regulatory and Institutional Changes Post-GFC

The pre-GFC regulatory framework, that was formulated in the early 2000s, is the so-called Basel II Accord. It served as a basis for the new European banking regulation (European Parliament and of the Council of Eurpean Union, 2006a, 2006b). It was accepted in 2006 and was implemented from 2007 on a voluntary, and from 2008 on an obligatory basis. The newly introduced regulatory framework consisted of three pillars:

1) The minimum capital requirements that are obligatory for banks to hold. It required the banks to have at least 8% regulatory capital to risk weighted assets (RWA), although it provided a wide range of options for RWA calculation, conditional on the risk awareness of banks. For banks with the most advanced risk management, the regulation allows the wide-scale use of their own risk management models in relation to credit-, market-, and operational risk. For banks on a lower level of risk awareness, standardized methods are available, that are simpler and easier to use, however less customized, and accordingly intentionally overestimate the capital requirements to model-based approaches. In relation to modelling the credit risk capital requirements, a regulatory model was developed and banks are allowed to use their internal models for its parametrization.

2) The supervisory review and evaluation process that – based on an active dialogue between the regulators and the banks – assesses the banks' individual risk profile and risk management practice and determines the capital requirements above the obligatory minimum.

3) Disclosure requirements for banks with the aim of strengthening market discipline. As the new regulation was based on the then best practice of banking risk management, on the one hand, it represented an inherently microprudential approach (Mérő, 2017). On the other hand, it did not challenge the bad incentive structures that emerged in the early 2000s, as a result of regulatory arbitrage made possible by the emergence of shadow banking systems (Mérő, 2021a). However, as it turned out from the timing of the Basel II/CRD regulation, most of the pre-GFC risks built up in the previous - the so–called Basel I - regulatory framework, that was much simpler and less risk-sensitive, and did not include the regulatory tools of the later pillar 2 and pillar 3.

There are five primary regulatory lessons learned from the GFC. First, it is obvious that there is a need to integrate the macroprudential approach and regulatory tools that are designed and calibrated in a macroprudential view into the bank regulation. This includes tools that mitigate the procyclical nature of banking and that increase the stability of large, complex institutions with systemic importance (see Chapter 6 in this volume). Second, it has turned out that even in the microprudential view the quality and the quantity of banks' capital is far from sufficient to be able to absorb potential losses. The quality of the banks' regulatory capital, that is the equity and other sources that the regulators defined as sources that in the case of need are able to absorb losses similarly to equity, were highly diluted, as the regulators allowed banks to record more and more items as part of regulatory capital. At the same time, the basis of capital requirement calculation, the amount of risk weighted assets, significantly decreased in relation to total assets (Acharya et al., 2009). The reason for this phenomenon was that the banks could efficiently decrease their risk weighted assets to total assets ratio with the help of regulatory arbitrage, based on pre-crisis financial innovations, first of all on securitization and on incorporating shadow banking activity into their business model (Admati & Hellwig, 2013).

Third, within the Basel II framework, banks heavily built on the ratings of credit rating agencies, that turned out to be over-optimistic and misleading, first of all in relation to securitization-related items (Richardson & White, 2009). Fourth, there was no obligatory liquidity regulation before the GFC. Based on the efficient markets hypothesis, interbank markets were thought to be able to provide liquidity to solvent banks at any time. However, the GFC proved that interbank markets can suddenly dry-out, which stressed the need for liquidity regulation. Nevertheless, in the academic literature even today there is consensus on the rationale of liquidity regulation (Allen & Gale, 2018). Fifth, the GFC highlighted several structural weaknesses within the banking systems, including the high interconnectedness of banking and capital markets due to banks' excessive trading activity. The need for ring-fencing the banks' deposits and separating trading activity from commercial banking was also articulated (Liikanen, 2012; Hardie & Macartney, 2016).

As a response to the set of regulatory lessons listed above, thousands of pages of regulatory documents were issued, both in terms of global recommendations and directives, as well as country-specific rules, and in Europe as EU level regulations, accords and directives. On the global level, the post-crisis regulatory reform package, called Basel III, was developed in several stages between 2009 and 2019 and amended several times. Later, these regulatory pieces were consolidated into the so-called Basel Framework. Most of the items of the Basel Framework were implemented in the 2010s, although in the case of some items the phase-in period ends in the 2020s, with the latest in 2027. The Basel Framework preserved the three-pillar structure of Basel II but with fundamental changes. It contains regulatory answers to four out of the five lessons listed above, but not to structural issues.

In the European Union, the CRD of 2006 was re-regulated in line with the Basel Framework. The new version was adopted in 2013 in the form of an EU regulation (CRR) and an EU directive (CRD). The Regulation is directly applicable in all EU member states, while the Directive must be implemented as a national law in all individual countries. Originally, the EU rules aimed to address all five lessons, however, in July 2018 the EU Commission decided to withdraw the proposal for structural reforms. As the new regulatory items of the Basel Framework were published, the EU also amended several times the CRR and the CRD, considering the special features of the European Banking industry. The process is ongoing even today.

The new EU rules redefine the concept of regulatory capital in order to ensure its higher quality. They also require more capital to absorb banking losses than the previous regulation even in the microprudential view. Besides, they require the creation of several types of additional macroprudential capital buffers. The risk weighting system was also changed significantly, with the aim of limiting the use of preferential risk weights in several fields, including securitization. In addition, to limit the potential for regulatory arbitrage within the risk weighting framework, a non-weighted leverage requirement was introduced. In addition, as one of the last amendments to the CRR/CRD framework a so-called output floor is defined for the model results that limits the amount of capital savings of model-based capital requirements compared to standardized methods. In the EU, the concrete method of calculation of the floor is under extensive debate, and it is to be implemented gradually between 2022 and 2027. However, as of 2021, due to the pandemic it is postponed for the period 2023-2028. Another important novelty of the regulation is that it also makes it obligatory to meet a short-term and a long-term liquidity ratio requirement (the so-called liquidity coverage ratio, the LCR, and the net stable funding ratio, the NSFR).

Both the CRR and the CRD consist of several national options and discretions, i.e., room for implementation, that vary from country to country. The EEE have widely used these opportunities. According to (Kudrna & Puntscher Riekmann, 2018), the use of national options and discretions is significantly more frequent in the EEE than in other EU countries, as - due to the high foreign ownership of banks - these countries were highly committed to ring-fencing the capital and the liquidity of foreign owned local banks..

The accounting rules on provisioning of non-performing loans also changed significantly. Pre-crisis provisioning, i.e., creating loss absorbing reserves as pre-tax expenditure, was possible only for losses incurred. Since the expected loss based on careful analysis of portfolio quality was much higher than the losses incurred, it was also highly debated post-crisis. To implement more forward-looking accounting rules for provisioning, bank regulators had to come to an agreement with the accounting standard setting bodies. The main issue was to match the prudential views of regulators and the reliability and objectivity principles of accounting. As a result, in 2018, the International Financial Reporting Standard 9 (IFRS9) came into effect in Europe. The new accounting rules required reclassification of all credit exposure into three stages, depending on their credit risk. Stage 1 loans are low-risk, while stage 3 is for loans with losses incurred. Stage 2 is in-between, including loans with significantly deteriorated quality but still performing. Provisioning also became necessary for expected losses of stage 2 loans, which seriously increased the banks' provisioning requirements.

Besides regulatory deficiencies, several institutional weaknesses of banking supervision became apparent during the GFC. The EU's first step to reform the supervisory structure was the establishment of a High-level Working Group led by Jacques de Larosière. Based on the De Larosière et al. (2009) a supervisory system based on an interconnected macro-, and microprudential pillar was introduced. For macroprudential supervision a brand-new institution, the European Systemic Risk

Board (ESRB) was established (see Chapter 6 in this volume). The microprudential pillar of the system consisted of the national competent financial supervisory authorities (NCAs) and the newly established European Supervisory Authorities, the ESAs, namely, the European Banking Authority (EBA), the European Securities and Markets Authority (ESMA), and the European Insurance and Occupational Pensions Authority (EIOPA). The ESAs were established on the basis of the formerly existing committees for supervisory coordination, however, in the form of much more powerful authorities. The report considered but rejected the idea of creating an EU wide microprudential supervisory authority on the basis of the ECB. As regards the banking supervisory system in the EEE, before 2013 Hungary and Poland had financial supervisory authorities outside the central bank responsible for bank regulation. In 2013, the Hungarian financial supervisory authority was merged with the central bank. In this way, by 2013, in seven out of the eight members of the EEE central banks were the competent supervisory authority.

In addition to the regulatory and institutional weaknesses that were evident at an early stage of the GFC, the Eurozone's sovereign debt crisis highlighted the potential vicious circle between the banks and their sovereigns. To break the vicious circle and make the European financial system more robust and crisis-proof, the next step in the line of supervisory institutional changes was the decision to establish the European Banking Union (BU) in 2012 (European Commission, 2012). By its design, Eurozone member states automatically became members of the Banking Union, while the countries outside the Eurozone could apply for opt-in as voluntary members in the form of so-called close cooperation. Accordingly, at the time of its establishment, the two Eurozone member states of the EEE, Slovakia and Slovenia became BU members, while the others had to decide whether to opt-in or opt-out.

The European Banking Union is based on three pillars. The first was based on the Single Supervisory Mechanism (SSM), established in November 2014, when the ECB became the supervisory authority for the BU. It directly supervises the most significant banks of the BU member states, including the three largest banks of all member states, and indirectly through competent national supervisory authorities, the others. The second pillar is the Single Resolution Mechanism (SRM) that relates to banks directly supervised by the SSM, and to cross-border banking groups. The SRM is for the orderly resolution of failed banks or ones likely to fail, which consists of the Single Resolution Board, a Brussels-based resolution authority and a Single Resolution Fund financed by the banking sector. The SRM became fully operational on 1st January 2016. The third pillar is the European Deposit Insurance Scheme (EDIS), which is highly debated within the EU, and before its implementation the Banking Union project cannot be fully-fledged. Besides the three pillars, the Banking Union is based on the Single Rulebook, the set of harmonized prudential rules and supervisory procedures worked out by the European Banking Authority (EBA). The Single Rulebook is a special building block of the BU in the sense that it relates to all EU member states, not only to BU members.

For countries that decide to enter into close cooperation with the BU, it brings several advantages, since it can foster financial integration with the EU, increase the level and reputation of banking supervision, decrease the regulatory capture and make funding cheaper. The potential access to the sources of the Single Resolution Fund can be an asset (Darvas & Wolff, 2013; Montanaro et al., 2016). However, the SSM does not grant fully equal rights with the countries of the Eurozone. There are two important differences. The first is that the opt-in countries have no representation in the highest-level decision-making body of the ECB, the Governing Council. To partially offset this problem, the Supervisory Board was established to initiate and prepare all the draft decisions of the SSM. However, the final decision remains in the hands of the Governing Council that adopts the decisions under the non-objection procedure. The second important difference is that non-Eurozone countries have no access to the ECB's liquidity support, that is they delegate several decisions on the SSM level while the consequences of decisions remain national.

The six members of the EEE that are not in the Eurozone have different approaches to joining or not the Banking Union. The first non-Eurozone member to decide to opt-in was Bulgaria. In June 2018, the Bulgarian authorities simultaneously applied for ERM2 membership and joining the BU. Conducted by the ECB, this was followed by a comprehensive asset quality review of the six largest Bulgarian banks. According to the results (ECB, 2019), four banks met the requirements, while the other two needed restructuring and recapitalization. As it was completed by mid-2020, in July 2020 the ECB decided to establish close cooperation with Bulgaria, and from 1st of October the ECB became the supervisor of the Bulgarian banking system. The second member, Croatia, applied for establishing close cooperation with the Banking Union and for joining the ERM simultaneously in July 2019. Since the Croatian banking system was in a better condition than the Bulgarian, all five large Croatian banks that were subject to the ECB's asset quality review passed it without requiring any further measures. Thus, on the same day as Bulgaria, Croatia also entered into close cooperation with the BU.

Of the remaining four members of the EEE, only Romania is committed to joining the BU even before applying for ERM2 membership, however, as of mid-July 2021 it had not sent a request to the ECB. Czechia, Hungary, and Poland are definitely against joining the BU, first of all due to their nationalist banking policy. However, their stable banking system and the non-fully equal treatment of the BU's Eurozone member states and the opt-in countries might also contribute to this view (Mérő & Piroska, 2016; Mérő, 2021b).

2.3.1.2 Balance Sheet Developments

By 2014, fundamental steps had been made for the post-GFC stabilization of the European banking sector, even though it had not recovered from the GFC and the subsequent European debt crisis. Due to massive deleveraging that characterized almost all countries of the European Union, the domestic credit-to-GDP gap, that shows whether the banks' lending activity is below or above its long-term trend level,[1] remained in the negative range in almost all the EEE, as well as in their peer

[1] The credit-to-GDP gap is defined as the difference between the actual credit-to-GDP ratio and its long term trend.

countries for the whole period. The most negative values, that is, more depressed lending, characterized Hungary and Slovenia followed by Bulgaria and Romania. Admittedly, the gap has been decreasing in all four countries, which shows that lending started to converge to its trend (Figure 2.3).

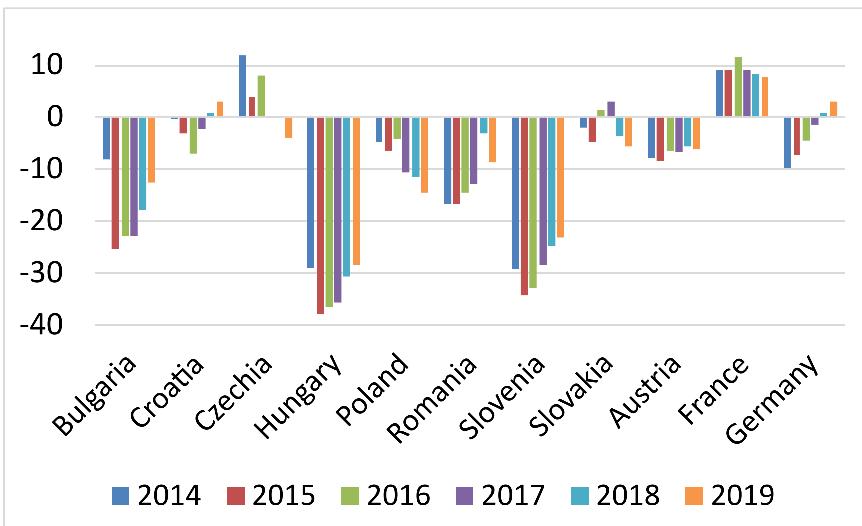
About the Banking Data

For analyzing the banking sector in the EEE, the most comprehensive dataset is the ECB's consolidated banking statistics. However, they contain data on the highest level of consolidation, including cross-border consolidation, which means that foreign branches and subsidiaries are included in the parent banks' data. Since in the EEE only the Hungarian OTP has significant foreign operations, in the case of the Hungarian banking sector we replaced the consolidated data of the ECB with the data provided by the Hungarian Central Bank (MNB). The method is not perfect in the sense that the ECB in most cases publishes average data, while the MNB often publishes year-end-data. However, this causes no significant difference, and gives much more reliable information than using the ECB consolidated data for Hungary. These data are also consolidated; however, the scope of consolidation is narrower, as it contains only domestic undertakings. Due to this method, we could use only those data from the ECB consolidated statistics that are included both in the ECB's and the MNB's datasets. Some Hungarian data are available only for 2015. For the conversion of MNB data from HUF to EUR, we used the year-end official exchange rates. For using the ratios to GDP, we used the Eurostat GDP data at market prices. The scope of consolidation made it impossible to use the peer countries' data from the ECB consolidated banking statistics, since all three countries have significant foreign branches and subsidiary networks, which makes their data highly inflated. Besides the ECB consolidated banking data, we use different sources of data that can cause some differences in data content. For example, if available, we prefer to use the IMF and World Bank databases that contain consolidated data on individual countries' banking systems without consolidating foreign undertakings, however, these data are in USD that we converted to euro at year-end exchange rates, which may also lead to some differences.

The reason for the large negative lending gap in the case of Croatia, Hungary, and Romania is first of all the high pre-crisis unhedged FX lending to households and the SME sectors and, as a consequence, the banks' high exposure to FX interbank sources (Király et al., 2020).This made the crisis exceptionally deep and had a long-lasting effect on both credit supply and demand. Accordingly, it made the bank lending seriously depressed even during the 2010s. In Slovenia, the pre-crisis boom was based on credit-fueled economic growth. Slovenia adopted the euro in 2007, but even before that, during its ERM2 membership it pegged the Slovenian tolar to the euro. Accordingly, the crisis hit Slovenia not through FX lending, but through the foreign financed credit boom, which resulted in high corporate indebtedness. The loans to corporates were granted by weak Slovenian - partly state owned - banks that based their lending activity on short-term foreign interbank sources. As these sources suddenly dried up in autumn 2008, the Slovenian government had to support the banking system. These processes led to the Slovenian crisis, a textbook case for the vicious circle between banks and sovereigns (IMF, 2012) resulting in depressed lending during the 2010s. In Bulgaria, in June 2014, there were bank runs on the country's third and fourth largest banks that temporarily undermined the banking sector's stability (IMF, 2015). The Polish credit-to-GDP gap was moderately negative at the beginning of the period, however, by 2017 it was more than 10%, that is, its trend is the opposite of those in other countries.

The only member of the EEE that experienced a positive gap between 2014 and 2018 was Czechia, while by 2018 the Croatian gap had also turned positive. The most balanced lending was related to Slovakia, where the gap fluctuated in a narrow band around the trend. As regards the peer countries, Austria was characterized by a moderately negative, while France with a moderately positive gap, while the German gap turned from negative to moderately positive in 2018 (Figure 2.3).

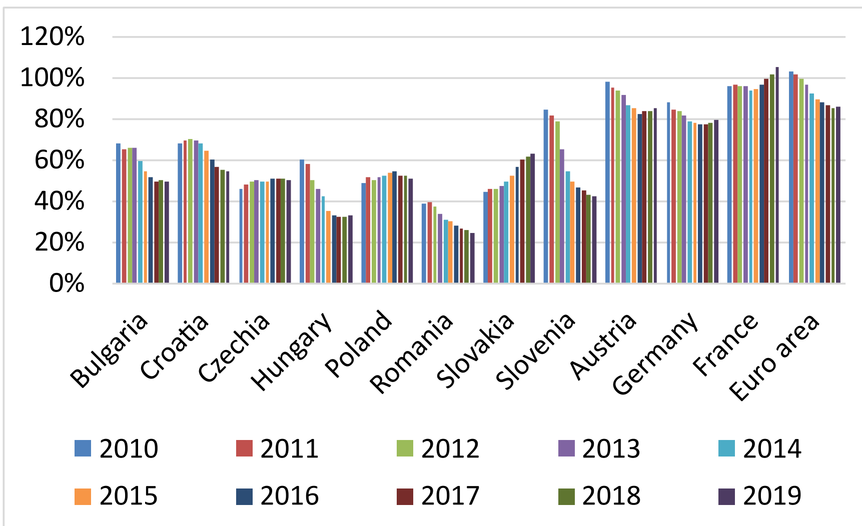
Fig. 2.3: Domestic credit-to-GDP gap (%)
Data: European Central Bank (2021b)



In line with the structural characteristics we explored in Section 2.2.1, the depth of banking financial intermediation measured by domestic credit of deposit taking financial institutions to the private sector is much lower in the EEE than in the peer countries or in the Euro area. The changes in the depth of banks' financial intermediation mostly reflects on the evolution of the domestic credit-to-GDP gap. In countries with depressed lending activity the banking intermediation has been even less deep. This is definitely the case for Bulgaria, Hungary, Romania, and Slovenia.

In the case of Croatia, the very moderate credit-to-GDP gap was associated with decreasing lending activity. Its antecedent is that in the early 2000s, the Croatian banking sector experienced an outstandingly high increase in its balance sheet, and as a result, just before the GFC both its total assets and its private credit relative to GDP were the highest in the region. The only member of the EEE with significant deepening is Slovakia, where the level of domestic credit increased in line with GDP. The level of the Czech and Polish domestic credit to GDP ratio remained about the same during the period (Figure 2.4). Overall, with the exception of Slovakia, the post-crisis period did not result in convergence in the EEE to the peer countries' banking intermediation level, but on the contrary, in the case of several countries, the backlog continued to grow.

Fig. 2.4: Banks' domestic credit to private sector to GDP (%)
Data: World Bank (2021)



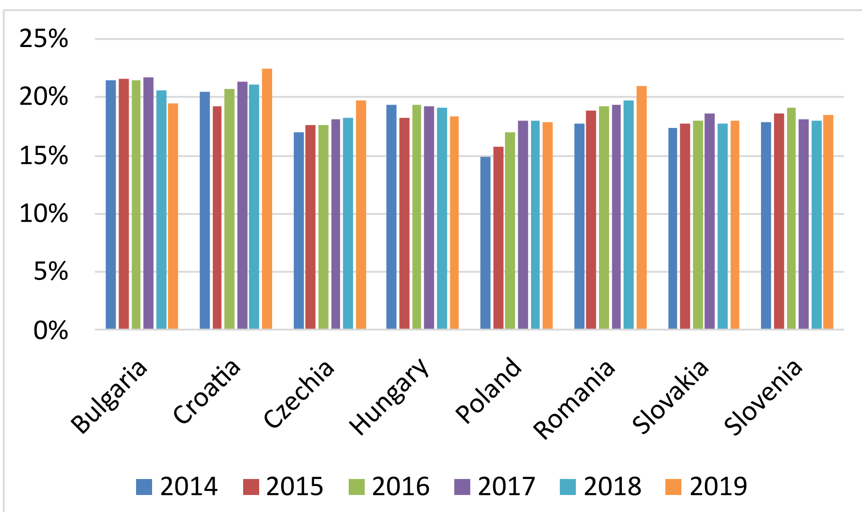
2.3.1.3 Funding

In the pre-GFC period, several members of the EEE financed extensive credit growth -increasingly by foreign interbank sources, dominantly granted by parent banks. At its peak, the loan-to-deposit ratio of the banking sector was about 120% in Romania, 140% in Hungary, and 160% in Slovenia. The Czech banking sector was characterized by the most stable funding, where the main sources of funds continued to be the deposits, and the loan-to-deposit ratio did not go above 80% (Bethlendi & Méro, 2020a). As the interbank markets dried up from September 2008 and the main owners of the regions' banks also faced troubles, interbank sources started to decrease, and the role of local deposits was appreciated. By 2014, the loan-to-deposit ratio fell below 100% in all eight members of the EEE. The most prominent decline was seen in Slovenia and in Romania where the ratio almost halved. The trends in the 2014-2019 period were divergent; however, in all countries, the range of the ratio remained between 70 and 100%, only in Czechia - where the high level of non-deposit funding has never been a problem - did it go slightly above 100% by 2018.

2.3.1.4 Capital Position

As regards the solvency of the banking system in the EEE, it became strong by 2014 and remained strong throughout the whole period (Figure 2.5). There were two main items that contributed to the high solvency ratios, that is to the solid capitalization of the banking systems in the EEE. First, in the wake of the GFC, parent banks raised the capital of their subsidiaries in the EEE several times to offset the losses incurred. Second, due to the strong post-crisis deleveraging and the continuing depressed lending in the 2010s, the RWA of the banking systems increased only moderately. Accordingly, the CRR/CRD's new capital requirements, that were valid from 2014 and required banks to gradually but significantly increase their capital relative to their RWA, did not have the same effect on the EEE banks, as already in the 2014 initial state, they had enough capital to meet the new regulatory requirements.

Fig. 2.5: Solvency ratio of the banking systems in the EEE (%)
Data: European Central Bank (2021a) and MNB (2021)



The other characteristic of the capital ratios of the EEE is that they reflect a high level of RWA-to-total assets. While in the peer countries the RWA is typically in the 30-50% range [2] of the assets, it is typically in the 50-60% range in the EEE. The only exception is Czechia, where its value was just below 50% in 2014, and gradually decreased to below 40% by 2019. The reasons for the higher RWA are partly the differences in balance sheet structure, that is, the higher role of credit and lower role of market-based assets. However, a significant part can be explained also by the wider use of a standardized method in the EEE for capital requirements calculation that computes higher RWA. This also means that there are some buffers in the solvency ratios of the EEE for further credit growth, since as the banks move more towards the model-based capital requirement calculation, their regulatory capital requirements may decrease (Montes, Sand-Zantman & Valletti, 2018).

2.3.1.5 Asset Quality

The banks in the EEE that were worst hit by the GFC experienced very serious portfolio quality deterioration. In these countries the level of non-performing loans (NPL)[3] that accumulated during the GFC was extremely high even in 2014 and started to normalize only from the mid-2010s. The households' loan portfolio was of the worst quality in Hungary, with more than 20% of NPLs in 2014, but it also had double digit values in Bulgaria, Croatia and Romania. By 2017, the households' NPL ratio went down to single digit levels everywhere. The decrease was due not only to the recovery of households' position, but in the case of Croatia and Hungary to government interventions in 2014 and 2015, which resulted in a swap of FX loans to domestic currency denominated loans (Hungary) or CHF denominated loans to euro (Croatia). In addition, the newly granted loans under swaps, by definition, were classified as performing. However, as the economic recovery continued, these loans mainly could preserve their performing status. In Romania a similar law was accepted, but it was rejected by the constitutional court. The lowest NPL ratios characterized Czechia and Slovakia, the two countries that were less hit by the GFC. This was the case both for households and for corporate portfolios in these countries. In Slovenia, in line with the corporate induced nature of the crisis, the households' NPL was acceptable during the whole period, however it was the country with absolutely the highest corporate NPL ratio. Nevertheless, the corporate NPL ratios were also above 20% in 2014 in Bulgaria, Croatia, Hungary, and Romania. The corporate NPL ratios started to stabilize in the second half of the 2010s as post-crisis lending was given an impetus and new, good quality loans were granted to companies. Nevertheless, in Bulgaria and Croatia it was slightly above 10% even in 2019 (Figure 2.6).

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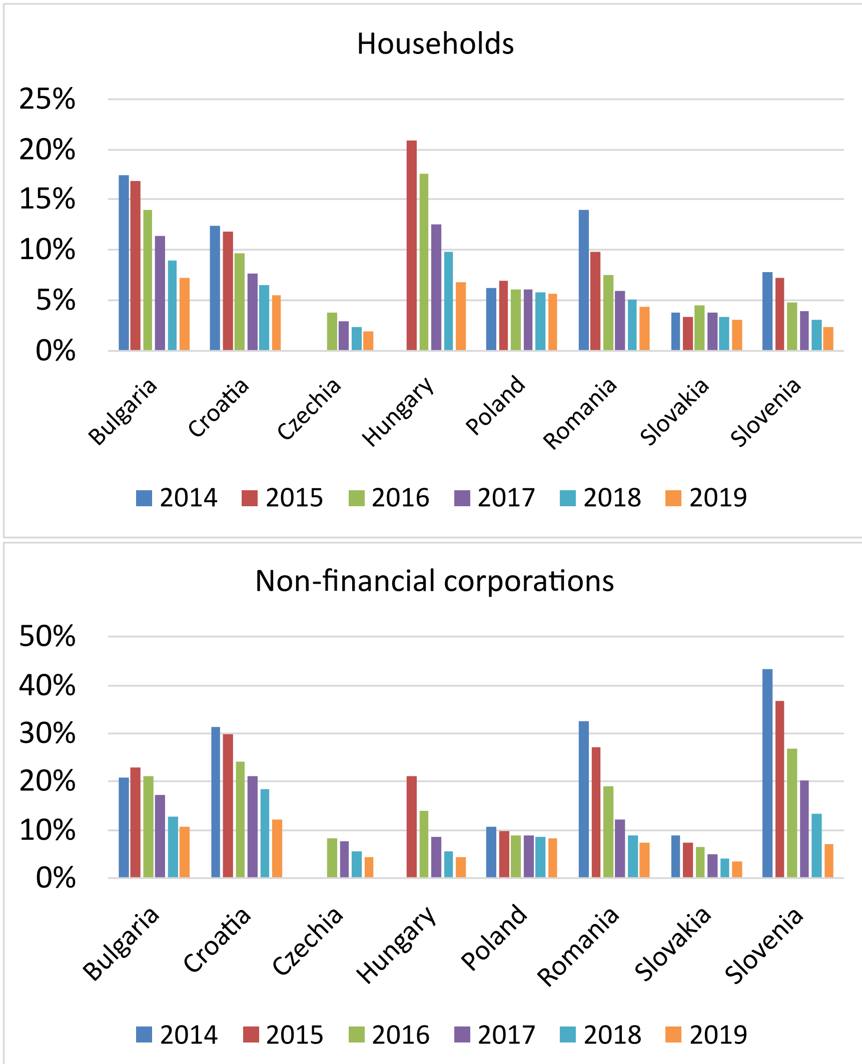
[2] The figures are from ECB consolidated banking data, that is on the highest level of consolidation for peer countries. It means that they include the subsidiaries in the EEE with high RWAs. Without this, the peer RWAs would be even lower (see box 2.1).

[3] Generally a loan is classified as non-performing if it is at least 90 days past due.

Fig. 2.6: Household and corporate non-performing loans (%)
Data: European Central Bank (2021a) and MNB (2021)



Overall, after the GFC the portfolio quality of the EEE improved only slowly. NPL levels remained very high for 2014 and started to significantly decrease in the second half of the 2010s. By 2019, NPL levels had reached the level of pre-GFC NPLs. The two countries that experienced high NPL ratios both for their retail and corporate portfolios are Bulgaria and Croatia, the ones that joined the Banking Union in 2020.

2.3.1.6 Profitability

The profitability of EEE banks was outstandingly high before the GFC, significantly higher than that of the Eurozone banks. The return on equity (RoE) ratios were typically double digit, several times around or above 20%. During the years of the GFC, especially the Croatian, Hungarian, Romanian, and Slovenian banking sectors suffered serious losses, which was aggravated by the losses on pre-crisis excessive foreign exchange mortgage and SME lending and, for Slovenia the corporate credit boom financed by short term foreign sources. In 2014, the, Romanian and Slovenian, while in 2015 the Croatian banking systems were loss making. Since 2016, all banking systems in the EEE have been profitable. Despite the profitability decrease, the Czech and Polish banks' return on equity remained outstanding during and after the crisis as well (Figure 2.7). The return on assets (RoA) in the EEE developed in line with the RoE (Figure 2.7). Recovery of EEE banks' profitability had been achieved by mid-2016. Most lately, similarly to the pre-crisis period, EEE banks' profitability has been significantly above the EU average, primarily because of the slow recovery of the Eurozone banking system.

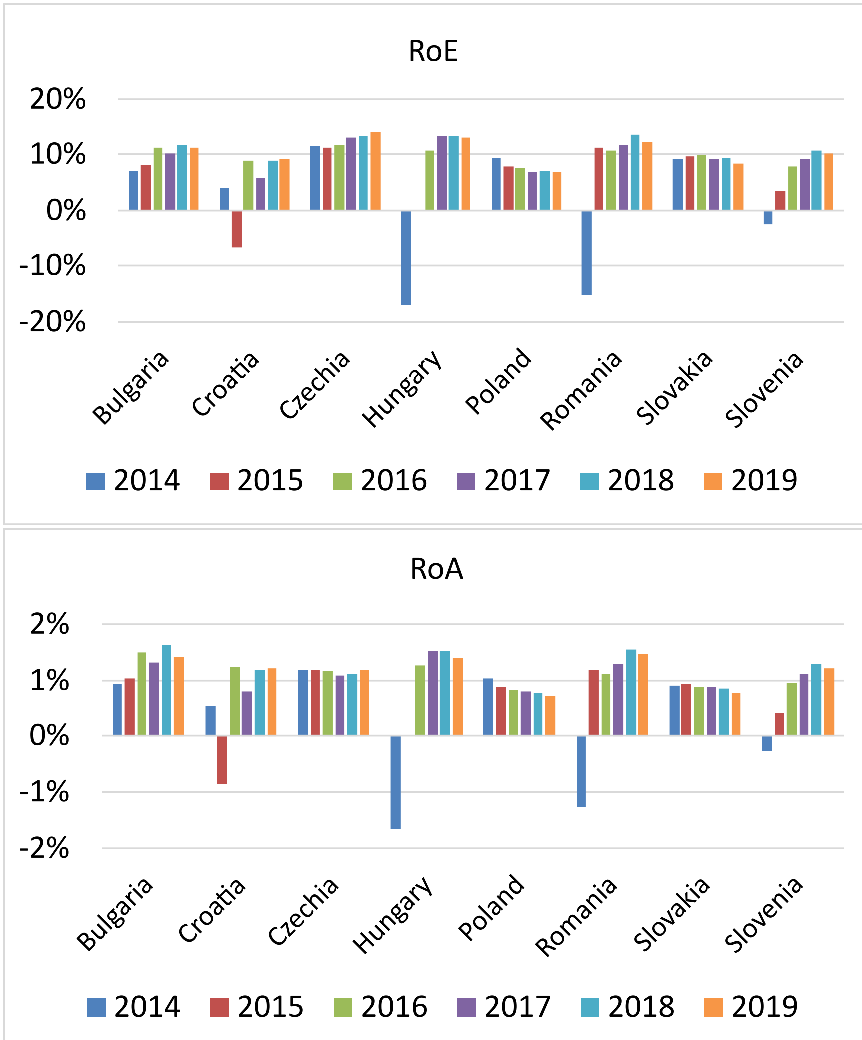
2.3.2 Capital Markets

2.3.2.1 Regulatory and Institutional Changes Post-Crisis

The post-GFC capital market-related regulatory changes can be traced back to two main reasons, namely 1) same as in the case of banks, the lessons learned from the GFC, and 2) the need for highly integrated European capital markets. The first resulted in changes in prudential and consumer protection-related regulations and the reform of market infrastructures, while the second in the Capital Markets Union (CMU) initiative (European Commission, 2015). In line with the chapter's topic, here we focus only on prudential regulation and the CMU.

During the build-up of the GFC, markets - assisted by the rating agencies - significantly mispriced the risks, that is, malfunctioned. According to the EU's assessment of the causes of the GFC (de Larosière Report, 2009), the following items, that also reflect the flaws of capital markets regulation, contributed to the crisis: 1) the extreme complexity of structured finance products; 2) the emergence of the shadow banking system and 3) the underestimation of credit risk by credit rating agencies (CRAs). The three issues are strongly interrelated, as securitization

Fig. 2.7: Profitability of banking sector in the EEE (%)
Data: European Central Bank (2021a) and MNB (2021)



and ratings are among the tools which could be used to operate the shadow banking system.

Transferring shadow banking into stable market-based finance was one of European regulators' post-GFC priorities. The first step was the regulation of CRAs in 2009. It had a limited scope, referred to only CRAs whose ratings were also used for regulatory purposes. Since 2011, the CRAs have been supervised by the European Securities Markets Supervisory Authority (ESMA). Since 2013, a regulation and a directive regulate all the CRAs active in the EU, not only those whose rating is used for regulatory purposes. CRA regulations affect capital markets in the EEE dominantly as the users of ratings. According to the ESMA register, as of May 2021, there are only two CRAs with residence in the EEE: the Bulgarian BCRA-Credit Rating and the Polish Euro Rating.

In the wake of the GFC, the securitization was first regulated only concerning banks' and investment firms' exposure to securitization within the CRD amendment. That is, the product itself was not to be regulated, but the way financial institutions should manage their positions. The proposal for a comprehensive regulation of securitization was published in 2015, on the same day as the CMU's first Action Plan. The regulation was issued in 2017 and became effective only in January 2019. It sets the criteria for simple, transparent, and standardized (STS) securitization. The European Securities Markets Authority registers all the securitization transactions that meet the STS criteria. The advantages of STS securitization are twofold. First, the STS securitization exposures could be cheaper to hold for banks and investment firms since they represent preferential risk weight under the CRR. Second, the STS status of securitization can increase the investors' trust, and market liquidity. However, as presented earlier in this chapter, in the EEE, securitization is very limited. Accordingly, the regulation has little effect on these markets.

Another investment tool that was highly used by the shadow banking system for liquidity management is Money Market Funds (MMFs). The MMF regulation was accepted in 2017 and was effective from 2019. It determined rules on the portfolio composition of the MMFs in order to prevent contagion. From the perspective of the EEE, two new limits have outstanding importance: the limit on investing in bank deposits, which limits both the deposits at the same bank and the total bank deposits, and the limit on repo and reverse repo transactions. In the EEE, Poland has the largest MMF portfolio. However, it is also significant in Croatia and Hungary. In these countries, the typical policy of several MMFs was to deposit their money at the mother bank of asset managers, which had to be changed because of the regulation. As a result, several MMFs were transferred to bond funds or discontinued their operation.

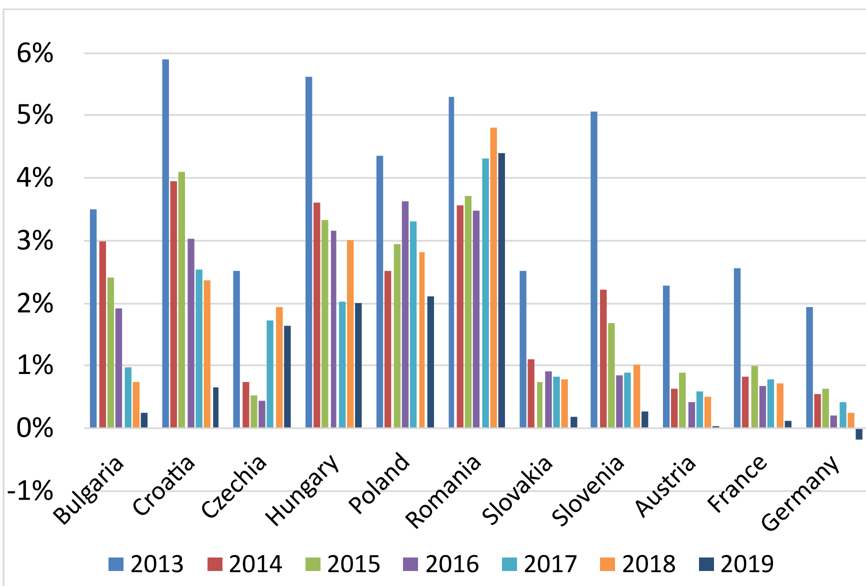
In the European Union, investment funds' regulation relies on two different approaches. Undertakings Collective Investment in Transferable Securities (UCITS) Directive aims to give a framework to fund managers, where UCITS funds can be registered at the European level and sold to investors worldwide using unified regulatory and investor protection requirements. In comparison, the Alternative Investment Fund Managers Directive (AIFMD) regulates non-UCITS funds (called alternative investments) to protect investors and reduce the systemic risk of investment funds.

It was a GFC experience that in the case of a severe market turmoil, significant short selling positions could further amplify the crisis and decrease market confidence. Therefore, in 2012 the EU adopted a Short Selling Regulation. It introduces an EU-wide transparent regime to restrict or prohibit short selling when there is a serious threat to financial stability or to market confidence in a member state. The Regulation also requires investors to report to regulators the net short selling positions relating to equities and sovereign debt.

2.3.2.2 Capital Markets Environments

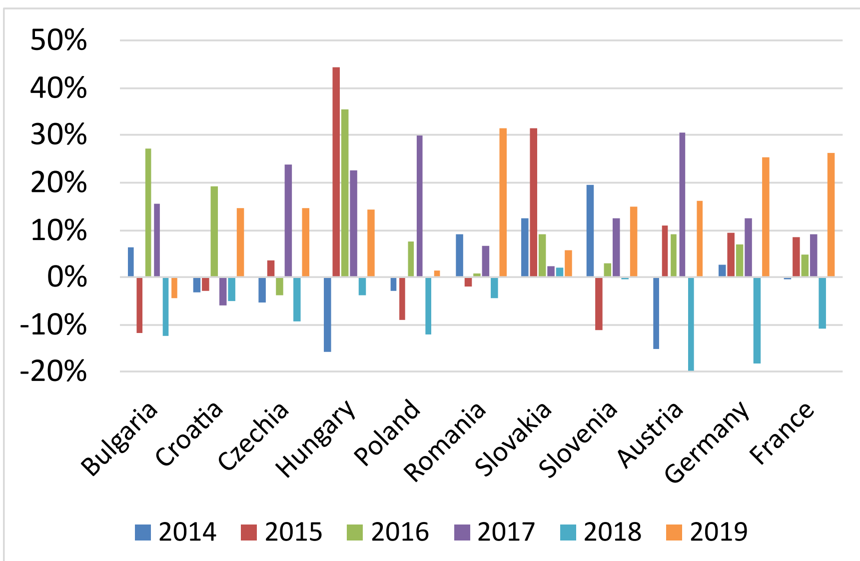
We limit our analysis to capital markets segments that are the most common and more directly involved in financing the real economy (bond and equity markets). Therefore, we do not present the development of other markets (FX, derivatives, repos, or money markets). In the beginning of the period under review (2014-2019), the uncertainty related to sovereign debt developments in the EU represented a risk. As a consequence of the ECB efforts (quantitative easing and other non-conventional policy tools), the pressure on the government bond market and long-term yields began to ease from 2014. By the end of the period, we see a near-zero/negative yield environment in the euro area countries. The non-euro central banks of the region followed the ECB policy. Nevertheless, their long-term yields remained significantly positive (see Figure 2.8).

Fig. 2.8: 10-year government bond yields at the end of the period
Data: Bloomberg L.P. (n.d.-a)
Note: We used the following Bloomberg tickers. Austria: GAGB10YR, Bulgaria: Index GBBP10, Croatia: Index G0369Z 10Y BLC2 Curncy, Czechia: CZGB10YR Index, France: GFRN10 Index, Germany: GDBR10 Index, Hungary: GHGB10YR, Poland: Index POGB10YR Index, Romania: ROMGGR10 Index , Slovakia: GRSK10Y Index, Slovenia: GSLO10YR Index



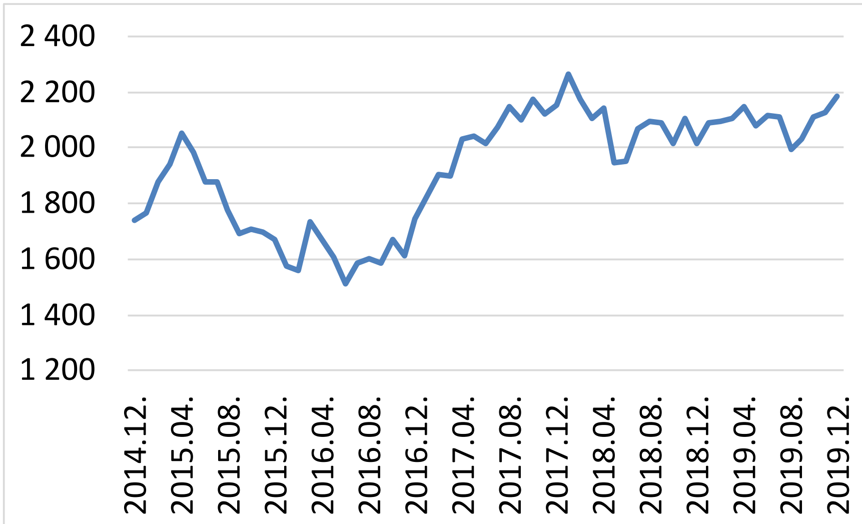
Equity markets, in general, remained robust in the examined period. However, there were some sub-periods characterized by increased valuation risk in equity markets together with a resurgence of volatility. These negative events affected the main stock exchanges in the EEE to varying degrees. In the period under examination, there was only one common negative year, 2018, when almost all analyzed stock exchanges in the EEE suffered some losses on a yearly basis. In 2018, there were several negative events: the general macroeconomic outlook of the EU weakened; the political risks related to Brexit increased; the US vs. China trade tension increased; the global monetary stimulus was reduced. These vulnerabilities eased somewhat in 2019, allowing the stock markets to recover (see Figure 2.9).

Fig. 2.9: Yearly yields of stock indexes in the EEE
Data: Bloomberg L.P. (n.d.-d)
Note: We used the relevant index name of Bloomberg. Austria: ATX Index, Bulgaria: SOFIX Index, Croatia: CRO Index, Czechia: PX Index, France: CAC Index, Germany: DAX Index, Hungary: BUX Index, Poland: WIG Index, Romania: BET Index, Slovakia: SKSM Index, Slovenia: SBITOP Index



Looking at the largest corporate stock prices, we can see somewhat different trends. The CETOP index, the Central European Blue Chip Index, contains up to 25 blue chips from seven out of the eight members of the EEE, taking into account maximum seven shares from each country. The exception is the Bulgarian Stock Exchange. For the blue chips of the EEE as well, 2015 was a bad year. However, the intra-year volatility was high primarily at the beginning of the period (see Figure 2.10). All in all, the stock exchange indexes in the EEE, as well as that of the region's blue chips, rose significantly higher by the end of 2019 than they had been in 2014, which also reinforces the post-GFC strengthening of the region's financial systems.

Fig. 2.10: The CETOP index
Data: Budapest Stock Exchange (2021)



Capital markets in the EEE are integrated into the global financial markets. Nevertheless, if we analyze the monthly yields of stock market indexes in the EEE between 12/2013 and 12/2019, we notice mainly a moderate or low correlation among them (see Table 2.3). In these small stock markets, idiosyncratic factors are significant. We see a higher yield correlation among the more developed stock markets (Austria, France, Germany, Czechia, Hungary and Poland). This is in line with Baele, Bekaert and Schäfer (2015), who showed considerable heterogeneity across the EEE .

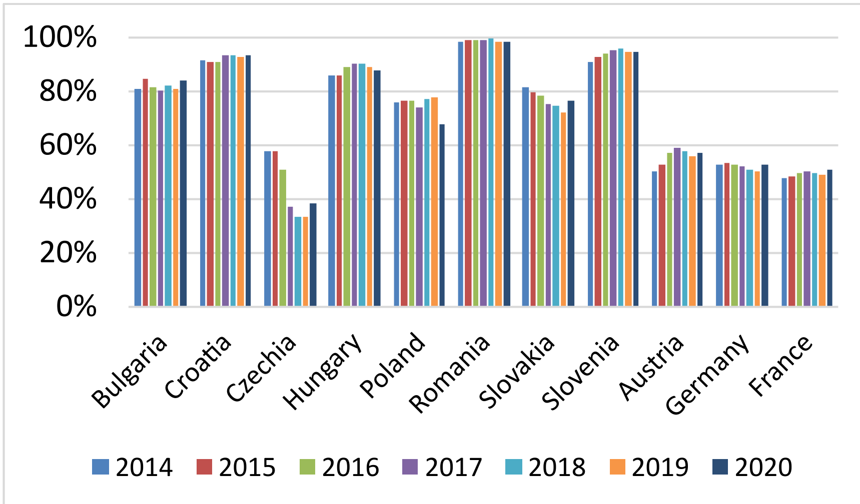
Table 2.3: The correlation of stock market indexes' monthly yields in the EEE
Data: Bloomberg L.P. (n.d.-c)

	BG	HR	CZ	HU	PL	RO	SK	SI	AU	FR	GE
BG	1.0										
HR	0.1	1.0									
CZ	0.1	0.2	1.0								
HU	0.1	0.2	**0.6**	1.0							
PL	0.3	0.4	**0.6**	0.5	1.0						
RO	0.0	0.3	0.3	0.3	0.4	1.0					
SK	0.0	0.0	0.1	0.1	0.2	-0.1	1.0				
SI	0.2	0.4	0.5	0.4	0.5	0.4	0.0	1.0			
AT	0.1	0.2	**0.8**	**0.6**	**0.6**	0.4	0.2	0.4	1.0		
FR	0.1	0.2	**0.7**	0.4	0.5	0.4	0.1	0.4	**0.8**	1.0	
DE	0.1	0.2	**0.6**	0.4	0.5	0.3	0.1	0.5	**0.8**	**0.9**	1.0

2.3.2.3 Securities Markets

Among the securities, the government bond market is the most developed in the EEE. The relative level of government bond nominal value depends on the indebtedness of the given country's general government. The size of government capital market funding precedes other sectors (non-financial corporations and credit institutions). Another characteristic is that the share of government bonds within bonds of the total economy is quite stable. The most significant change happened in Czechia; however it was not due to an increasing share of private sector bond issues but was due to the switch in the monetary policy tools of the central bank, which started to issue bonds on a large scale in 2017 (see Figure 2.11). In this Figure, we use general government data. With the exception of Germany, the predominant part of general government bonds are central government ones. In Germany, due to the federal state structures, local government bonds are also significant (cc. 25%).

Fig. 2.11: Share of general government bonds within bonds of the total economy
Data: Eurostat (2021)

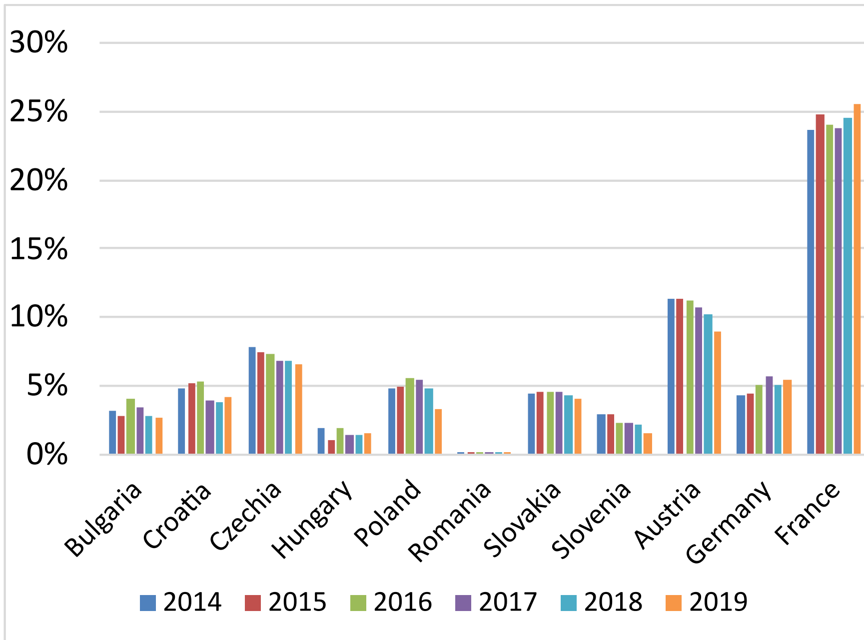


The EEE and the peer developed countries traditionally have bank-based financial systems. However, in times of crises in the bank sector, this feature may indicate a weakness of these economies when a credit crunch occurs. In such conditions, a shift from bank loans to bonds might be an attractive change. Accordingly, policies are required to develop capital markets as an alternative source of financing (e.g., at the European level, the already mentioned CMU).

Yoshitomi and Shirai (2001) found that in the case of South-East Asia after the banking crisis of the 1990s, a considerable portion of financing bank loans was substituted with bonds. In the EEE, we see a stable underdeveloped non-financial corporate bond market. Only in Czechia, was there some substitution between 2009 and 2014 (Mačí & Hovorková, 2017). Figure 2.12 compares the outstanding amounts of non-financial corporation bonds (at nominal value) to GDP. Not even Austria and Germany, which are used for comparison, have developed bond markets to finance the real economy. There were some country-level policy initiatives to develop the corporate bond market with limited success. For example, the Central Bank of Hungary launched a corporate bond purchasing program in mid-2019. As a result, the ratio of non-financial corporate bonds to GDP increased from the very low 1.4% of 2018 to 3.1% of 2020.

As regards the bonds issued by financial corporations and the corporate stock market capitalization to GDP ratios, we can observe similar trends. Most of the changes we discovered in Section 2.2.1 as post-GFC structural changes between 2010 and 2019 in relation to both financial corporations' bond issue and stock market capitalization happened during the early 2010s, and there were no further

Fig. 2.12: Nominal value of non-financial corporation bonds to GDP
Data: Eurostat (2021)



significant changes between 2014 and 2019. That is, the Tables 2.10 and 2.12 well describe the significance of capital markets in the EEE for the entire period.

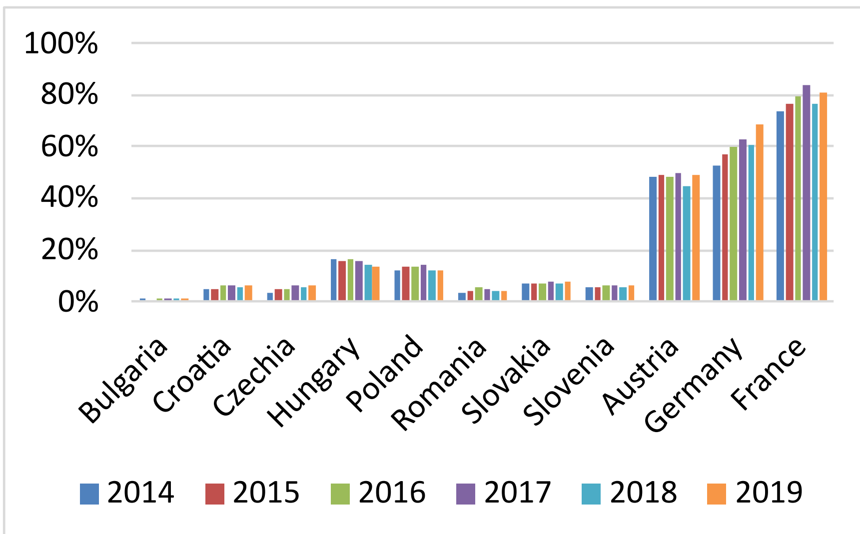
2.3.3 Investors – the Asset Management Industry

Investors (retail, pension funds, life insurance companies, non-financial companies, and foundations) in capital markets generally make investments via different types of funds. Therefore, we focus on investment funds of the asset management industry. Domestic/foreign differentiation has three levels:

- Asset managers and their funds are foreign or domestic; we have data from the domestic (national) asset management industry;
- Investments of the funds are foreign or domestic; we do not have this data breakdown;
- Buyers of funds (final investors, except in the case of funds of funds) are foreign or domestic; we do not have this data breakdown either.

In this way, we analyze the asset management industry in the EEE independently from the country focus of their investment and the nationality of their buyers. Net assets of investment funds in the EEE to GDP show a strongly underdeveloped situation (see Figure 2.13). The relative stance of France and Germany increased due to their fund industry growth. Only in Hungary and Poland is there a visible local asset management sector. However, Czechia has developed rapidly from a very low level. Alternatively, analyzing the volume of assets under management, in the EEE, Czechia already reached third place after Poland and Hungary by 2019. Behind the underdevelopment, there are also demand and supply factors: the relatively low level of financial savings of households, demand for more traditional products (bank deposits), strong government bond market, and supply of foreign asset management products (cross border services). In Hungary, its share of the fund market decreased. This is a good example of how a solid retail government bond market with attractive products, strong sales channels, and tax incentives could crowd out other forms of savings. In Hungary, the correlation of monthly government bond and mutual fund transactions is negative (-0.57) from 2014 to 2019.

Fig. 2.13: Net assets of investment funds (UCITS & AIF) to GDP
Data: EFAMA (2020)

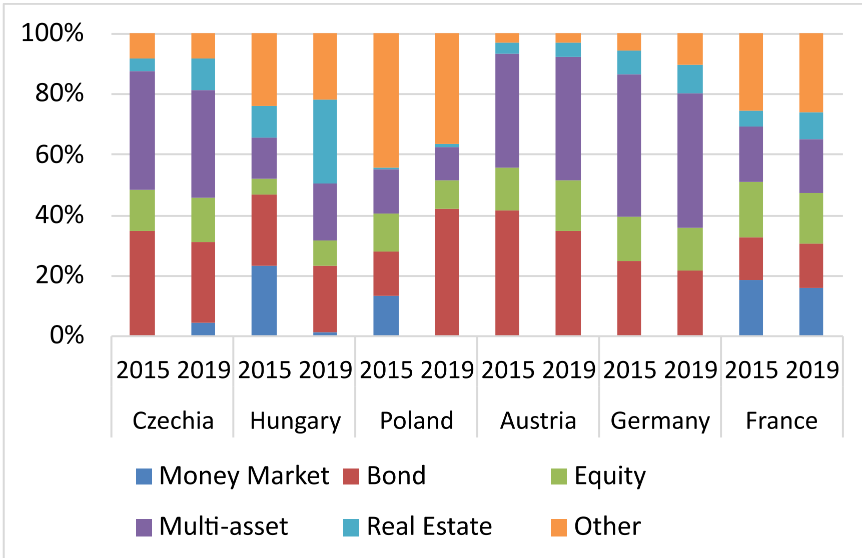


Regarding the composition by fund type, we analyze only three more developed markets in the EEE (Czechia, Hungary, and Poland) and exclude the tiny local markets (see Figure 2.14).

The composition of funds is mostly country-specific. We perceive only some general tendencies:

- Due to the MMF regulatory change: MMF funds ceased to exist in Hungary and Poland. In France, they remained active.

Fig. 2.14: Net asset composition by fund type (UCITS & AIF)
Data: EFAMA (2020)



- Bond and equity funds are important investment vehicles in all countries. Equity funds are the least developed in Hungary.
- The significance of multi-asset funds shows a great variety.
- Hungary is an outlier in terms of large real estate funds.
- According to EFAMA detailed statistics, other assets are very significant in Poland, of which almost 90% are private equity funds. The remaining part is related to securitization products, as securitization plays a special role in Poland, where primarily the non-performing assets are securitized, and the resulting securities are purchased by specialized securitization investment funds (Buszko & Krupa, 2016). This means that the debt collection market in Poland operates through these special investment funds and not through debt collection companies, as in the other eight members of the EEE.
- In the case of France, the bulk of other assets is securitization-related items, and the second largest part contains special long-term care and retirement products. In Austria, the most important other fund category is the absolute return innovative strategies (ARIS) fund. In Czechia and Germany, data for the more detailed composition of other funds are not available.

The post-GFC private equity market of the EEE recovered in 2017-2019. The main private equity market (in million EUR) of the EEE is in Poland and in Romania, followed by Hungary and Czechia. Hungary is an outlier in terms of the number of invested companies due to the large-scale government-sponsored seed investments. In 2019, private equity investments as a percentage of GDP were 0.59% in France, 0.44 in Germany, and 0.08% in Austria. In the EEE, the biggest share is in Romania (0.25%) and Poland (0.12%). Hungary is at the level of Austria (0.89%). The other countries are far below the Austrian level (InvestEurope, 2020).

2.4 Covid and EEE Financial System

2.4.1 Banks

2.4.1.1 Covid-related Regulatory Measures

The so-called CRR quick fix is the EU Commission's regulatory package, accepted in April 2020, adopted to mitigate the effect of Covid and to facilitate lending during the pandemic. It contains temporary ways of easing of the CRR's measures. Some of them are not relevant for the EEE (for example, those that relate to the Global Systematically Important Institutions, G-SIIs). However, some are important for the region. These items relate to leverage ratio calculation, as well as the application of favorable treatments for non-performing exposures guaranteed or counter guaranteed by public sector entities. It also allows easing the effects of IFRS9 accounting rules, permitting members not to use automatically the expected credit loss concept for provisioning during the pandemic. Besides the CRR amendments, the EU Commission's communication confirmed that they encourage banks and their supervisory authorities to exercise the flexibilities enabled by the quick fix (European Commission, 2020), i.e., practice regulatory forbearance, however, only for loans under the member states' legislative or non-legislative moratoria. Further CRR related measures, in line with the similar modification of the Basel Framework, were brought in to defer the introduction of some regulatory tools, which were to be introduced from 1st January 2022 to 1st January 2023, as well as to push back the transitional period of introduction output floors from 2022-2027 to 2023-2028.

The other stream of Covid-induced regulatory items is the introduction of different kinds of public (legislative) and private (non-legislative) moratoria. At first sight, the moratorium seems to be in favor of consumers rather than banks. Nevertheless, considering it together with the non-automatic application of the expected credit loss approach to NPLs provisioning, it is clear that it is also in favor of banks, since there are no or limited provisioning costs for the loans under moratoria. That is, the costs of provisioning are not paid by the banks during the period of moratorium. Moreover, the full loan stock under moratorium continuously generates interest income for banks. The logic of moratoria and the related provisioning easing is that the pandemic causes only temporary losses, accordingly, once it is over, debtors' creditworthiness recovers, and after the pandemic they will be able to fulfill their repayment obligations. In this case, due to debtors' post-Covid recovery, reclassification of the loans under moratorium would result in post-Covid over-provisioning. The measures actually ease the burdens of the banks and increase their lending potential, however, at the same time, they hide potential losses, and accordingly they act against the transparency of potential risks. The scope, the length and the specificities of moratoria are different within the EEE, nevertheless, all of them applied some form of them.

For the uniform management of the possibility for deviation from IFRS9 for loans under moratoria, EBA (2020a) issued guidelines on how banks should tackle non-performing loans. The Guidelines were applicable from 2nd April 2020. They define the concept of general payment moratorium as one which is in line with the following: the credit under moratorium was granted before the introduction of the moratorium; the moratorium has to apply to a broad range of borrowers, not only to certain selected borrowers; the participation for borrowers; has to be voluntary the same moratorium has to grant the same conditions to all participating clients; and the moratorium may change only the schedule of the payment, but no other conditions. In relation to moratoria in line with the EBA definition, banks are allowed not to reclassify the loans under moratorium as stage 2 loans, and accordingly, there is no automatic provisioning obligations for them in contrast to the general rules of IFSR9 provisioning. However, the forbearance cannot be full-scale: it merely means that non-repayment of loans under moratoria does not automatically trigger reclassification to stage 2. Banks have to carefully monitor their portfolio under moratorium and provision them, if necessary. However, since the reclassification rules were relaxed, to a large extent it has been up to the banks how and when they reclassify the loans and, accordingly how much provision they make.

This type of regulatory forbearance was applied in all members of the EEE, that is, the loans under moratorium did not become massively non-performing. The original deadline for the expiration of the moratoria was 30 September 2020, that is, it was planned for six months. Later, it was extended twice. The last extension allowed the application of the EBA Guidelines until 31 March 2021. In most countries, including six of the eight members of the EEE, that was the actual end of the moratorium, however, in Bulgaria and in Hungary it was extended further.

2.4.1.2 Practices with Moratoria in the EEE

Although all members of the EEE applied moratoria to ease the debtors' burden and the eased provisioning rules in line with the EBA Guidelines, the practice of individual countries varied significantly. Besides the features of the country specificities that are overviewed in Table 2.4, the uniqueness of the Hungarian moratorium at its first stage before the first extension was that debtors automatically participated in the moratorium, and had to opt-out if they did not want to. In all the other countries, debtors needed to apply to opt-in to the moratorium.

The countries with public, legislative moratorium are Czechia, Hungary, Romania, Slovakia, and Slovenia, while in Bulgaria, Croatia, and Poland the moratorium is private, that is non-legislative. In Bulgaria and Poland the private moratorium is initiated and coordinated by the Bank Associations, while in Croatia it was the Supervisory Authority that issued Supervisory Guidelines for the moratorium.

Table 2.4: Some characteristics of loan moratoria in the EEE
Data: ESRB (2020); EBA (2020)

	Type of moratorium	Maximum period of non-payment (months)	from	to
Bulgaria	non-legislative	6	10.04.2020.	31.12.2021.
Croatia	non-legislative	3-6; up to 12 for tourism	31.03.2020.	31.03.2021.
Czechia	legislative	3-6	01.04.2020.	31.10.2020.
Hungary	legislative	until the end of the moratorium	18.03.2020.	31. 08.2021.
Poland	non-legislative	6-9	13.03.2020.	31.03.2021.
Romania	legislative	1-9	31.03.2020.	31.03.2021.
Slovakia	legislative	9	12.03.2020.	31.03.2021.
Slovenia	legislative	9-12	29.03.2020.	31.03.2021.

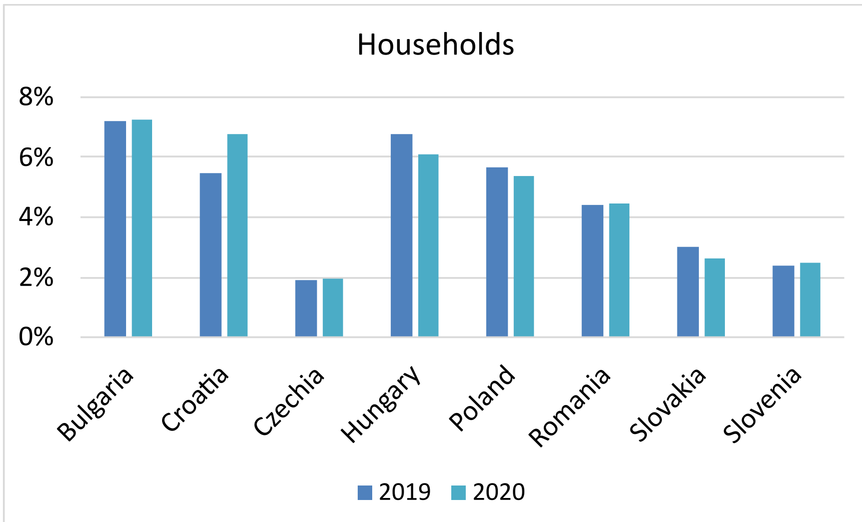
Czechia had the shortest moratorium in the EEE. It was in force between 26 March and 31 October 2020. On its expiry, banks could decide to extend the non-repayment period on an individual basis. The legislative extension of the moratorium was proposed but rejected by the legislation. However, in Czechia direct grants were the main tool for helping households and companies, rather than credit easing. In the other countries, there were several extensions of the originally introduced moratorium. The most typical extensions were in line with the EBA Guidelines, that is until 31 March 2021. The longest extensions were given in Bulgaria and Hungary.

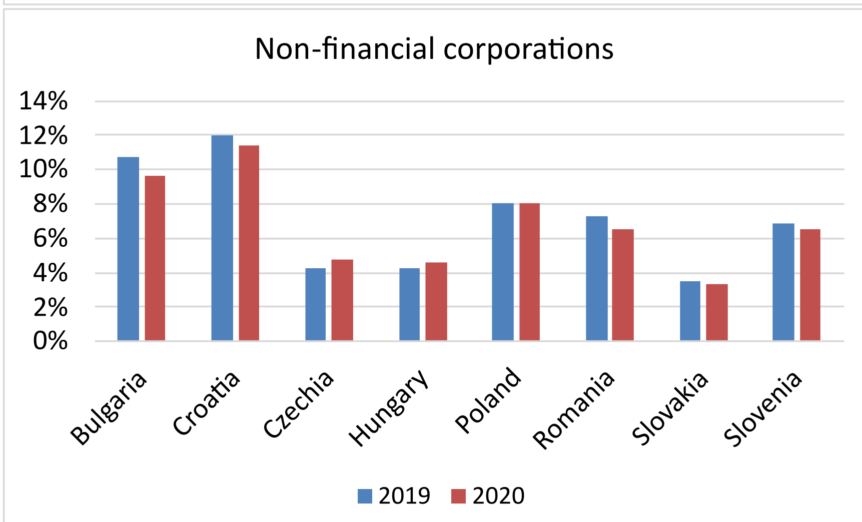
According to the EBA report on the experiences of the moratorium (EBA, 2020b), as of June 2020, within the EEE the highest proportion of retail and corporate loans under moratoria as a percentage of total retail and corporate loans were found in Hungary (more than 20%), while it was significantly above 10% in Croatia and Romania, and around 10% in Bulgaria and Poland. As regards the peer countries, it was between 5 and 10% for Austria and France and below 5% for Germany, i.e., the EEE used the moratoria more widely than their peers. The highest Hungarian ratio may be the consequence of the opt-out option instead of opt-in for debtors.

2.4.1.3 Non-Performing Loans (NPL) during the Pandemic

Due to the eased regulation and fiscal grants to debtors, the rate of non-performing loans did not accelerate in the EEE; instead their level remained stable over 2020 (see Figure 2.15). There are countries with increasing (Croatia), and some with decreasing (Hungary and Poland) levels, however, there were no extreme changes in either direction.

Fig. 2.15: Household and corporate non-performing loans (%)
Data: European Central Bank (2021a) and MNB (2021)





Another option to view the riskiness of the NPLs is to evaluate the NPL coverage ratio, that is the volume of loan loss provisions to the gross NPL. The higher the level of provisions, the lower the related risks, since besides the capital it is the provisioning that can absorb losses.

Table 2.5: Non-performing loans coverage ratio
Data: Vienna Initiative (2021)

	NPL coverage ratio, 2020	Change in NPL coverage ratio, 2020 (%) - 2019 (%)
Bulgaria	46,0	-1,6
Croatia	83,3	1,5
Czechia	53,6	-1,8
Hungary	70,4	4,2
Poland	69,6	0,3
Romania	61,8	0,0
Slovakia	64,7	-0,3
Slovenia	81,7	-0,4

As Table 2.5 shows, from this point of view Bulgaria is the riskiest country, as its high NPL ratio goes together with low provisioning. Moreover, despite these unfavorable figures, Bulgarian banks decreased their provisioning coverage in 2020. High NPL ratios are characteristic of Croatia, however, at more than 80% its NPL provisioning ratio is the highest within the EEE, . The second lowest NPL coverage ratio is the Czech one, however, due to the permanently low level of household and corporate NPL ratios, it does not seem risky.

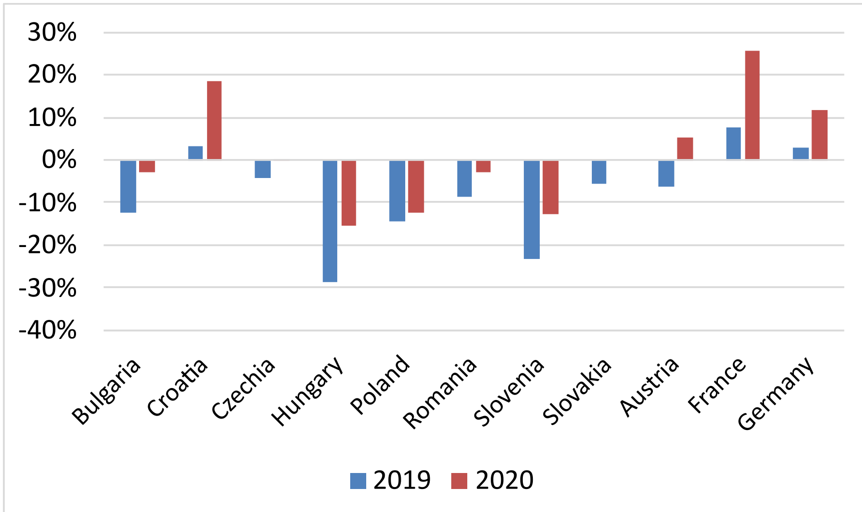
Nevertheless, since the NPL definition relates only to stage 3 loans (at least 90 days past due) both the NPL levels and the NPL coverage ratio reveal little about the scope of supervisory forbearance and banks' provisioning practices in relation to stage 2 loans, that is, about the accumulated hidden losses during the pandemic.

2.4.1.4 Lending During the Pandemic

Due to the moratoria and wide-scale fiscal grants that were intended to help households and companies to survive the pandemic, the credit-to-GDP gap moved upwards considerably in all countries. Where it had been positive pre-Covid, it increased further (Croatia, and France and Germany of the peer countries). In all the other members of the EEE (with the exception of Slovakia, for which we have no data) it converged to its trend value (see Figure 2.16). However, this is not due to closing the gap in cyclical terms, but due to moratoria, state guarantees, other temporary fiscal grants, and the macroprudential measures that increased the banks' lending capacity (see Chapter 6 of this volume).

The trends in granting new loans, other than renewing loans under moratorium, varied in the EEE. For example, in Croatia construction industry loans increased at the highest rate due to public investments and residential home constructions after

Fig. 2.16: Domestic credit-to-GDP gap (%)
Data: European Central Bank (2021b)

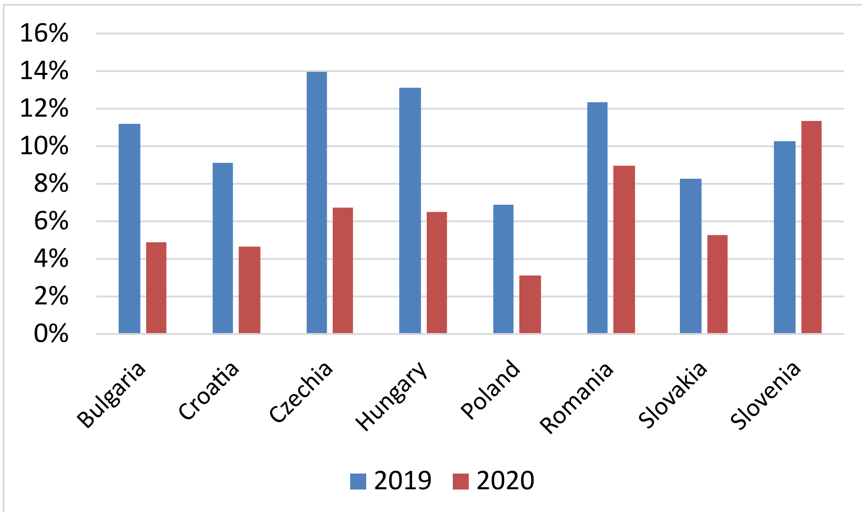


the earthquake. In Hungary, the newly granted loans increased due to two special programs: the very favorable loans provided to young married couples within the government's new childbirth initiative program, and the central banks' new Funding for Growth Scheme for companies. Without these two programs the new lending would have decreased in 2020. In Czechia, new loans to households, primarily for real estate purchase, increased significantly, while the loans to non-financial corporations also increased, although at a substantially decreasing rate. Overall, besides similarities in regulatory easing, differences between members of the EEE are prominent. Not only the GFC, but also the Covid-induced crisis hit the region differently and resulted in diverging trends in NPLs and in lending processes.

2.4.1.5 Banks' Profitability during the Pandemic

By 2019, the banks in the EEE had become highly profitable: some realized double digit returns on equity (RoEs), others close to 10%. At 7%, the lowest RoE was in Poland. In 2020, the banks' profitability deteriorated significantly in all eight countries, however, it remained positive. With the help of regulatory easing, governments' fiscal measures and with central banks providing ample and cheap liquidity, they could preserve their profitability. Slovenia is the only country where banks even increased their RoE slightly, and where even in 2020 it remained double-digit (see Figure 2.17). However, with the end of moratorium and the allowed supervisory forbearance in relation to expected credit loss-based provisioning, it is highly questionable whether the profitability will be able to remain positive in the next years, or it will turn negative in several members of the EEE, especially in those that utilized the moratoria the most.

Fig. 2.17: Return on Equity (%)
Data: European Central Bank (2021a) and MNB (2021)



2.4.1.6 Banks' Capital Position

The capital position of banks typically strengthened during the pandemic due to their profitable operation and the restrictions on dividend payments and share buybacks, which means that all the after-tax profits became part of retained earnings, i.e., capital. The Bulgarian solvency ratio increased the most, while it showed a slight decrease in Hungary and Slovenia (see Table 2.6). However, the post-pandemic pressure is expected to lead to higher dividend payments to compensate shareholders for the unpaid years. Moreover, as the moratoria end in all countries and the loan portfolio is revaluated in line with the real riskiness, it is also possible that internal models used for capital requirement calculation also result in higher capital requirements, i.e., a lower solvency ratios.

2.4.1.7 Managing Non-Performing Loans post-Covid

The moratoria postponed the realization of Covid-related losses; however, it is clear that the recovery will not be so wide-scale as to be able to eliminate most of the losses. According to the ECB (2020) estimation, without fiscal measures, by mid-

Table 2.6: Solvency ratio of banks
Data: European Central Bank (2021a) and MNB (2021)

	Bulgaria	Croatia	Czechia	Hungary	Poland	Romania	SLovakia	Slovenia
2020	23,06	23,24	22,10	18,28	19,57	23,54	19,33	18,29
2019	19,47	22,47	19,69	18,40	17,84	20,96	17,97	18,54

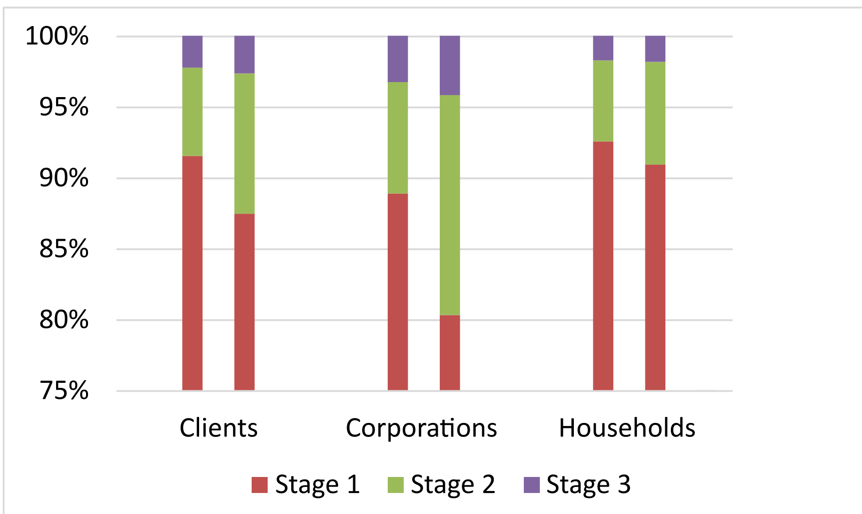
2021 about 9% of the Eurozone's total loans could be non-performing. The high loss potential stresses the importance of the question of how to tackle the stock of NPLs accumulated during the pandemic after the expiry of moratoria. To manage the problem, in December 2020, the European Commission published its Action Plan on tackling NPLs after the pandemic (European Commission, 2020b). It determines four main goals. They are as follows:

1. Develop the secondary market for NPLs in order to promote banks' balance sheet cleaning. In this way, banks would be able to focus on lending instead of work-out activity. Practically, this means promoting NPL securitization. This is a more advanced way of portfolio cleaning than simple loan-selling, which is typical in the EEE, as we have shown earlier.
2. Harmonization of EU corporate insolvency and recovery legislation. This could contribute to the success of the first goal. This is not a new idea, however, not much development has been seen so far.
3. Initiate the establishment of national Asset Management Companies that buy bad loans from banks. This also aims to clean up the banks' balance sheet. Besides, the Commission suggests establishing an EU-wide network of national Asset Management Companies with the aim of sharing information, including best practices and standards, as well as the cross-border cooperation of creditors.
4. apply precautionary measures under the existing state aid and bank recovery framework. Under the general rules of state aid, Asset Management Companies, if they use public guarantees, could buy the banks' portfolio at its real economic value. The Commission suggests some simplified rules for determining this value. As regards the banking resolution framework, as a base case it allows to receive public support only for failed and likely to fail banks. However, in some rare cases it allows to provide public sources without declaring the insolvency or the high likelihood of insolvency. According to the Commission's Action Plan, the pandemic can be treated as such a rare case.

The EU Action Plan is well balanced in the sense that it contains both private sector (NPL securitization and secondary market development) and public sector measures (asset management companies and precautionary measures). However, as in the EEE, financial markets are significantly less developed than in the more developed EU member states, and where securitization is almost non-existent, it is very likely that public measures are expected to spread more than the private measures of the Action Plan.

The need for applying the above measures of the Action Plan also depends on the severity of the post-Covid NPL problem of the EEE. Czechia is the first country where the moratorium expired, on 31 October 2020, and therefore has experience with post-moratorium processes. Since the Czech banking sector is outstandingly stable, profitable, and has the lowest NPL ratio in the EEE, its experience is an indicator for the region. The Czech data show a 64% increase in stage 2 loans during 2020, dominantly for corporate loans. However, this also means that the transparency of credit risk has become higher, i.e., hidden risks could be uncovered. As of 31 March, 58%, of loans that were under moratorium could be continuously categorized as stage 1, the remaining 42% was transferred to stage 2, or in a few cases, to stage 3 (see Figure 2.18).

Fig. 2.18: Czech loan structure by stages
Data: Czech National Bank (2021)



According to the Czech central bank, the Czech banking sector is able to tackle these amounts and to lend to the Czech economy post-crisis, due to its persisting profitability and the restriction on dividend payments in the Covid period (see the macroprudential measures in Chapter 6 of this volume), which strengthened further the banks' capital base . The main question in this respect is whether there will be a further transition from stage 1 to stage 2, and from stage 2 to stage 3. If not, then the unfavorable conditions for the EEE of the EU NPL Action Plan are unlikely to cause a major problem for Czechia. However, for other members of the EEE the case could be worse, as the real amount of hidden credit losses will be revealed only in the following periods.

2.4.2 Capital Markets

2.4.2.1 Covid-related Capital Market Regulatory Measures

The COVID related regulatory measures on the EU level have been formulated as the so-called Capital Markets Recovery Package, or “COVID quick fix”. Its measures can be divided into two groups. The first aims to ease the information and disclosure requirements to help companies access financial markets during the post-COVID recovery period. The second aims to create a capital markets regulatory framework that can effectively help post-Covid recovery by easing the use of securitization. The most important item in the latter is the extension of the EU framework for simple, transparent and standardized securitization also to synthetic securitization. However, since in the EEE there is no, or only negligible synthetic securitization, at present it is not relevant for the region. The securitization regulation is also related to the post-COVID treatment of non-performing loans, as explained in section 2.4.1.7. Besides the special COVID-related regulatory items, one out of the four main focus points of the second Action Plan of the European Capital Markets Union, published in September 2020, is the recovery from COVID through well-functioning, green and digital market-based finance. However, this does not mean incorporating special COVID-rules into the Action Plan, but it stresses the corporate sector’s need for stable funding structures in order to be able to survive shocks.

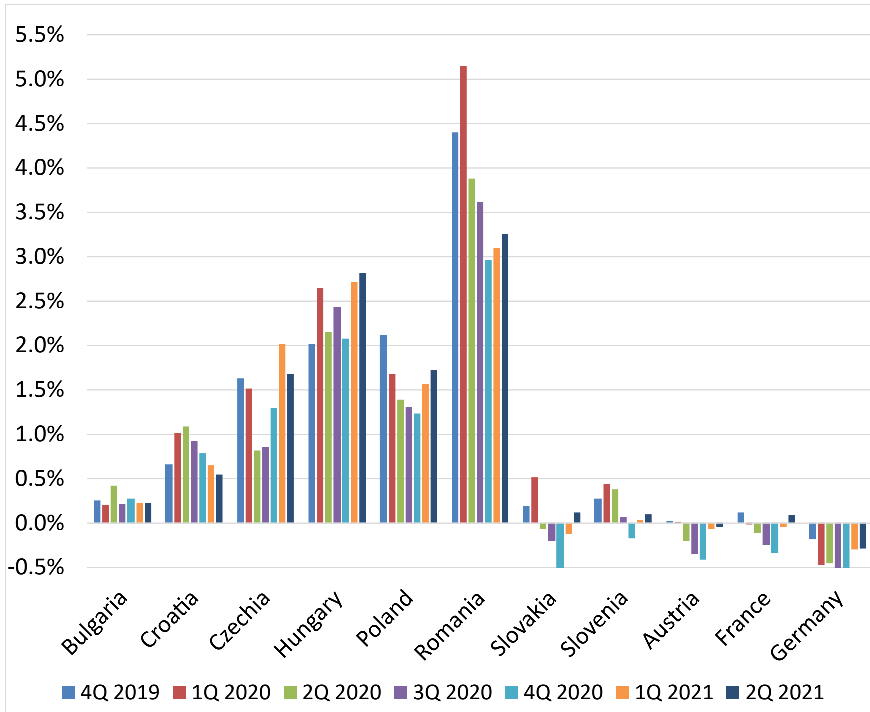
2.4.2.2 Capital Market Developments

The COVID-19 pandemic hit financial markets to unprecedented extent in Q1 2020: the collapse of the markets affected not only market valuation but entailed an upswing in volatility and liquidity contractions. Very significant fiscal, monetary, and regulatory policy responses in the EU successfully mitigated the first impact of the pandemic. In Q2 2020, markets showed a remarkable rebound.

As a result of the massive bond market intervention of central banks (treasury security purchases in Croatia, Hungary, Poland, and Romania), the long-term sovereign debt market stabilized successfully despite the very sharp real economic contraction and unprecedented fiscal stimulus (see Figure 2.19). The average fiscal support in the EEE was in line with that in the EU27 (for the details of macro policy measures, see sections 6.3.1. and 6.3.3.). As a result, public indebtedness also rose in the EEE . In 2020, the nominal value of general government bonds to GDP increased significantly due to the rising indebtedness and shrinking GDP in most members of the EEE , however, to very different degrees (by 3 and 4% points in Poland and Bulgaria, while by 16% points in Slovenia).

In general, in a stress situation, the interconnectedness of equity markets is substantially reinforced compared to normal periods. In the Covid period as well, we see a high degree of co-movements between the EEE and developed countries. The only outlier was the small Slovak equity market (Table 2.7).

Fig. 2.19: 10-year government bond yields at the end of the period
Data: Bloomberg L.P. (n.d.-a)



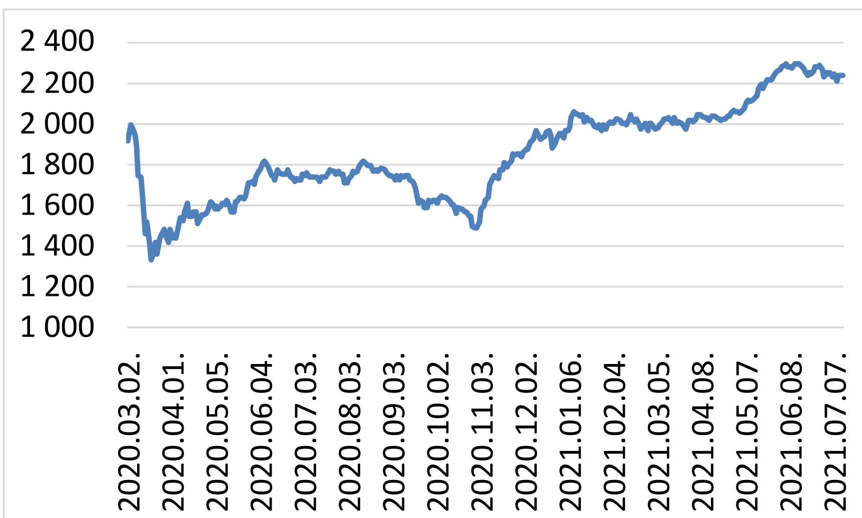
The recovery of equity markets was so robust that by May 2021, most of the stock market indexes exceeded the pre-Covid value (31/12/2019). Only Bulgaria and Croatia remained slightly below the pre-crisis index value. The region's blue chips index shows a similar pattern: after its approximately 30% fall in March 2020, a period of recovery soon started. Between April and November 2020, the CETOP index fluctuated in the 80-90% band of its pre-crisis value, while in the first quarter of 2021 it was around its pre-Covid values. By Q2 of 2020, it significantly exceeded those values (see Figure 2.20).

The far largest bond market segment, the government bond market, expanded substantially during the Covid shock due to the rising government indebtedness of states and supportive monetary policy. However, in most countries rising government bond issuance generally did not crowd out non-financial bond issuance. We see a shrinking corporate bond market only in Czechia and Poland (in Slovenia, the market is very insignificant). In the other countries, there was a net issuance in 2020. Due to the low corporate bond penetration (very low basis value) in some members of the EEE (see Figure 2.12), growth rates are misleading. E.g., in Romania, despite the rocketing growth rate, the corporate bond to GDP ratio is still 0.4%. The only

Table 2.7: The correlation of stock market indexes' monthly yields between February and December 2020 in the EEE
Data: Bloomberg L.P. (n.d.-b)

	BG	HR	CZ	HU	PL	RO	SK	SI	AU	FR	GE
BG	1.0										
HR	**0.9**	1.0									
CZ	**0.8**	**0.9**	1.0								
HU	**0.8**	**0.9**	**0.9**	1.0							
PL	**0.6**	**0.9**	**0.9**	**0.9**	1.0						
RO	**0.8**	**0.9**	**0.9**	**1.0**	**0.9**	1.0					
SK	0.5	0.5	0.2	0.5	0.1	0.5	1.0				
SI	**0.8**	**1.0**	**1.0**	**0.9**	**0.9**	**0.9**	0.3	1.0			
AT	**0.8**	**0.9**	**1.0**	**0.9**	**0.9**	**0.9**	0.2	**0.9**	1.0		
FR	**0.6**	**0.9**	**0.9**	**0.8**	**0.9**	**0.8**	0.1	**0.9**	**0.9**	1.0	
GE	**0.7**	**0.9**	**0.9**	**0.9**	**1.0**	**0.9**	0.2	**1.0**	**0.9**	**0.9**	1.0

Fig. 2.20: The CETOP index
Data: Budapest Stock Exchange (2021)



material increase in volume was seen in Hungary (by cc. EUR 2 billion) largely due to the already mentioned central bank corporate bond purchase program.

Credit institution bond issuance is significant in Czechia, Hungary, Slovakia, and Slovenia. Except for Slovenia, we see relatively stable activity during the Covid shock.

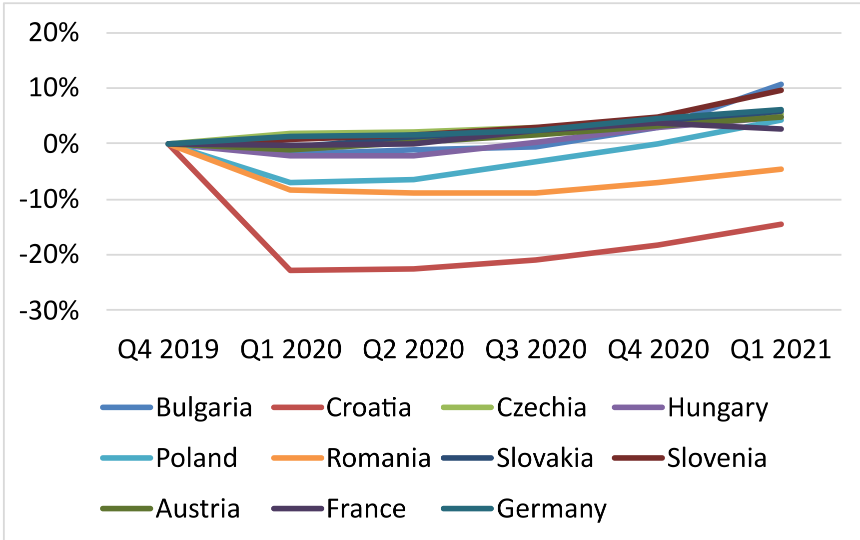
Table 2.8: Change in the outstanding nominal amount of bonds
Data: (Eurostat, 2021)

2020/2019	BG	HR	CZ	HU	PL	RO	SK	SI	AT	DE	FR
Non-financial corporations	103%	97%	91%	187%	87%	1639%	109%	91%	124%	117%	111%
Credit institution	110%	NA	100%	108%	79%	75%	102%	79%	103%	115%	93%

In the European fund market, after a short period of redemption in March-April 2020, the investment confidence rebounded, and the net sales of funds became robust during the remaining part of 2020. Net sales were strong in equity and multi-asset categories, while bond fund sales underperformed. In most of the analyzed countries, we see the same tendency except three outlier countries (Figure 2.21).

In Poland, after the first shock, the recovery was slower, but by the end of 2020, they had also recovered. In Croatia, there was a very strong outflow from bond funds and the cumulative net sales are still significantly negative, We can see a similar trend in Romania, but to a lesser extent. In Croatia, the bond market was severely hit by the crisis. In April 2020, a state-guaranteed Stability Fund was established for the redemption of bonds or other market instruments to ensure additional liquidity of funds in case of new larger investment outflow. The policy action was successful; this was followed by a slowdown in the redemption of funds.

Fig. 2.21: Net cumulative sales of investment funds (UCITS & AIF) as a percentage of 2019 year-end stock
Data: EFAMA (2020)



Because of their illiquid assets, in the EEE retail real estate funds are the most exposed to runs. Therefore, we have analyzed the net sales of these funds, where this market segment is not negligible (above 5% of funds): Czechia, Hungary, Slovakia, and the three developed countries. We have found the crisis did not hit this market segment. The largest redemption happened in Hungary, but by the end of 2020 the market recovered.

Overall, the Covid-induced crisis - in line with global trends - was surprisingly short on EEE capital markets, with speedy recovery from the second half of 2020.

2.5 Conclusions and Longer-Term Perspectives

The financial systems of the EEE were highly bank-based before joining the EU and remained highly bank-based throughout the buildup and aftermath of the GFC and the 2010s. In this respect Covid did not bring any change. The main trends that characterized the financial systems of the most developed countries pre-GFC, that is, the emergence of market-based banking and shadow banking, to a limited extent have also become typical of the EEE. As a result, the more substantial lag for capital markets than for banking also remained a prominent feature of the EEE. In the wake of the GFC, convergence to developed countries' financial systems both in terms of depth of financial intermediation and in the level of financial development was limited throughout the region. However, besides these basic similarities, we have identified several country-specific differences, which seem to raise the question whether the financial system in the EEE can be described as a single region.

The role of financial system was very different in the two crises. In the GFC, the financial system was mostly blamed for the crisis, and most of the lessons learned from it were related to the institutional framework and the making of financial regulation in order to limit the incentives for regulatory arbitrage and the risk taking of financial institutions and market participants. As a result, the regulation of banking and financial markets was substantially renewed, both in relation to the micro- and macroprudential levels. In addition, several new regulatory and supervisory institutions were established, also for the micro- and macroprudential level. The attitude of the members of the EEE to these changes was different, which is well represented, for example, by their different approaches towards the Banking Union.

For the adjustment to the new prudential regulations, a long transitional period was provided, so that they should not cause sudden changes to industry. This is why the new regulations had not been fully implemented when the Covid-induced crisis started. Despite the lack of the full-fledged implementation of the regulatory framework, there were no major financial industry- or capital market-related failures due to Covid. However, this was not only thanks to the fact that the regulation already provided sufficient stability to the financial system even in this mostly implemented form, but also due to the regulatory easing, supervisory forbearance, and the direct state grants provided for the private sector (companies and households). That is, we do not know to what extent the financial sector was equipped to resist a crisis. Nevertheless, higher capitalization and more stable funding structures definitely made banks more crisis-resilient, and the coordinated crisis management measures of regulators, governments, central banks, and market participants made crisis management effective. However, the success of crisis management is not straightforward. The moratorium-related suspension of IFRS9-conform provisioning built up significant hidden losses for the future that may cause huge problems in forthcoming years. The Covid-crisis also showed that to break the vicious circle between sovereigns and financial institutions is not a project completed by the establishment of the Banking Union. The scope and timing of the moratorium was different in individual members of the EEE, and the materialization of hidden risks is still unknown.

Among the peculiarities of the Covid-crisis, we should mention its contradictory effect on banks and capital markets. Without the moratoria and the related measures, banks would have suffered huge losses that could have had an adverse effect on the entire economy. However, as the moratorium and the direct grants in most countries were open to all, not only to the neediest, for the less needy persons and entrepreneurs it opened the door to more extensive investment activities. That is, in Europe the moratorium and the direct grants to the private sector might have played a similar role to the helicopter money in the US: they increased the money available for capital markets' investments. It is a related question whether this was really a countercyclical effect, which temporarily calmed the capital markets. It also remains to be seen whether in the post-Covid economic growth stock prices will continue to increase or with the drying up of the additional money provided by the moratorium and the grants, the trends will be reversed.

As a longer-term effect, we can observe that the pandemic has significantly strengthened three already existing trends. They are as follows:

1. The fast advance of digital financial services. The digitalization of finances is not a new phenomenon, however the lockdown and the fear of personal administration contributed to its fast and wide-scale use.
2. Advance of cross-border services. This is not a new phenomenon either. As fintech companies work globally, the spread of cross-border financial services characterized the pre-Covid period. However, with the lockdown and peoples' more openness to digital services it could develop faster and wider. The EEE generally tend to be host countries rather than the home countries of these companies. Thus, the competition of these companies means a great challenge to the domestic financial sector of the EEE.
3. There are signs that the pandemic increased the environmentally conscious attitude of people, which encouraged the banking and capital markets to turn towards the adoption of ESG (environmental, social and governance) programs.

Since these trends are not new, it is highly probable that their advancement will not be reversed after the Covid pandemic, instead their effect on the acceleration of positive trends will be lasting.

Annex

Table 2.9: Types of financial intermediation to GDP in EEE countries, Austria, France, Germany and the Euro area, 2010.
Data: ECB (2021); Eurostat (2021); World Bank (2021); BIS (2021)

	2010				
	private credit	**bonds: financial institutions**	**bonds: non-financial corporates**	**stock market capitalization**	**Total**
Bulgaria	68.52	1.08	1.71	14.64	85.96
Croatia	68.14	0.08	2.94	23.27	94.43
Czechia	46.32	17.37	4.40	42.71	110.80
Hungary	60.28	24.92	1.95	21.00	108.16
Poland	48.69	6.56	3.22	39.74	98.22
Romania	39.15			8.54	
Slovakia	44.67	5.18	0.73	4.61	55.19
Slovenia	85.05	13.43	2.14	19.58	120.20
Austria	98.19	87.77	15.83	32.16	233.95
France	95.85	67.22	18.17	72.33	253.57
Germany	88.49	68.87	4.95	42.10	204.41
Euro area	103.46	89.94	8.84	55.82	258.06

Table 2.10: Types of financial intermediation to GDP in EEE countries, Austria, France, Germany and the Euro area, 2019.
Data: ECB (2021); Eurostat (2021); World Bank (2021); BIS (2021)

	2019				
	private credit	**bonds: financial institutions**	**bonds: non-financial corporates**	**stock market capitalization**	**Total**
Bulgaria	49.74	1.13	2.64	23.29	76.8
Croatia	50.64	0.37	4.20	36.97	92.2
Czechia	54.41	48.98	6.49	10.66	120.5
Hungary	33.37	5.90	1.56	20.12	60.9
Poland	50.80	6.83	4.01	25.45	87.1
Romania	24.72			10.44	
Slovakia	62.89	12.01	4.01	2.95	81.9
Slovenia	42.45	1.67	1.50	14.63	60.2
Austria	85.55	41.17	5.39	29.90	162.0
France	105.25	61.87	25.68	84.87	277.7
Germany	79.72	40.42	25.68	54.34	200.2
Euro area	86.36	66.83	11.82		

Table 2.11: Number and market share of foreign banks in EEE countries, 2010. Data: ECB (2021)

	2010				
	Number of Foreign branches	**Number of Foreign subsidiaries**	**Total Assets of Foreign Branches (% of Total Assets of Banking Sector)**	**Total Assets of Foreign subsidiaries (% of Total Assets of Banking Sector)**	**Total Foreign Ownership of Total Assets (%)**
Bulgaria	6	16	4.29	69.99	74.27
Croatia					
Czechia	16	18	11.55	81.28	92.83
Hungary	10	18	7.16	50.89	58.05
Poland	21	39	4.79	63.21	68.00
Romania	9	23	6.86	74.85	81.71
Slovakia	14	13	6.92	93.04	99.96
Slovenia	3	8	0.95	26.16	27.11

Table 2.12: Number and market share of foreign banks in EEE countries, 2019. Data: ECB (2021)

	2019				
	Number of Foreign branches	**Number of Foreign subsidiaries**	**Total Assets of Foreign Branches (% of Total Assets of Banking Sector)**	**Total Assets of Foreign subsidiaries (% of Total Assets of Banking Sector)**	**Total Foreign Ownership of Total Assets (%)**
Bulgaria	5	12	2.25	78.36	80.62
Croatia	1	9	0.00	74.60	74.60
Czechia	25	17	9.21	85.07	94.27
Hungary	8	12	3.84	35.49	39.33
Poland	34	17	11.55	43.40	54.95
Romania	7	14	11.93	53.41	65.35
Slovakia	15	10	12.40	84.89	97.29
Slovenia	2	6	0.00	30.17	30.17

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Chapter 5
Transport and Mobility

Melinda Matyas, Daniel Hörcher and Jacek Pawlak

Abstract After the fall of communism, the Emerging European Economies inherited a transport sector characterised by low car ownership rates, heavy reliance on public transport, and a sparse infrastructure network. This chapter presents a systematic review of the evolution of transport policy through the region's EU accession, the 2008 financial crisis, and the Covid-19 pandemic. The transport sector is one of the major recipients of EU funding in the region's economies, but we observe that the objectives of territorial cohesion are not fully met due to inefficiencies in transport project appraisal and ex-post monitoring. This chapter puts an emphasis on emerging transport technologies, such as electrification, automation, and micromobility, alongside discussing the prevalence of online forms of activity participation. We argue that the density of public transport provision, the changes in spatio-temporal travel patterns during the pandemic, and the time lag in the adoption of travel habits, such as online shopping, offer an opportunity to leapfrog the challenges that are already visible in Western European cities. Towards this end, we present a number of policy recommendations aimed at the transport sector.

5.1 Introduction

Transport policy in the Emerging European Economies (EEE) is an isolated subject both in the academic literature and in the more widely accessible international media.

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Little is known about the EEE as a region itself in the global community of transport professionals, policy makers, and researchers. On the one hand, this is mainly due to the scarcity of transport-related academic publications and descriptive policy papers from the former Eastern Bloc. On the other hand, the economists and social scientists who specialise in Emerging European Economies often perceive transport and infrastructure provision as an engineering discipline, where the cost of highway construction or the benefits of improving the signalling system of a railway line are technological details of low relevance. Thus, the chapter has two parallel objectives: to reduce the isolation of the EEE in terms of research on transport policy, and to explain the economics of transport in the well-known context of the socio-economic development of this region.

Transport development in the EEE is poorly documented. One of the reasons is that the bulk of the discussions on transport policy remains within the national communities of researchers and policy makers, and few of the findings are disseminated internationally. In addition, due to the historical heritage of these countries, transport is still dominated by an engineering approach. Therefore, we find many more contributions from the region on the technological challenges of mobility. Broader questions, such as the societal impact of investments in transport and the economic efficiency of service provision, are still shyly dealt with by transport specialists in the region, constrained by the belief that these questions have to be addressed in the political sphere. The unfortunate consequence is that many transport-related decisions are distorted by this one-sided approach and, also, the outside world has little chance to become informed about key transport-oriented developments, challenges, problems, and opportunities in the region. In this chapter , we try to address these issues.

The role that transport policy plays in the economic development of the EEE is far more pronounced than its international visibility would suggest. Since the accession of these countries, investment in the transport sector has become the backbone of the cohesion policy of the enlarged European Union. It is among the main recipients of EU funding, and tens of thousands of kilometres of highways and railways have been built since the early 2000s with the aim of promoting territorial cohesion between the Western and Eastern parts of the Union. Do these investments pay off in terms of the social welfare induced in and outside the region? Who benefits the most from these investments? Are the goals of territorial cohesion *within* and *between* the member states achieved through infrastructure development? It is difficult to answer these crucial questions without a proper understanding of the transport sector in the EEEs.

Due to the scarcity of literature to rely on, we begin our discussion some- what earlier on the historical timeline than some of the other chapters of this book. We first enlist those unique characteristics of communist economies in the late 20th century that put the evolution of regional mobility onto a different path compared to Western Europe. Some of these characteristics show clear underdevelopment (e.g., generally lower levels of accessibility), some others offer the opportunity to leapfrog the challenges that developed economies face today (e.g., more reliance on public transport *versus* individual car use). Our chapter then covers the transformational change in infrastructure financing after the EU accession of the countries we investigate. Our analysis concentrates on the effectiveness of investment appraisal in a two-tier system of governance, where funding came from the EU's central budget, but the legitimate interests of EEE member states often diverged from that of the European taxpayer residing elsewhere in the Union.

Along this historical timeline, the chapter covers the developments of the recent past with a coverage of the transport-related consequences of the Covid-19 crisis. The pandemic broke out in the EEE in February-March 2020. Restrictions in everyday mobility made up the majority of the rules introduced to curb the spread of the virus, resulting in one of the largest shocks that the transport sectors of these countries have ever seen. Within weeks, demand for mobility plummeted and travel behaviour drastically changed – leaving transport operators and authorities struggling to adapt to the new situation. We document decisionmakers' response to the pandemic in both public and private sectors, explaining the consequences of the increased public transport-dependency of these countries, and the way that competition between governments affected temporary regulations in the transport sector. Even though the aftermath of the pandemic is not yet visible at the time of writing, we conclude that the accelerated convergence in reliance on information and communication technologies (ICT) and flexible working arrangements is one of the unexpected positive consequences of the pandemic.

The final aim of this chapter is to understand how the EEE countries' transport sectors have been impacted by the pandemic and explore whether transport investments can help them bounce back to a post-pandemic world. The subtleties of the EU's Recovery and Resilience Facility are just unfolding as we complete our analysis, but at this stage it seems that after the pandemic transport policy will remain one of the main tools of reconstruction. We observe a structural change in transport financing, which was already highlighted in earlier communications of the EU's 2021-2027 multiannual financial framework (MFF): priority is assigned to investments in greener modes of transport,[1] promising a new golden age for rail, in particular. Our assessment concludes that even if EU money no longer turns into pure concrete in the form of highway development in the EEE, one cannot take the efficiency of investments into railways and bicycle paths for granted. In other words, the relevance of transparent and methodologically sound investment appraisal (including cost-benefit analyses and studies on spatial economic impacts) does not diminish as transport becomes a leading tool of the European 'green deal'. Focusing more on the region we investigate, as transport is the backbone of economic activity and a core element of the EU cohesion policy, the future success of the EEE highly depends on how they utilise EU funds post-Covid.

The chapter is structured as follows. Section 5.2 provides an overview of transport policy in three epochs: after the fall of communism, after EU accession, and amid the Covid-19 pandemic. Section 5.3 covers the scene of emerging mobility trends in the age of digital technologies, developments that are continuously transforming transport in the EEE and helped overcome the challenges of transport restrictions during the pandemic. Section 5.4 is devoted to the story we have experienced since

[1] See an in-depth discussion on energy, environment, and sustainability in Chapter 7 of our book.

early 2020 from the transport sector's point of view, while Section 5.5 discusses the prospects of transport policy after the pandemic. The chapter concludes with a summary of our findings in Section 5.6.

5.2 Transport Policy in the EEE Region

We cover the evolution of transport policy over the past decades by first focusing on the hardware, that is, the infrastructure built for moving travellers and freight around. However, we put equal emphasis on transport service provision and its regulation, i.e., the software which has crucial relevance for the efficient utilisation of infrastructure development. We first cover public service provision in the EEE, then provide an assessment of the region's experience with liberalisation in the transport sector, most notably in the airline industry, and the road and rail freight markets.

5.2.1 Infrastructure Development and Prevalence of EU Funds

The EEE inherited a unique infrastructure sector after the fall of communism in the early 1990s.[2] The general belief in the transition period to market economies was that the EEE should catch up with the West in terms of infrastructure supply. In the preceding decades, the amount of public investment had certainly lagged behind Western European standards. Whether infrastructure is a major catalyst or just a precondition to economic development is indeed one of the main conundrums of economic thinking. Assuming that the socially optimal level of infrastructure-related public service provision is partly determined by the demand for such services, one cannot confirm with certainty whether the low quality and quantity of roads, for instance, was a cause or a consequence of the sluggish functioning of the communist economy.

The rate of car ownership was similarly underdeveloped in the EEE compared to their Western peers. The main obstacle preventing households from buying their first car was affordability and supply-side shortages, not road congestion or the presence of more attractive alternatives for travel. Demand for mobility, in general, was limited by industrial structure. Due to the limited role and number of small and medium-sized enterprises in a non-market economy, business interactions were limited to the top management of (mainly government owned) firms and service providers. Thus, two daily commuting trips dominated the travel pattern of the typical city in the communist era, often with centrally planned origins (residential location) and destinations (workplace). The purpose of infrastructure in this setup was to ensure the most efficient transfer of workers along concentrated transport corridors. On top of this, limitations in households' disposable income meant that leisure-related

[2] See an authentic contemporary overview from this decade in Hall (1993).

mobility was also a fraction of today's economies, once again diminishing demand for transport provision. The mere fact that congestion was rarely observed in major Eastern Bloc cities before the late 1980s implies that the *quantity* (i.e., capacity) of road infrastructure was often even oversized compared to local conditions. Some of today's EEE infrastructure is still reminiscent of this period, such as the extensive network of railway lines, which are among the most dense in Europe (Eurostat, 2021c).[3]

Underdevelopment in terms of the *quality* of infrastructure was more evident immediately after the democratic transition. Certain transport technologies, especially those enabling high-speed movement, were sparsely available or entirely missing. The construction of a highway network clearly meant the promise of economic development for lagging regions.[4] High-speed rail, which has existed since the early 1980s in France, soon followed by Italy, Germany, and Spain, is still only in the planning phase in most of the EEE. The absence of such services is largely due to the lower willingness to pay for travel time savings in the EEE. The region has also been struggling with maintaining in good repair the existing infrastructure. To this day, the quality of road networks within almost all the EEE is rated among the worst in Europe (World Economic Forum, 2018). This likely contributes to the fact that roads are generally less safe in the EEE than the rest of Europe, with Romania, Bulgaria, Croatia, and Poland having the highest number of road fatalities on the continent per million inhabitants (see Figure 5.1).

Due to insufficient financial support for maintenance and renewals, the otherwise very dense passenger rail network was also prone to quality degradation. The EEE public transport passenger experience suffered (and to this day suffers) from unreliable timetables, long travel times, limited comfort, and inhospitable customer service. Nevertheless, the transport system managed to play an important redistributional role within society by enabling affordable access to mobility for all income groups, including students and the elderly.

The transition towards the market economy implied a rapid increase in demand for business and social interactions. As incomes and car ownership grew, what could have been previously a rational allocation of resources for infrastructure provision turned out to be no longer sufficient. The thirty years since the fall of communism are characterised by two distinct periods, with the accession to the European Union in 2004 forming an evident frontier. In the first period between 1990 and 2004, government budgets were overwhelmed by the financial costs of the economic and social transition. In this period, infrastructure development, which typically involves large up-front expenditures combined with a long-run realisation of the benefits

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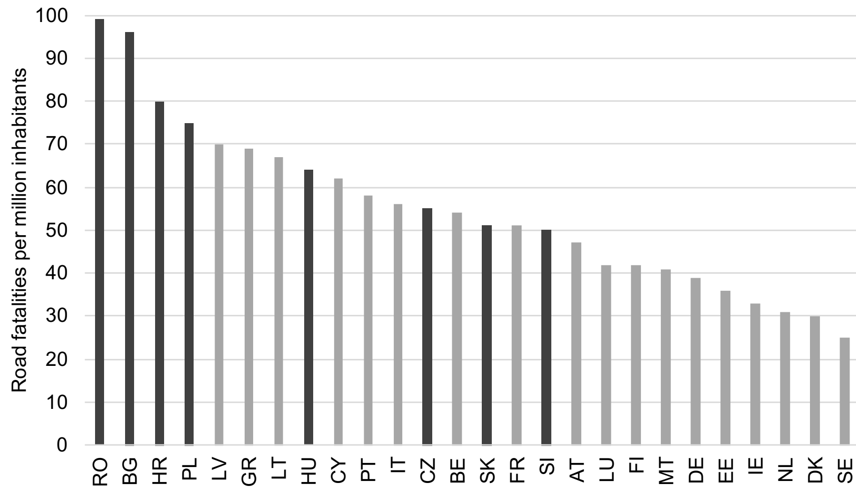
[3] The most developed European countries witnessed a series of railway line closures from the mid-twentieth century as road transport became widespread in both the passenger and freight markets. This process was much slower and less intensive in the EEE where regional lines, even those originally designed for agricultural or industrial purposes, retained a significant role in providing commuting services for workers. The existence of a dense regional rail network can be an opportunity for the EEE to offer cleaner alternatives to individual car use in rural areas.

[4] As we will discuss later , the region has reduced or even eliminated this gap in terms of the density of highways but the widely anticipated convergence in wealth disparities has not become a reality.

Fig. 5.1: Road fatalities in the EEE and EU-27 in 2017
Data: European Commission (2017)



suffered from permanent starvation. Governments tried to satisfy the newly emerging demand (which quickly gained support in the political arena as well) with borrowing, but the appalling credit rating and mounting debt ratios formed a severe constraint for major infrastructure development.

Public-private partnerships (PPPs) offered an alternative means of financing, and several large-scale highway projects were completed initially in collaboration with private investors. However, due to deficiencies in contract design and alleged corruption in a series of large infrastructure projects in the region in the late 1990s and mid-2000s (Monsalve, 2009), public opinion soon turned away from PPPs.[5] According to ex-post assessment by the World Bank, most failures in PPP project delivery were linked to the lack of feasibility studies, overly optimistic demand forecasts, public resistance to tolls, changing financial support mechanisms, non-competitive procurement, and subsequent revisions of the legal and regulatory frameworks (Monsalve, 2009). We will see later in this chapter that most of these failures were not specific to private involvement in project financing and remained prevalent in the region's policy landscape when PPPs were mostly replaced by EU funding.

The political transition in the EEE also triggered substantial changes in the urban spatial structure of major cities. While suburbanisation was a gradual process in

[5] Monsalve (2009) notes that the popularity of PPPs in infrastructure development was very uneven in Central and Eastern Europe and Southern Europe, as 87% of the investments took place in four countries: Croatia, Hungary, and Poland. 'Growth in 2005 was exceptionally strong, driven by two transactions: the Budapest International Airport in Hungary and the Gdansk–Torun Motorway in Poland. These two transactions alone accounted for about half the region's total PPP investment in 2000–2006.

the United States and Western Europe in parallel with the spread of car ownership, post-communist countries witnessed the same process in a much shorter period. Real estate development in the conurbations of cities happened organically, without considering the distortions caused by urban sprawl in several markets, including the provision of local public services and transport infrastructure. In practice, this meant that local municipalities were unprepared and financially ill-equipped to tackle the sudden demand for public goods and services like elementary education, healthcare, and even public utilities. Adequate taxes were not imposed on real estate developers to internalise the social cost of public services. Even though the central parts of urban areas were historically covered by a dense public transport network, the burden of serving the emerging suburban commuting demand was left for an underdeveloped local road network. Ironically, transport policy in the 1990s was overly enthusiastic about building a long-distance highway network within and between members of the EEE, while at the same time, the first bottlenecks in infrastructure provision emerged in the suburban surroundings of big cities. Suburbanisation has remained a permanent phenomenon in the past thirty years, and congestion-related challenges of inner cities are still mostly due to suburban commuters with no viable alternatives to individual car use.

The second major epoch of infrastructure development began with the accession of most of the EEE to the European Union in the mid-2000s. The political forces aiming at a fast convergence in wellbeing between the old and new members of the EU put transport development to the centre of cohesion policy. The underlying intention behind the unprecedented sums the EU allocated to transport-oriented grants was to ensure convergence by improving connectivity between the East and the West, thus reducing the cost of trade and other interactions between regions earlier separated by the Iron Curtain. Does economic theory fully justify this idea? New economic geography (NEG), the workhorse theoretical framework in trade economics and regional development, suggests that a reduction in transport costs might lead to various outcomes through the spatial rearrangement of economic activity. However, convergence between the regions affected is not guaranteed, especially in the short run (Fujita, Krugman & Venables, 1999).

With improved connectivity, consumption markets of the EEE opened up for more productive Western firms. Their productivity advantage stemmed from scale economies and technological development. The entry of these firms had a devastating impact on several industries in the region. At the same time, better connections also enabled the labour cost advantage of the EEE to be utilised by Western European manufacturers by moving their production facilities Eastwards. Naturally, the reallocation of workplaces from the West to the East had negative consequences for employment in incumbent states of the European Union, triggering unemployment in Western Europe. A detailed analysis of the spatial pattern of industrial activity within the EU is outside the scope of this chapter (please see Proost and Thisse (2017)).

However, we can ascertain at this point that, despite the commonly used vocabulary, transport-oriented Cohesion Fund spending has not led to a homogeneous division of consumer, producer, and innovator roles within the more closely connected European Union. What we observe instead is industrial specialisation within the EU. Labour-intensive tasks with limited value added, such as auto assembly, are clustered more intensively in the EEE. In other words, as opposed to the popular view, transport and communication networks do not function as communicating vessels equalising the economic output and welfare of EU member states, confirming the principles of regional specialisation and urban hierarchy (Tabuchi & Thisse, 2006).

Access to EU funds has dramatically changed the landscape of infrastructure policy in the EEE. Financing large-scale projects is possible without major sacrifices in national budgets, and due to the technical requirements of EU-funded projects, these new infrastructure elements satisfy very high standards in terms of quality (e.g., railway lines can only be built with a design speed of 160 kph and all stations must have step-free access). However, the conflict of interest in project selection between the EU as a whole and the national governments was also apparent from the very beginning. The European Commission initiated the ambitious plan of a Trans-European Network (TEN) of infrastructure, originally launched in the mid-1990s, in which the role of new network links in peripheral countries was to create connections to the economic centre of the union. For the EEE, this means East to West corridors almost exclusively. In addition, the Commission puts emphasis on 'eliminating bottlenecks and completing missing links' in the TEN network. By contrast, the first priorities for national governments were to

- create new links with the highest value added for the internal functioning of national economies;
- modernise the most heavily used infrastructure with degraded quality due to insufficient funding for maintenance in previous decades, and
- when it comes to international connections, to reduce transport costs to other peripheral countries beside the central hubs of Europe.

The nature of this conflict of interest is well documented in the fiscal federalism literature (Kitchen, McMillan & Shah, 2019). In a fiscal federation, individual regions (countries) have a strong incentive to exploit the benefits of a common pool of financial resources provided by the central budget, while the central government's aim should limit its support for projects with inter-regional (international) importance.

One of the leading reasons why, in this sense, the principles of decentralisation and subsidiarity (Oates, 1972) could not hold in practice is that infrastructure funding has a non-negligible secondary role within the EU: the Cohesion Fund is one of the key tools for financial redistribution between wealthier and poorer countries. National governments have the advantage in debates on project selection because persistent opposition against a member state's investment proposals would show signs of reluctance in achieving the commonly agreed redistributional objectives. Therefore, a significant proportion of EU funds have been allocated to projects with very limited international importance since the Cohesion Fund became available for the member states of the EEE. Bröcker, Korzhenevych and Schürmann (2010) show in a spatial computable general equilibrium model that the distributional impact of a significant proportion of major Trans-European infrastructure projects contradict the intended cohesion-oriented objectives.[6]

Another obvious source of EU-level cultural conflict can be identified in terms of the traditions of infrastructure project selection. The European Commission prescribes a series of ex-ante conditions that the proposals should satisfy before EU funds can be granted to the applicant. Most importantly, member states have to prove the financial sustainability and economic efficiency of the project they intend to implement. Cost-benefit analysis (CBA) is a widely accepted tool for investment appraisal among economists, and in most Western European countries its use as a decision-making tool dates back several decades. By contrast, the former Eastern Bloc had no experience whatsoever in providing publicly available quantitative evidence in support of public expenditures, which created confusion in a political culture dominated by strong personal decisions. The administrative procedures of applying for EU funding were so challenging in the first years of the EEE that some of them were unable to spend the resources in structural and investment funds directly allocated to their national envelopes.

Unfortunately, the solution to this cultural misalignment was consensual rather than fully efficiency-oriented. Eventually, the EU bodies responsible for overseeing investment appraisal realised that clogging the pipelines of cohesion-oriented money was not in their interest, while member states showcased a steep learning curve in formally ticking the boxes of CBA guidelines without reversing the culture of political oversight in project selection. The quality of investment appraisal within the EU lags far behind the state-of-the-art cost-benefit analysis techniques. Nevertheless, with nearly two decades of experience, recent examples show that the EEE are ready to drop the CBA requirement in national decision-making when EU grants are not among the funding sources of planned infrastructure projects. [7]

5.2.2 Public Service Provision

The post-communist economy is characterised by large transport service providers that are among the major employers of the public sector. The strength and influence of railway and public transport operators in local- as well as national- politics is a direct consequence of limited car ownership ratio and the fact that a significant proportion of society relies on publicly provided transport services. Their political power is further reinforced by the role of cheap public services in achieving redistributional

[6] Proost et al. (2014) go even further by claiming that most targeted projects in the TEN network do not pass the aggregate benefit-cost test either, according to three different transport models benchmarked against each other.

[7] See the planning and implementation of a new railway line between Budapest and Belgrade that the Hungarian Government finances as part of an inter-governmental agreement with the People's Republic of China. The feasibility study (including the CBA outputs) of this major infrastructure project is a classified document with no access for the public.

goals, which implies that public transport is generally viewed as a social service primarily devoted to fulfilling the elementary needs of the low-income population.

After the fall of communism, the public transport sector faced severe challenges. The source of the underlying policy tension is that the wider public anticipated that (i) the positively perceived attributes of transport as a 'social service' would be retained, including

- high network coverage geographically,
- free or heavily discounted access to public transport for several groups of society, including students and the elderly,
- significant discounts for regular public transport users,

while (ii) the quality of service will gradually converge to Western while (ii) the quality of service would gradually converge to Western European standards, but (iii) transport operators would become more efficient and rely less on public subsidies.

Among these conflicting expectations, condition (iii) turned out to be the most stringent due to the general financial famine in the transitioning EEE. With a dwindling budget, major improvements in service quality were out of reach, and most of the efforts were concentrated into maintaining the quantity of public transport supply without major (visible) cuts in affordability. Interestingly, the 'social service' status of public transport had not changed dramatically with the transition to market economies. In fact, in Hungary, for example, the redistributional role of the transport sector strengthened as a result of a 1997 political decision on making public transport completely free for the elderly population above 65 years. This seemingly surprising move in the middle of the 1990s can be explained by the limited visibility of the true cost of such policy interventions as opposed to raising pensions, for instance. Free access to public transport was an immediately visible benefit delivered to a socially vulnerable group of voters. At the same time, the cost of an intensified and financially unbalanced increase in demand led to a higher need for public subsidies in the transport sector several years later. Once again, due to the lack of available funding from the public purse, public transport provision shifted towards a high quantity–low quality equilibrium rather than the anticipated convergence to European standards.

The state of local public service provision is closely linked to the financial stability of local governments, including municipalities and regional or provincial authorities. The structure of governance and the level of local independence vary significantly across the EEE. Our general assessment is that the region's local governments have more independence in regulatory issues, and limited flexibility in financial policy making, including taxation and the redistribution of tax revenues to public service provision. Large infrastructure developments and vehicle procurement rarely happened in large cities without support from the higher-level (in most cases national) governments or debt financing. In the latter case, the excessive debt burden could lead to a reduced credit rating for local municipalities, which triggered outsourcing in the technological processes of public transport provision.

More diversity can be observed in regional transport services where several members of the EEE, including Czechia and Poland, successfully adapted the concept of regional transport authorities following the examples of Germany and Switzerland. The precondition for this reform was the existence of strong governments on the regional level (between local and national governments) with sufficient freedom in financing procurement and operational subsidies. These regional transport authorities were remarkably successful in improving service quality in the passenger rail network, for instance, which often outpaced the quality of the long-distance service of the national railway. At the other end of the spectrum, still within the EEE, Hungary made moves towards substantial centralisation in public transport provision. Regional public bus operators (24 in total), which historically served individual counties, were first integrated into six regional authorities in the early 2010s, and then merged into a single national public transport operator within the concern structure of the Hungarian State Railways. This series of diverging policy decisions can be explained by the general weakness of county-level regional governments in Hungary as compared to the financial independence of the same level of government in Czechia and Poland.

5.2.3 Deregulation of Transport Markets

We now turn to the EEE reaction to the broader policy objectives of market liberalisation within the European Union. Liberalisation had been high on the EU transport policy agenda since the late 1980s when deregulation was successfully implemented in the aviation industry (Burghouwt & de Wit, 2015). This led to substantial improvements in the region's connectivity to major business and holiday destinations in Europe, and later also in intercontinental directions.

Liberalisation also intensified competition in the industry. This put mounting pressure on incumbent flag carriers that often did not reach the level of scale economies required to compete with major European airlines in internal efficiency. As an initial response, the region's national air carriers first joined one of the three global airline alliances, TAROM (Romania) and CSA (Czechia) affiliating with Skyteam, LOT (Poland) and Malév (Hungary) joining Star Alliance and One World, respectively.

Connecting Central and Eastern Europe's national airlines to global industry alliances made a structural change in the sector's management practices unavoidable. The emergence and rapid expansion of private low-cost airlines further amplified the competitive pressure on incumbents who intended to rely on (indirect) state aid amid the aftermath of the 2008 global financial crisis, circumventing competition rules in the Union's liberalised market. The early 2010s left certain members of the EEE without a functioning national flag carrier (e.g., Hungary, whose national carrier Malév filed for bankruptcy in 2012),or triggered major efforts in fleet homogenisation and rebranding (e.g., Poland's LOT and Romania's TAROM).

First, cheap and frequent connections between Western and Eastern European cities fuelled labour force mobility within the continent, allowing a generation of the EEE to find employment opportunities in more developed parts of the common market whilst staying in regular contact with friends and relatives in their home countries. Second, low-cost air connections opened up new market segments for tourism in the EEE, essentially filling up the seats of Eastern European workers with Western European tourists in the back-haul of the same flights. Capitals in the EEE, including Budapest, Prague, and Warsaw have thus arrived in the top league of European tourist destinations [8] Third, the expansion of multinational low-cost airlines showed a reasonable alternative to traditional flag carriers. With the diversification of their service portfolio (e.g., large-legroom seats and discounts for frequent travellers) and the extension of their network, they are gradually entering the market of regular business travel. The most recent fleet renewals enable them to reach the Middle East and Central Asia from the EEE, and short-term expansion plans include connections to North America.

The EU transport policy in the 1990s set the ambitious goal of introducing competition in all land transport markets, following the success stories of airline deregulation. Throughout the EEE, open access and competition were introduced in the road freight sector in parallel with or right after the fall of communism. The barriers hindering international movements were completely eliminated after EEE accession to the EU common market. Free movement includes the possibility of cabotage deliveries, that is, EU hauliers can provide services between any member states without entering their home country. This equipped EEE truck operators with a substantial efficiency advantage due to their access to cheap local labour they employ freely in Western European markets. Several trade unions have been raising concerns about the working conditions of drivers who spend weeks or even months on the road, which in future could trigger stricter regulation.

Compared to the airline and road freight industries, the pace of passenger service liberalisation in the railway sector lags far behind. Between 2001 and 2016, the European Commission introduced four railway packages to gradually open up the rail market for competition and make international train operations more fluid. The general expectation was to break the monopoly of incumbent national railway companies and provide incentives for more efficient operations through competition, incentives that national railways in the EEE desperately needed to bridge the gap caused by decades of underinvestment in railway infrastructure and in rolling stock (Tánczos & Bessenyei, 2009).

These regulatory efforts have led to limited success thus far. Although the rail freight sector witnessed the entry of many new private competitors, their initial success was limited to the most lucrative market segments, such as regular container shuttles between major seaports and inland terminals. In the rest of the market, incumbent train operating companies have preserved their monopoly, primarily due to scale of economy in fleet size and the network they can serve. Interestingly, competition has intensified between the member states' publicly owned rail companies who entered each other's markets rather than newly established private challengers. In the EEE, the dominance of Germany's state-owned DB Cargo (Deutsche Bahn) and Austria's Rail Cargo Group have increased substantially in international destinations, as well as through local subsidiaries and acquisitions. Liberalisation and investments in cross-border interoperability have certainly contributed to a more

[8] See the pre-Covid passenger volumes at the largest airports of the region in Table 5.2.

efficient European rail system, but the possibility that state-owned carriers can still exploit substantial local monopoly power, especially in their foreign markets, cannot be entirely excluded. In his quantitative analysis, Tomeš (2017) finds no evidence of any increase in the modal share of European railways due to the vertical separation of national railway companies and the introduction of competition.

The above-mentioned railway packages of the European Commission also envision deregulation in passenger rail services. The challenge in this case is that in most member states domestic rail services are provided under public service obligation (PSO) contracts , especially in Central and Eastern Europe where low fares are substantially complemented with public subsidies. This implies that passenger rail services have a social redistributional role, and thus their governance is under strong political influence for legitimate reasons. Introducing competition raises several policy questions in this market: new entrants would have limited chances to compete with heavily subsidised public operators. The rare examples of open access competition in the EEE apply to the most demand-intensive intercity routes where business travel has a substantial market share. The prominent example is the Czechian domestic rail corridor between Prague and Ostrava where two private entrants, Regiojet and Leo Express, provide services in direct competition with the incumbent Czech Railways (Tomeš & Jandová, 2018). In thin markets such as regional lines, competition could be introduced by tendering monopoly rights for service provision for pre-determined time periods, following the United Kingdom's approach to passenger rail liberalisation. However, with no more than a limited number of examples in Czechia and Poland, it seems the majority of the EEE opt for preserving economies of scale and political control in passenger transport through their national railway companies.

5.3 Emerging Trends in Mobility

Recent years have seen the beginning of a new era within transport and mobility. Driven by the heightened importance of climate change, technological advances, the emergence of new business models, and the widespread availability of information and communication technologies, a number of new trends are appearing that will likely renew the transport industry. This section touches on a few of these trends that we believe are most relevant to the EEE.

5.3.1 Greening of Vehicle Fuels

Producing a quarter of emissions, the transport sector is one of the largest contributors to greenhouse gas (GHG) emissions globally (Sims et al., 2014). To tackle this problem, many countries around the world are implementing legal and economic measures to push people away from polluting diesel and petrol vehicles and pull them towards more environmentally friendly alternatives. In recent years, diesel vehicles have been especially hard hit. With the 'dieselgate' [9] emissions scandal driving many Western European cities to introduce rules banning or restricting access to diesel vehicles, demand for them has plummeted. This has had a knock-on effect on the EEE. As most major cities in the EEE have not followed suit with such restrictions, they provide an ideal market to offload unwanted or banned second-hand diesel cars.[10] This means that pollution from diesel vehicles is essentially being exported from the West to the East, deepening the East-West divide in air quality (Transport and Environment, 2018). This divide is likely to worsen, as many Western countries have introduced policies to completely phase out the sale of new petrol and diesel cars by 2030-2040, while the EEE have yet to follow suit.

The alternative strategy to decrease the environmental impact of the transport sector is to provide support for alternative fuel vehicles that run on energy sources other than traditional petroleum fuels. The most commonly adopted alternative fuel passenger vehicle is the electric vehicle (EVs), which is fully or partially (in case of hybrid EVs) powered by electricity. While this technology is viewed as an important contributor to decreasing transport-related GHG emissions, there is diversity in its adoption by the EEE due to differences in how progressive each country's policies are to support uptake. In 2013, the market share of electric cars throughout the EEE was among the lowest in Europe, with both Bulgaria and Croatia reporting a staggering 0% market share (European Alternative Fuels Observatory, 2020). By 2019, Hungary, Romania and Slovenia had taken large steps forward, but Croatia, Czechia and Poland were left behind (European Environment Agency, 2019). The uptake of electric vehicles is strongly dependent on the availability of financial incentives to help compensate for the higher purchase price of EVs. For example, Slovenia's EV registrations increased rapidly in 2016-2017 due to tax exemptions coupled with a EUR 7,500 incentive granted In contrast, in Croatia, no incentives were available in 2016 and 2017, which together with the low number of available charging points led to limited progress in a growing market share (Musec & Kancejak, 2018).

The uptake of other alternative fuels for passenger cars, such as biodiesel, ethanol, hydrogen and natural gas, remains low, not only in the EEE, but also Europe-wide. The only notable exception is liquified petroleum gas (LPG, commonly known as autogas). LPG powered vehicles have been exceptionally popular in Poland, making it the fifth largest LPG-fuelled passenger vehicle market in the world. The main driving force behind the popularity of largely retro-fitted LPG vehicles is the significant excise-tax advantage over petrol and diesel, ensuring a consistently low fuel price.

[9] Dieselgate refers to the Volkswagen emissions scandal, when the car manufacturer programmed vehicles to activate certain emission controls during testing, thereby meeting the US standards during regulatory testing.

[10] To recognise the magnitude of this challenge, note that around 350,000 second-hand diesel cars were imported to Poland in 2017 alone (Transport and Environment, 2018).

Table 5.1: Market share of newly registered electric vehicles (battery and plug-in hybrid)
Data: European Environment Agency (2019) and European Alternative Fuels Observatory (2020)

Country	**Market share 2013 (%)**	**Market share 2019 (%)**
Netherlands	5.4	16
Sweden	0.6	11.5
Finland	0.2	7.1
Portugal	0.2	5.7
Cyprus	0.0	4.9
Denmark	0.3	4.2
Ireland	0.1	4.1
Luxembourg	0.4	3.5
Austria	0.3	3.4
Belgium	0.2	3.2
UK	0.2	3.2
Germany	0.3	3.0
France	0.5	2.7
Hungary	0.0	1.7
Spain	0.1	1.3
Romania	0.1	1.2
Slovenia	0.0	1.1
Bulgaria	0.0	1.1
Italy	0.1	0.9
Slovakia	0.0	0.6
Lithuania	0.1	0.5
Czechia	0.0	0.5
Poland	0.0	0.4
Greece	0.0	0.4
Croatia	0.0	0.4
Estonia	0.8	0.3

5.3.2 New Mobility Services

Alongside the push towards reduction of emission, the transport sector has seen the emergence of a variety of new mobility business models built around the sharing economy. Shared mobility provides transportation services and resources that can be used my multiple users, thereby providing a substitute to outright ownership of specific mobility tools (e.g., car, bike). Examples include car sharing, car-pooling, ride sharing and micromobility sharing. In many cases, shared mobility services have proven to lower private vehicle ownership, use and associated GHG emissions (Fishman, Washington & Haworth, 2014; Chen & Kockelman, 2016).

Looking at the supply of such services, the shared mobility market is dominated by startups,[11] where financial stability always proves to be a challenge. This is heightened in the EEE for two reasons. For the foreign operators who are trying to enter the market, the challenge lies in making enough revenue to make it worth their stay. As GDP per capita is lower in the EEE than in Western Europe, users are also less willing to pay. This means that the average price of a hire needs to be set lower to be able to attract a substantial enough user base to maintain economic sustainability. While the lower revenue is partially offset by slightly lower labour costs, it is not always sufficient to motivate operators to stay in the market. For local startups, the challenge is attaining enough seed funding. Securing venture capital in the EEE is harder, and well-known companies like Skype, Transferwise (now Wise) and Prezi all had to relocate or open offices in the West to gain appropriate resources to finally achieve success.

However, these economic challenges have not held companies back from trying to launch services in the EEE. Poland was an early adopter of bike sharing, with dock-based systems available in most cities since 2010. Now the country is planning to change its e-scooter regulation, which should kick-start the expansion of e-scooter sharing throughout Poland. Hungary launched its first locally run bike- sharing system in 2014, which spun out of an EU funded feasibility study. While initially the service gained popularity, its use was going downhill because the operators failed to update their hardware, and foreign competitors entered the market. The service is now being revamped, in the hope that it will be able to stay competitive with foreign-run operators.

5.3.3 ICT Developments Changing Needs

An important consideration when discussing trends in mobility concerns its relationship to the development and proliferation of information and communication technologies, also frequently referred to using the acronym ‘ICT’. The reason why

[11] Budapest is one of the exceptions in terms of the market structure of car sharing: The dominant player in this city is MOL Group, the largest Hungarian oil and gas company, which entered the market in 2018 as part of its business development and promotions strategy.

interactions between ICT and transport matter stems from their impact on activity participation, ultimately affecting travel demand. This has been very vividly demonstrated through shifts towards work-from-home during the Covid-19 pandemic (see next section). However, interactions between ICT and transport can occur at multiple levels. In addition to activity participation, ICT underpin the implementation of intelligent transport systems (ITS) or the emergence of novel mobility business models.

The debate concerning interactions between ICT and transport dates back to the 1970s and 1980s. The seminal contributions by Ilan Salmon and Patricia Mokhtarian resulted in a typology of relationships that conceptually distinguishes four broad types of interactions between ICT use (originally telecommunications) and travel demand (Salomon, 1986; Mokhtarian, 1990):

- *Substitution* concerns a situation in which participation in an ICT-enabled activity reduces or removes the need for travel to participate in the activity;
- *Complementarity* concerns a situation in which participation in an ICT-enabled activity may create further need to travel, either for the same or a different activity;
- *Modification* concerns a situation in which travel still takes place (in its original amount) but its attributes may change, e.g., mode of transport or time of travel;
- *Neutrality* concerns a limiting case where the three interactions above do not take place.

More recently, it has also become common to include two further interactions (Lavieri, Dai & Bhat, 2018):

- *Activity fragmentation* describes relaxation of traditional links between activities, spaces and times, facilitated by ICT-based activity participation (Alexander, Ettema & Dijst, 2010);
- *Multitasking* , which is the simultaneous conduct of multiple activities, including while travelling, which is argued to be facilitated by various ICT (Wardman & Lyons, 2016; Pawlak, 2020).

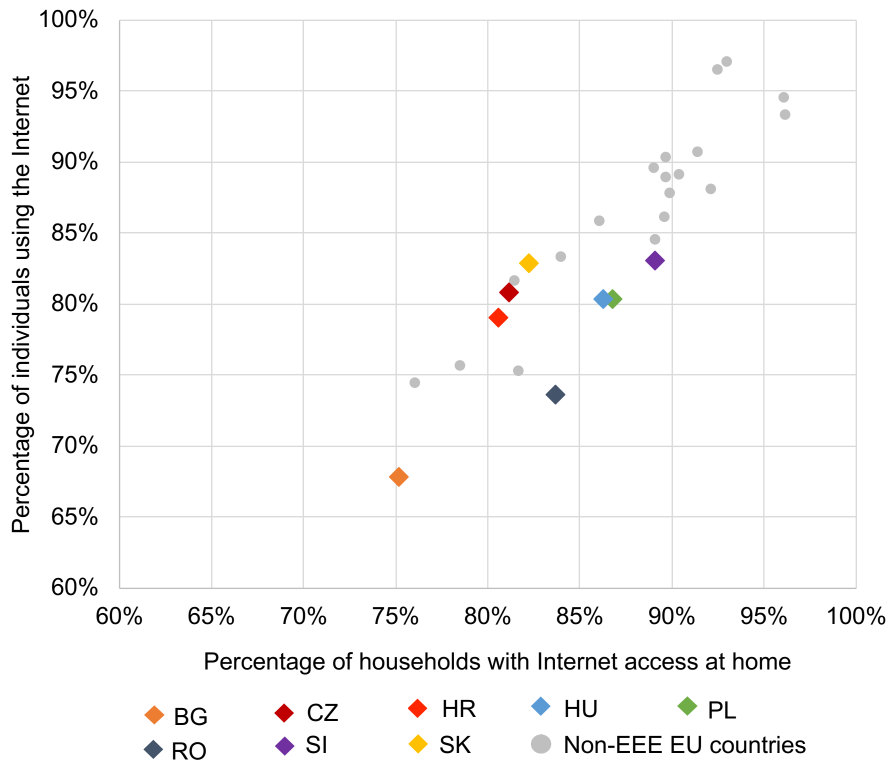
While the typology was originally devised for the context of passenger travel, it can be applied also in the context of freight transport, e.g. a digitisation of a product can remove the need for that product to be transported ('substitution').

ICT Infrastructure and Use in the EEE

In understanding the presence and extent of impact of such interactions in the context of the EEE, the first step requires establishing the status of the main enabler of modern ICT: the Internet. In particular, it is possible to observe that there is a close relationship between access to the Internet and its use, which stems from the bi-directional relationship between the two: the intention to use motivates acquisition of access but also access stimulates use, reducing the cost of travelling to an Internet-access destination (library, cafes, etc.)

Confirmed also for the EEE, the relationships described have been found to apply in multiple contexts and scales (see Figure 5.2). What we can observe is that the

Fig. 5.2: Home Internet access and use of the Internet in the EEE countries and EU-27, 2019
Data: ITU (2021)

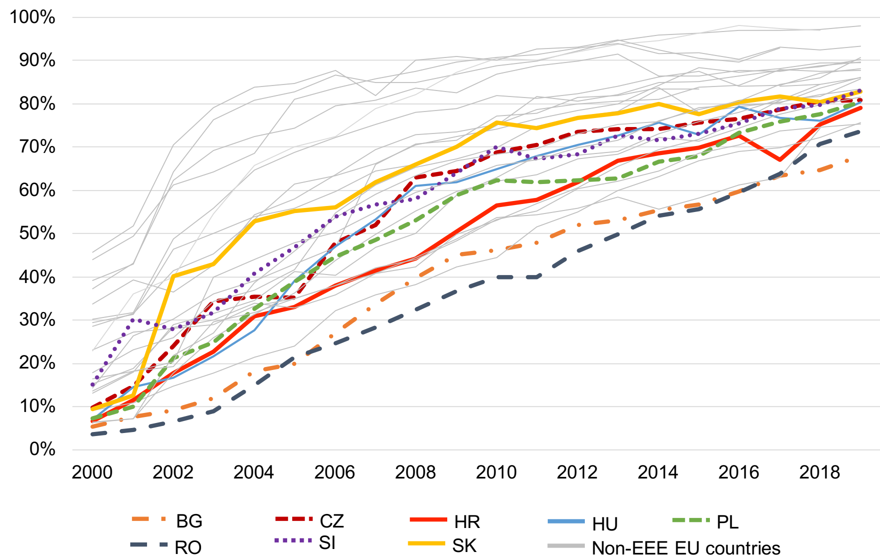


EEE fall into two groups. The first, including Croatia, Czechia, Hungary, Poland, Slovakia, and Slovenia, have Internet access and adoption levels close to or above 80%. The second group comprises Bulgaria and Romania, with comparatively lower levels. Importantly, all the EEE remain below the 90% observed in a number of countries in Western Europe, and also in Estonia or Latvia.

To complement the cross-sectional perspective, Figure 5.3 provides an insight into Internet adoption trajectories in the EEE against the EU27. What we can observe is that since 2000, the EEE have followed a similar upward trend in the adoption of the Internet. Importantly, the gap between the EEE and other EU countries has narrowed. In particular, in the early 2000s, the EEE were approximately 40% below the level of other EU countries, whilst in 2019 this difference was well below 20 % compared to countries with the highest levels of adoption.

Access to the Internet is an essential prerequisite for participation in activities online or, more broadly, remote activities, originally termed ‘teleactivities’ to

Fig. 5.3: Dynamics of Internet adoption in the EEE countries against the EU-27, 2000-2019
Data: ITU (2021)

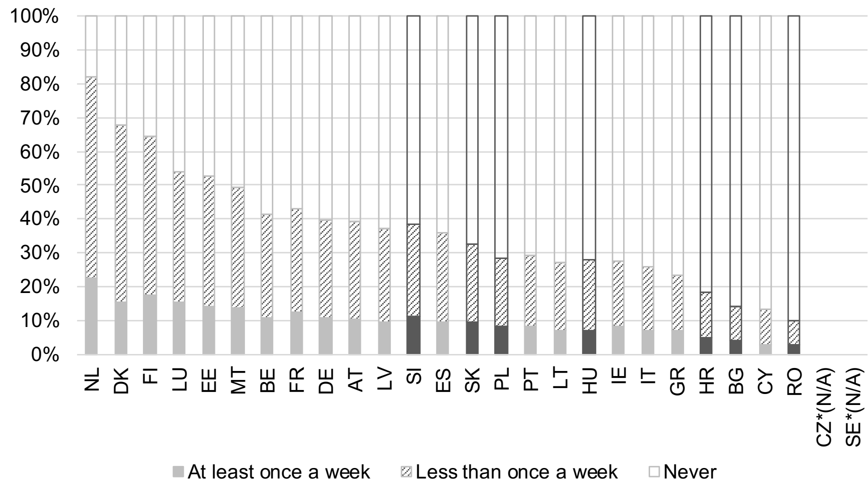


emphasise the at-a-distance ('tele-' from Greek) aspect of participation. It is such participation that is argued to interact with mobility alongside the aforementioned six interactions. Below we focus on examples of work from home, online shopping, and travel and accommodation services.

Work from Home: Telework and Telecommuting

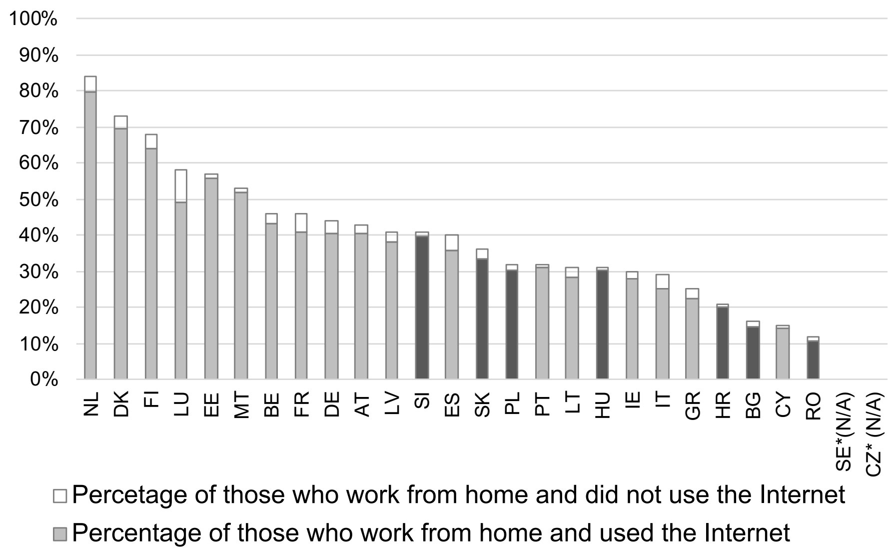
The modern interpretation of the term 'work from home' emerged in the late 1970s with the concepts of telework and telecommuting. The latter emphasise the ability to work from home while being able to interact remotely, by means of ICT, and thus avoiding the physical commute (Mokhtarian, 1991). Initially expected to be widely adopted and to become a *panaceum* to traffic problems, by the early 2000s telecommuting has been adopted by only a limited percentage of individuals and typically in a hybrid-mode, with some days worked from home, and others from more traditional spaces (see Figure 5.4). Thus, the major effect on traffic congestion is deemed not to have materialised. As for the EEE, in 2018 they were clearly behind Western and Northern European EU members, though at levels similar to those of the Southern members. Part of the reason behind this relatively lower level of adoption was the structure of the labour market, given that certain occupations (primarily services) are far more amenable to work from home than others (manufacturing, agriculture, and tourism).

Fig. 5.4: Percentage of employed (including self-employed) working from home, from an external site, or on the move, 2018: EEE vs EU-27
Data: Eurostat (2021b)



The tight coupling between work from home and Internet use is revealed in Figure 5.5. To this end, the EEE follow a similar pattern to all EU countries in having a strong association between work from home adoption and Internet use. Importantly, Internet access needs to be seen a necessary condition that enables the practice, but not a sufficient one for proliferation of work from home. The latter requires also a suitable labour market structure and suitably digitised business environment and organisational culture that accepts such practices. Naturally, the situation outlined above reflects the state just prior to the Covid-19 pandemic, which presented an unprecedented shock to adopting the practice of work from home. In particular, the public health advice and in some cases a legal obligation to 'work from home whenever possible' forced the adoption of work from home across the population, also in terms of an increased frequency. An implicit statement contained in this slogan was to use computers and the Internet to work from home, which has been seen as the only possible means of maintaining collaborative work processes and organisational cohesion of companies. Further discussion of the situation during the Covid-19 pandemic is available in the next section.

Fig. 5.5: Work from home in the EEE against the EU-27, 2018
Data: Eurostat (2021b)



Online Shopping

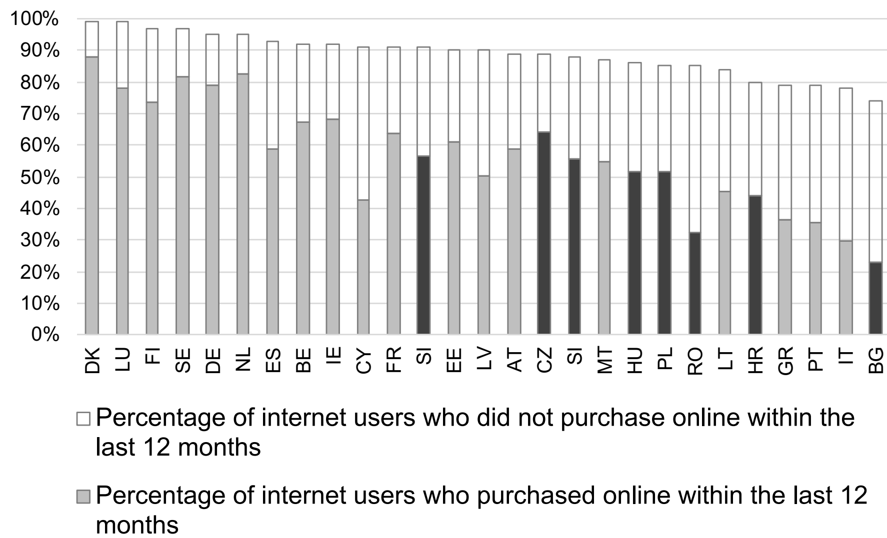
Another important activity enabled by ICT concerns doing shopping by means of ICT (teleshopping), typically using the Internet (online shopping)[12]. On the one hand, its immediate importance for the transport sector stems from the potential reduction in the demand for travel due to shopping needs, conceptually similar to the case of working from home. On the other hand, online shopping requires deliveries performed typically by light goods vehicles, potentially leading to increased traffic congestion (Visser, Nemoto & Browne, 2014). In the medium to long run, the effects of online shopping can also have implications for land use and urban landscape, by affecting the popularity and ultimately the needs for traditional ('brick-and-mortar') stores, including in shopping centres, shopping streets, and retail parks. In practice, this means that access to such locations will no longer be attractive in the real estate market, which may trigger urban sprawl.

As for the context of the EEE, Figure 5.6 indicates that with the level of online purchases within the 12 months prior to the survey between 40 and 60%, such countries are clearly behind the leaders in Western and Northern Europe, but often well above the countries in Southern Europe. What is also interesting is that over

[12] See Pawlak and Circella (2021) for a discussion on differences between the concepts of *teleactivities* and *online activities*.

the past five years, the EEE have experienced a period of dynamic catch-up. The main reason for non-adoption of online shopping by Internet users as indicated by Eurostat data is the preference for in-store shopping, including the desire to see the product, or force of habit (Eurostat, 2021b) rather than a lack of skills, payment security concerns, or lack of trust in return and complaint procedures.

Fig. 5.6: Internet use (bar height) and online purchases (shading) in the last 12 months, 2019: EEE vs. EU-27, 2018
Data: Eurostat (2021b)



Travel and Accommodation Services

Beyond the impact on mobility through activity participation, ICT can also facilitate access to travel and accommodation services. This type of services, sometimes termed 'travel industry services' or 'online travel industry' (Barnes, 2018), typically refers to the context of medium- and long-distance travel, i.e., business travel and tourism, in order to make travel arrangements easier and more transparent, hence arguably reducing the overall cost (including time, effort, as well as money). Examples of services include both direct sales, e.g., via service provider (airline, railway company, or hotel) websites or smart device apps, as well as platforms with search, price- comparison and transactional capabilities, such as Skyscanner, Kayak, Booking.com, and AirBnB.

Fig. 5.7: Percentage of Internet users who made use of travel and accommodation services online, 2009-2017: EEE vs. EU-27
Note: Light grey lines represent other EU countries
Data: Eurostat (2021b)

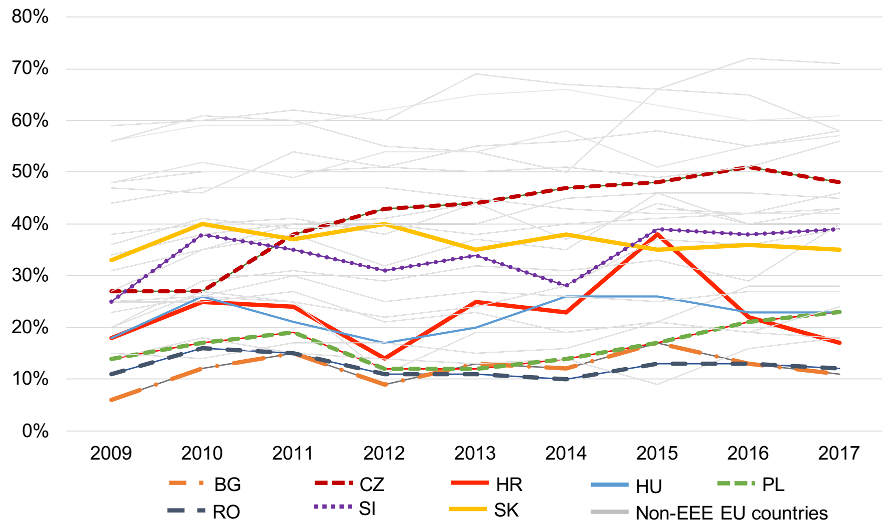


Figure 5.7 shows that by 2017 the adoption of travel and accommodation services increased slightly, from between 5 and 35% in 2000 to between 10 and 50%. This figure, however, needs to be interpreted in light of the growth in the aforementioned overall Internet adoption, meaning an overall increase in the total number of users of such services. The adoption of such services in combination with the emergence of low-cost carriers serving the region have also been behind growth in both inbound and outbound tourism in the EEE prior to the Covid-19 pandemic.

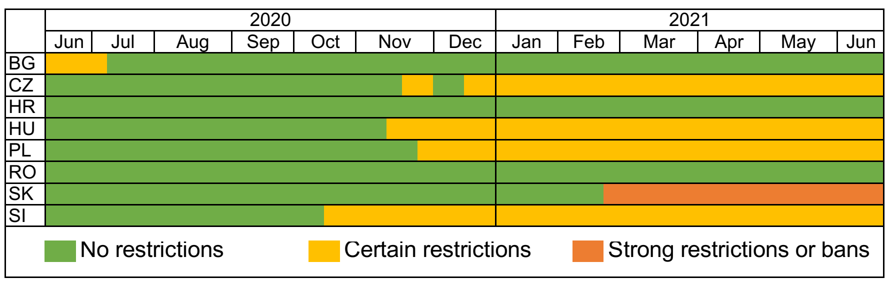
5.4 The Effects and Aftermath of the Covid Shock

The first cases of Covid-19 in the EEE were reported at the end of February and in early March 2020 (for more details, see Chapter 8 of this book). This resulted in one of the largest shocks that the EEE transport systems have ever seen. The following sections present the restrictions introduced, and discuss the impact they have had on travel, and the interventions that were necessary to respond to the shock.

5.4.1 Mobility Restrictions and Impacts

As Covid-19 cases started to appear, the EEE progressed with the imposition of a variety of mobility restrictions, especially with respect to bans on arrivals in countries. Initially, they were limited to high-risk destinations, but following the reporting of the first cases, very quickly evolved into restrictions on entering countries (either as complete bans on non-citizens or non-residents), as well as into constraints on mobility within the countries themselves (‘lockdowns’). All Schengen member countries invoked their right to introduce border controls on internal borders. In the weeks following reports of the first cases, the changes in regulations were highly volatile, sometimes varying by regions within countries. In general, occupations deemed critical to the operation of transport infrastructure and supply chains, such as professional drivers and ship crews, were excluded from the restrictions. Interestingly, the swift and strict response in the EEE led to a reasonably low number of Covid-19 cases during the first wave of the pandemic compared to levels in Western Europe.

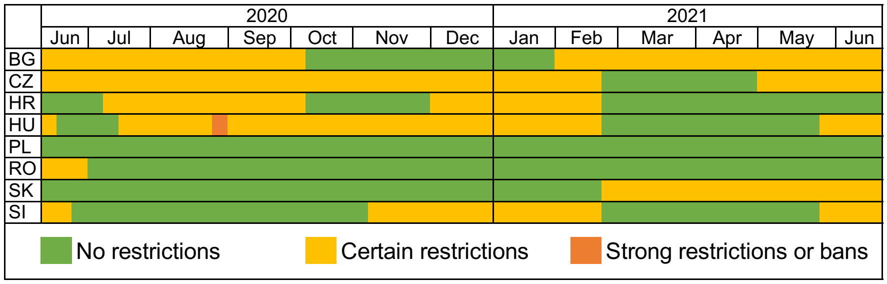
Fig. 5.8: May I freely move within this member of the EEE?, June 2020-April 2021
Data: European Union (2021)



From mid-June 2020, the EU’s response to Covid-19 included collating data about the Covid-19 situation across the member states, including the status of mobility restrictions as part of the ‘Re-open’ initiative (www.reopen.europa.eu). The data indicate that the restrictions on moving within the countries were largely lifted across the EEE by summer 2020 (see Figure 5.8), partly motivated by the low number of cases during the first wave. In autumn 2020, in some countries such restrictions were re-introduced, in response to the second wave of the pandemic. On this occasion, they remained in place for much longer, especially as the EEE witnessed much higher rates of infection than during the first wave.

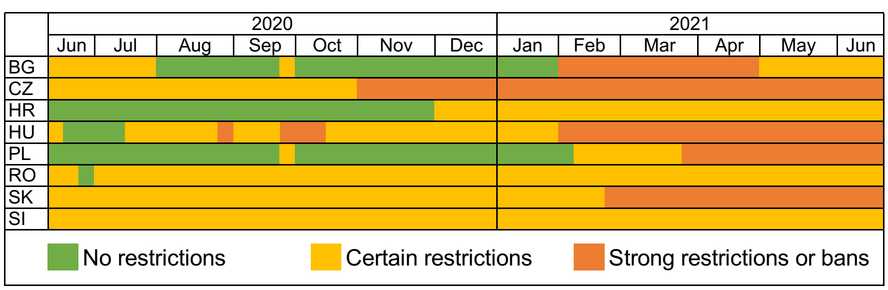
Whilst the initial period of the pandemic saw strict restrictions imposed on any arrivals in the EEE, this was subsequently seen as remaining in opposition to the spirit of free movement, as envisioned in both the EU and the Schengen Zone treaties. Hence, subsequent periods saw transit permission given through the countries (see Figure 5.9), though often only under certain conditions such as specific purpose,

Fig. 5.9: May I transit within the EEE?, June 2020-April 2021
Data: European Union (2021)



e.g., business or urgent and documented personal reasons, or upon presentation of a recent negative Covid-19 test result, evidence of past infection or completed vaccination. In the case of tourism-related travel (see Figure 5.10), the restrictions on arrivals were clearly much more stringent. In particular, until autumn 2020, the EEE generally allowed visits for tourism-related purposes (with occasional exceptions). Subsequently, gradual restrictions were implemented, beginning with pro-longed restrictions in Czechia, motivated by the surge in the number of cases. By February 2021, most of the EEE either did not allow tourists in or only permitted them under certain conditions, such as demonstration of a recent negative test or a vaccination certificate. Even in the latter circumstances, operation of the tourism and hospitality sector in all of the EEE has remained restricted as of mid-June 2021.

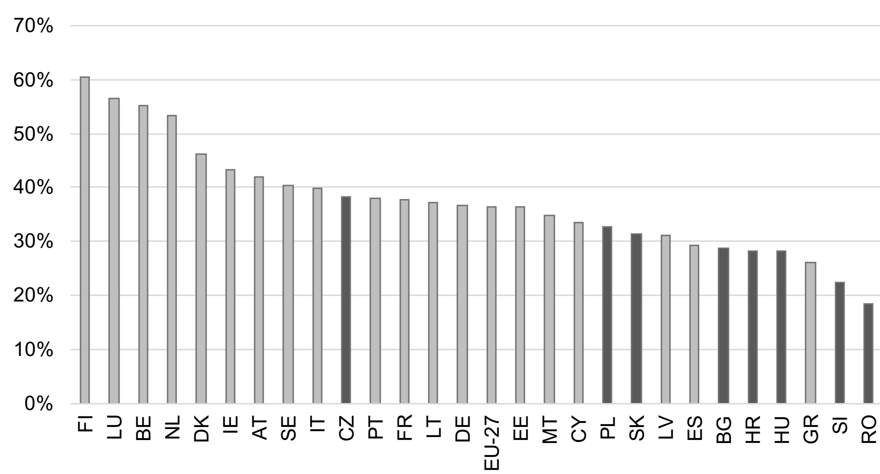
Fig. 5.10: May I travel to this country from within the EU/EEA for tourism purposes? EEE, June 2020-April 2021
Data: European Union (2021)



The impact of these strict restrictions could be seen throughout the EEE. People chose to significantly limit their mobility and only travel to work or nearby shopping locations. For example, Bucsky (2020) estimates that in Budapest, overall mobility fell to 50%. Similarly, in Poland, data from ca. 125k smartphones indicate that during the first lockdown (in March 2020) 50% of the respondents travelled within 100m from their place of residence, arguably only to visit the local shop or pharmacy (Publiczny, 2020). Another study in Poland reveals an intuitive role of employment status and occupation (blue-collar workers not working from home versus white collar workers working from home) as well as fear of Covid determining how much travel reduction was experienced (Borkowski, Jażdżewska-Gutta & Szmelter-Jarosz, 2021).

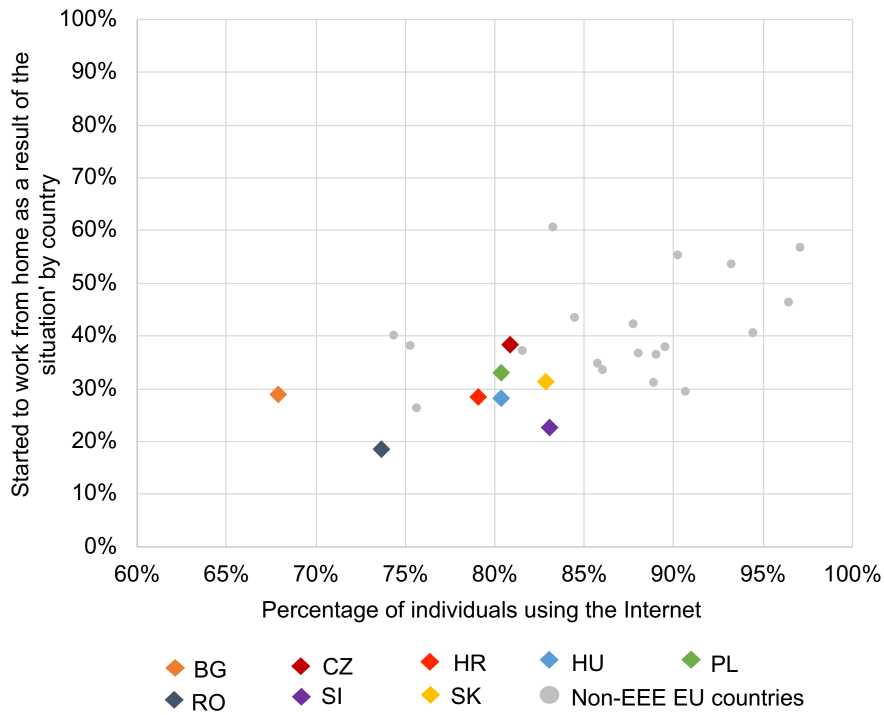
One of the defining features of the Covid-19 pandemic has been the slogan to ‘work from home’ whenever possible. This follows the understanding concerning the higher transmissibility of the SARS-CoV-2 virus in close physical proximity, especially indoors. Compared to Western European countries, the EEE have seen a comparatively lower propensity to shift towards work from home practices (see Figure 5.11). The likely reasons have been the comparatively lower adoption of the Internet (see Figure 5.12), lower prevalence of work from home prior to the pandemic, as well as lower acceptance of such practices by employees and employers alike in the EEEs (Gądecki, Jewdokimow & Zadkowska, 2016).

Fig. 5.11: Percentage of the employed that started working from home as a result of the Covid-19 situation. EEE vs. EU-27
Data: Eurofound (2021)



When people did choose to travel, their mode choices were different to before the pandemic. Public transport use decreased as people shifted to using private cars and active transport (e.g., walking and cycling). For example, in Budapest, car mode share increased to 65% from 43%, while cycling more than doubled (Bucsky, 2020). Bike sharing schemes also became particularly popular, partly due to temporary

Fig. 5.12: Household Internet access and initiation of work from home due to the Covid-19 pandemic. EEE vs. EU-27
Data: Eurofound (2021)



fare reduction for using Budapest's MOL Bubi bike sharing service (Lozzi et al., 2020). Other mobility sharing systems chose to restrict their operations. For example, the scooter-sharing company Lime, stopped their operations in almost all European countries including Bulgaria, Czechia, Hungary and Romania (Lozzi et al., 2020).

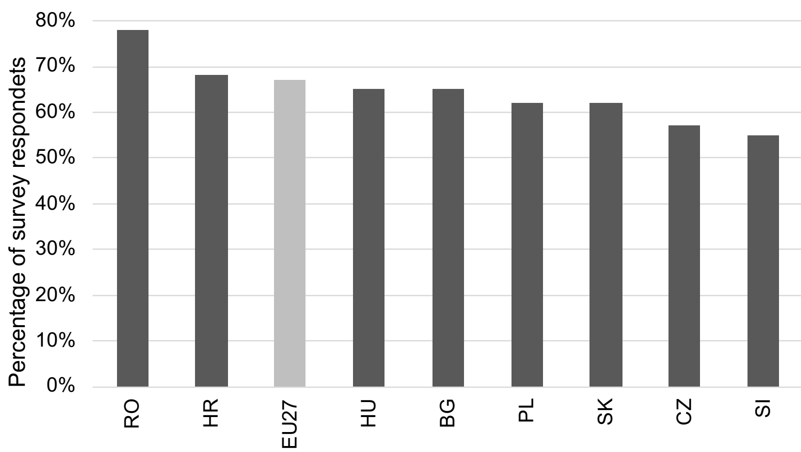
5.4.2 Public Interventions in the Pandemic

Public Service Provision

As public transport provision is built on the concept of transporting large groups of travellers in shared vehicles to exploit economies of scale , mass transit was one of the sectors hardest hit by the pandemic. The dramatic reduction in public transport demand was partly caused by lockdown restrictions (the same way as in other modes of transport), but the perceived risk of infection made public transport even less attractive for urban travel. In the first wave of the pandemic, public transport demand plummeted to as little as 10-15 percent of regular ridership in many cities.

Following the period of substantially reduced mobility in March and April 2020, volumes of travel gradually climbed back as passenger transport started to adapt to the new conditions. However, impacts on mobility were not even across modes of transport. Due to its nature of sharing vehicle space, often in crowded conditions, public transport became the main victim of Covid-19 circumstances. The EIB Climate Survey (see Figure 5.13) indicated, consistently with respondents across EU27 that health worries were a substantial determinant in avoiding public transport, even after a number of months into the pandemic.

Fig. 5.13: Did you avoid public transport due to health worries? EEE vs. EU-27 average, October-November 2020
Data: European Investment Bank (2021)



Even though common sense suggests that physical proximity between passengers could make public transport a suitable environment for contamination, there is only a limited amount of evidence on the objective risk of infection in buses and urban rail vehicles. The risk is certainly very high in the absence of precautionary measures. A growing body of evidence suggests, however, that with an effectively enforced face mask policy and properly functioning air ventilation, the risk of infection substantially decreases. [13] Several recent contributions make the point that public transport might not be among the most typical activities for virus transmission because individual travellers normally do not talk to each other and do not eat; therefore the

[13] See recent empirical evidence in Chu et al. (2020) and Hu et al. (2021), and a public transport-specific review in Hörcher, Singh and Graham (2021).

density of infected aerosol droplets can be kept at a low level when an obligatory face mask policy is introduced (Tirachini & Cats, 2020). This encouraged many stakeholders in the public transport industry to argue that passengers actually overestimated the risk of infection. Naturally, these stakeholders have a vested interest in rebuilding trust in the industry they represent; therefore the safety of public transport cannot be independently verified on the basis of such claims. The statistical quantification of the pure causal link between public transport use and infection rates is hindered by the fact that Covid infected individuals might remain asymptomatic for several days, and travellers undertake a range of other activities besides their trips, where the risk of infection is similarly unknown. Even though hundreds of empirical research articles have been published in recent months, no reliable evidence is available at this moment on the exact degree to which public transport is riskier than other means of urban mobility.

The sudden and unprecedented loss of demand induced a fundamental transformation in the economics of public transport provision. The natural response to such external shocks is indeed that the supply attributes of the public service should be adjusted to the new conditions. We discuss two potential supply-side reactions below: potential changes in the tariff system and the available capacity.

Whether public transport should be cheaper or more expensive during the pandemic is a non-trivial dilemma from a welfare economics point of view. Several counteracting factors might come into play.

1. The risk of infection can be considered as a standard consumption externality: one traveller's trip endangers another user's health, and this consequence might remain exogenous to the individual decision taker. In fact, the infection risk amplifies the external cost of crowding in public transport. Higher external costs imply higher fares according to welfare maximising pricing principles. Note, however, that due to the general reduction in travel demand, occupancy rates are much lower than normal, and therefore it is ambiguous whether the actual external cost is higher than normal during the pandemic.
2. 2. Amid the economic downturn caused by the pandemic, urban economies require stimuli to trigger economic transactions, and cheap mobility can be one way to achieve that Hörcher, De Borger, Seifu and Graham (2020) show that in the presence of agglomeration economies, i.e., positive productivity externalities linked to accessibility, transport should be cheaper than in the absence of this effect. Redistributional concerns might also justify cheap access to public transport, especially among the unemployed for whom the cost of displacement is an important determinant of the effectiveness of job searching. These factors would point in the direction of lower fares during the pandemic.
3. Foregone tax revenues and the increased expenditure on countermeasures against the pandemic also impose a financial strain on local governments. Thus, covering the financial deficit of public service provision becomes increasingly difficult for municipalities, which translates into a relatively high marginal cost of public funds (Proost & Van Dender, 2008). This consideration suggests that the unit subsidy is more expensive for society during the pandemic, and, consequently,

governments face increasing pressure to reduce the financial deficit of service provision.

Items 2 and 3 above have the opposite implication for the optimal tariff reform in the pandemic scenario, while the sign of the crowding-dependent tariff adjustment is ambiguous. Robust empirical estimates, especially epidemiological ones on the exact infection rates, would be a crucial prerequisite for more concrete policy recommendations. Perhaps not due to this particular reason but rather due to the high level of political uncertainty in general, thus far no major reforms in public transport prices have been implemented in the EEE.

In comparison with Western European countries, low car ownership and limited possibilities for working from home in the EEE imply that a greater proportion of commuters relied on public transport during the crisis. Nevertheless, calls for adjustments in the capacity of the public transport network were more usual during the first waves of the Covid crisis (compared to fare setting). Economic theory suggests that the capacity (including service frequency and vehicle size) should be increased as long the marginal cost of expansion falls short of the marginal benefit it provides for travellers (Small & Verhoef, 2007; Hörcher & Graham, 2018).

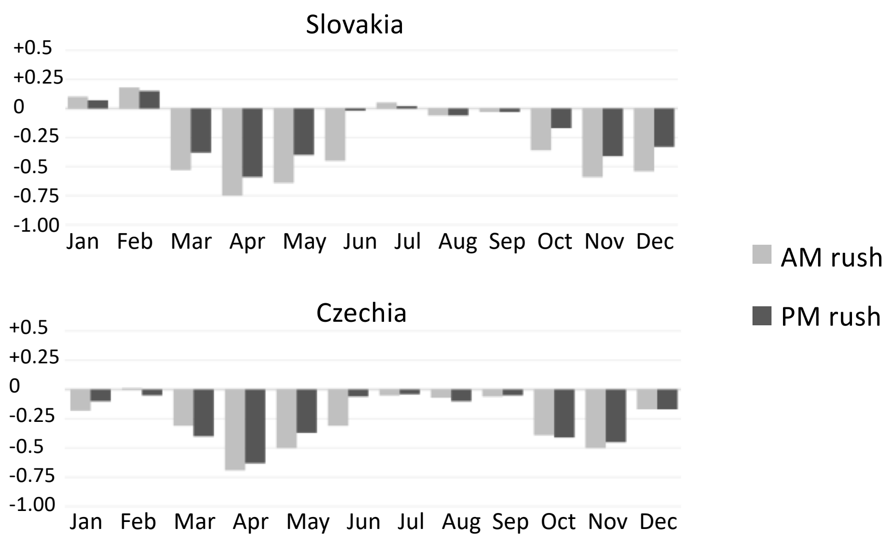
During the pandemic, both the costs and the benefits of capacity provision might have changed substantially. For example, staff shortages and the increased risk that employees were infected during work raised the cost of operating urban transit services. On the benefit side, on the one hand, the dramatic reduction in travel demand also diminished the benefits of high-capacity services. On the other hand, one may argue that the need for social distancing increases the importance that sufficient capacity remains available for each user. That is, users attain higher benefit from the incremental expansion of capacity.

There were three groups of arguments that frequently emerged in public debates on transit capacity, most of which were also relevant for the EEE. First, the apparent under-utilisation of public transport vehicles in an emerging financial crisis motivated the opinion that service frequencies should be reduced, and only smaller vehicles should be employed. Second, even though aggregate travel demand plummeted, demand fluctuations implied that certain (peak-hour) services remained crowded, or were even more crowded after capacity reductions. This fuelled outrage in the political sphere, blaming decision makers for exposing public transport-reliant commuters to severe health risks. Third, certain commentators argued that the long-term success of public transport would require that supply should remain unchanged during the pandemic, otherwise the deterioration of service quality could cause irreversible damage to the industry. Naturally, this view gained support among industry stakeholders and pro-public transport lobby groups. These tendencies are not surprising when we consider that the pandemic struck this sector at a time when the urban population was already increasingly concerned about sustainability in transport provision.

Road Use and Parking Regulation

Another unique development of the Covid-19 pandemic is that individual car use became significantly more convenient due to the near disappearance of road congestion in most cities in the EEE.

Fig. 5.14: Difference in rush hour congestion throughout 2020 in comparison to 2019 in Slovakia and Czechia
Data: TomTom Traffic Index, 2021



Even though a significant portion of regular public transport commuters shifted to car use, which was perceived as safer, travel times fell dramatically due to the general reduction in demand for mobility. Urban pollution also fell to unprecedentedly low levels, often achieving the targets that seemed unattainable without introducing draconian emission regulations over multiple decades. Once again, conflicting assessments appeared in the public opinion on falling car use statistics. Many proponents of sustainability in transport policy argued that what had been observed proved that a significant reduction in individual car use was indeed feasible in modern societies, and our car-centric lifestyle was wasteful and mostly unnecessary. At the same time, others stressed that the exogenous restriction on mobility caused a global economic downturn comparable with the Great Recession a century before, and what we observed illustrated that – in the absence of major technological innovation – the cost of reaching our emission goals was a major reduction in urban productivity.

The fact that individual car use became a quicker and safer alternative to other transport modes raised concerns about the long-term behavioural change in commuting habits. Additionally, car use was quicker and safer for those who actually owned a car. In other words, low-income households and other vulnerable groups in society, e.g., students and the elderly, did not enjoy the benefits of congestion-free mobility. To counterbalance these developments, debates intensified on the reallocation of urban space for car use and other modes of transport, including active modes such as walking and cycling. New cycling lanes were established along busy urban corridors where despite limited road capacity, car congestion could be avoided (Huet, 2020). Nevertheless, creating new cycling lanes often became controversial for two main reasons. Some of these interventions happened without elaborate planning and demand modelling, thus leading to the eventual under-utilisation of the new cycling infrastructure. Amid fears of a gradual regeneration of congestion, lobby groups of car users also raised concerns about whether the temporary changes would remain in effect in the long run. As in many other fields of policy making, we observe that tensions in the public policy arena were fuelled by the unprecedented and uncertain nature of the pandemic environment.

Several governments in the region have taken explicit steps to incentivise infection risk-free mobility, and thus intensify interactions in the paralysed economy. Parking policy is a subtle tool to manage demand for car use and make the allocation of the scarce space in dense urban areas more efficient. As one of the first counter-measures during the pandemic, parking was made free by the central government in several of the EEE, for example Hungary and Slovenia. In Hungary, this intervention was supported by the public as an approach to reduce the number of people using public transport (Medve, 2020). This move can be justified in general terms, primarily because in many locations, indeed, scarcity in parking possibilities disappeared due to working from home and reduced travel demand. Note, however, that parking patterns in modern cities are highly diverse. In neighbourhoods where on-street residential parking is dominant, demand for parking did not decrease, and the abolition of parking fees actually worsened the living conditions of local inhabitants. This diversity calls for more differentiation in local policy making, either by shifting the right of tax setting to lower levels of government, or by collecting more data on local usage patterns when the central government introduces nation-wide policies.

Another important aspect of parking policy is that the related tax revenues constitute a major source of income for local municipalities. Naturally, free parking caused immediate financial difficulties for these governments, who had to implement sudden changes in their budget planning. To understand the scale of income loss, the policy of free parking produced a monthly EUR 1.5 million loss in the city of Ljubljana (Interreg, 2020). This highlights the pronounced role of intergovernmental cooperation at a time of unprecedented reforms in the tax system due to the pandemic. Intuition suggests that the abolition of taxes and the introduction of extra expenditures at various levels of a multi-tier system of government should be coupled with a fine-tuned readjustment of financial flows between them. This is a precondition for maintaining fiscal stability. Unfortunately, we observe in reality that competition between governments that are both vertically and horizontally related is a huge threat to stability in the public sector, which is further amplified if political division hinders cooperation between higher and lower levels of government.

5.4.3 Downturn in Liberalised Transport Markets

The nature of the impact that the pandemic had on liberalised transport markets differs from what we discussed regarding the public sector for two reasons. On the one hand, due to private ownership, the financial dependence of these firms on market prices and demand is more pronounced. On the other hand, private firms face a different type of travel demand compared to public service providers: as their activities are not regulated by any public service obligations, they might adopt more flexible strategies to eliminate the adverse financial effects of a demand shock. The forthcoming discussion will cover developments in the airline industry first, then our focus moves to land transport modes with a more diverse spectrum of privately provided services.

Airline Industry

Major airlines of the EEE region are experiencing unprecedented challenges due to the increased exposure of air travellers to the risk of infection and wide-spread restrictions on international mobility. The challenges are very similar to what the airline industry is going through globally. Referring to our discussion on the main destinations of air travel from the region, both tourism and business travel plummeted during the crisis. This includes the traditional market of Western European visitors, who could not visit the EEE due to lockdown in their home countries, as well as the local population whose traditional destination for tourism is the Mediterranean. The crisis has also appeared to slow down labour mobility within Europe. Citizens from the EEE who reside in Western parts of the continent could perform fewer trips to visit friends and relatives. The frequency of short-term business trips was also reduced due to quarantine restrictions introduced in both the origin and destination countries.

Table 5.2: Quarterly passenger demand (in 1,000 travellers) at major airports in the EEE
Data: Eurostat (2021a)

	2019-Q1	2019-Q2	2019-Q3	2019-Q4	2020-Q1	2020-Q2	2020-Q3	2020-Q4
Vienna	6,040	8,566	9,306	7,724	4,936	172	1,952	788
Warsaw	3,701	4,899	5,747	4,520	3,106	60	1,584	n.a.
Prague	3,199	4,660	5,822	4,159	2,495	49	829	281
Budapest	3,135	4,208	4,715	4,041	2,767	116	780	177
Bucharest	2,986	3,859	4,349	3,501	2,476	119	1,164	692
Sofia	1,591	1,856	1,952	1,679	1,362	223	761	485
Belgrade	1,035	1,577	2,139	1,409	923	85	478	n.a.

As of early 2021, the pressure on the airline industry has not materialised in the collapse of major airlines, despite the evaporation of travel demand. One explanation is the set of substantial managerial decisions aimed at cutting variable operating costs as much as possible. Major areas of cost reduction include job cutting, the cancellation of aircraft orders -– or, conversely, the acceleration of fleet modernisation programmes[14] -–, and flight cancellations or even the closure of low-demand aircraft bases. The resilience of this sector might also indicate that the crisis hit a relatively healthy and consolidated EEE airline industry, where the main players had managed to accumulate significant financial reserves in preceding years.

Despite its competitive industrial organisation, governments in Europe agreed to significant bailout measures to avoid the collapse of the industry (Abate, Christidis & Purwanto, 2020). This practice is legally prohibited under normal conditions, but a temporary regulation by the European Commission enabled exemptions (European Commission, 2020b). Naturally, this was not well received by competitors in the industry, which led to several lawsuits, primarily in Western Europe (Euronews, 2021). We are not aware of similar cases in the EEE, where government bailout for flag carriers also happened, but to a more moderate extent.

Case study

Newly established air carriers had a transformational impact on air transport since the EEE joined the EU, and thus its Single European Sky legal framework. This allows airlines based in any member state to provide transport services anywhere within the Union. Wizz Air, established in 2003, is currently the largest airline in the EEE, and the third largest discount airline in Europe after Ryanair and Easyjet. This airline served three million passengers in 2006, but the number went up to 40 million by 2019, the final year before the pandemic. As Wizz Air was founded in Budapest by former managers of Malév, the Hungarian flag carrier, a part of the company's know-how came from its incumbent competitor.

Wizz Air, just like other 'low-cost' carriers (LCCs), built its business strategy on point-to-point connections, as opposed to the hub-and-spoke network of flag carriers. This strategy is based on the recognition that airport hubs in the EEE do not reach the critical scale to make feeder services operated with low-capacity aircraft competitive. Instead, the LCC model builds on a homogeneous fleet of identical or technologically very similar aircraft. In the point-to-point markets they enter, LCCs offer substantial discounts in a ramp-up period to reach a critical traffic density, and their revenues are coupled with profits from a range of compulsory services such as (optional) on-board catering.

As discussed in Section 5.2.3, the establishment of Wizz Air coincided with the growth of long-distance travel demand between Western and Eastern Europe, fuelled by labour mobility, seasonal workers, and tourism. The availability of new, frequent air connections must have facilitated these developments, and the sudden growth of

[14] For example, Tarom in Romania published plans on reducing their fleet size by 25% in upcoming years, but most of the remaining fleet will be replaced with new aircraft (Ch-aviation, 2021)

LCCs was also due to the freedoms provided by the Single European Sky. In this sense, Wizz Air found the ideal moment to initiate an aggressive growth strategy following the EU accession of its home country. Currently, the airline has a fleet of 138 aircraft of the highly homogeneous A320, A321, and A321neo types of Airbus, and 242 additional aircraft of the same type are expected to be delivered by 2026. The average age of this rapidly growing fleet is around five years, which makes it one of the youngest in Europe. The company is based in Budapest, has been listed on the London Stock Exchange since 2015, and has subsidiaries in London-Luton (since 2017), as well as Abu Dhabi (since 2019). The aircraft are split between bases in more than 40 cities in Europe.

During the Covid-19 crisis, Wizz Air was one of the hardest hit transport companies as it lost 58% of its ridership (flying 16.7 million customers in 2020). The LCC implemented cost cuts by a 20% reduction of its workforce in the same year. At the same time, Wizz Air was one of the first airlines to receive government support in the form of contracts to conduct exceptional transfers of medical equipment, such as PPE, ventilators, and later also vaccines. For this purpose, the company performed 130 flights between Hungary and China in April and May 2021, thus establishing an ‘air bridge’ between the two countries. Later, the Hungarian government procured its own cargo aircraft to handle medical transfers, but this Airbus A330 was also operated by Wizz Air. This unconventional public-private partnership is another example of how LCCs enter uncharted territories during the pandemic relative to their regular activities, sometimes retaking the traditional roles of publicly owned flag carriers.

Liberalised Land Transport Modes

Aggregate demand for long-distance freight transport has not decreased as dramatically as passenger mobility, but hauliers had to adapt to several structural changes in their ordinary businesses. Naturally, regular consumption goods closely linked to activities restricted by lockdown measures did not have to be transported either. Due to disruptions in the supply chains of the manufacturing sector, e.g., the auto- motive industry, freight forwarders and hauliers experienced faltering and irregular demand. At the same time, the pandemic generated new demand for a range of products that had to be delivered to hospitals, commercial outlets, and homes. Essential goods such as medical equipment, food and vaccines required the establishment of new supply chains. The adjustment of people’s everyday lifestyle to working from home induced unprecedented demand for a range of consumption goods, which ensured that freight transport capacities maintained partial utilisation in the lockdown period.

According to the estimates of the International Road Union (IRU), the decline in revenue for European road freight transport operators was 20% of the regular volumes in 2020, which contributes to the loss of USD 125 million compared to the previous year, 2019 (IRU, 2020).The loss of demand was coupled with rising operating costs. The increase in the cost base was primarily due to transport, routing, and delivery restrictions in several European countries. Delays at border crossings were prevalent in the first weeks of the pandemic (Reuters, 2020). Restrictions included testing and sometimes quarantine obligations, and border crossings. Drivers were indeed increasingly exposed to infection risk as they traversed several countries, which amplified the Europe-wide driver shortage to 36% (Knowler, 2020) and raised the cost of labour for freight operators. The rapid transformation of freight demand and ad-hoc deliveries meant that capacity in the back-haul was unutilised more often, which also reduced the efficiency of operations. As a consequence of these challenges, the IRU named liquidity as the most pressing problem for this industry; insolvency and default risk were estimated highest in Europe in the IRU's global comparison.

EU-level efforts to maintain the free flow of goods in the single market focused on speeding up border crossings, whilst minimising the risk of infection propagation between truck drivers. The European Commission published a policy paper on establishing 'green lanes' at the most densely used border crossing points (European Commission, 2020a). The concept of green lanes envisioned that checks and health screenings should take no more than 15 minutes. The Commission proposed that this policy should be applicable to all cargo vehicles, whatever goods they carried. The EEE reacted to this proposal by quickly establishing dedicated highway corridors for international movements, including the selection of transit-only gas stations and parking places where foreign drivers could be isolated as they passed through the continent. This way employees in the freight sector enjoyed almost as much freedom of movement as essential travellers (European Commission, 2020a). The industry was also supported by novel technological solutions to facilitate information provision and optimise route planning amid the unusual circumstances (Euronews, 2020). On 28 October, the Commission proposed an extension of the green lane policy to all modes of transport, including rail and waterborne freight.

Beyond these administrative and traffic management measures, the freight industry had access to regular financial support, such as furlough schemes and funding for recovery. The IRU, a leading interest group of the industry, voiced repeated calls for dedicated financial support to reduce the fixed costs of vehicle leasing, for example. Unfortunately, the sudden loss of demand had a more severe impact on small players in this competitive market. In their defence, this trade union claimed that "government cash grants had gone to large 'national champions' in air or rail rather than targeting the millions of smaller road transport operators who, together, move more goods and passengers" (IRU, 2020).

5.5 Prospects after the Pandemic

The Coronavirus public health crisis coincides with the launching of the 2021-2027 multiannual financial framework (MFF) of the EU, which creates a fortunate opportunity to adjust common policies to the aims of social and economic recovery. The new financial period would have brought about significant changes in infrastructure policy anyway. Traditional transport-oriented programmes, such as the Cohesion Fund, the European Regional Development Fund, and the Connecting Europe Facility, are complemented with new elements of the European Green Deal (EGD), which will become a major source of transport funding in the new financial period. The EGD targets a 55% reduction in carbon emissions by 2030, and making Europe climate-neutral by the middle of this century. Based on the allocation of funding in the forthcoming MFF, it had been clear much before the Covid-19 crisis that large-scale road infrastructure projects, including highway construction, would no longer be supported by EF funds in the EEE. This marks the end of an era of intensive highway network development which began with the EU accession of member states in the region.

Then, by early 2020, it became evident that Europe could not avoid the devastating impact of the Covid-19 pandemic, and the new financial framework would need to be upgraded into a widespread economic recovery plan. EU leaders reacted to this pressing new reality with a substantial expansion of the original budget of the MFF, which in 2018 terms amounted to EUR 1,074.3 billion. Due to the Covid-19 crisis, an extra EUR 750 billion was added to the MFF as part of a new mechanism called Next Generation EU (NGEU). The majority of the NGEU is constituted by the Recovery and Resilience Facility (RFF), with a total sum of EUR 672.5 billion. Nearly half of this amount, EUR 312.5 billion, will be provided as a regular grant, while EUR 360 billion becomes accessible as long-term loans on favourable conditions. [15]

It is not yet fully confirmed at the time of writing what proportion of this unprecedented sum of EUR 1.8 trillion will be allocated specifically to transport improvement. Traditional funding sources, such as the Cohesion Fund and European Regional Development , constitute only 48 billion and 226 billion of the total budget, respectively, while the transport pillar of the Connecting Europe Facility receives only EUR 12.83 billion. However, the vast budget of the RRF remains open for transport improvement, where the actual sectoral allocations will depend on the specific needs of individual member states expressed in their national recovery plans. In the rest of this section, we review what is currently known about the transport-related development plans of members states in the EEE. This is followed in 5.5.2 by a discussion on the prerequisites of the efficient use of these funds. Finally, Section 5.5.3 provides an even broader outlook on the prospects of transport policy in the EEE threatened by the middle-income trap.

5.5.1 The Role of Transport Policy in National Recovery Plans

The financial programming of the RRF follows an unconventional path in the sense that member states submit individual national recovery plans (NRPs) to determine the future allocation of the grants and loans made available centrally. At the time

[15] The present (2021) value of the sums above are as follows. MFF: EUR 1210.9 billion; NGEU: EUR 806.9 billion; RRF: EUR 723.8 billion, in which 338 billion will be grant subsidy, and 385.8 billion comes from loans (European Commission, 2021).

of writing most of the NRPs are already submitted. However, depending on their forthcoming assessment by the European Commission, further adjustments can be anticipated during the course of 2021. In what follows, we focus on the transport-specific elements of the currently available NRPs of the EEE.

Bulgaria

The allocation from the EU Recovery and Resilience Facility to Bulgaria is expected to amount to EUR 10.7 billion, including EUR 6.2 billion in grants and EUR 4.5 billion in loans. The Bulgarian plan (Government of the Republic of Bulgaria, 2021) is built around 4 pillars:

- Innovative Bulgaria;
- Green Bulgaria;
- Connected Bulgaria;
- Fair Bulgaria.

The mobility aspect of the plan features most prominently under the third pillar (‘Connected Bulgaria’), which expects EUR 2.675million of funding. The pillar is focused on three policy fields: digital connectivity, transport connectivity and local development. The focus of the transport connectivity policy field concerns the reduction of the carbon footprint of the transport sector via investments in modernisation and digitisation of the railway. The proposed specific investments towards this end include:

- Digitisation of railway transport through modernisation of the safety and energy efficiency systems along the railway tracks from the core and the extended TEN-T network;
- Restructuring and rehabilitation of key station complexes and building of an intermodal terminal at Gorna Oryahovitsa;
- Modernisation of traction substations and section posts along the core and the extended TEN-T network with construction of the SCADA tele-management and tele-signalling system;
- Provision of sustainable transport connectivity and service through the purchase of energy efficient and comfortable rolling stock.

Moreover, mobility-related investments also feature in the digital connectivity policy area. In particular, the plan mentions the intention to provide safe broadband mobile connectivity of the main roads included in the TEN-T – the Trakia, Hemus, and Struma motorways, and the connections to Romania and Turkey.

Croatia

The RRF allocation for Croatia is expected to be EUR 9.9 billion, including EUR 6.3 billion in grants and EUR 3.6 billion in loans (Government of the Republic of

Croatia, 2021). The Croatian plan is structured to include five components and one initiative:

- economy;
- public administration, judiciary and state property;
- education, science and research;
- labour market and social protection;
- healthcare;
- (initiative): renovation of buildings.

Mobility features primarily within the first component ('Economy') as a subcomponent 'development of a competitive, energy sustainable and efficient transport system'. This is to be achieved via a set of reforms in five areas:

- road sector;
- railway sector;
- maritime and inland navigation;
- improving the public transport;
- greening of traffic.

The road sector reform will focus on investments in electronic toll collection systems, improving ways of exercising the rights of persons with disabilities in the field of mobility, the creation of a National System of Electronic Storage and Data Exchange in Road Transport (NSCP), investments in reporting and management systems of passenger and freight transport in road traffic, as well as investments in monitoring the road transport of dangerous goods.

The railway sector reform is expected to look at the reconstruction and upgrade of a number of railway sections (Dugo Selo-Novska, Kutina-Novska, Oštarije - Knin - Split, Zagreb Kustošija-Zagreb ZK -Zagreb GK), the reduction of noise in freight wagons, the application of green technologies in passenger rail transport as well as the upgrading of the information and sales systems.

The reforms in maritime and inland navigation involve investments in the modernisation of ports open to public traffic, the procurement and construction of passenger ships for coastal line passenger traffic, the modernisation and renewal of the inland navigation fleet (especially in the context of environmental protection and increasing safety) and the construction of a new ferry "Křižnica" in the municipality of Pitomača. Lastly, the investments will also look at equipping ports and docks with waste disposal infrastructure.

As for the improvements of the public transport system, the plan expects the procurement of alternative propulsion vehicles for public urban and suburban regular traffic, as well as the modernisation of tram traffic. Finally, the greening of traffic is expected to include investment in the modernisation and greening of the Zadar airport infrastructure, research, development, and the production of new mobility vehicles and the supporting infrastructure, as well as the creation of a program for co-financing the purchase of new alternative fuel vehicles and the development of alternative fuel infrastructure in road transport.

Czechia

Czechia has requested a total of EUR 8.6 billion in grants under the RRF, and EUR 10.6 billion in loans (Government of Czechia, 2021). The Czech plan has six pillars:

- digital transformation;
- physical infrastructure and green transition;
- education and the labour market;
- institutions and regulation and business support in response to COVID;
- research, development and innovation;
- health and resilience of the population.

The measures oriented at mobility are incorporated under the second pillar, which itself expected to obtain the majority of the funding, i.e., ca. 45%. The specific investments will be oriented at measures to develop safety, sustainability, and the development of inter-modal transport; new technologies and the digitisation of railway infrastructure; the electrification of railways and support for railway infrastructure; anti-noise measures on the road network; investments in measures to improve road and rail safety, including rail crossings, bridges, tunnels, cycle paths, and barrier-free routes, as well as the development of and support for clean mobility.

Hungary

Hungary has requested a total of EUR 7.17 billion in grants under the RRF and EUR 9.66 billion in loans, according to the first draft submitted to the European Commission (Government of Hungary, 2021), but since then its Government has communicated that only grants will eventually be requested. At the point of writing this chapter the approach and the plan were still being assessed by the European Commission. The Hungarian plan has nine components:

- demography and public education;
- renewal of universities;
- catching-up of municipalities;
- water management;
- sustainable green transport;
- energy (green transition);
- transition to a circular economy;
- digitalisation reform for competitiveness;
- health.

The key provisions concerning mobility are included in the fifth component (sustainable green transport). The plan assumes three main reform areas:

- infrastructure and service reform intended to double the number of rail passengers, the number of trains running in and between metropolitan areas and improve access to railway stations.

- institutional system and service reform to operate the entire suburban and interurban transport, including a unified system with a common network and traffic organisation, an integrated timetable structure, and a unified ticketing and transport management system.
- logistics reform to enhance the competitiveness of Budapest, as the freight hub of Central and Eastern Europe, in the field of green mobility.

FFurthermore, the plan mentions addressing rail accessibility and quality of service by establishing missing network connections, new fixed track sections, new transit connections at the intersection of busy public transport routes and upgrade of the rolling stock. The plan also emphasises the role of public transport and its electrification as a means to gradually reduce CO2 emissions and reach the climate-neutral emission target by 2050. For example, the proposed Green Bus Program will support the replacement of the bus fleet operating in public transport with fully electric vehicles and will be backed by the stimulation of domestic electric bus production.

Poland

Poland has requested a total of EUR 23.9 billion in grants under the RRF and EUR 12.1 billion in loans (Government of the Republic of Poland, 2021). The Polish plan is structured around five pillars (‘components’):

- economic resilience and competitiveness;
- digital transformation;
- green energy and the reduction of energy consumption;
- green, intelligent mobility;
- health system effectiveness, accessibility, and quality.

The main transport elements of the plan are described under the ‘green, intelligent mobility’, which, in terms of expected funding, is the second largest component of the plan. It is expected to receive EUR 6.818 billion in grants and EUR 700mil in loans. The specific aims of the component are:

- increased share of zero- and low-emission transport as well as mitigation and reduction of negative environmental impacts of transport.
- increased transport accessibility, safety and digitisation.

The first aim is to be realised via two streams of investments. The first will deliver support for enterprises offering zero- and low- emission technologies and solutions. The second stream will look at investments that increase the share of public transport, especially buses, using alternative fuels as well as the development of the accompanying charging or refuelling infrastructure.

The second aim will be supported via investments in rail, especially in track infrastructure renewal, traffic management systems, with a particular focus on routes that carry substantial volumes of freight and with a vision to enable more effective multi-modality. As for passenger rail, the plan assumes investments in the renewal of rolling stock to improve the comfort and satisfaction with rail travel. In addition, the plan expects investments that improve transport safety, especially with respect to vulnerable users, and the elimination of transit (road) traffic from urban areas. Lastly, the aim expects investments oriented at increased digitisation of transport systems to deliver their increased efficiency.

Romania

Romania has requested a total of EUR 29.2 billion from the RRF, including EUR 14.2 billion in grants and EUR 15 billion in loans (Government of Romania, 2021). The plan is structured around five pillars ('components'):

- the green transition;
- digital transformation;
- smart growth;
- social and territorial cohesion;
- health and resilience;
- policies for the next generation.

The transport sector is expected to receive the largest share of the funding, amounting to approximately EUR 7.6 billion. The plan features two reforms and four investments, including in motorways (434 km of new motorways, 625 ha of linear forest curtains along newly built motorways, and the elimination of 45% of road safety hot spots), railways (modernisation of 311 km of lines, including the implementation of the ERTMS 2 system, the electrification of 110 km of lines, the increase of operational speed of up to 15% on 2534 km of lines, a modern centralised management system) and metro (15.6 km of new network as well as 15 stations and 30 rolling stock frames).

Slovakia

Slovakia has requested a total of EUR 6.575 billion from the RRF (Ministry of Finance of the Republic of Slovakia, 2021). The plan features six key areas of action:

- green economy;
- education;
- science, research and innovation;
- healthcare;
- efficient government;
- digitalisation.

Reforms and investments oriented at mobility are included under the first area, under the banner of 'Sustainable transport'. The specific investments include:

- the development of low carbon transport infrastructure;
- promotion of environmentally friendly passenger transport;

- the development of inter-modal freight transport;
- support for building infrastructure for alternative fuel vehicles.

At the same time, the plan expects reforms in the following areas:

- reform of transport investment project preparation;
- passenger transport reform;
- inter-modal freight transport;
- introduction of new policies for the long-term promotion of alternative propulsion in the transport sector.

The key intended outcomes are the refurbishment of more than 69 km of railway and the construction of more than 100 km of new railway. In addition, the plan assumes the construction of 200 km of new cycling infrastructure. Furthermore, the plan aims to lead to the construction of a network of urban and long-distance infrastructure for vehicles with alternative propulsion. All these measures are expected to contribute towards increasing the share of environmentally friendly modes of passenger and freight transport, and lead to a reduction of the country's contribution to CO2 emissions.

Slovenia

Slovenia has requested a total of EUR 2.47 billion from the RRF, including EUR 1.8 billion in grants and EUR 660 million in loans (Republic of Slovenia: Government Office for Development and European Cohesion Policy, 2021). The plan is divided into four key areas:

- green transition;
- digital transformation;
- smart, sustainable and inclusive growth;
- healthcare and social security.

Mobility is incorporated primarily under 'green transition' as 'sustainable mobility' and acknowledges the context of increased competitiveness in the transport sector emerging in recent years. The plan notes two key reforms to be undertaken:

- the reform of the organisation of public passenger transport;
- the reform in the introduction of infrastructure for alternative fuels.

These reforms are reflected in three primary areas of investment:

- increasing the capacity of railway infrastructure;
- digitising of railway and road infrastructure;
- promoting the establishment of infrastructure for alternative fuels in transport.

Investments are strongly focused on railway infrastructure, including upgrading the main railway line sections (Kranj-Jesenic, Ljubljana-Divača, Ljubljana-Brezovica, Ljubljana-Divača, and Brezovica-Preserje-Borovnica) and railway stations (Domžale, Grosuplje, and Ljubljana), and the digitisation of the infrastructure.

Further investments are expected in railway (ETSC) and road traffic management systems. Lastly, the plan expects substantial investment in infrastructure for alternative fuels, with a particular emphasis on electric vehicle charging.

5.5.2 Transport Funding and the EU Cohesion Policy

Investment into the transport infrastructure will remain the backbone of the EU cohesion policy in the 2021-2027 period. Thus, the degree to which cohesion-oriented efforts are successful will depend on the effectiveness of the EEE transport policy. We saw earlier in this chapter that the motivations of member states in project selection may diverge from the objectives of EU-level cohesion and the maximisation of aggregate wellbeing. Thus, one of the crucial challenges is whether EU funding bodies will be able to ensure the effective utilisation of cohesion funds without escalating conflicts with member states.

The role of economic appraisal should be strengthened in project selection, for example, by limiting the extent to which the applicants of structural funds can diverge from the standardised methodology of cost-benefit analysis. As a first step in this process, substantial intellectual efforts should be mobilised to reduce the gap between existing central CBA guidelines and the state-of-the-art of research in spatial and transport economics. It is remarkable that monetary spending on transport infrastructure in the EEE has grown significantly over the last decade, while investments into high-quality decision support and project selection have stagnated or even declined.

The CBA guidelines of the previous 2014-2020 financial period show particular weaknesses in quantifying the benefits of public transport modes where convenience and crowding related improvements can be of greater importance than pure travel time savings. Also, present appraisal practices neglect the changes in urban spatial structure and economic productivity due to transport improvements. Even though we acknowledge that these are challenging tasks from a methodological point of view, we believe that adequate funding for research on methodological development could ensure that only evidence-based elements can be added to the appraisal framework. Without such research-oriented efforts, we see at least two threats to the CBA approach: public trust in the method will decline if it does not cover some of the most obvious consequences of transport improvements (e.g., suburbanisation or industrial clustering), and an underdeveloped set of guidelines will create room for the intentional misuse of the CBA method.

Funding bodies should pay increased attention to validate past investment appraisal exercises with data collection after project implementation, to identify the best and worst practices in ex-ante analysis. Demand forecasting is one of the key elements of investment appraisal where erroneous predictions introduce significant distortions in the reliability of the estimation of future costs and benefits. With an ex-post comparison of past predictions and the actual demand, one can learn whether the prediction method was appropriate and whether it should be adopted for future analyses. This validation approach, often called *ex-post CBA*, should receive more attention to ensure efficient spending in the infrastructure sector and transparency in the decision making process.[16] At the same time, grant applicants should receive adequate incentives to avoid the intentional manipulation of demand forecasts and benefit calculations.

Railway and public transport-oriented infrastructure development is at the centre of the EU transport policy for the 2021-2027 period. Whilst this general objective is certainly in line with the correction of underdevelopment and past underinvestment in the rail sector in the EEE, railway orientation should not overwrite the principles of efficient project selection on an ideological basis. If railway projects have a clear superiority over other modes in terms of environmental or social benefits, then these advantages should be shown explicitly in an objective project appraisal framework. Even though the technological features of railways and public transport are hardly questionable in terms of scale economies and electric propulsion, projects that do not attract sufficient demand or create competition for alternative modes, such as cycling or walking, should not receive unconditional support.

5.5.3 Transport, Mobility, and the Middle-Income Trap

In this section, we seek to discuss the role of transport and mobility in enabling conditions that prevent countries from remaining within the 'middle income' category and achieve convergence with Western EU member states. This closely relates to the notion of a 'middle-income trap' covered in more detail in Chapter 1 of this volume. The shock brought by the Covid-19 pandemic and the subsequent recovery plans proposed by the EEE as part of the EU Recovery and Resilience Facility provide an opportunity to reflect on how the proposed transport and mobility reforms and investments align with trajectories avoiding the middle-income trap.

Kharas and Kohli (2011) identify three critical transitions that were essential for certain East Asian countries, such as South Korea, to escape the middle-income trap:

- diversification to specialization in production;
- the physical accumulation of factors to productivity-led growth;
- centralized to decentralized economic management.

Following this taxonomy, the most important role of transport and mobility is in the facilitation of the second transition, which among other considerations, requires that the countries become 'enjoyable places to live and raise a family' (Kharas & Kohli, 2011, p. 287). Such a condition is necessary to achieve a suitable concentration of skilled professionals, retention of in-country and attraction of inter national talent. This concentration is, in turn, critical to establishing a suitably creative, innovative, as well as productive workforce that underpins transition to high-income economies. The realisation of such conditions requires a focus on providing adequate levels of

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[16] See an early example of ex-post evaluation for major transport investments in Poland by Rokicki, Haddad, Horridge and Stępniak (2021).

public goods, such as urban transport, clean air, or access to facilities. More recently, the shift towards digitalisation, as well as the proliferation of work-from-home practices, indicate that the availability of suitable ICT infrastructure alongside digitally sophisticated services, both private and public, can be seen as key contributors to transition towards productivity-led growth. Furthermore, transport and communications retain their role in enabling proximity between centres of creativity, research and development and business, in order to facilitate innovation-led business opportunities. This links back to the concept of enabling agglomeration benefits whilst avoiding excessive congestion costs.

5.6 Conclusions and Policy Recommendations

Transport and mobility in the EEE have clearly been undergoing evolution over the past two decades, fuelled by a number of socio-economic trends but also a variety of shocks, including accession to the EU, the global financial crisis of 2007-2008, and most recently the Covid-19 pandemic. The latter has led to dramatic social and economic consequences. At the same time, the aftermath of this shock is likely to see important implications for transport and mobility, through for example investments in the sector (via the NRPs), a more prevalent adoption of new forms of activity participation (work from home, online shopping) or shifts in mobility patterns (use of active modes of transport). Considering the overview provided in the earlier sections, in this final part of the current chapter we seek to draw a number of conclusions and indicate directions for policy consideration.

The Covid-19 pandemic has been the most radical facilitator of the mass adoption of work from home practices, often overnight. This shift has forced a number of wide-ranging changes, including the perception of and preferences for- working from home, changes in legislation to permit them, and increase in the demand for complementary goods and services (e.g., home desks, web cameras, collaboration software suites). It is expected that such forms will remain more prevalent and persistent in the future, even if coexisting with workplace-based work. Whilst more discussion concerning the implications for the labour market can be found in Chapter 4, here we observe that the shift of work location is likely to be accompanied by changes in preferences concerning locations of other activities, such as shopping, eating, and leisure. This will manifest itself in altered spatio-temporal mobility patterns and infrastructure needs. In other words, we may increasingly see people operating in greater proximity to their residential locations. This shift ought to be embraced as an opportunity for policy-making, in particular in reducing transport-related externalities. On the one hand, flexibility can help alleviate the problems of traffic congestion along major commuting arteries to offices, business parks and industrial districts. Nonetheless, such expectations have been part of the tele-work agenda since the 1980s but without meaningful outcomes. Therefore, we opt for directing attention towards a policy opportunity to incentivise the use of active transport and new mobility options: micromobility, bike sharing, etc., to meet the needs for efficient local trip-making. Such policies need to be accompanied by not only suitable infrastructure changes, but also changes in the road-space power dynamics. Specifically, users of the incumbent, dominant form of private transport, the car, require training and perhaps even more importantly, a shift in mentality, to accept the presence of non-car road space users. We see this as a crucial condition to ensure safe co-existence and the reduction of the number of accidents, injuries and fatalities – the track record of which among the EEE is very poor (recall Figure 5.1).

Naturally, the main precondition of the post-pandemic compact city vision outlined above is that urban economies can maintain their pre-pandemic productivity by substituting a large fraction of personal interactions with remote communication. Currently no evidence is available on this, given that the direct economic effects of the public health crisis cannot be disentangled from the impact of working from home. If it turns out that regular personal interactions are still inevitable for competitiveness, that is, agglomeration economies still matter, then sacrificing long-distance connectivity for the sake of short-distance transport improvement may have detrimental economic consequences. Therefore, as long as the final waves of the pandemic prevail, our policy recommendation is that it is too early for major urban restructuring interventions.

Another aspect concerns the increasing adoption of online as a channel for shopping. From the mobility standpoint, online shopping can offer clear benefits in the form of reduced trip-making for searching and shopping. The shopping deliveries, in turn, can leverage suitable optimisation techniques to ensure more efficient deliveries than would be the case for individual-shoppers. At the same time, the increase in online shopping has significant implications for urban logistics and street space management. ‘White van’ created congestion and competition for curb space are problems that cities with higher penetration of online shopping have already been facing over the last decade.

With the upward trend in online shopping, the EEE have to act immediately to prepare solutions that are sustainable for the future. Some examples of techniques that could be explored are as follows. First, kerbside management and creating reservable time-spliced kerb spaces can decrease the need for delivery vehicles to circle looking for parking spaces. By clear, transparent management, delivery vehicles can be in and out of areas in the most efficient way. Second, there should be a push to decrease reliance on large vans in urban logistics by using micro-consolidation centres located in the delivery areas, from where the last mile deliveries are completed with electric cargo bikes.

Third, there should be an increasing share of electric vehicles used for freight deliveries, given that the (high) utilisation patterns of delivery fleets are what EVs are well-suited to, providing a faster return on investment. Thus, policy leverages should be applied in this space to ensure that growth in online shopping and the consequent reduction in shopping trips are not offset by increased emissions due to deliveries. In particular, to speed up the EV-based delivery uptake, government support is needed, e.g., via investment in charging infrastructure where any freight operators can reliably charge their vehicles. Without such support, uptake will be sluggish, creating increasing issues around urban air pollution.

There are several approaches that could provide solutions, however, as each city is unique, the only way to fully understand which approach, or combination of approaches can deliver the best outcomes, prior work needs to be carried out. Specifically, Sustainable Urban Logistics Plans (SULPs), which are planning strategies for urban freight that ensure efficient and sustainable logistics operation, should be created (and, if they already exist, they should be updated) that plan for future scenarios.

More broadly, the electrification of transport is a major trend across industrialised countries, pushed on the one hand by the need to decarbonise the sector and pulled on the other by progress in EV technology and design. The investments and activities proposed in the NRPs are a clear indicator that the EEE also have their ambitions in the space, seeking to address charging infrastructure shortcomings and necessary adjustments to transmission networks, to accommodate large numbers of EVs on the roads. These are certainly pre-requisites to mass EV adoption and gradual replacement of internal combustion engines. At the same time, the EV adoption warrants the consideration of the ultimate source of electricity. In the context of the EEE, this is still predominantly based on fossil fuels (the broader energy context in the EEE is discussed in more detail in Chapter 7). As a consequence, the electrification of transport without the accompanying green transformation of the energy sector may not lead to the reduction, but to the relocation of emissions. Thus, policy measures need to look at these systems jointly, while also incentivising emerging solutions related to local energy generation and storage, e.g., based on the vehicle-to-grid (V2G) concepts, in which EVs are expected to play a substantial role.

On a related note, we also bring attention to trends in vehicle automation, especially private vehicle automation. In particular, the gradual progress in the capabilities of automated vehicles seen over the past decade has recently culminated in legislation changes in a number of countries (the US, China) that permit the operation of such vehicles in real life environments. Our policy recommendation in this space is to continue and expand involvement in activities related to connected and automated mobility (CAM), e.g., in cross-border trials (European Commission, 2021a), work on suitable regulations related to vehicle automation, through public consultation but also involvement of the public and take this trend into consideration in infrastructure planning.

An important concern that requires attention from a transport and mobility policy-making standpoint is the need to actively take into account sociodemographic changes in societies, especially related to ageing (see Chapter 9 for a more detailed discussion) to ensure that the evolution in transport provision remains inclusive. The reforms, policies, and investments need to guarantee that the, consequent benefits do not disproportionately benefit particular groups. For example, the promotion of EVs may need to be accompanied by policies that allow the acquisition of such vehicles by all groups, not only the affluent (see Chapter 12 for more discussion on inequality and welfare in the EEE countries). Incentives to promote active forms of transport require careful consideration of user groups or contexts, where such forms may not be adequate or safe due to the lack of physical or mental capability or practicality. Lastly, the digitisation of the transport and mobility sectors must incorporate policy measures that recognise the presence of segments of society that lack suitable digital skills or equipment to make use of digital solutions. In other words, what could be termed *a blind digitisation of mobility* may risk aggravating transport accessibility, especially within vulnerable groups. Given that such areas may also lack market incentives (insufficient user base with possibly low willingness to pay), it will likely be up to policy interventions to provide suitable corrections, in the form of regulations, guidance or incentives to transport sector operators.

Beside the rapid spread of emerging transport technologies, conventional infrastructure development (fuelled by the cohesion-oriented EU funds) and public service provision will remain the backbone of transport policy in the EEE. Despite nearly two decades of experience in EU-funded infrastructure development, the quality of investment appraisal, project selection, and monitoring throughout the project life cycle receive insufficient attention. Thus, even though the total value of the infrastructural asset stock of the EEE does converge to the rest of the EU, the efficiency of its utilisation varies on a wider range, and asset condition deteriorates more quickly. This chapter recommends that project selection should be a more transparent process in which a larger pool of locally generated project ideas are assessed and benchmarked according to objective criteria. This would change the purpose of investment appraisal from the justification of high-level political decisions to actual decision support for policy making. Furthermore, traffic forecasts and other elements of ex-ante feasibility studies should remain publicly accessible long after new infrastructure projects are completed, so that the ex-post monitoring of the precision of earlier feasibility estimates becomes possible for the wider public. The absence of transparent checks and balances creates room for biased decision-making and corruption in the infrastructure sector. We believe that such efficiency-enhancing mechanisms should also be a binding requirement for infrastructure development in the EEE , whether funding for transport investments comes from EU bodies, the private sector, or non-European countries.

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Chapter 6
Monetary, Macroprudential and Fiscal Policy

Júlia Király, Balázs Csontó, László Jankovics, and Katalin Mérő

Abstract The chapter provides an overview of the conduct of monetary, macroprudential and fiscal policies in the Emerging European Economies since the Global Financial Crisis, including the policy response to Covid-19 and the post-pandemic challenges. We show that changes in the institutional frameworks both at the regional and national level led to a significant expansion of the instruments available for policymakers, as well as enhanced fiscal frameworks and resilience in the financial sector. At the same time, monetary policy was constrained by several factors, including the global financial cycle, the long-term decline in interest rates and the globalization of inflation. The large policy accommodation in response to Covid-19, including through the use of unconventional tools, helped mitigate the economic damage. The post-pandemic challenges, however, are significant, given the limited policy space, some structural factors affecting inflation and interest rates, as well as potential threats to independent institutions.

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6.1 Introduction

Over the past decade, the conduct of macroeconomic policies in the Emerging European Economies (EEE) has been influenced by several factors, including the reform of both the national and regional institutional frameworks, significant shifts in the global economic landscape, as well as the need to respond to major challenges arising from the Global Financial Crisis (GFC), the European sovereign debt crisis and the Covid-19 pandemic.[1 2]

The GFC and the European sovereign debt crisis reiterated the importance of reducing vulnerabilities and increasing resilience to external shocks, including through revamping fiscal governance frameworks, as well as strengthening financial sector supervision and regulation. For example, the reform of the European Union's (EU) Stability and Growth Pact led to increased emphasis on public debt and stronger enforcement mechanisms, while allowing for flexibility conditional on the economic cycle. In addition to and partly triggered by the EU-level changes, the national governance frameworks also evolved, including the establishment of independent fiscal institutions and the adoption of fiscal rules. Similarly, the macroprudential institutional framework was developed both at the EU- and national level, leading to the establishment of the European Systemic Risk Board and national authorities, as well as the widespread use of macroprudential tools across the EEE. In addition to their positive impact on policy credibility, the enhanced governance frameworks also proved to be flexible enough to respond to the Covid-19 shock.

Monetary policy frameworks also underwent major changes in the aftermath of the GFC. Following Slovakia and Slovenia, the Baltic states also adopted the euro by the mid-2010s, while Bulgaria and Croatia – with both countries using the euro as an exchange rate anchor, albeit under different exchange rate regimes – entered the Exchange Rate Mechanism (ERM)-II during the Covid-19 pandemic. Although Czechia, Hungary, Poland, and Romania maintained the inflation-targeting framework and the *de jure* floating exchange rate regime, the degree of exchange rate flexibility differed across countries and periods, reflecting the challenges arising from swings in capital flows, the limited monetary policy space, and the tolerance of the central bank towards exchange rate volatility.[3]

The conduct of macroeconomic policies has also been affected by the changing global economic landscape. For example, the decline in global interest rates on the back of structural factors such as demographic changes and low productivity growth have reduced monetary policy space, but enhanced the room for fiscal

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[2] The EEE includes Bulgaria, Croatia, Czechia, Hungary, Poland, Romania, Slovakia and Slovenia.

[3] Throughout the chapter, we refer to monetary policy space as the room for conventional monetary easing, i.e., the 'distance' of the policy rate from the zero lower bound.

policy.[4] Moreover, given the high degree of financial openness, the independence of monetary policy has been constrained by the emergence of the global financial cycle (Rey, 2015), with the latter largely influenced by monetary policy in major advanced economies in the aftermath of the GFC. Against the backdrop of increasing economic interconnectedness, including through global value chains, the 'globalization' of inflation implies inflation becoming less responsive to domestic economic slack, thereby potentially increasing trade-offs for monetary policymakers. Finally, the unprecedented nature of the Covid-19 crisis also necessitated largely accommodative monetary, macroprudential, and fiscal policies, including through the use of unconventional measures.

The post-GFC period also highlighted the importance of the interaction and coordination of policies. Specifically, the largely accommodative monetary policy increased fiscal space by lowering both the interest rate and the need for automatic stabilizers. In turn, sustainable fiscal policy could enhance monetary policy space by lowering the country risk premium. There is also some empirical evidence that the use of macroprudential policies could increase monetary policy space when facing external shocks.

Notwithstanding the benefits associated with strengthened policy frameworks, policy challenges will be significant in the aftermath of the Covid-19 pandemic. Given the largely accommodative policies in response to Covid-19, both monetary and fiscal policy space will be limited. The former will also be affected by the impact on interest rates and inflation of structural factors that are beyond the scope of macroeconomic policies. The emergence of cryptocurrencies will mean further challenges for monetary policy. Finally, the increased attention to monetary policy, including its distributional effects and potential role in climate change policies, could pose a threat to central bank independence. Therefore, clear communication about the mandate of central banks and the justification of the use of policy tools will be more important than ever.

In the remainder of the chapter, we provide an overview of the main developments in the period between the GFC and the Covid-19 pandemic (Section 6.2), the response to the Covid-19 crisis (Section 6.3), and post-pandemic policy challenges (Section 6.4). In doing so, we will cover the EEE, albeit to a different extent across macroeconomic policies, reflecting the differing degree of policy independence (e.g., lack of monetary policy independence in the members of the euro area).

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[4] We refer to fiscal space as the room for fiscal policy to act countercyclically without jeopardizing debt sustainability. As such, a lower level of debt, a higher primary balance, lower interest rates or higher growth would imply higher fiscal space.

6.2 Recovery and Progress After the Global Financial Crisis

6.2.1 Monetary Policy

Over the past three decades, the monetary policy framework has been evolving rapidly in EEE, reflecting economic challenges (with the use of exchange rate pegs as an anchor during the transition period, followed by a shift towards more flexible regimes during the convergence period), the global spread of inflation targeting (IT) regimes[5] and central bank independence, as well as developments in European integration (with two members of the EEE adopting the euro before the 2010s). Based on the monetary policy framework, a decade after the GFC the EEE can be divided into three main groups:

- Euro area members: Slovenia (2007), Slovakia (2009),
- ERM-II members: Bulgaria and Croatia (July 2020), and
- Inflation-targeters: Czechia, Hungary, Poland, and Romania.

As Slovakia and Slovenia gave up independent monetary policy at the time of their accession to the euro area, while Bulgaria's currency board arrangement limited monetary policy independence even before its entering the ERM-II, they are not subject to the analysis of monetary policy in this chapter.[6] Nevertheless, they will be used as a control group when discussing the performance of the EEE in terms of inflation. In Croatia, the use of the euro as an exchange rate anchor constrains the independence of monetary policy and distinguishes the country from those targeting inflation within the EEE group in terms of available policy tools, therefore its coverage differs from those of the inflation-targeters in the remainder of the chapter.

6.2.1.1 Conventional and Unconventional Policy Tools

Policy Rate and Corridor

Most inflation-targeting members of the EEE entered the post-GFC decade with an ongoing easing cycle.[7] Specifically, the collapse of Lehman in 2008 was followed by a series of policy rate cuts by each inflation-targeting member to counterbalance the real economic crisis, with the notable exception of Hungary where a rate hike of 300 basis points was triggered by the significant depreciation pressure at the peak of the crisis (Figure 6.1). This, however, was quickly reversed, as an improvement in investor sentiment, partly attributed to the financial assistance program by the

[5] The IT regime is a monetary policy framework that commits the central bank to achieve a certain rate of inflation as its primary objective.

[6] The leva has been pegged to the euro since its launch in 1999, at a fixed rate of €1 = BGN 1.95583, which is the central rate in the ERM II.

[7] A comprehensive overview of the history of inflation targeting in Czechia, Hungary, and Poland is given in Ciżkowicz-Pekała et al. (2019).

International Monetary Fund (IMF)-European Union (EU)-World Bank (WB), reduced the country risk premium. In general, countries with high foreign exchange (FX) indebtedness (Hungary, Poland, and Romania) were more cautious, given the potentially destabilizing impact of the weakening of the exchange rate. In 2011-2012, the supply-side inflationary pressure arising from food and oil prices and the depreciation of the currency, with the latter driven by the contagion effect of the euro area crisis (combined with increasing concerns about policymaking and the rule of law in Hungary), forced Hungary and Poland to increase the policy rate, before returning to the easing cycle. Policy rates hit their pre-Covid historical minimum, reaching 0.05 percent in Czechia in 2012, and 0.9, 1.5, and 1.75 percent in Hungary, Poland, and Romania, respectively, in the mid-2010s. Policy rate hikes started in Czechia and Romania in August 2017 and January 2018, respectively, when the Česká Národní Banka (CNB – Czech National Bank) and the Banca Naţională a României (BNR – Romanian National Bank) reacted with gradual rate increases to the rising inflationary pressure.[8] At the same time, Hungary and Poland – experiencing the same slowly crawling inflation – considered the inflationary pressure to be a temporary phenomenon, with no monetary policy response needed. In addition to the policy rate, the interest rate corridor, which in advanced economies used to be an effective crisis management tool during the GFC to foster the effect of policy rate decisions (Papadia & Välimäki, 2018), had also been actively used in the 2010s by inflation-targeting EEE.[9]

Liquidity Measures and Standing Facilities

After the GFC, benign money market conditions supported stable liquidity conditions, with neither a serious liquidity squeeze, nor superfluous liquidity in the banking sector.[10] To manage the liquidity position of banks and support the effect of policy rates, the EEE use similar tools, including repo and reverse repo,[11] short term credit, short term deposit (or CB bills), outright purchase/sale of eligible assets (including foreign exchange), and FX swap.[12] Since inflation-targeters are typically

[8] The post-GFC easing cycle, however, ended in Czechia in April 2017 when the exchange rate commitment was abolished, with the koruna strengthening thereafter.

[9] Czechia started to narrow the corridor in 2009, and widened it in 2017 (with the latter supporting the rate hike cycle), while Hungary, Poland and Romania narrowed it in the mid-2010s in order to reinforce the rate cutting cycle. Moreover, whereas Poland and Romania kept the symmetry of the corridor around the policy rate, the policy rate was equal to the lower bound in Czechia, and to the upper bound in Hungary during certain periods.

[10] See Table 6.1 for an overview of monetary policy instruments in EEE.

[11] In a repo transaction, the central bank provides its counterparts with liquidity against collateral (typically securities), with an opposite transaction at a forward date. In a reverse repo, banks deposit their excess liquidity with the central bank against collateral provided by the central bank for a certain period.

[12] In most of the EEE, the reserve requirement is quite low and not actively used. In Romania, however, it was significantly reduced from 20 to 8 percent on lei deposits, and from 40 to 5 percent

Fig. 6.1: Central bank policy rates and interest rate corridor (percentage)
Data: CNB (2021a); MNB (2021c); NBP (2021c); BNR (2021d)

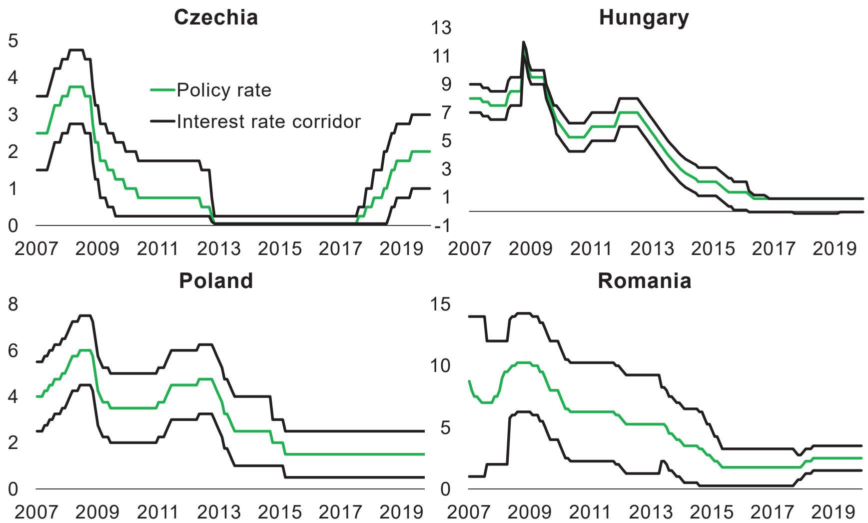


Table 6.1: Monetary policy instruments 2010-2019
Data: authors' compilation

	Croatia	Czechia	Hungary
Operation related to policy rate	No special policy rate (mainly FX management)	2W reverse repo	Aug 2014-Sep 2015: 2W deposit; Oct 2015-Dec 2018: 3M deposit; 2019-: reserve account (effective policy rate: 1W HUF-providing swap and/or 1W deposit (from 2020))
Interest rate corridor	Lombard rate / overnight credit. Overnight depo rate	Overnight marginal lending facility and overnight depo. Corridor may be asymmetric.	Overnight deposit facility and overnight marginal lending facility. Corridor may be asymmetric.
Other standing facilities	Purchase/sale of euro; 1W and ON credit; 1W reverse repo (2015-17)	2W repo, 2W FX swap	1Y and 5Y IRS; preferential deposit; FX swap (1M,3M,12M); 1W deposit
Reserve requirement	Decline from 13% in 2010 to 9% in 2019	2.0%	Nov 2010-Nov 2016: 2-5%; Dec 2016-: 1-2%

Table 6.1 Cont.: Monetary policy instruments 2010-2019
Data: authors' compilation

	Poland	**Romania**
Operation related to policy rate	1W bills	1W repo (since Mar 2011)
Interest rate corridor	Overnight deposit facility and ovenight marginal lending facility. Symmetric corridor.	Overnight repo and depo. Symmetric corridor.
Other standing facilities	Repo and swap (non-active)	Credit operations against collateral; Outright purchase/sale of eligible assets; FX swap; CB CDs; Reverse repo
Reserve requirement	3.5%	Since 2015, 8% on lei deposit and 0% on FX deposit (increased to 5% in Nov 2020)

not euroized[13] and are open economies (with Hungary and Poland at the opposite ends of the spectrum) with significant FDI and other capital flows, albeit declining after the GFC, they have large FX reserves, which usually results in excess liquidity in the banking sector. As a consequence, with the exception of some periods, central banks have been mostly active on the liability side, absorbing the excess liquidity.

The liquidity of the Hungarian and Romanian banking sector was volatile, with ample movements in autonomous liquidity factors resulting in swings between periods characterized by banks' negative/positive net liquidity position of banks. Given that these swings were not necessarily synchronized across banks, central banks had to alternate between liquidity-providing and liquidity-absorbing instruments, sometimes using them in parallel. The policy rate was attached to various facilities, with the repo and reverse repo alternating in Romania, and some ambiguity as to which policy instrument the policy rate was attached to during certain periods in Hungary. Specifically, the effective policy rate was sometimes different from the official one in Hungary (e.g., when the implicit rate of the liquidity providing swap functioned as the effective policy rate), with money market rates reacting to movements in the effective rate (e.g., the summer of 2018 and 2019, and the pre-Covid two-month period), i.e., there was an implicit rate hike in response to the inflationary pressure.

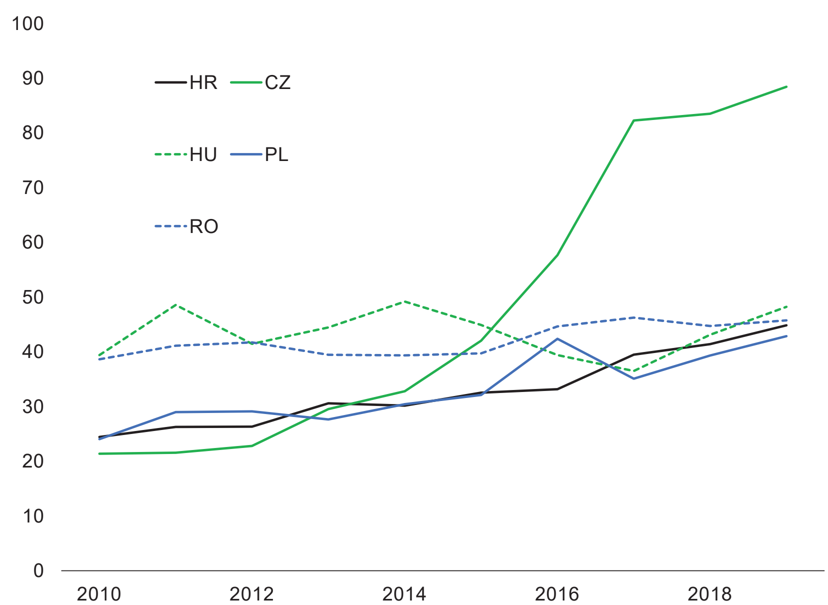
on FX deposits. In Croatia, it was double-digit post-GFC and unchanged at 12 percent in the second half of the 2010s.

[13] Euroization refers to the phenomenon when a foreign currency replaces the domestic currency as money used in the country.

Unconventional Measures

After the GFC, many advanced countries launched unconventional monetary policy (UMP) measures – such as long-term lending and asset purchase programs to increase the effectiveness of monetary policy at the zero lower bound (ZLB) (see e.g., Borio and Zabai (2016)).[14] Similarly to most emerging markets (EMs), however, the EEE did not resort to unconventional tools, with the exception of Hungary that – together with Colombia – operated the only asset purchase program among EMs before Covid-19 (Cantú, Cavallino, De Fiore and Yetman (2021)). Specifically, Hungary was actively using UMPs, including the launching of the Funding for Growth Scheme and three different asset purchase programs (MNB, 2021e).

Fig. 6.2: Central bank balance sheet (total assets, percentage of GDP)
Data: HNB (2021b); CNB (2021c); MNB (2021d); NBP (2021a); BNR (2021c); IMF (2021c)

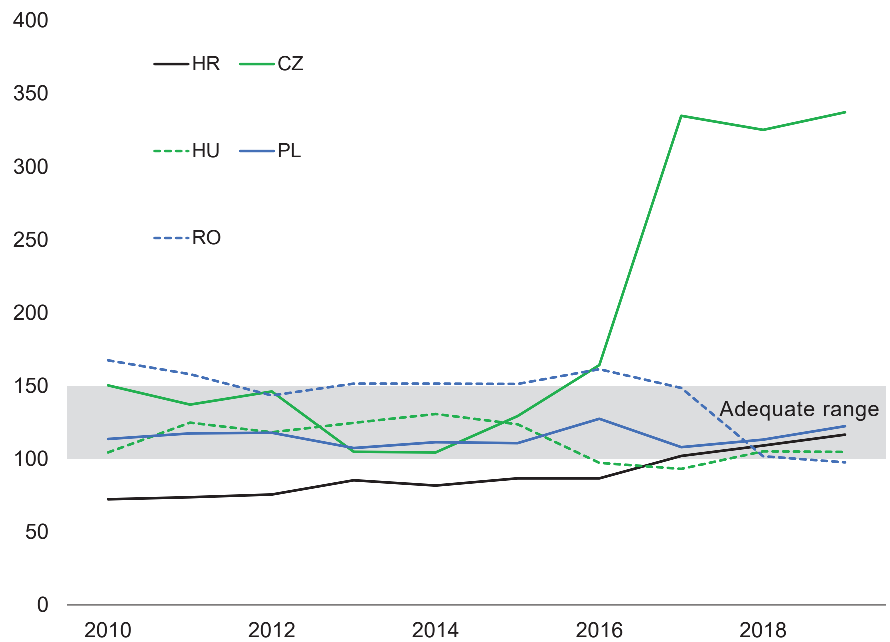


Czechia is another exception. In order to prevent an excessive appreciation of the koruna and the deepening of deflation against the backdrop of hitting the 'technical zero', in November 2013 the CNB introduced a floor on the exchange rate rate (CKZ/EUR of 27), which was maintained until April 2017. As argued by Lízal and Schwarz (2013), when facing the ZLB "foreign exchange interventions represent a

[14] In general, UMPs can also aim at improving market functioning, especially in emerging and developing countries. ZLB refers to the constraint that once interest rates reach zero, a further decline would lead to negative interest rates, i.e., requiring creditors to pay debtors.

meaningful monetary policy tool for small open economies not facing serious liquidity problems”. The unconventional easing contributed to the rapid consolidation of economic activity, while inflation reappeared only in 2017 (Baxa & Šestořád, 2019). In the meantime, the balance sheet of the CNB expanded on the back of the significant increase in FX reserves (Figures 6.2 and 6.3), with the IMF’s reserve adequacy metric exceeding 300 percent vs the adequate 100-150 percent range. Moreover, the CNB recorded significant losses, just as the Swiss National Bank did under a similar experiment (Baxa & Šestořád, 2019; Franta, Holub & Saxa, 2018)).

Fig. 6.3: FX reserves (ARA metric, percentage)
Data: IMF (2021a)
Note: The Assessing Reserve Adequacy (ARA) metric compares the level of reserves to a set of indicators, including short-term debt, medium- and long-term debt and equity liabilities, broad money, and export earnings (IMF, 2015).



6.2.1.2 Some Challenges and Puzzles

In this section, we focus on three major challenges and puzzles that were at the forefront of policy discussions in the aftermath of the GFC. Specifically, the questioning of the trilemma or the ’impossible trinity’ shed light on the difficulties faced by small open economies highly integrated into global financial markets.[15] Similarly, the increasing integration into global trade and value chains seems to have increased the role of global factors in driving inflation, with possible major implications for the conduct of monetary policy. Finally, the long-term decline in the neutral rate has also been a widely covered topic that became even more prominent given its implications for monetary policy space.

Trilemma or Dilemma?

Is there independent monetary policy at all? Although monetary policy space is enhanced by flexible exchange rate regimes in the presence of open capital accounts as postulated by the trilemma, “there is a global financial cycle in capital flows, asset prices and in credit growth” that transforms the trilemma into a ‘dilemma’, i.e., the independence of monetary policy is constrained by the global financial cycle irrespective of the exchange rate regime (Rey, 2015). Moreover, Rey (2015) argues that “monetary policy in the centre country” is one of the drivers of the global financial cycle.[16] In addition to the reduced independence of monetary policy, under specific circumstances, this could even lead to procyclical monetary policy. For example, against the backdrop of a simultaneous negative shock to domestic economic activity and global financial conditions, the central bank of a small open economy would face a major trade-off. Specifically, the reduction in the policy rate in response to the negative real shock could exacerbate the impact of the financial shock on capital flows and the exchange rate. As a result, changes in the policy rate might respond to the latter even in inflation-targeting regimes.

During and in the aftermath of the GFC, policymakers of small open economies, including in the EEE, often faced major challenges arising from large swings in global financial conditions. Against the backdrop of open capital accounts across the EEE, differences in the degree of exchange rate flexibility do not seem to be reflected in the level of monetary policy independence (Figure 6.4). Indeed, as Dăianu (2016) notes, the dilemma indicates “how hard it is to conduct an effective monetary policy in small open economies when facing substantial capital flows”. As discussed earlier, for example, the Magyar Nemzeti Bank (MNB – Hungarian National Bank) had to resort to a policy rate hike at the peak of the GFC, with Governor András Simor emphasizing that the rate hike was needed “in order to raise the cost of speculating against our currency” (Reuters, 2008). In the aftermath of the GFC, large and volatile capital flows continued to pose major risks for EMs (BIS, 2021a), including the EEE that remained exposed to external market sentiment and spillovers from the monetary policy of major advanced economies. For example, Grabowski and Stawasz-Grabowska (2020) find that during the decade after the GFC financial markets in Czechia, Hungary and Poland were strongly affected by the unconven-

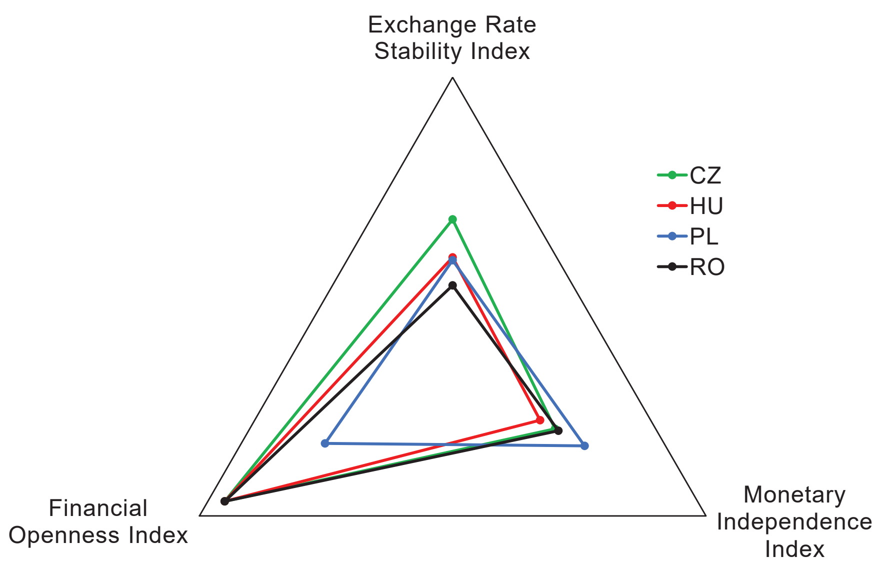
[15] The trilemma of the Mundell-Fleming framework is that a country can achieve simultaneously only two of the following three goals: independent monetary policy, exchange rate stability, and free capital flows. For a comprehensive overview of the trilemma, see Aizenman (2019).

[16] The "centre country" refers to the U.S.

tional measures of the European Central Bank (ECB), especially its asset purchase programs. Specifically, the Outright Monetary Transactions (OMT) were associated with a decline in yields, while the OMT, the Securities Markets Programme (SMP) and the Public Sector Purchase Programme (PSPP) led to currency appreciation vis-à-vis the euro in the region. Antal and Kaszab (2021) also find spillover effects of the ECB's programmes in Bulgaria, Croatia, Czechia, Hungary, Poland, and Romania, with a drop in sovereign bond yields of around 1-6 basis points within two days of the PSPP announcements.

Notwithstanding the exposure of the EEE to changes in external financing conditions, their vulnerabilities decreased significantly in the aftermath of the GFC, thereby potentially enhancing monetary policy space in the wake of negative external shocks. For example, the average current account balance in Croatia and the inflation-targeting EEE improved from a deficit of close to 8 percent of GDP in 2008 to a surplus of around 1 percent of GDP in the mid-2010s. The stock of FX loans of unhedged households, another major source of pre-GFC vulnerabilities, also decreased substantially in Poland and Romania and was basically eliminated in Hungary in the mid-2010s. The improvement in resilience was a general phenomenon across EMs, reducing "the severity of the disruptions" that sudden stops in capital flows cause (BIS, 2021a).

Fig. 6.4: Trilemma index (average, 2010-19)
Data: Aizenman, Chinn and Ito (2010)



If open capital accounts constrain the independence of monetary policy irrespective of the exchange rate regime, do EEE inflation targeters choose different exchange rate regimes and – if yes – what is the reason to do so?[17]

There are differences among inflation-targeters in terms of the *de facto* exchange rate regime.[18] Specifically, the *de facto* exchange rate regime has been classified as as floating arrangement in Hungary and Poland since the GFC.[19] The floating regime was temporarily replaced by other managed and stabilized arrangements between 2013 and 2016 in Czechia,[20] and by a crawl-like system in 2016 and a stabilized arrangement in 2018 in Romania.[21] The stabilized arrangement "entails a spot market exchange rate that remains within a margin of 2 percent for six months or more [. . .] and is not floating" (Habermeier et al., 2009). At the same time, there was much less variation in terms of the *de jure* regimes, with each inflation-targeter operating a form of floating arrangement after the GFC.

In Czechia, the main reason for frequent FX intervention was that the policy rate hit the "technical zero" (see above), therefore further monetary policy easing was possible through the weakening of the koruna. Therefore, between the autumn of 2013 and the spring of 2017, the CNB used an exchange rate commitment to intervene

[17] As noted earlier, the Hrvatska narodna banka (HNB – Croatian National Bank) set the exchange rate of kuna against the euro as a nominal anchor for monetary policy: "The HNB's monetary policy framework is based on maintaining the stability of the nominal exchange rate of the kuna against the euro. A stable exchange rate of the kuna against the euro constitutes the so-called nominal anchor of monetary policy by which the HNB stabilizes inflationary expectations and, ultimately, inflation itself" (HNB, 2015). The special framework can be explained by the high level of euroization of the country, the high level of FX indebtedness of different sectors and the openness of the economy. Between 2010 and 2015, FX interventions prevented the depreciation of the kuna (i.e., the sale of the euro), while the over-appreciation was prevented by the sale of the kuna after 2015.

[18] The *de facto* regimes are based on the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) database.

[19] It is floating in Hungary, and free-floating in Poland. Based on Habermeier, Kökényné, Veyrune and Anderson (2009), "a floating exchange rate is largely market determined, without an ascertainable or predictable path for the rate. [. . .] Foreign exchange intervention may be either direct or indirect, and serves to moderate the rate of change and prevent undue fluctuations in the exchange rate, but policies targeting a specific level of the exchange rate are incompatible with floating". At the same time, "a floating exchange rate can be classified as free floating if intervention occurs only exceptionally, aims to address disorderly market conditions, and if the authorities have provided information or data confirming that intervention has been limited to at most three instances in the previous six months, each lasting no more than three business days. If the information or data required are not available to the IMF staff, the arrangement will be classified as floating."

[20] Specifically, it was other managed arrangement in 2013 and a stabilized arrangement between 2014 and 2016. The category of other managed arrangement is a residual, "used when the exchange rate arrangement does not meet the criteria for any of the other categories" (Habermeier et al., 2009).

[21] In crawl-like arrangements, "the exchange rate must remain within a narrow margin of 2 percent relative to a statistically identified trend for six months or more (with the exception of a specified number of outliers), and the exchange rate arrangement cannot be considered as floating. [. . .] an arrangement will be considered crawl-like with an annualized rate of change of at least 1 percent, provided that the exchange rate appreciates or depreciates in a sufficiently monotonic and continuous manner" (Habermeier et al., 2009). In Romania, the *de facto* regime was reclassified retroactively to crawl-like in July 2016 and to stabilized in January 2018 (IMF, 2020a).

in the foreign exchange market if necessary in order to maintain the exchange rate close to CZK 27 vis-à-vis the euro.

In other inflation targeters, FX intervention generally aims at preventing disorderly market conditions, especially during episodes of major external shocks, such as the Taper Tantrum in 2013 or the general EM sell-off in 2018. A survey conducted among EM central banks also highlights that many central banks intervene to maintain price stability, given the pass-through of depreciation into prices, and to build reserves (Patel & Cavallino, 2019).

Financial stability considerations could also play a role. In general, Slavov (2017) highlights the negative relationship between the degree of euroization and exchange rate flexibility in Central, Eastern and South-eastern Europe, with Croatia, Hungary, and Romania belonging to the group of countries characterized by a high share of FX loans and a low degree of exchange rate flexibility. Hofman et al. (2020) also argue that the case for FX intervention under inflation-targeting could be the "strongest in the presence of large currency mismatches". Indeed, the negative impact of the depreciation on FX borrowers could reduce the central bank's tolerance vis-à-vis the volatility of the exchange rate. A special case of debt-related FX intervention took place in Hungary, where in 2014 the MNB offered FX swaps to credit institutions to avoid disorderly market conditions potentially arising from the conversion of the FX denominated loans to HUF.[22]

Finally, in addition to outright FX interventions, changes in the policy rate were sometimes also partly motivated by the evolution of the exchange rate. Both the MNB and the Narodowy Bank Polski (NBP – National Bank of Poland), for example, emphasized the role of the pass-through of the depreciation of the exchange rate into inflation behind the policy rate hikes in 2011 and 2012. Specifically, in November 2011 the MNB noted that "the depreciation of the forint in recent months is a threat to meeting the 3 per cent inflation target" (MNB, 2011), while in May 2012 the NBP explained that "elevated inflation will be driven by the previously observed weakening of the zloty and high commodity prices" (NBP, 2012).

Declining Neutral Rate and Policy Space

The assessment of monetary policy stance, "defined as the contribution made by monetary policy to economic, financial and monetary developments" (ECB, 2010), requires an understanding of the the neutral interest rate. The latter is an unobservable variable, with the concept originating from Knut Wicksell who described it as "a certain rate of interest on loans which is neutral in respect to commodity prices, and tends neither to raise nor to lower them" (Wicksell, 1936). On this basis, Holston, Laubach and Williams (2020) define the neutral rate as "the real short-term interest rate consistent with output equaling its natural rate". In small open economies, an additional consideration for the interest rate to reach its neutral level is that "the risk premium is also in line with the medium-term target" (Baksa et al., 2013).

[22] For a comprehensive overview of the phasing-out of household FX loans in Hungary, see Kolozsi, Banai and Vonnák (2015).

The real neutral rate has been declining over the past few decades in major advanced economies, including the euro area (Brand, Bielecki & Penalver, 2018; Holston et al., 2020). Notwithstanding the high degree of uncertainty around these estimates, the real neutral rate is also found to have declined in Czechia, Hungary, Poland and Romania in the aftermath of the GFC, with some reversal in the mid-2010s (Baksa et al., 2013; Stefański, 2018; Hlédik & Vlček, 2019; Arena et al., 2020). While the gradual increase continued until 2019 in Romania and Poland (Arena et al., 2020), the neutral rate is estimated to have declined to as low as 1 percent in 2017 following its peak in 2015 in Czechia on the back of the appreciation of the equilibrium real exchange rate amid robust real GDP growth (Hlédik & Vlček, 2019). The uncertainty around these estimates, however, is very high. For example, Hlédik and Vlček (2019) estimate the width of the 90 percent confidence band around the neutral rate of 1 percent at 400 basis points.

The decline in neutral rates has been a long-term phenomenon driven by a number of structural factors. For example, Stefański (2018) attributes the decline in neutral rates to both internal (e.g., population ageing, rising inequality) and external factors (e.g., slowdown in global total factor productivity growth). Population ageing, for example, could lower the neutral rate through several channels, including by increasing savings for retirement and lowering the capital/labor ratio and thereby the marginal product of capital. Similarly, rising inequality could increase savings through the concentration of income with those who have a lower propensity to consume. Finally, Hlédik and Vlček (2019) also emphasize the role of changes in the equilibrium real exchange rate in small open economies.

The neutral rate can be used as a benchmark for assessing the monetary policy stance, with an accommodative and tight stance indicated by an actual real interest rate below and above the neutral rate, respectively. This also shows the importance of distinguishing between policy stance and cycle: (i) the policy stance could remain tight even during an easing cycle if the policy rate remains above the neutral rate; (ii) an easing cycle might not fully translate into a looser stance if the neutral rate also declines during the same period. Indeed, a major implication of the decline in the neutral rate is that the post-GFC monetary easing did not fully translate into a looser policy stance.[23] In other words, to some extent, monetary policy only followed the fall in interest rates driven by structural factors. Moreover, the proximity of the effective lower bound in the low interest environment also reduced the space for further monetary easing. Finally, the pro-cyclical nature of the neutral rate, e.g., its decline during economic downturns, implies the need for a stronger response to cyclical fluctuations (Stefański, 2018).

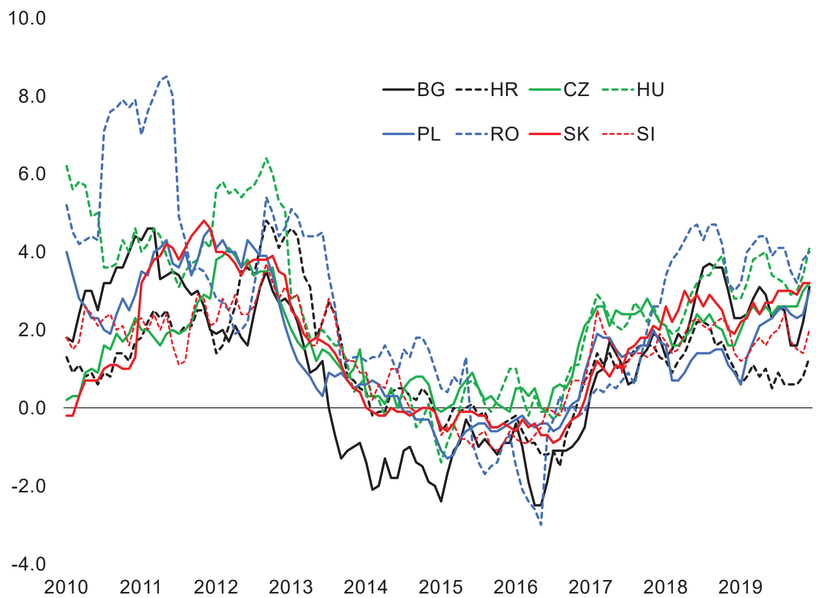
Inflation Puzzle – Increasing Role of Global Factors?

Based on the inflation pattern in the EEE, it is difficult to distinguish between euro area members, non-euro area peggers and inflation-targeters, as the general

[23] There are also major implications for fiscal policy as discussed in Section 6.2.3.2 (see also Blanchard (2019)).

pattern follows that of the euro area.[24] Although inflation targets are different across inflation-targeting members of the EEE,[25] similar inflation patterns might reflect close economic ties with the euro area, as well as policy spillovers from the euro area. For example, the ECB's monetary policy is found to have a significant impact on economic activity and prices in the non-euro area EU members as well, with the effects of unconventional measures weaker than those of conventional measures (Kucharčuková, Claeys & Vašíček, 2014; Hájek & Horváth, 2017).

Fig. 6.5: Inflation (percentage)
Data: Eurostat (2021c)



The increasing co-movement of inflation across countries has been a global phenomenon (Lovin, 2020). The role of external factors in driving inflation strengthened especially after 2012, with the decline in inflation mostly driven by global factors in Czechia, Hungary, Poland and Slovakia during this period (Nagy & Tengely, 2018). When augmenting the traditional Phillips curve with external slack, the authors also

[24] Considering a longer period starting at the introduction of inflation targeting in the region, the CNB has been the most successful, while the MNB has been the least successful in the EEE, based on the deviation from the target (Ciżkowicz-Pekała et al., 2019).

[25] Specifically, the target is 2 percent in Czechia, 2.5 percent +/-1 percent in Poland and Romania, 3 percent +/- 1 percent in Hungary. Taking into consideration the low inflation environment, with even deflationary pressure for a few years, in the past decade, and the difference in the level of economic development between Romania and Hungary, it is difficult to justify the relatively high inflation target in Hungary.

showed that the impact on inflation of the EU output gap is significantly stronger than that of the domestic consumption gap. Hałka and Szafrański (2015) also emphasize the role of global factors, including commodity prices and price developments in the euro area. Similarly, Iordache, Militaru and Pandioniu (2016) suggest that the Phillips curve might have flattened because of the increasing importance of global factors in price formation in Romania. Specifically, price formation could be affected by several external factors, including rising participation in global value chains and global supply shocks. Moreover, the Phillips-curve might also have flattened amid the low inflation environment as the latter is characterized by a lower frequency of price adjustments (Baxa & Šestořád, 2019). The potential flattening of the Phillips curve, in turn, could imply a larger trade-off for central banks as a higher decline in economic activity is needed to reduce inflation. At the same time, others do not find evidence for the flattening of the Phillips curve (Hasenzagl, Pellegrino, Reichlin & Ricco, 2018, 2019; Ball & Mazumder, 2020). Nonetheless, the potential flattening of the Phillips curve, in turn, could imply a larger trade-off for central banks as a higher decline in economic activity is needed to reduce inflation. Notwithstanding the higher correlation of inflation, most of the EEE departed from the euro area pattern before the pandemic. Specifically, while the euro area overall inflation was decreasing, most of the EEE recorded an increase in inflation in 2019. This might reflect the fact that the average volatility of inflation is higher in the EEE than in the core euro area countries.

Another major challenge was the low level of inflation, with inflation well below the target in the mid-2010s. In the euro area, for example, Corsello, Neri and Tagliabracci (2019) find that inflation expectations departed from the ECB's target, and are anchored at a much lower level. In Czechia, the use of the exchange rate floor also highlighted the difficulties in increasing inflation when the exchange rate pass through is low. In addition to these factors, this could also be the result of a limited impact of depreciation on inflation expectations when it is not complemented with a temporary switch from inflation- to price level-targeting (Baxa & Šestořád, 2019). In the case of simultaneous commitment to the exchange rate floor and the domestic price level, however, the central bank might have to face "the dilemma of which of these two commitments to adhere to and which to abandon, a situation that would be highly undesirable from the perspective of monetary policy credibility" (Franta et al., 2014).

Finally, the composition of the consumer price basket was also subject to debates. An interesting experiment was launched in Czechia, where Sutoris (2020) attempted to measure the cost of living and found that its pattern departed from that of the CPI. In the EEE, the issue of affordable housing and real estate bubbles is a recurring theme, with costs of housing considered relevant for inflation. This is also in line with the ECB's new strategy: "We need to keep track of broad concepts of inflation that capture the costs people face in their everyday lives and reflect their perceptions, including measures of owner-occupied housing" (Lagarde, 2020).

6.2.2 Macroprudential Policy

The need for a macroprudential approach to banking regulation emerged in the late-1990s in the wake of the Asian and the Russian crises (Crockett, 2000; Borio, Furfine & Lowe, 2001; Borio, 2003). In the early 2000s, the importance of macroprudential policies was increasingly stressed by the academic literature, central banks and international financial institutions (Allen & Gale, 2000; Danielsson & Shin, 2003; IMF, 2000). At the same time, the practice of banking capital regulation was transformed and became more risk-based (Mérő, 2021). Accordingly, the new Basel II capital accord was widely criticized because of its highly procyclical nature, i.e., its ignorance of the macroprudential view (Danielsson et al., 2001; Altman & Saunders, 2001; Király & Mérő, 2014). In 2008, the new regulation on capital requirements was finally implemented in the EU, including the EEE. As a result, the GFC hit the region at a time when the macroprudential view began to gain ground but had not yet materialized in the form of concrete regulatory developments.

Despite the non-existence of generally accepted macroprudential regulations at the international level, several countries applied some macroprudential regulatory tools even before the GFC. Specifically, in the early 2000s, EM economies were more active users of macroprudential tools than advanced economies (Lim et al., 2011). In the EEE, Bulgaria, Croatia and Romania introduced multiple macroprudential regulatory tools in the mid-2000s, Poland introduced tighter criteria for the then-booming FX lending, while Czechia, Hungary and Slovenia did not apply any macroprudential tools during the pre-GFC boom (Lim et al., 2011; Alam et al., 2019).

The GFC resulted in a complete turnaround in the approach to banking regulation. First, the institutional framework was reformed, including the establishment of global and regional institutions, as well as changing responsibilities at the national level. Second, the macroprudential toolkit was significantly expanded.

6.2.2.1 Institutional Framework for Macroprudential Policy Making in the EEE

In the European Union, based on the recommendations of the de Larosière Report (de Larosière, 2009), the European Systemic Risk Board (ESRB) was set up in November 2010 to be in charge of the macroprudential oversight of the EU's financial system. Its main tasks have been to identify and analyze systemic risks, issue warnings and recommendations on how to mitigate them,[26] as well as monitor the implementation of corrective measures.

Moreover, each EU member state had to appoint a national 'macroprudential authority' and a 'designated authority'. First, based on the ESRB recommendation,[27] the 'macroprudential authority' is entrusted with general macroprudential policy-

[26] The recommendations are binding legal documents published in the Official Journal of the European Union.

[27] See ESRB Recommendation 2011/3 (ESRB, 2012).

making with the aim of safeguarding the stability of the entire financial system. It can be either a single institution or a board consisting of representatives of multiple institutions that are important for financial stability. In either case, the central bank should play a leading role. Second, a 'designated authority' had to be made responsible for setting the capital buffer requirements in line with the Capital Requirement Directive (CRD).[28] The two mandates can be given to either the same institution or different ones.

The EEE set up different institutional structures to comply with these requirements (Table 6.2). For example, both mandates were given to the central bank in Czechia, Slovakia and Slovenia, and to the National Committee for Macroprudential Oversight in Romania. At the same time, the financial stability council/committee became the macroprudential authority in the rest of the EEE, with the designated authorities being the central bank in Bulgaria, Croatia, and Hungary, and the Ministry of Finance in Poland.

Table 6.2: Institutional setup of the macroprudential regulation in the EEE
Note: The Hungarian Financial Stability Council consists of only central bank employees and is subordinated to the Monetary Policy Council, so *de facto* the central bank is both the macroprudential and the designated authority. Accordingly, in the following we refer to the Hungarian central bank as a single macroprudential and designated authority.
Data: ESRB (2019)

	Macroprudential authority	**Designated authority**
Bulgaria	Financial Stability Advisory Council	Central Bank
Croatia	Financial Stability Council	Central Bank
Czechia	Central Bank	
Hungary	Financial Stability Council	Central Bank
Poland	Financial Stability Committee	
Romania	National Committee for Macroprudential Oversight	
Slovakia	Central Bank	
Slovenia	Financial Stability Board	Central Bank

As regards central bank involvement in macroprudential policymaking, only the Croatian and the Polish central banks have no *de jure* general financial stability mandate (Edge & Liang, 2017). Even in these countries, however, central banks are involved in issues related to financial stability as members of the macroprudential committee in Poland, and as a designated macroprudential authority in Croatia. Until the mid-2010s, the Croatian central bank had the weakest macroprudential mandate since the Croatian Financial Stability Council only had an advisory role

[28] See Capital Requirement Directive 2013/36/EU.

(Table 6.3). As part of the preparation for the ERM-II membership and close co-operation with the Banking Union, the central bank act in Croatia was amended, making its macroprudential and financial stability mandate explicit. Nevertheless, the strongest macroprudential mandate belongs to the Czech, the Hungarian and the Slovakian central banks that are the sole macroprudential authorities in these countries.

Table 6.3: Macroprudential committees in the EEE
Note: *Ministry of Finance; **central bank, ***prudential regulator, ****deposit insurance company
Data: Edge and Liang (2017)

Country	Name	Year	Agencies	Chair affiliation	Role of committee
Bulgaria	Financial Stability Advisory Council	2003	MoF*, CB**, PR***	MoF	Advisory body, right to address proposals and make recommendations to members
Croatia	Financial Stability Council	2013	CB, MoF, PR, DI****	CB	Advisory only
Poland	Financial Stability Committee	2015	CB, MoF, PR, DI	CB and MoF co-chair for different responsibilities	Statements and comply or explain recommendations to members of the FSC
Romania	National Committee for Macro-Prudential Oversight	2007	CB, MoF, PR, DI	Rotation between members	Advisory, monitoring financial stability risks
Slovenia	Financial Stability Board	2013	CB, PR for securities markets, PR for insurance companies	CB	Information sharing, and recommend actions on comply or explain basis

6.2.2.2 Macroprudential Tools

In addition to changes in the institutional framework, the GFC also changed the toolkit available for banking regulation. Despite the increasingly frequent use of the term 'macroprudential' and the incorporation of macroprudential tools in the banking regulatory framework, the definition of macroprudential tools may differ across institutions and academics. According to the classification of Borio (2003), rather than the tool itself, it is the ultimate and proximate aim related to the application of the tool and the approach to its calibration that makes a regulatory tool macroprudential. The liquidity ratio, for example, could demonstrate these nuances. The basic requirement for banking operations to be liquid is a microprudential one, while the build-up of liquidity buffers during good times to be used in case of market turbulences is a macroprudential one. In this chapter, we use the term 'macroprudential' and define macroprudential tools in line with the understanding of the European Systemic Risk Board (ESRB) and the European regulatory framework. Specifically, the new Basel III Accord (see Chapter 3 for more details) and its European versions, the Capital Requirement Regulation (575/2013/EU) and the Capital Requirement Directive (2013/36/EU), incorporated several macroprudential items upon its approval in 2013 (Table 6.4). In terms of the application of macroprudential capital buffers and other borrower-based macroprudential measures, however, there are differences across countries.[29]

Capital-based Measures

The Capital Requirements Regulation (CRR) introduced mandatory capital buffer requirements, including the capital conservation buffer, the countercyclical capital buffer and the capital buffer for global systemically important institutions (G-SII). Moreover, optional buffers include the capital buffer for other systemically important institutions (O-SII) and the systemic risk buffer. The capital-based measures of the EEE are summarized in Table 6.5.

Each member of the EEE introduced the capital conservation buffer of 2.5 percent by 2019, with Bulgaria, Croatia, Czechia and Slovakia doing so as early as 2014 and the other four countries reaching the target gradually in several steps. At the same time, the countercyclical capital buffer is used only by Bulgaria, Czechia and Slovakia as a tool to mitigate excessive credit growth. Its range is between 0.5 percent and 2 percent, subject to a quarterly review.

In line with the structural characteristics of their banking systems, there are no G-SIIs in the EEE; however, there are several O-SIIs in each member.[30] The O-SII buffer rates are calculated in all members of the EEE on the basis of the guidelines developed by the European Banking Authority (EBA, 2014), which allows for a high degree of freedom in using the scope of optional indicators, i.e., for determining both the scope of O-SIIs and the level of the buffer rate. In Czechia, the O-SIIs are identified, but no O-SII buffer requirement has been applied so far. The rest of the EEE introduced the O-SII buffer between 2016-2018, with some differences in the level of the buffer across countries.

[29] The compilation is based on the ESRB (2021b) dataset and the information published on the national central banks' webpages. The ESRB dataset was updated on 25 March 2021.

[30] As of July 2021, the number of O-SIIs were as follows: 8 banks in Bulgaria, 7 in Croatia, 5 in Czechia, 8 in Hungary, 10 in Poland, 8 in Romania, 5 in Slovakia and 6 in Slovenia.

Table 6.4: Macroprudential measures in the European banking regulation
Data: authors' compilation

Regulatory Tool	**Description**
Capital conservation buffer (CCoB)	Mandatory buffer. 2.5% of bank's total exposures. Banks have to build the buffer from their profits. It can decrease in years when banks do not have profits.
Countercyclical capital buffer (CCyB)	Mandatory buffer. Designed to act against the procyclical lending of banks. Buffer capital should be accumulated in booming periods and can be utilized in recessions. Main guiding ratio: credit-to-GDP gap. Maximum level: 2.5%
Capital buffer for either global (G-SIIs) or other systemically important institutions (O-SIIs)	Mandatory for G-SIIs and optional for O-SIIs. The G-SII buffer is 1-3.5%. The list of G-SIIs is published by the Financial Stability Board. At present, there are 30 G-SIIs of which 8 are EU-based banks. The O-SIIs determined by national authorities. The buffer is 0-2%.
Systemic risk buffer (SRB)	Optional buffer. The SRB requirement is the only buffer which comes not from the Basel Accord, but is specific to the EU. Designed to mitigate long-term non-cyclical risks. Can be used for a sub-group of institutions or sub-group of exposures exposed to specific risk factors. No maximum limit on the buffer, but EU-level authorization is needed above 3%. The G-SII, the O-SII and the SRB are not cumulative but determine a combined buffer requirement.
Other measures under the CRR	Set of regulatory calibrations that can be established on higher than the business-as-usual level at national discretion.
Other national measures not harmonized by the EU regulations	National regulations can set macroprudential tools which are not regulated in CRR/CRD. This category typically includes borrower-based measures, such as limits on loan-to-value, debt-to-income, and debt-service-to-income ratios for retail lending.

Within the EEE, Slovenia is the only country that has not applied the SRB. While in principle the SRB can be used for a sub-group of exposures to specific risk factors, most countries applied it to a broad definition of exposures such as total exposures, where the rate itself depends on the market share of banks (Croatia), total domestic exposures (Bulgaria, Poland) or domestic exposures of O-SIIs (Slovakia). In Czechia, the SRB is imposed on O-SII banks, rather than the use of the O-SII buffer requirement. In Hungary, it was applicable only to the problem commercial real estate (CRE) project loans, and was later extended to non-problem FX CRE project loans too, while in Romania its rate depended on non-performing loans and macroeconomic risks. There are two options for calculating the combined buffer requirements: either the higher of O-SII and SRB (Croatia until 2020) or their cumulative amount (Bulgaria and Croatia after 2020, Hungary, Poland, Romania, and Slovakia).

Table 6.5: Overview of capital buffer requirements
Data: ESRB (2021a)

	BG	HR	CZ	HU
2014	CCoB: 2.5% SRB: 3% (D,C)	CCoB: 2.5% SRB: 1.5-3% (A,H)	CCoB: 2.5% SRB: 1-3% (O,H)	
2015	CCoB: 2.5% SRB: 3% (D,C)	CCoB: 2.5% SRB: 1.5-3% (A,H)	CCoB: 2.5% CyB: 0.5% SRB: 1-3% (O,H)	
2016	CCoB: 2.5% CCyB: 0.5% SRB: 3% (D,C)	CCoB: 2.5% O-SII: 0.2-2% SRB: 1.5-3% (A,H)	CCoB: 2.5% CyB: 0.5% SRB: 1-3% (O,H)	CCoB: 0.625%
2017	CCoB: 2.5% SRB: 3% (D,C)	CCoB: 2.5% O-SII: 0.2-2% SRB: 1.5-3% (A,H)	CCoB: 2.5% CyB: 1-1.25% SRB: 1-3% (O,H)	CCoB: 1.25% O-SII: 0.5-2% SRB: 0-2% (S,C)
2018	CCoB: 2.5% CCyB: 0.5% SRB: 3% (D,C)	CCoB: 2.5% O-SII: 0.2-2% SRB: 1.5-3% (A,H)	CCoB: 2.5% CyB: 1.5-1.75% SRB: 1-3% (O,H)	CCoB: 1.875% O-SII: 0.5-2% SRB: 0-2% (S,C)
2019	CCoB: 2.5% CCyB: 0.5% SRB: 3% (D,C)	CCoB: 2.5% O-SII: 0.2-2% SRB: 1.5-3% (A,H)	CCoB: 2.5% CyB: 1.75% SRB: 1-3% (O,H)	CCoB: 2.5% O-SII: 0.5-2% SRB: 0-2% (S,C)
2020	CCoB: 2.5% CCyB: 0.5% O-SII: 0.5-1% SRB: 3% (D,C)	CCoB: 2.5% O-SII: 0.2-2% SRB: 1.5-3% (A,H)	CCoB: 2.5% CyB: 0.5-1% SRB: 1-3% (O,H)	CCoB: 2.5%

Borrower-based Measures

Other measures that the national authorities may introduce typically consist of borrower-based measures that aim to promote prudent lending, including limits on loan-to-value (LTV), debt-to-income (DTI) and debt service-to-income (DSTI) ratios. While Bulgaria requires the highest combined level of capital buffers among the EEE (Table 6.5), its banking regulation, together with the Croatian, does not contain any borrower-related regulatory items.[31] The LTV and the DSTI limits are applied by six members of the EEE, while the DTI cap is only applied in a few cases.

Romania was the first member of the EEE to introduce LTV and DSTI limits in 2011, followed by most other countries in the mid-2010s. Also, borrower-based rules were introduced as recommendations in Czechia, Slovakia and Slovenia, before becoming binding regulations in the latter two countries. In addition to differences in the level of these limits, their application also differed in modalities across countries. For example, the LTV and DSTI limits are differentiated based on the currency of

[31] Nevertheless, there is an implicit DSTI limit in Croatia. Specifically, the Foreclosure Act stipulates the amount that a creditor cannot seize. The Croatian central bank recommends banks to apply the same DSTI ratio for mortgage lending and other loans with maturity of more than five years.

Table 6.5 Cont.: Overview of capital buffer requirements
Data: ESRB (2021a)

	PL	**RO**	**SK**	**SI**
2014			CCoB: 2.5%	
2015			CCoB: 2.5%	
2016	CCoB: 1.25% O-SII 0.1-1%	CCoB: 0.625% O-SII: 1% SRB: 1%(S,C)	CCoB: 2.5% CCyB: 0.4% O-SII: 1-2%	CCoB: 0.625%
2017	CCoB: 1.25% O-SII 0.1-1%	CCoB: 1.25% O-SII: 1% SRB: 1%(S,C)	CCoB: 2.5% CCyB: 1.25% O-SII: 1-2% SRB: 0.5%(O,C)	CCoB: 1.25%
2018	CCoB: 1.875% O-SII 0.1-1% SRB: 3% (D,C)	CCoB: 1.875% O-SII: 1% SRB: 0.1-2%(S,C)	CCoB: 2.5% CCyB: 1.5% O-SII: 1-2% SRB: 1%(O,C)	CCoB: 1.875%
2019	CCoB: 2.5% O-SII 0.1-1% SRB: 3% (D,C)	CCoB: 2.5% O-SII: 1-2% SRB: 0.1-2%(S,C)	CCoB: 2.5% CCyB: 2% O-SII: 1-2% SRB: 1%(O,C)	CCoB: 2.5%
2020	CCoB: 2.5% O-SII 0.1-1%	CCoB: 2.5% O-SII: 1-2% SRB: 0.1-2%(S,C)	CCoB: 2.5% CCyB: 1-1.5% SRB: 1%(O,C)	CCoB: 2.5% O-SII: 0.25-1%

the loan in Hungary and Romania, reflecting the high level of FX lending in these countries before the GFC. Additionally, in some cases, the LTV limits depend on the type of loan (Hungary, Poland), or whether the borrower is hedged (Romania), while the ceiling on the DSTI limits is a function of the borrower's income level (Hungary, Poland, and Slovenia) or the length of fixed interest rate period (Hungary).

In comparison with other EU countries, the EEE were very active users of macroprudential tools in the wake of the GFC. According to Piroska, Gorelkina and Johnson (2020), a potential reason, at least in the case of the five dependent market economies of the region (i.e., Czechia, Hungary, Poland, Romania, and Slovakia), is that these countries use the macroprudential measures not only for financial stability purposes, but also for managing the distributional effects of financial globalization and EU integration.

6.2.3 Fiscal Policy

6.2.3.1 Fiscal Policy Framework

Following the GFC, successive reforms (embodied in the so-called six-pack and two-pack legislations, as well as in the intergovernmental Fiscal Compact[32]) have strengthened the EU economic governance architecture. First, at the supranational level, the Stability and Growth Pact was revamped via, inter alia, increased emphasis on public debt, reinforced sanction mechanisms and the enhanced adaptability of the rules to economic conditions. In addition, more stringent regulations were adopted for the euro area Member States through strengthened budgetary coordination (see e.g., Kamps and Leiner-Killinger (2019) or European Commission (2020c) for an overall assessment). Second, EU-level legislative initiatives provided a significant impetus for the development of national fiscal governance arrangements, ranging from the number and coverage of numerical rules, to the design features of medium-term budgetary frameworks and the establishment of independent fiscal institutions (IFIs). It is worth pointing out that against the backdrop of a comparatively less advanced initial state of budgetary frameworks in the EEE, the necessary changes in the domestic public finance acts/fiscal responsibility laws represented a strong channel of institutional convergence (for a detailed discussion, see Jankovics, Igarzabal and Ciobanu (2021)).

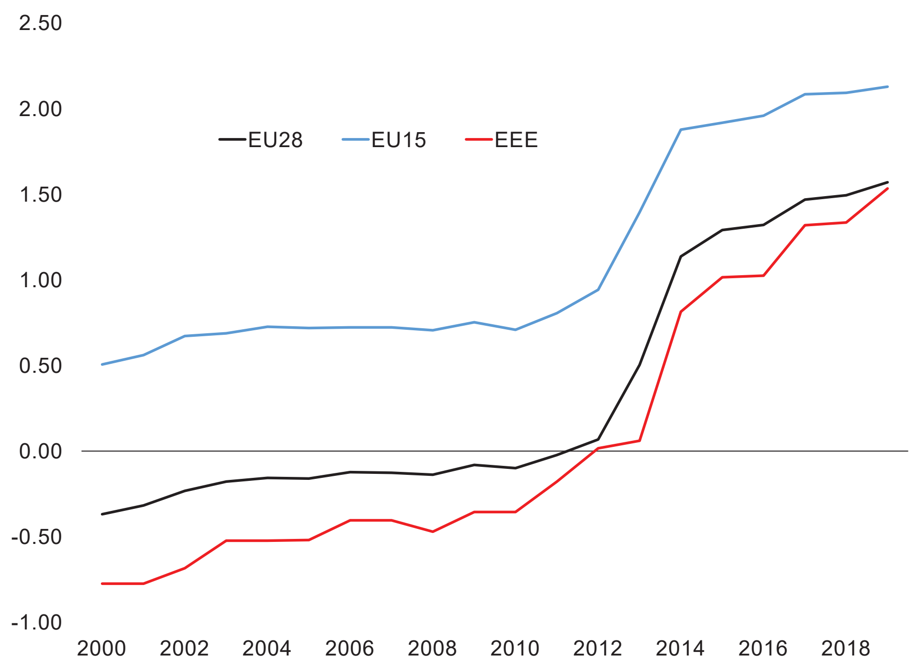
According to the European Commission's Fiscal Governance Database (FGD), in 2019 there was a total of 33 numerical rules in force in the EEE, whereas only 20 had been in place in 2010, before the European governance reforms started (most notably, structural budget balance rules were introduced in all countries in the region over the last decade, with the exception of Poland). Beyond the sheer number of fiscal rules in place, the quality of those rules is probably even more important when trying to capture the strength of a country's fiscal framework. Based on the FGD, the European Commission calculates the Fiscal Rules Index (FRI) for each country starting from 1990, based on the strength of the quality of each rule in effect.[33] Over the last two decades, the FRI has improved across different groups of EU member states (Figure 6.6). The index of the EEE caught up with that of the EU-28 in the late-2010s, showing an example of upwards convergence in terms of fiscal rule design

[32] The Fiscal Compact is Title III of the intergovernmental Treaty on Stability, Coordination and Governance in the Economic and Monetary Union, signed in March 2012. It requires euro area countries to introduce in the national legislation a balanced budget rule in structural terms, an automatic correction mechanism, and an independent fiscal institution to monitor the rule. Bulgaria, Denmark and Romania are bound by the same requirements on a voluntary basis.

[33] These strength indices are based on qualitative information on five key dimensions as self-reported by the Member States, namely: the legal base of the rule, the extent to which the target is binding, the institution which monitors and enforces the rule, the forecasting institution, the corrective measures triggered in the case of non-compliance, and the extent to which the rule is resilient to economic shocks. Thereafter, the strength indices for each fiscal rule are aggregated to a single comprehensive FRI country score per year with a weighting that reflect the decreasing marginal benefit of multiple rules.

in the aftermath of the 2011-2013 economic governance reforms. In parallel, the distance to the 'old' Member States group (EU-15) has significantly narrowed.

Fig. 6.6: The European Commission's fiscal rule index
Data: European Commission (2020d)



As part of the legally induced reinforcement of national fiscal frameworks, the number of IFIs has exponentially increased in the recent past: in 2021, out of the nine IFIs that are present in the EEE[34], only the Slovenian Institute of Macroeconomic Analysis and Development (IMAD) had started to supply the official macroeconomic forecasts well before the GFC. The latest arrivals on the scene are the Slovenian Fiscal Council, which became operational in late spring 2017, and the Czech Fiscal Council, whose first Board was appointed in early 2018. In terms of independence safeguards, all regional IFIs rely on a statutory base grounded in ordinary legislative provisions or those of higher legal standing (in Hungary and Slovakia, IFIs were established through constitutional norms or laws with qualified majority quorums).

[34] While Poland is the only country without a full-fledged IFI in the EU, both Slovakia and Slovenia have two IFIs. Specifically, one has a specific mandate in the independent production/endorsement of the macroeconomic forecasts underpinning budgetary planning, while the other is a fiscal council with a broad mandate.

With the exception of the Romanian IFI,[35] regional IFIs function as a detached body (i.e., operating on a standalone basis). Nonetheless, IFIs in the EEE exhibit a large variance in allocated budgets and human resources, partly reflecting the differences in their mandate: while there are a number of regional bodies with solid analytical capacities (IMAD and the Czech and Slovak fiscal councils are equipped with support staff of a dozen or more experts), the remaining regional IFIs employ a small technical staff of several economists (3-5), slightly smaller than the average resource endowment of EU IFIs.

6.2.3.2 Fiscal Stance in the EEE

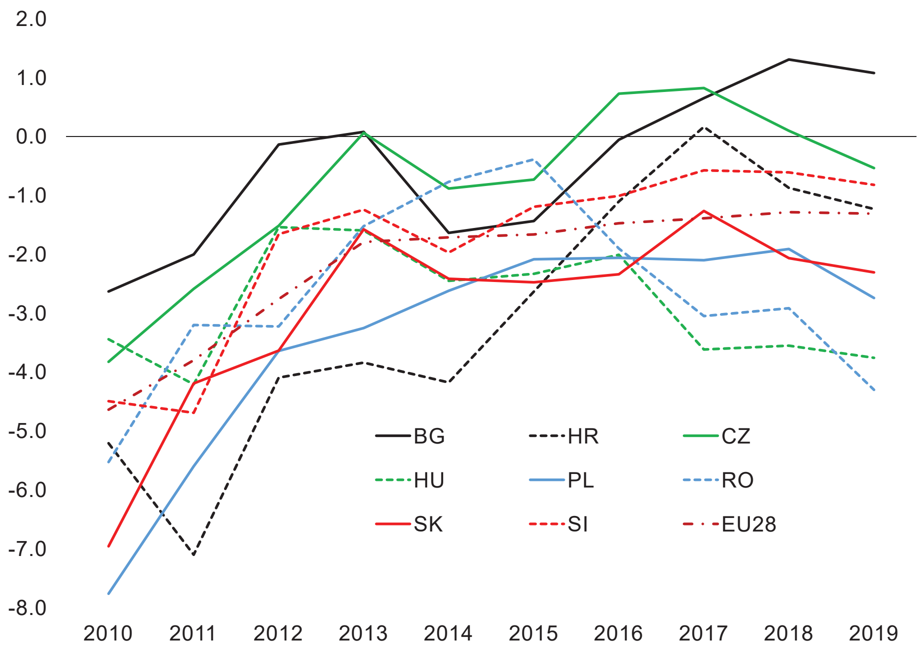
Following a substantial fiscal adjustment in the aftermath of the GFC, headline fiscal balances starting from 2015 consistently met the SGP deficit threshold of 3 percent of GDP in all members of the EEE. The only exception was Romania, which posted a deficit of 4.3 percent of GDP in 2019 on account of sizeable expansionary measures, resulting in an excessive deficit procedure launched just before the pandemic struck the EU. At the same time, underlying fiscal policies have not always been appropriate as demonstrated by diverging trends in structural balances (Figure 6.7).[36] Specifically, Bulgaria, Croatia, Czechia and Slovenia repeatedly registered structural surpluses or small deficits in the second half of the last decade. At the same time, in addition to Romania, Hungary, Poland and Slovakia saw increasing structural deficits, thereby drifting away from both the EU average level (hovering above 1.5 percent of GDP) and their medium-term fiscal objective. The pro-cyclical policy stance of this group is perhaps best illustrated by the Hungarian budgetary figures: while the headline deficit was broadly stabilized at around a deficit of 2 percent of GDP in the 2015-2019 period, the primary structural balance peaked in 2013 with a surplus of 3¼ percent of GDP and showed a continuous deterioration thereafter to reach a deficit of 1¾ percent of GDP in 2019. This represents an overall deterioration of around 5 percent of GDP, of which close to two-thirds could be attributed to the change in the cyclical component reflecting an increasingly positive output gap, and some one-third to the fact that the substantial drop in the Hungarian debt service costs was not used to reduce the deficit. Similarly, in other countries in this group, the stabilization (or even the decline) of headline deficits were thus driven by improved

[35] The Romanian Fiscal Council is attached to the Romanian National Academy, i.e., it has legally defined financial and organizational links with its host institution. It should be noted that some of the formally standalone institutions (e.g., the Bulgarian and the Hungarian Fiscal Councils) also receive administrative support from existing public bodies (most notably, offices of the national Parliaments).

[36] Fiscal stance could be defined as a gauge of the direction and extent of discretionary fiscal policy. It is commonly measured by the structural balance or the structural primary balance – when these balances are in surplus, the fiscal stance is considered to be restrictive, and when in deficit, the fiscal stance is considered to be expansionary. The structural budget balance equals the nominal (headline) budget balance corrected for the impact of the economic cycle and net of one-off and other temporary measures. The structural balance net of interest payments gives the structural primary balance.

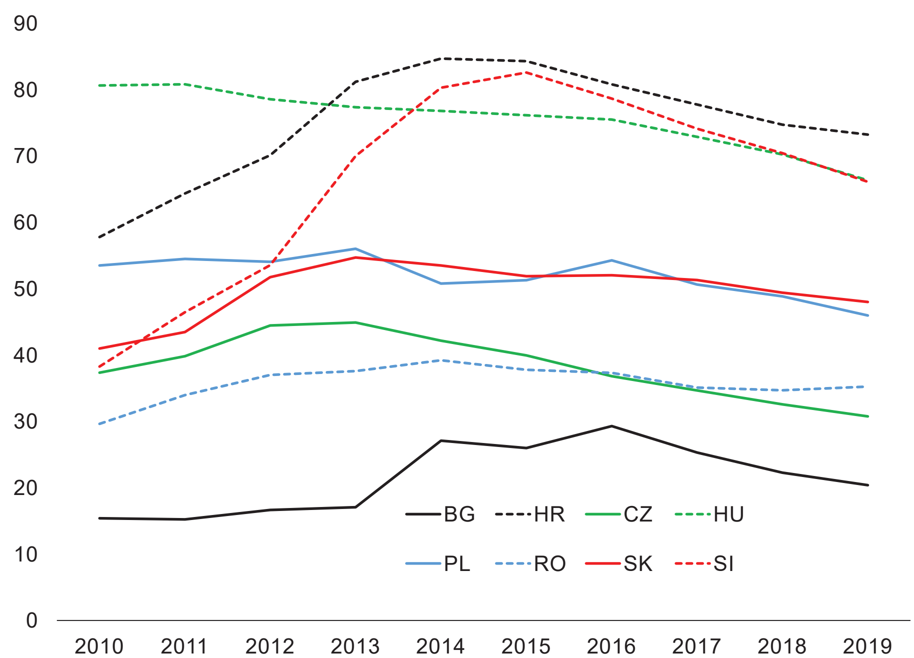
macroeconomic conditions coupled with drops in debt servicing costs rather than permanent adjustment measures. The latter was supported by both the structural decline in the neutral rate and the monetary policy easing undertaken during the same period (Section 6.2.1.2).

Fig. 6.7: Structural balances in the EEE (percentage of GDP)
Data: Eurostat (2021d)



From the post-GFC peak of close to 90 percent of GDP in 2014 in the EU, public debt decreased by around 8 percentage points during the 2015-2019 period (Figure 6.8). In a similar vein, there was a decline in the debt-to-GDP ratio in the EEE over the same timeframe, but better-than-average performances were achieved typically by those with a comparatively high debt: namely, Croatia, Czechia, Hungary and Slovenia, with these countries recording double-digit declines. Given the generally favorable macroeconomic and financial environment in the EEE during the 5-year period prior to the pandemic (the comparatively strong nominal GDP trajectories coupled with low interest rates), the debt reductions could have easily been more ambitious, thereby enhancing the fiscal buffers to a more robust level in order to increase preparedness for the next crisis. This statement is corroborated by the fact that in the economies singled out above as posting increasing structural deficits (Hungary, Poland, Romania), the debt-reducing impact of the interest rate-growth differential (captured in the so-called snowball effect calculated for the 2015-19 period) was much larger than the overall decrease in the debt-to-GDP ratio. Concretely, while the average snowball effect of these 3 countries would have led to a ceteris paribus lower debt ratio by close to 9.5 percent of GDP over the five years in question, the actually recorded reduction was 6.5 percent of GDP. In fact, this additional possibility for public leveraging was chiefly "substituted" by increasing primary deficits (Romania) or the adverse impact of stock-flow adjustments (Hungary, Poland).[37]

Fig. 6.8: Public debt in the EEE (percentage of GDP)
Data: Eurostat (2021d)



[37] Stock-flow adjustments explain the difference between the change in government debt and the government balance for a given period. There are several factors behind this difference, such as financial transactions (e.g., privatization, bank recapitalization, debt restructurings), and the discrepancies between cash and accrual (ESA2010) figures. It is worth pointing out that the re-valuation effects on the foreign currency-denominated sovereign securities are also recorded here (relevant for countries outside the euro area).

6.2.4 Overall Policy Mix: Cycle and Stance

The post-GFC decade was predominantly characterized by monetary policy easing and the maintenance of a loose policy stance in the EEE inflation-targeters, with the exception of the temporary tightening cycle in response to the inflationary pressure between late-2010 and mid-2012 in Hungary and Poland, and between 2017 and the Covid-19 crisis in Czechia and Romania. The evolution of monetary conditions and the policy stance, however, also depends on other factors. First, as mentioned above, the neutral rate also changed during this period. For example, the estimated decline in the neutral rate between 2010 and 2012 partially 'absorbed' the impact of policy rate cuts on the policy stance in Czechia, and amplified the effect of the tightening cycle on stance in Hungary and Poland. Second, real interest rates were affected by developments in inflation. For example, the strong disinflation increased real interest rates across the region in the mid-2010s, while the pickup in inflation contributed to the decrease in real interest rates in the second half of the 2010s (Figure 6.10). Finally, monetary conditions were also influenced by external factors, as highlighted by the depreciation of the real effective exchange rate in the mid-2010s, with a reversal in Czechia and stabilization in other members of the EEE thereafter (Figure 6.9).[38]

In contrast with monetary policy, the use of macroprudential policies was dominated by tightening measures (Figure 6.11). Notwithstanding their impact on the business cycle, these measures were primarily not motivated by the evolution of the cycle. As discussed in Section 6.2.3.1, the post-GFC period was characterized by major changes in the institutional framework that mandated the widespread introduction in the EEE of several macroprudential measures in the mid- and late-2010s. Nevertheless, as the introduction of several measures took place during the period of economic upturn in the second half of the decade, macroprudential policies acted counter cyclically.

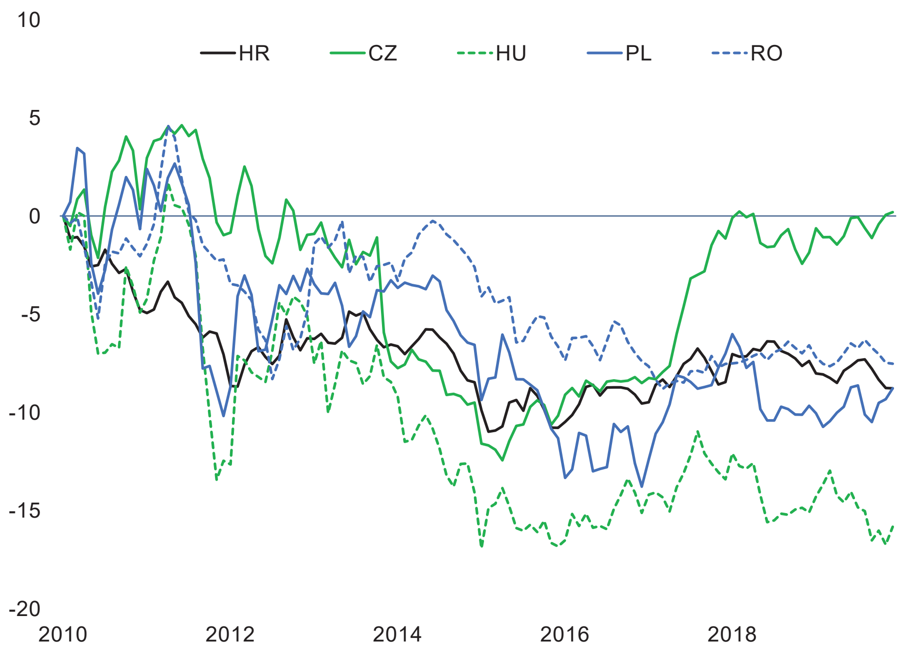
Similarly to macroprudential policies, the conduct of fiscal policy was largely driven by changes in fiscal governance frameworks, with the EEE tightening fiscal policy but maintaining a relatively loose stance in the first half of the 2010s. The second half of the decade, however, was characterized by diverging fiscal policy patterns. Most notably, the widening structural deficits implied a decisively looser fiscal stance in Hungary and Romania. Notwithstanding this regional re-emergence of procyclicality, Gootjes and de Haan (2020) found more procyclical fiscal policies before the GFC in the entire EU. They concluded that the economic governance reforms between 2011 and 2013 significantly fostered more countercyclical policies. This is further corroborated by their finding that euro area Member States, where the fiscal rules and enforcement procedures are more stringent, have less procyclical policies than non-euro area EU countries. While there was no major fiscal impulse in Poland, Slovakia, and Slovenia, the broadly stable structural deficit implied a continuously loose stance. In Croatia, the fiscal balance became less loose (and broadly neutral in 2017) on the back of the improvement in the structural balance.

[38] The depreciation, however, was not only driven by external factors. As highlighted by Oblath (2021), the post-GFC depreciation implied a partial reversal of the pre-GFC appreciation.

Finally, the structural balance turning into surplus indicated a tight stance in the last few years of the decade in Bulgaria and for a temporary period in the mid-2010s in Czechia.

In general, post-GFC monetary easing was coupled with fiscal tightening in the first half of the decade, as well as divergent fiscal policies and macroprudential tightening in the second half of the decade. Notwithstanding the difficulties associated with the assessment of the policy stance, the overall stance seems to have been predominantly loose during this period.

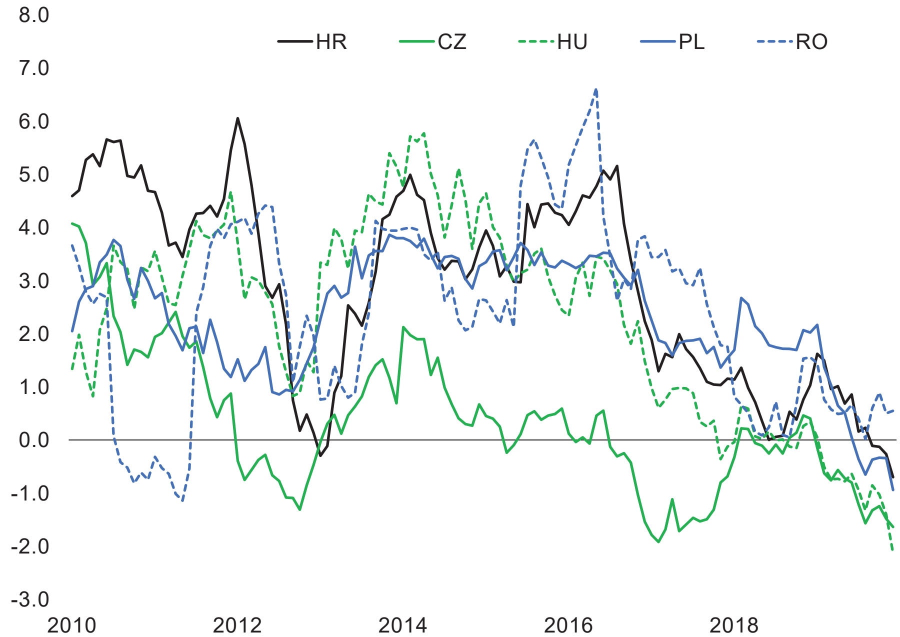
Fig. 6.9: Real effective exchange rate (cumulative change, percentage)
Data: ECB (2021c)
Note: An increase (decrease) in the REER indicates appreciation (depreciation).



6.3 Policy Response to the Covid-19 Crisis

In Section 6.3, the immediate monetary, macroprudential and fiscal measures will be enumerated and compared. For macroprudential regulation, the Covid-19 crisis can be interpreted as the first test for the recently established regulatory framework. Fiscal stimulus measures were immediate, also underpinned by newly designed EU

Fig. 6.10: Real interest rate (10-year yields, percentage)
Data: ECB (2021b); Eurostat (2021c)



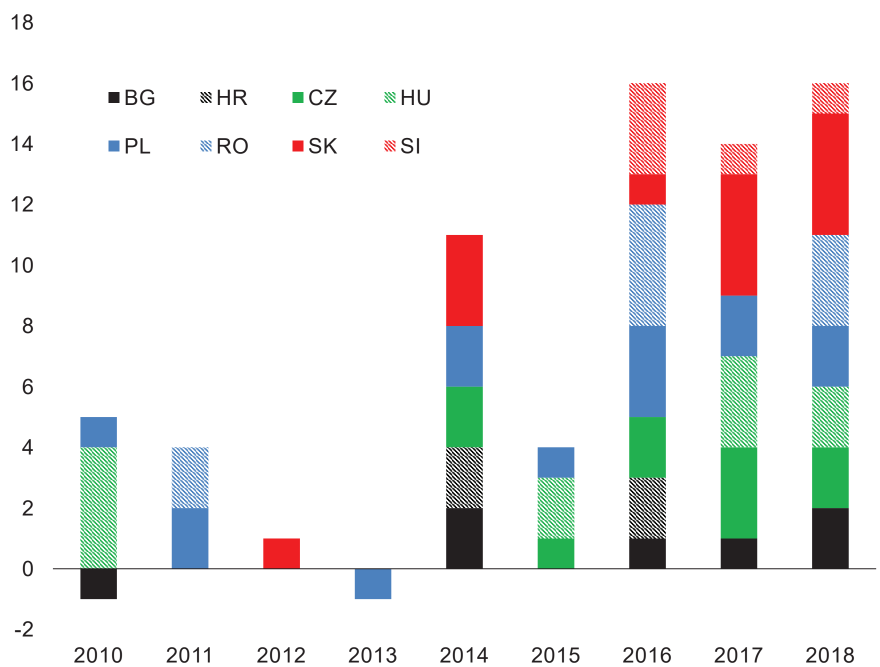
instruments; however, the evaluation of their short- and long-term effects is quite contested.

6.3.1 Monetary Policy

The real and financial shocks triggered an aggressive monetary policy response in the form of multiple tools, albeit to different extents across the EEE (Table 6.6). The impact of the Covid-19 shock on economic activity and financial markets led to an aggressive monetary policy response, including policy rate cuts, foreign exchange intervention, liquidity operations, lending programs and asset purchases in the region. Differences in monetary policy responses across countries reflected several factors, in particular differences in the policy framework and space.

At the onset of the Covid-19 crisis, the scope for conventional easing was constrained by low interest rates and global financial conditions. As discussed earlier, the decline in the neutral rate has reduced the scope for monetary policy easing. For example, the policy rate was around 1-2 percent in Czechia, Hungary, and Poland at the onset of the Covid-19 crisis, well below the range of 3.5-8.5 percent at the time

Fig. 6.11: Macroprudential measures (+ tightening, - loosening)
Data: Alam et al. (2019)

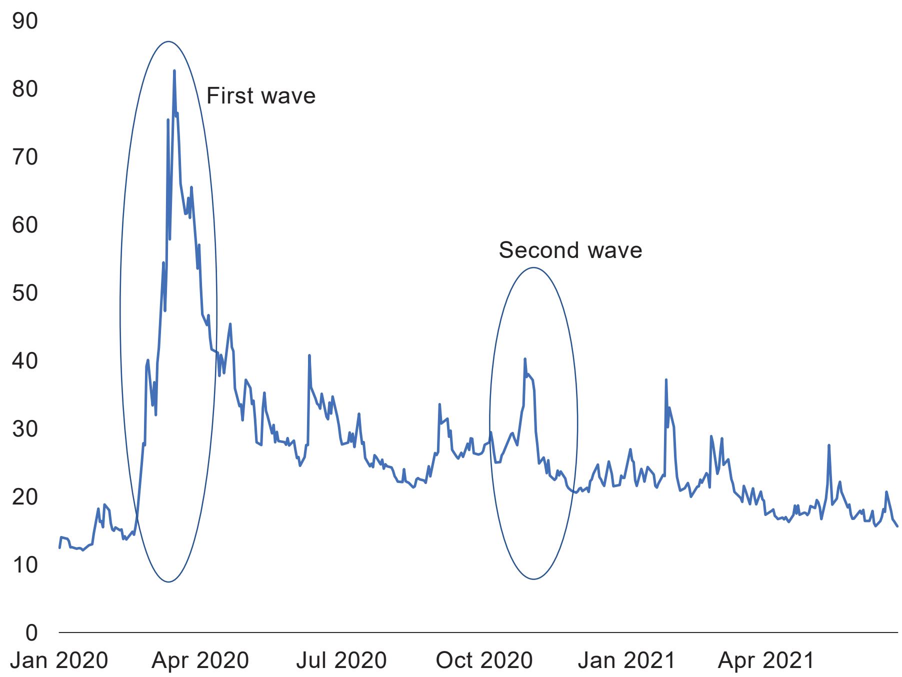


of the collapse of Lehman in 2008. Similarly, as mentioned in Section 6.2.1.2, the conduct of monetary policy has also been affected by global financial conditions. At the start of the Covid-19 crisis, the negative real economic shock was also coupled with a significant tightening of global financial conditions. As demonstrated in the past, the latter could reduce the pro-cyclicality of monetary policy. The initial sharp increase in risk aversion, however, was followed by a quick reversal thanks to the significant easing measures by major central banks and another uptick during the second wave (Figure 6.12).[39]

Monetary space was also affected by inflation developments. At the onset of the pandemic, inflation exceeded the target in the non-euro area inflation-targeting countries in the region (Figure 6.13)), with the inflationary pressure triggering a rate hike by the CNB in February 2020. The Covid-19 shock affected the measurement of inflation and the uncertainty around the outlook. For example, the lockdown resulted in significant difficulties associated with the collection of information on prices, the lack of availability of certain goods and services, and the changing composition of households' consumption basket (MNB, 2020a; NBP, 2020; BNR, 2020, 2021a; BSI,

[39] EM bond fund outflows during the first nine weeks of the Covid-19 crisis were even larger than during the GFC or the 2013 Taper Tantrum (Hördahl & Shim, 2020).

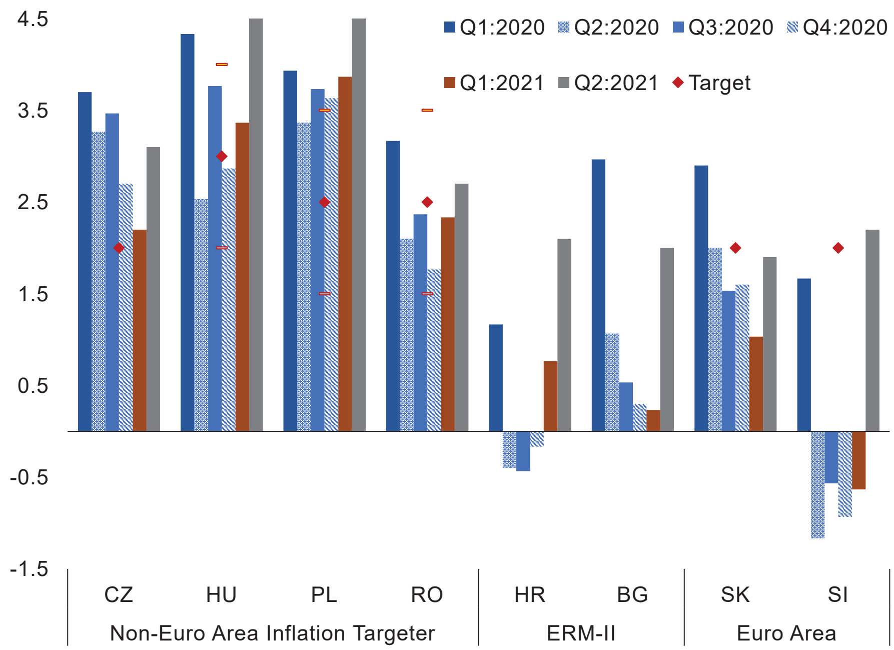
Fig. 6.12: VIX Index
Data: CBOE (2021)



2020; NBS, 2020), as well as increased heterogeneity of consumer price expectations (BSI, 2020).

The pandemic made an impact on inflation through several direct and indirect channels. Specifically, inflation fell at the onset of the crisis, mostly on the back of a sharp decline in oil prices and change in consumer demand. The impact of the latter, however, differed across the waves of the pandemic, with the stockpiling of goods by households partially offsetting the impact of lower economic activity during the first wave (BNR, 2020), followed by stronger disinflation during the second wave given the decline in households' buffers (CNB, 2020c). Moreover, in some countries, the initial decline in inflation was subsequently offset by the inflationary impact of several factors, including (i) rising food prices partly attributed to the loss of access to seasonal workers amid the closure of borders (CNB, 2020d; MNB, 2020b); (ii) the depreciation of the exchange rate (CNB, 2020e); and (iii) the reopening of the economy with pent-up consumer demand against the backdrop of the gradual recovery in production (MNB, 2020b, 2021a). Nevertheless, by the end of 2020, inflation fell across countries, with deflation in Croatia and Slovenia, before a strong acceleration with the reopening in 2021 across the region. There were also some indications of increasing inflation expectations in 2021 in Hungary, Poland and Romania (MNB,

Fig. 6.13: Inflation (percentage)
Data: Eurostat (2021c)



2021b; NBP, 2021b; BNR, 2021b). Longer-term inflation expectations also increased slightly in Czechia, with short-term expectations remaining anchored (CNB, 2021b).

At the onset of the crisis, central banks with space reduced the policy rate towards the effective lower bound. The initial policy response was to cut the policy rate in order to support the economy in countries with sufficient space. Against the backdrop of capital outflows, this was facilitated by positive spillovers from the quick action by the Federal Reserve, the ECB and central banks in other major advanced economies, and the magnitude of the decline in domestic economic activity (Aguilar & Cantú, 2020). In the wake of the latter, in some countries the goal to support the economy "temporarily superseded inflation targeting" (UniCredit, 2020). The policy rate was cut by 200 and 140 basis points between March and May 2020 in the Czech Republic and Poland, respectively (Figure 6.14). Despite its larger space thanks to the slightly higher pre-Covid-19 policy rate, the reduction was more gradual in Romania, with rate cuts amounting to only 50 basis points in the first three months of the Covid-19 crisis and a further 75 basis points over the following eight months. Hungary was an outlier for three reasons: (i) given the very low pre-Covid-19 level of the policy rate, there was limited space in Hungary, resulting in only a 30-basis-point reduction in the policy rate in two steps in June and July 2020; (ii) the initial response was

Table 6.6: Monetary policy measures in response to Covid-19
Data: Cantú et al. (2021); BNB (2020a, 2020b); HNB (2020b, 2020a, 2020d, 2020f, 2020c, 2020e, 2020k, 2020g, 2020i, 2020h, 2020j, 2021a)

	Interest rate	Exchange rate	Reserve policy
Bulgaria		Swap line with the ECB; ERM-II membership	Reduction in reserve requirements
Croatia		FX interventions; swap line with the ECB; ERM-II membership	Reduction in reserve requirements
Czechia	Reduction in the reference rate (200bps), the discount rate (120bps) and the lombard rate (225bps)	Verbal intervention	
Hungary	Reduction in the reference rate (30bps); no change in the deposit rate; increase in the credit rate (95bps); activation of the one-week deposit facility with interest rate at 90 basis point (well exceeding -5 basis points on the overnight deposit facility)	Repo line with the ECB; FX swap tenders	
Poland	Reduction in the reference rate (140bps), the deposit rate (50bps) and the lombard rate (200bps)		Reduction in reserve requirements; increase in the remuneration of required reserves
Romania	Reduction in the reference rate (125bps), the deposit rate (75bps) and the credit rate (175bps)	Repo line with the ECB	Reduction in reserve requirements on FX liabilities

actually a tightening as the interest rate on the overnight collateralized loan (i.e., the top of the interest rate corridor) was raised by 95 basis points in April in order to support the exchange rate; and (iii) the one-week deposit facility was activated in April with an interest rate of 0.9 percent, well above the interest rate of -0.05 percent on the overnight deposit facility. The tightening of financial conditions at the beginning of the Covid-19 crisis is also reflected in the increase in the 3-month Bubor (Figure 6.15). Finally, while the deposit facility rate remained in negative territory in the euro area (Slovakia and Slovenia), EEE central banks did not experiment with negative policy rates. For example, Tomáš Holub argued that "asset buying is at a higher place in the ranking, or charts, than negative rate" (CNB, 2020a). At the same time, the Governor of NBP, Adam Glapiňski, noted that he would "allow for negative rates" that "would have to be connected with a radical deterioration of the economic situation" (Reuters, 2021). The acceleration of inflation in 2021, however, altered

Table 6.6 Cont.: Monetary policy measures in response to Covid-19
Data: Cantú et al. (2021); BNB (2020a, 2020b); HNB (2020b, 2020a, 2020d, 2020f, 2020c, 2020e, 2020k, 2020g, 2020i, 2020h, 2020j, 2021a)

	Lending operations	**Asset purchases**
Bulgaria	Liquidity-providing repo transactions; maturity extension; expansion of eligible collateral and institutions	
Croatia	Structural open market operations	Purchase of Treasury securities in the secondary market
Czechia	Liquidity-providing repo transactions; expansion of eligible collateral and institutions	
Hungary	Liquidity provision via the expansion of eligible collateral; new collateralized lending facility; expansion of institutions eligible for loan tenders; Funding for Growth Scheme (GFS) Go!; expansion of potential uses of funds under the FGS Go!	Purchase of Treasury securities in the secondary market; mortgage bond purchase programme; increase in individual exposures under the Bond Funding for Growth Scheme; expansion of eligible counterparty institutions and maturity extension under the Treasury security purchase programme; expansion of the asset purchase programme to state-guaranteed debt securities
Poland	Liquidity-providing repo transactions; discount credit for banks	Purchase of Treasury and state-guaranteed securities in the secondary market
Romania	Liquidity-providing repo transactions	Purchase of Treasury securities in the secondary market

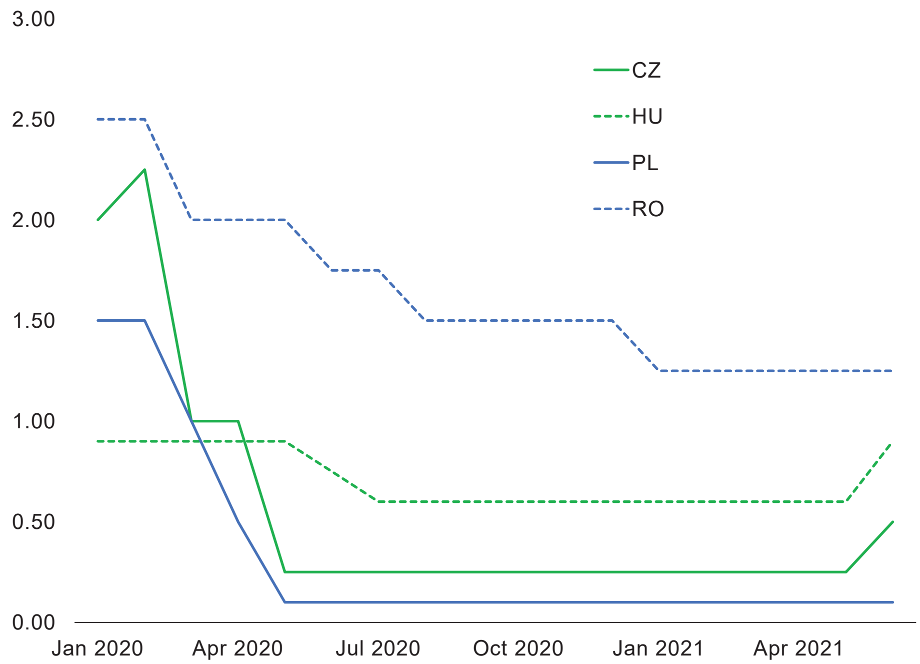
the primary concerns of policymakers, triggering rate hikes in Czechia and Hungary in June 2021.

Exchange rate flexibility also played an important role in the adjustment to the shocks in some countries. Flexible exchange rates helped adjust to the initial shock in mid-March 2020, with a broadly synchronized depreciation in Czechia and Poland and the region's largest weakening of the currency in Hungary on the back of the global repricing of risk (Figure 6.16). For example, Tomáš Holub, Board member of the Czech National Bank, noted that the depreciation of the koruna at the onset of the crisis was "more or less natural and mostly desirable" as it "significantly relaxed monetary conditions" (CNB, 2020b). Disorderly changes in the exchange rate, however, were prevented by verbal interventions (e.g., Czechia)[40], FX interventions (e.g., Romania)[41], the use of the euro as the exchange rate anchor (Bulgaria, Croa-

[40] CNB Board member Tomáš Holub also noted that "if the currency sell-off were to go too far, this could start hurting parts of the economy, and then of course it would be worth considering whether we should step in" (CNB, 2020b).

[41] See Reuters (2020).

Fig. 6.14: Policy rate (percentage)
Data: CNB (2021a); MNB (2021c); NBP (2021c); BNR (2021d)

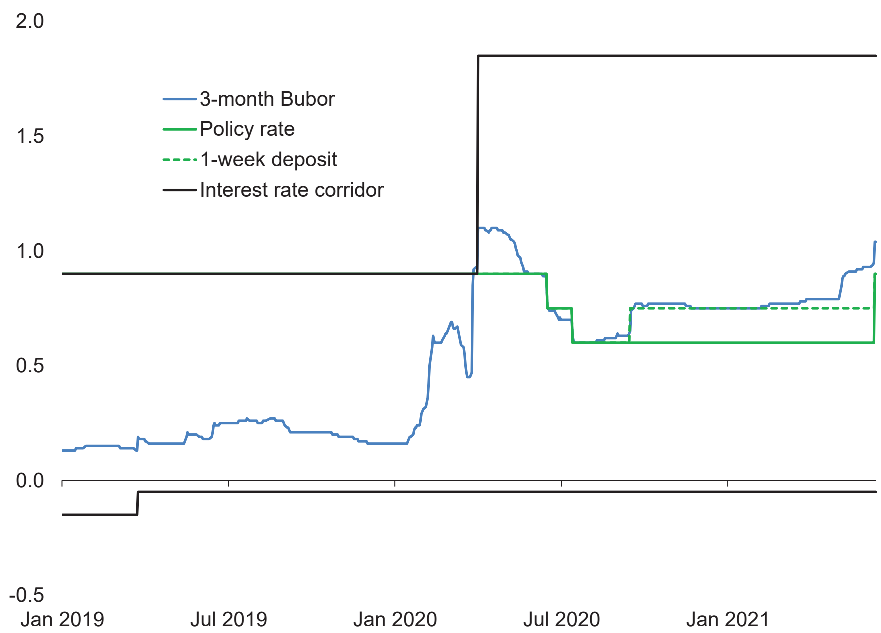


tia)[42] and membership in the euro area (Slovakia and Slovenia). In countries with floating regimes, the depreciation pressure subsided quickly, supported by spillovers from the liquidity injection by central banks in major advanced economies, before resuming in the wake of the second wave of the pandemic in the fall of 2020.

The nature of the crisis also necessitated an extensive use of liquidity measures (Figure 6.17). With the aim of mitigating stress in domestic financial markets, each central bank in the region implemented liquidity-provision measures. Changes in reserve policy included the lowering of the reserve requirement (Bulgaria, Croatia, Poland, and Romania), an increase in the remuneration of reserves (Poland) or the suspension of sanctions on reserve deficiency (Hungary). The latter, however, was reversed after a few months when the remuneration of excess reserves was also reduced in Hungary. At the same time, liquidity was enhanced through repo operations (Bulgaria, Czechia, Hungary, Poland, and Romania), as well as the expansion of eligible collateral (Bulgaria, Czechia, Hungary, and Poland) and eligible institutions (Czechia, Hungary, and Poland). Some countries also set up swap (Croatia) and repo lines (Hungary and Romania) with the ECB in order to ensure sufficient euro

[42] For example, the Hrvatske Narodne Banke (HNB) sold €2.7 billion to banks at the onset of the Covid-19 crisis (HNB, 2020l).

Fig. 6.15: Hungary: Reference rates (percentage)
Data: MNB (2021f, 2021c, 2021g)

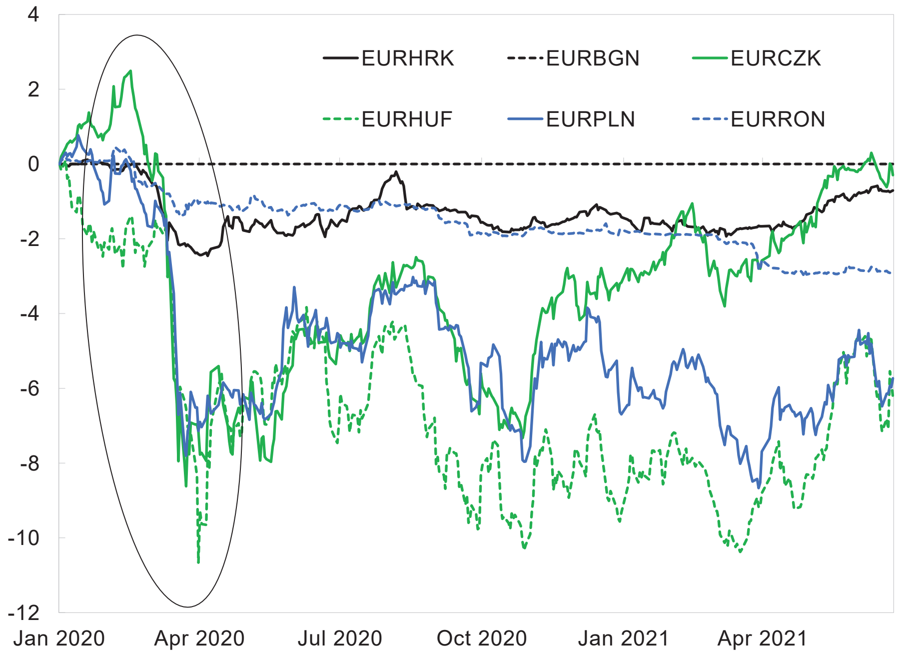


liquidity. As the lockdown measures were put in place, credit to the private sector was supported by programs of funding for lending (Cantú et al., 2021). For example, Poland introduced a discount credit for banks for the refinancing of loans of non-financial corporations, while Hungary introduced a collateralized lending facility of unlimited total amount and launched the Funding for Growth Scheme Go! for small- and medium-sized enterprises. The ECB also adopted a range of measures, such as the easing of the conditions of the targeted longer-term refinancing operations (TLTRO) and the introduction of the pandemic emergency longer-term refinancing operations (PELTRO).

Asset purchases were also added to the toolkit in some countries, contributing to the expansion of central bank balance sheets. In addition to the asset purchase programs (APP) undertaken by central banks in major advanced economies, such as the ECB's pandemic emergency purchase program (PEPP), APPs were also undertaken by EMs, including central banks in the EEE to ease financial conditions and enhance monetary policy transmission at the long end of the yield curve, contributing to the expansion of their balance sheet (Figure 6.18).[43] In contrast with

[43] It is worth noting, however, that the expansion of balance sheets was not only driven by asset purchase programs. First, an increase in international reserves and liquidity provision measures could also have contributed to the increase in central banks' total assets. Second, the impact of

Fig. 6.16: Exchange rate (cumulative change, percentage)
Data: ECB (2021a)



40 percent in advanced economies, however, 90 percent of asset purchase programs were new in EMs, with only two programs existing in Colombia and Hungary before Covid-19 (Cantú et al., 2021). These new programs included the purchase of government securities in the secondary market (Croatia, Hungary, Poland, and Romania), the relaunch of the mortgage bond purchase program (Hungary), the expansion of eligible securities to state-guaranteed securities (Hungary and Poland), as well as the expansion of the corporate bond purchase program (Hungary).

Monetary policy accommodation helped mitigate market stress and lower yields (Figure 6.19). Announcements of asset purchase programs are found to have reduced long-term bond yields in EMs that also benefited from external factors, including positive spillovers from the announcements by the Federal Reserve in March and changes in global risk aversion (Sever, Goel, Drakopoulos & Papageorgiu, 2020; Rebucci, Hartley & Jiménez, 2021). For example, there was a within-day decline of 45 basis points after the first announcement on March 17, 2020 in Poland (Rebucci et al., 2021). Fratto, Vannier, Mircheva, de Padua and Poirson (2021) also find a negative and statistically significant multi-day effect of asset purchases on bond

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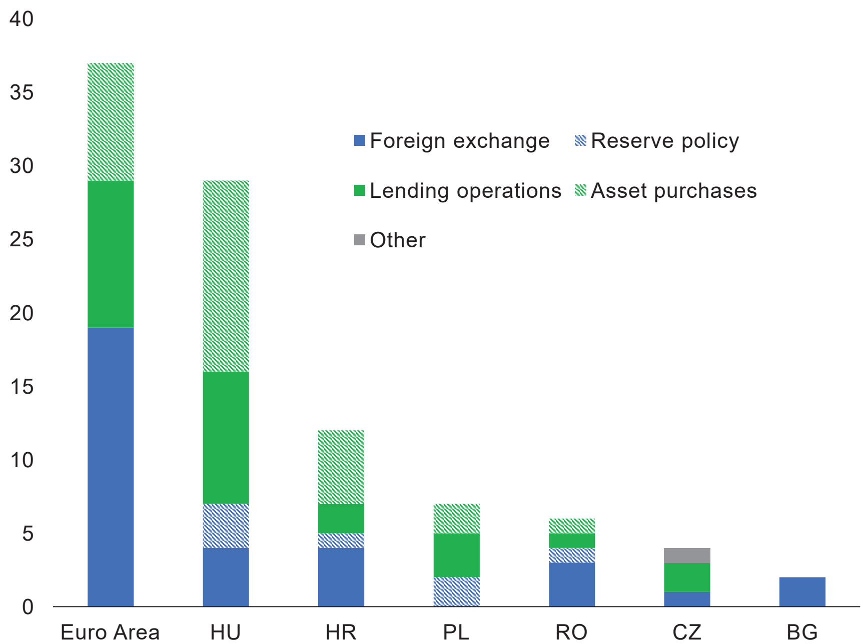
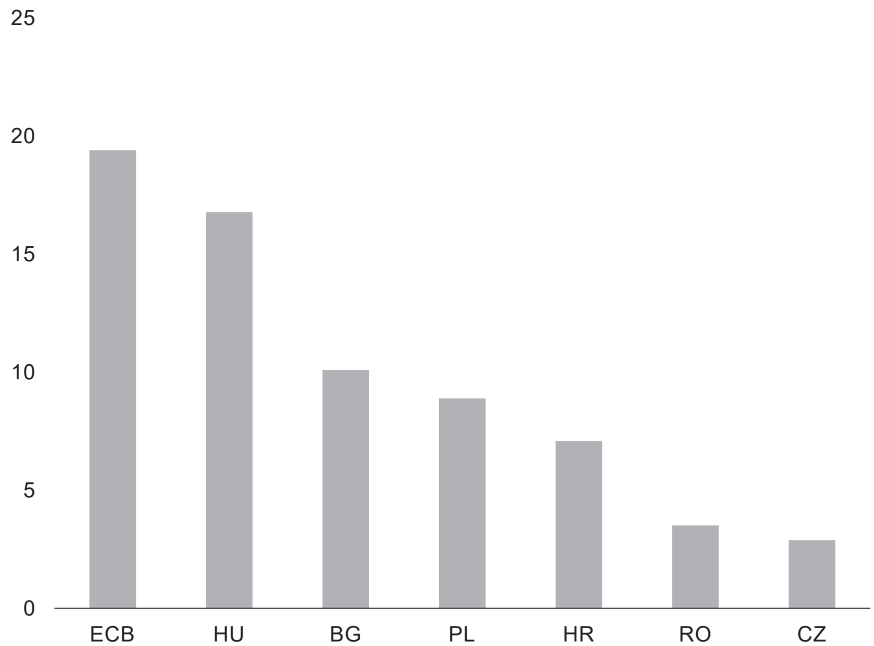
crisis response measures on balance sheets depends on the extent to which these measures were sterilized by the central bank.

Fig. 6.17: Monetary policy measures in response to Covid-19 (number of announcements)
Data: Cantú et al. (2021); BNB (2020a, 2020b); HNB (2020b, 2020a, 2020d, 2020f, 2020c, 2020e, 2020k, 2020g, 2020i, 2020h, 2020j, 2021a)
Note: The chart includes announcements made between the start of the pandemic and March 2021.



yields in 15 EMs and eight small advanced economies. Similarly, Arslan, Drehmann and Hofmann (2020) find EM bond purchase announcements to have reduced bond yields in a significant and persistent way, with 10-year yields declining by 10 basis points on the day of the announcement and by up to 25-50 basis points after five days. Asset purchase programs also contributed to the decline in local market stress, albeit with a delay, with the impact materializing once global financial conditions eased (IMF, 2020b). Following the initial decline in yields, there was some divergence in the region. For example, long-term yields continuously declined in Romania throughout 2021 as the central bank maintained the easing cycle. At the same time, yields stabilized in Poland and rebounded slightly in Czechia and Poland. Bulgaria, Croatia, Slovakia and Slovenia benefited from the euro area and ERM-II membership, with yields in either negative territory or slightly above zero.

Fig. 6.18: Balance sheet of central banks (change, percentage of GDP)
Data: HNB (2021b); CNB (2021c); MNB (2021d); NBP (2021a); BNR (2021c); IMF (2021c)
Note: The change is between December 2019 and March 2021.



6.3.2 Macroprudential Policy

In response to Covid-19, six members of the EEE took macroprudential measures to ease the capital buffer or borrower-based requirements, with Czechia and Hungary being the only countries that adopted both types of easing (Table 6.7).[44] For example, easing measures included the repeal of pre-announced increases or a decrease in the countercyclical capital buffer (Bulgaria, Czechia, and Slovakia), the suspension of SRB requirements (Hungary and Poland), the easing of DTI and DSTI limits (Czechia and Slovenia), the easing of LTV limits (Czechia) and the temporary abolishment of the O-SII buffer requirements.

In addition to changes in the macroprudential measures of the CRD/CRR framework, the only Covid-related macroprudential measure was the ECB recommendation (ECB 2020) on the suspension of dividend payments and share buybacks by euro area banks introduced in March 2020 and extended several times later. Moreover, the

[44] An important measure applied in almost every country, payment moratoria, is discussed in detail in Chapter 3.

Fig. 6.19: Long-term government bond yields (10-year yields, percentage)
Data: Eurostat (2021b)

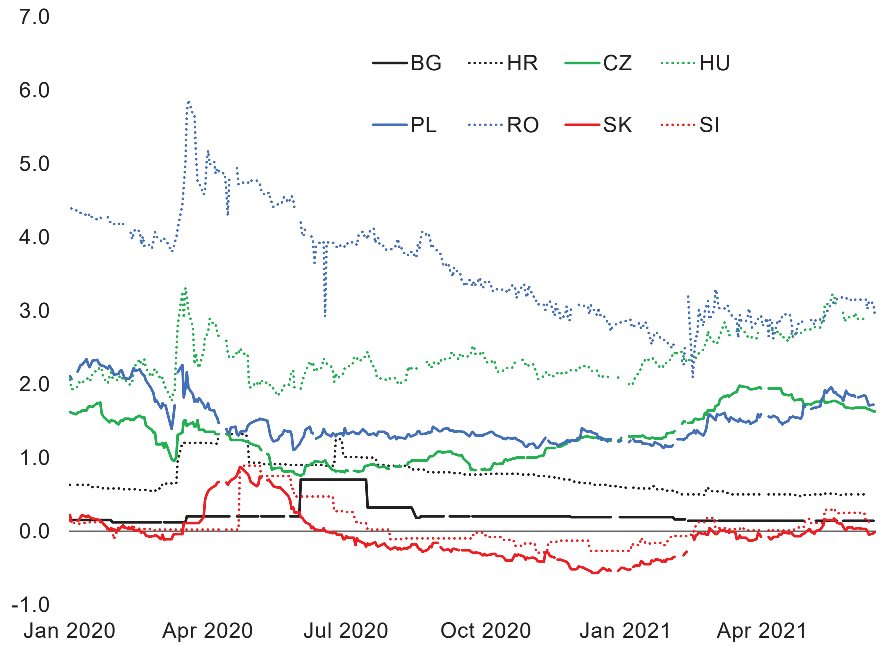


Table 6.7: Covid-19-related macroprudential measures in the EEE
Data: authors' compilation

Country	**Description**
Bulgaria	Repeal of the pre-announced increase in CCyB due to become effective from Q2 2020
Czechia	Repeal of the pre-announced increase in CCyB in March 2020 and instead lowering it in two steps from 1.75 to 0.5 percent; Cancellation of DTI and the DSTI limits in 2020; LTV limits easing to 90 percent, equal for all mortgages, including the buy-to-let ones, too.
Hungary	Temporary abolishment of O-SII buffer requirements with the obligation to restore it gradually between 2022 and 2024 (March 2020). Suspension of SRB buffer requirements (March 2020)
Poland	Suspension of SRB buffer requirements (March 2020)
Slovakia	Decrease of CCyB by 0.5 percent
Slovenia	Temporary ease in DSTI-related income calculation (2020)

ECB recommendation required banks to consult on dividend payment or share buy-back with their supervisory authority. The four members of the EEE that are neither euro area member states, nor members of the European Banking Union (Czechia, Hungary, Poland, and Romania), adopted similar regulations. The obligation of supervisory consultation on dividend payments decided by the 2021 Annual General Meetings of banks was also included in the Czech, the Polish and the Romanian rules, while the Hungarian central bank's recommendation was more rigorous, as it did not allow banks to make an irrevocable commitment to pay dividends until September 2021.

The aim of these measures is to protect the capital of banks (i.e., accumulate capital) and their ability to finance the economy under volatile and unforeseen conditions. In contrast with the cyclical capital buffer requirements that aim to build up buffers during good times, these restrictions are about retaining earnings in not-so-good times.

In a regulatory framework that builds on the macroprudential approach as the main idea for promoting financial stability, the question arises why there were so few macroprudential steps during the Covid pandemic. The answer is that some macroprudential capital buffers, i.e., the capital conservation buffer, the OSII and GSII buffers, work like automatic stabilizers. They can decrease automatically (i.e., without any active measure) – even to zero - during bad times when profit is decreasing or eliminated. The buffers should then be rebuilt over a longer time horizon, thereby smoothing the business cycle. The CCyB is linked to the credit-to-GDP gap, implying a decrease in the buffer in several countries when banks extended less credit and the gap moved to negative territory. At the same time, the SRB is the only buffer that was suspended in some countries based on discretionary analysis of the macroprudential authorities. Finally, the easing of borrower-based measures operates through a different mechanism, i.e., by affecting the demand side of credit instead of banks' lending capacity. Although borrowing decisions are long-term decisions, especially in the case of mortgage loans, temporary modifications in income calculations can help households to accommodate the income effect of the pandemic.

6.3.3 Fiscal Policy

6.3.3.1 Fiscal Measures

National fiscal support had a significant impact on European economic activity and budgetary developments. At the onset of the crisis, national governments throughout the EU deployed fiscal packages of unprecedented magnitude in addition to the automatic fiscal stabilizers. This was made possible by the fact that in light of the exceptional nature of the crisis, the EU activated the severe economic downturn clause (or as commonly referred to: the general escape clause[45]) of the Stability and

[45] The severe economic downturn clause was introduced in 2011 as part of the six-pack reform of the SGP. It allows for additional and temporary flexibility in the event of a severe economic

Growth Pact allowing member states to expand their budgets.[46] Moreover, additional fiscal space was supranationally created through the issuance of common debt, on a temporary basis, to fund new mechanisms (notably, the Support to mitigate Unemployment Risks in an Emergency (SURE) and the Next Generation EU funds). In particular, the Recovery and Resilience Facility (RRF) offers a novel type of Union instrument to support growth and modernization at Member State level, by providing direct financial support linked to packages of investments and reforms.

Fiscal support measures were typically implemented via sequences of fiscal packages that broadly reflected the change in priorities but also the eruption of successive pandemic waves. There is an undeniable uncertainty in quantifying the size of discretionary interventions, which are linked to the methodological issues in statistical recording and to the fact that the execution of some of these programs were prone to substantial revisions (e.g., due to a different take-up rate than initially assumed). Chiefly linked to these factors, but also to the different timing of the publications and the different treatment of budgetary reallocation in the aggregation, there are enormous differences among the various reports/data compilations by international and national organizations, think tanks attempting to put a total price tag to the Covid-support measures.[47] In this paper, the data and estimates of the European Commission are used, since these are available for all countries concerned in a consistent and comparable manner.

Total budgetary support in 2020 differed largely across the EEE,[48] with Slovakia (around 5 percent of GDP) and Slovenia (around 9 percent of GDP) at the opposite end of the spectrum (Figure 6.20). The average performance in the EEE was also in line with that in the EU27 where the headline deficit increased by 6.4 percent of GDP between 2019 and 2020, mostly resulting from a surge of 6.8 percentage points in the expenditure-to-GDP ratio. There were also differences in terms of the composition of the support. For example, budgetary support consisted mostly of automatic stabilizers in Slovakia, while discretionary measures were dominant in Croatia. On aggregate at the EU 27 level, the European Commission (2021c) estimates that around three-fifth of the overall budgetary support in 2020 resulted

downturn for the euro area or the EU as a whole (see Box 2. in European Fiscal Board (2020) for more details on the clause).

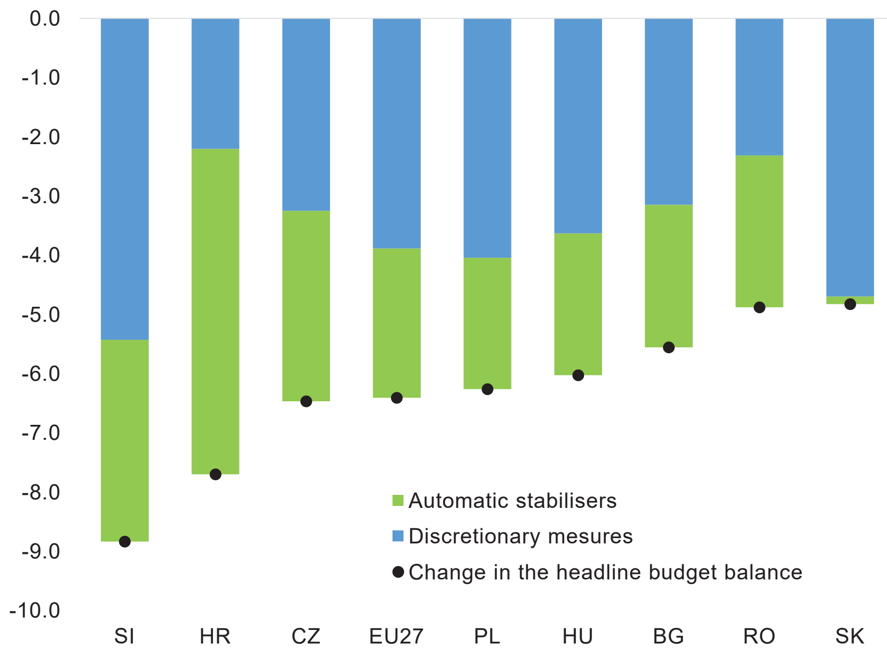
[46] On 20 March 2020, the Commission issued a dedicated Communication on the activation of the clause for 2020 (European Commission, 2020b), which was endorsed by the ECOFIN Council on 23 March. Subsequently, on 19 September 2020, in letters to the Ministers of Finance, the Commission informed the Member States that the clause would remain active in 2021 in light of the still high uncertainty about the economic consequences of the pandemic.

[47] Just for illustration: in the case of France, the figures estimated for discretionary measures in 2020 are as follows (in alphabetical order, percentage of GDP): Bruegel (2020): 5.1; European Commission (2021c): 3.3; IMF (2021b): 7.6; Network of EU IFIs: 2.3(Network of EU IFIs, 2020). For one of the economies in the EEE, Hungary, the respective figures are the following: Commission: 2.3; IMF: 9.2; Network of EU IFIs: 6.9; Nationalbank (2020): 4.8. On top of the above mentioned methodological and measurement issues, these colossal variances may also reflect differences in the interpretation for the concept of ’discretionary measures’.

[48] Total budgetary support is measured as the change in the headline fiscal deficit between 2019 and 2020.

from discretionary measures and some two-fifths from the operation of automatic stabilizers.[49]

Fig. 6.20: Total budgetary support in 2020 (percentage of GDP)
Data: European Commission (2021a)



The pandemic highlighted differences in the capacity of governments to respond to the alarming health situation and support the economy. Financial support programs for businesses and households contributed to limiting the economic damage (European Commission, 2020a). In the EEE, Covid-19-related discretionary measures consist overwhelmingly of additional spending both as a share of GDP and in nominal terms, in line with the patterns in other parts of the EU. The most typical components were the following: (i) emergency spending on the immediate health-care costs; (ii) introduction or the re-activation of short-time work schemes;[50] (iii)

[49] Automatic stabilizers were captured as residuals. This method captures not only the classical automatic stabilizers, i.e., cyclically sensitive budgetary items, such as income taxes and unemployment benefits, but also non-cyclical items that contribute to the macro stabilization. These latter effects stem from the inertia in public expenditures, i.e., already approved spending appropriations are typically not adjusted to the crisis-induced drop in output (for a detailed discussion, see Bouabdallah et al. (2020)).

[50] Short-time work schemes involve direct budgetary grants to companies that are contingent on not laying off employees who may have otherwise been fired due to the economic crisis. Such

increase in social allowances typically via extensions of sick pay and unemployment benefits; (iv) subsidies, capital transfers to firms and public investments. In addition, to a varying degree, regional governments also provided tax relief by cancelling (or temporarily reducing the rate of) certain taxes and social security contributions.

Beyond the above-mentioned similarities in terms of the composition of crisis-relief packages, however, there are marked differences vis-à-vis the ‘old’ Member States, and within the EEE (Figure 6.21). For example, the average increase in social transfers in the EEE was 2.5 percent of GDP, well below the EU average of 4.1 percent. Only Czechia, Slovakia and Slovenia showed a similar surge of around 3.2-3.5 percentage points in social benefits. In contrast, the increase in capital transfers and public investments turned out to be more pronounced in the EEE, albeit with massive regional heterogeneity. While this spending category grew by less than 1 percentage point in Slovakia, it jumped by more than 4 percentage points in Hungary and Poland. Generally speaking, government investment held up relatively well, recording an increase of 0.6 percent of GDP in 2020 (versus 0.3 percent of GDP in the EU). Given that the largest beneficiaries of the EU cohesion policy are members of the EEE on a per capita basis, this improvement was partly due to the mobilization of structural funds for the newly emerging needs in response to the coronavirus.[51]

6.3.3.2 Debt Developments

After falling for five consecutive years in the EU and in the EEE (with the sole exception of Romania), gross government debt increased significantly due to the unprecedented pandemic shock in 2020. The average debt-to-GDP ratio jumped by some 13 percentage points in the EU.[52] The respective figures in the EEE were more moderate, with the change in debt exceeding the EU-27 average only in Croatia and Hungary. The less pronounced growth in the region is partly explained by the fact that none of the seven Member States whose debt ratio was above 110 percent in 2020 (Greece, Italy, Portugal, Spain, Belgium, France and Cyprus in decreasing order) belong to the EEE group.

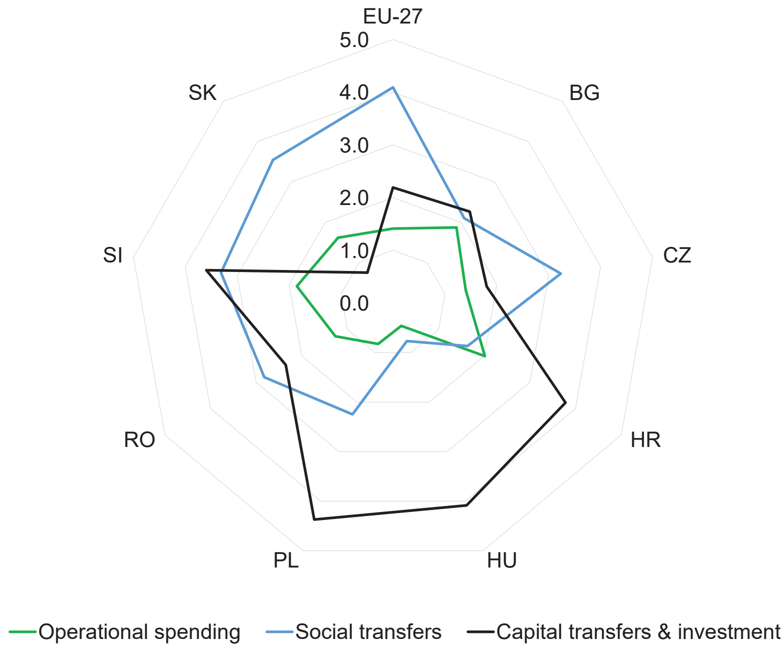
The increase in debt was triggered by large fiscal stimulus measures (see discussion above) and a huge recession triggering a decline in the level of economic activity in most member states (in the EEE, there was a minimal increase in nominal GDP only in Hungary and Poland), resulting in a significantly adverse snowball effect. Stock-flow adjustments played overall a smaller role in the 2020 debt dynamics.

schemes had already existed in a number of Western EU countries prior to the Covid pandemic (most notably, in Belgium, France and Germany), but virtually all EU Member States introduced such arrangements in 2020.

[51] In spring 2020, the Commission approved two packages to make use of the flexibility and liquidity offered under the Cohesion funds: the Coronavirus Response Investment Initiative (CRII) and the Coronavirus Response Investment Initiative Plus (CRII+).

[52] The jump of 13 percent of GDP in the EU public debt ratio should be seen against the background of the Great Recession period, when the overall increase was about 22 percentage points between 2007 and 2011. Based on the Commission’s spring 2021 forecast, public debt ratios peaked in 2020 in the EEE, except Czechia.

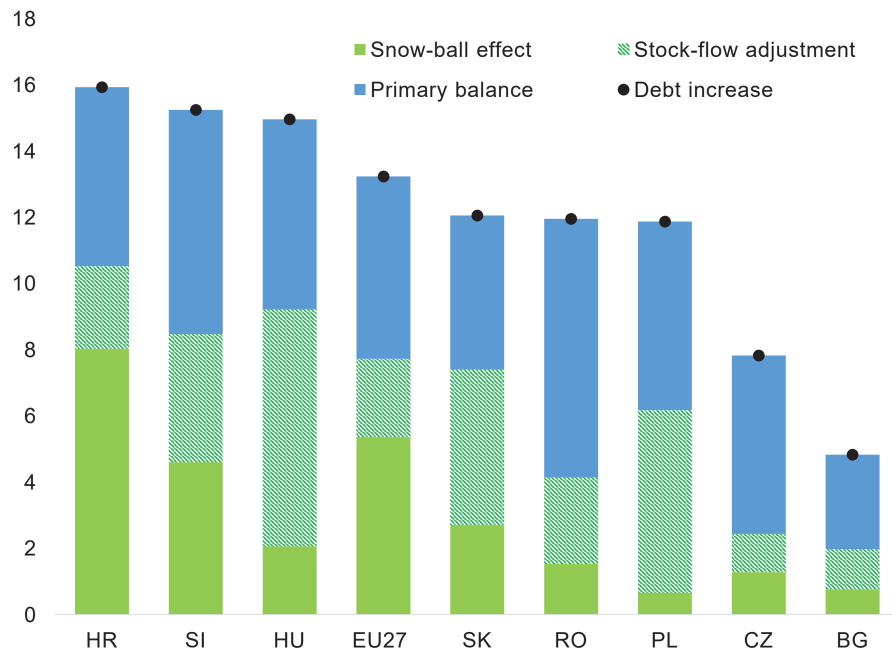
Fig. 6.21: Composition of the expenditure response in 2020 (percentage of GDP).
Data: European Commission (2021a)
Note: The decomposition is based on the economic classification of total government expenditure. The following grouping was applied: Operational spending: intermediate consumption + compensation of employees; social transfers: social benefits in cash + social transfers in kind; capital transfers & investment: gross fixed capital formation + subsidies + other capital expenditure.



This is in contrast to its more prominent role in the GFC-induced debt spiral, when debt-increasing stock-flow adjustments reflected extensive financial sector support schemes granted by the government. In the Covid-context, support for the financial sector has mainly been provided by the central bank (Section 6.3.1) or in the form of government guarantees that are not (yet) recorded as an increase in government financing or debt.

Both the size of the increase and the relative importance of the explanatory factors varied across the EEE. On the sounder end of the spectrum, the relatively moderate increase in Bulgaria and Czechia was mainly due to the contained increase in deficit and the low stock-flow adjustment. In Hungary and Poland, there was an outstanding increase in stock-flow adjustments as a significant depreciation of the forint and the zloty gave rise to an unfavorable valuation effect of government debt denominated in foreign currency (amounting to around 25 percent of total debt in Poland and close to 20 percent in Hungary). The largest increase was recorded in Croatia among the EEE, resulting from a particularly adverse snow-ball effect as a combination of the

Fig. 6.22: Decomposition of the increase in public debt in 2020 (percentage of GDP)
Data: European Commission (2021a)



highest debt ratio and deepest recession in regional comparison (this combination also explains the Slovenian case with the second-highest increase).

Given the adverse economic and budgetary impact of the crisis, the European Commission (2021c) found that sustainability risks have increased compared with pre-pandemic scenarios. Over the medium term, seven countries worsened their risk classification, including four members of the EEE (Croatia, Hungary, Slovakia, and Slovenia). This deterioration is chiefly explained by the large jumps in public indebtedness in 2020, and lower growth of potential GDP over the projection period. In the long term, where demographic trends and age-related spending dynamics play a dominant role in the simulations, six countries, including four members of the EEE (Bulgaria, Croatia, Slovakia, and Slovenia), were deemed to face more acute risks compared to the 2019 update. The deteriorating risk classification should be seen against the backdrop of a more favorable financial environment (negative interest-growth differentials) and the assumed correction of primary deficits.

6.3.3.3 Contingent Liabilities

Standard budgetary stimulus measures were not the only policy responses to the Covid-19 crisis. In order to tackle the sudden drying up of liquidity in the corporate sector, and allow businesses to continue paying suppliers and employees, virtually all EU Member States launched massive liquidity programmes, amounting to around 23 percent of EU GDP. It is worth highlighting that the EU (weighted) average is very much influenced by the actions of the four largest EU economies (France, Germany, Italy, and Spain), which all launched large interventions in proportion to their GDPs (the first three of the largest four top the EU ranking for this aspect). The most common form of support were provided through government guaranteed credit schemes (either directly or through the national promotional banks),[53] with an initially announced aggregated envelope of around 18.5 percent of GDP in the EU.[54] Other often applied tools have been deferrals of taxes and social security contributions (these have no direct impact on the government balance, since taxes are recorded in ESA-based accounts in the period when the economic activity generating the tax liability takes place). The size of liquidity measures was substantially smaller in the EEE (Figure 6.20). The largest package in the region was adopted by Poland, which is still less than half of the EU average as a share of GDP.

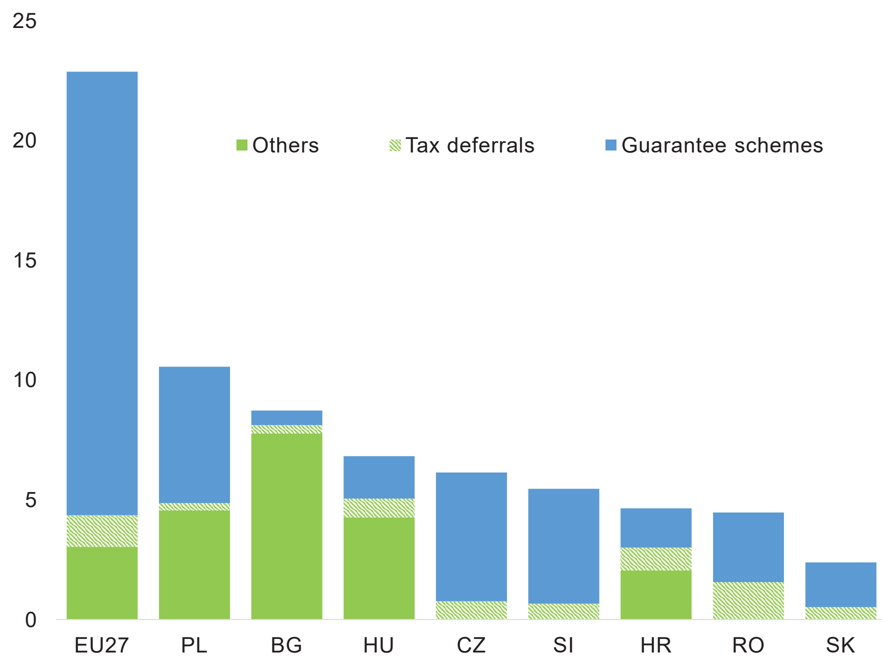
6.4 Long-term Prospects and Policy Implications

The GFC and the Covid-19 crisis brought to the forefront several old – and supposedly long solved – dilemmas concerning monetary, macroprudential and fiscal policy, as well as their interaction and coordination. Moreover, there is a high degree of uncertainty around the post-Covid-19 global economic landscape, with potential major implications for the conduct of macro policies.

[53] Standardized guarantees are issued to a large number of homogeneous clients (with student loans and export guarantees being the typical examples), where expected guarantee calls can be predicted with a good level of certainty in advance and hence recorded as expenditure from the inception. ‘One-off’ guarantees are assessed individually (particularly when large) or relate to cases where there is no certainty on future calls; therefore the default statistical rule for the ‘one-off’ guarantees is to record deficit impact after the actual call.

[54] In order to put this figure of 18.5 percent into context, it should be recalled that prior to the pandemic, in 2019, only Finland had a larger outstanding government guarantee program (see Eurostat (2021a) for the entire dataset). Contingent liabilities granted before 2020 took mostly the form of guarantees on assets and/or liabilities of financial institutions (N.B: data on contingent liabilities are collected with one-year lag to the reporting period).

Fig. 6.23: Total liquidity measures in 2020 (percentage of GDP).
Data: European Commission (2020e, 2021b)
Note: Other schemes include, for example, loans and equity injections by government agencies.



6.4.1 Monetary and Macroprudential Policy

6.4.1.1 Monetary Policy Framework and Tools

Most of the EEE already voted for giving up independent monetary policy and joining the euro area (Bulgaria, Croatia, Slovakia, and Slovenia). As a matter of fact, the remaining members of the EEE (Czechia, Hungary, Poland, and Romania) have no opt-out right, therefore they should also join the euro area. Moreover, taking into consideration the reduced independence of monetary policy discussed in detail in Section 6.2.1.2, the famous trilemma rather seems to be a dilemma, i.e., there are no strong arguments from a monetary policy point of view against accession in most cases. As noted by then-Governor of the NBP Marek Belka, the "challenge consists in having to conduct autonomous monetary policy under conditions of strongly limited autonomy" (Belka, 2014). Therefore, there are two major issues left: (i) the timing of the adoption of the euro; and (ii) the appropriate tools and frameworks in the meantime in view of the above-mentioned challenges.

First, the members of the EEE with independent monetary policy should assess the right timing of the adoption of the euro. Belka (2014) noted that “if a country doesn’t have as competitive an economy as Switzerland, as flexible a labor market as Denmark and as disciplined public finances as Estonia, it should think twice about adopting the euro”. Although “these criteria can only be taken half seriously”, they highlight that the timing is not purely an issue of monetary policy for the EEE. Relatedly, the introduction of the euro is sometimes also a political decision.

Second, a major question for policymakers is how to react to the post-pandemic challenges affecting policy space until the adoption of the euro. For example, there are some expectations about the potential rebirth of inflation. Goodhart and Pradhan (2020) argue that “the combined effect of a cutback in globalization, opposition to immigration, and the decline of new young entrants into the workforce” would reinforce the decline in the working-age population in countries with aging population, thereby increasing the bargaining power of labor, as well as shifting and steepening the Phillips curve. Haldane (2021) also noted the possibility of higher inflation on the back of the potential supply-side effect of Covid-19 (e.g., workers not returning to the workforce), the expansion in money supply and the fiscal stance, as well as increased risk appetite of households that strengthened their balance sheets during the pandemic. Blanchard (2020) argues that inflationary pressure could arise from the large increase in debt and fiscal dominance. At the same time, Haldane (2021) also emphasizes the possibility of a lower-inflation equilibrium, as many of the disinflationary forces could have been reinforced by the Covid-19 crisis.

Another major challenge is that the perceived neutral rate could decline further, especially if the pandemic negatively affects growth and the trend appreciation of the real exchange rate. At the same time, successful efforts to increase potential growth and escape the middle-income trap would have the opposite impact. Higher global uncertainty could also influence the neutral rate; however, the direction is not clear (Arena et al., 2020). While higher uncertainty could increase the risk premium, it could also reduce investments, thereby increasing interest rates (Bartsch, Bénassy-Quéré, Corsetti & Debrun, 2020). Finally, demographic changes could lower savings, exerting an upward pressure on the neutral rate (Goodhart & Pradhan, 2020). Notwithstanding the uncertainty around the relative strength of these factors in affecting the neutral real rate, “the likelihood is that it will remain low over the medium term” even if it recovers from its Covid-19 low and increases somewhat on the back of the short-run fiscal stimulus (Blanchard 2021). This – coupled with “no sign of willingness to revise the inflation target substantially upward” – would also imply low nominal interest rates for a long time (Blanchard, 2021), thereby reducing monetary policy space.

The post-pandemic conduct of monetary policy thus depends on the available space that is in turn a function of the evolution of inflation and the neutral rate. Borio and Zabai (2020) noted that the low neutral rate implied that “the only way to gain policy headroom is to raise inflation”, therefore “gaining policy headroom on a sustainable basis tomorrow requires lowering it today”. The legal requirement to adopt the euro over time, however, makes it unlikely for EEE inflation-targeters to increase the target, unless there is a similar increase undertaken by the ECB.[55] Against the backdrop of limited scope for conventional easing, central banks could thus consider the continued use of UMP. This, however, should be subject to a high degree of caution in the EEE. Even in advanced economies, several surveys and research papers not only pointed out the fading effectiveness of UMP (in compressing credit spreads and nudging lending activity) and the lack of transparency in monetary transmission (neither models nor empirical evidence can explicitly show the effect of a one billion extra asset purchase on interest rates) but also stressed the side effects of the UMP on financial stability (e.g., asset prices) and the financial sector (e.g., deteriorating profitability). Recent papers also draw attention to the danger that unconventional policies slowly become the new norm, without proper justification (e.g., Borio and Zabai (2020); Dabrowski (2021); Galí (2020)). Moreover, for the EEE, the main question is whether UMPs can be deployed even during non-crisis periods, as the use of UMPs during Covid-19 largely benefited from positive spillover effects of UMPs in advanced economies. Finally, the scope for negative interest rates seems to be constrained, as the effective lower bound could be higher in EMs than in advanced economies (Brandão Marques, Casiraghi, Gelos, Kamber & Meeks, 2021) and there are multiple technical and legal problems associated with negative rates (e.g., the linking of penalty interest rates to the policy rate in the legal system) (Franta et al., 2014).

Finally, the more widespread use of digital currencies could have implications for macro policies. For example, He et al. (2016) compare the challenges of an economy with a high share of virtual currencies to those that are dollarized, including the reduced ability of monetary policy to manage the business cycle (especially if the design of the virtual currency does not allow for an expansion in supply in response to negative demand shocks) and the lack of a lender of last resort function. Brunnermeier, James and Landau (2021) also argue that “both the disappearance of cash and the reduced role of banks threaten monetary independence”, therefore “a regime in which all money is convertible to central bank digital currency (CBDC) would uphold the unit of account status of public money”, thereby protecting the ability of monetary policy to influence credit and risk sharing.

In the recent past, several central banks have launched projects on the possibility of the issuance of CBDC, including the Sveriges Riksbank (Ingves, 2018), the People’s Bank of China (Auer, Haene & Holden, 2021) and the ECB (ECB, 2020). In members of the EEE outside the euro area, the introduction of digital currency has

[55] Similarly, the eventual adoption of the euro makes it unlikely that countries would give up the current form of the inflation targeting regime during the intermediate period. Notwithstanding the post-GFC debate about the use of alternative monetary policy frameworks, none of the inflation-targeting countries opted to change their regime. However, a notable change in the applied frameworks, announced in August 2020 by chairman of the Fed James Powell in Jackson Hole, was that the Fed would switch to average inflation targeting (Powell, 2020). Since then, several similar proposals have been made (e.g., the Governor of the Bank of Finland, Olli Rehn, proposed it for the ECB in May 2021). The literature about average inflation targeting (AIT) has not yet achieved a conclusive result (Clarida, 2020; Budianto, Nakata & Schmidt, 2020; Honkapohja & McClung, 2021). In the EEE with independent monetary policy, AIT has not yet emerged as a realistic possibility, especially given their commitment to adopt the euro over time.

not yet emerged as a possibility, though each central bank has conducted surveys, i.e., they are contemplating the potential use of CBDCs in the future. There can be myriad objectives behind these considerations, including the enhancement of payment system competition, efficiency and resilience, the support of financial digitalization, the improvement of monetary policy effectiveness or competition to privately issued currencies (Kiff et al., 2020). Indeed, the introduction of CBDCs could crucially modify the operation of financial intermediaries, international payments and monetary transmission (Bindseil, 2020). Nevertheless, there are also costs associated with CBDCs, including labor, infrastructure (e.g., servers), software, cyber security and support services (Kiff et al., 2020). Moreover, there still seem to be major legal impediments. For example, "most central bank laws do not currently authorize the issuance of CBDC to the general public" and "from a monetary law perspective, it is not evident that "currency" status can be attributed to CBDC" (Bossu et al., 2020).

6.4.1.2 Macroprudential Policies

At first sight, one might think that the Covid-19 crisis brought the first real test of the effectiveness of macroprudential policies. This, however, is not necessarily the case. Although the EEE banking system remained stable during the pandemic, there were several measures related to consumer protection and microprudential regulation, as well as monetary policy, thereby complicating the evaluation of the effect of macroprudential policy. For example, the wide-scale loan moratoria, combined with the ease of loans' provisioning under moratoria (see Chapter 2), lowered the amount of non-performing loans and accordingly the provisioning costs and capital requirements. Additionally, the easing of monetary policy, including through ample liquidity provision, helped maintain the financing of moratoria and credit. That is, macroprudential policies were only supplementary, representing a small part of the lines of defense against financial instability. Therefore, it might be tempting for banks to argue that 'while we were part of the problem during the GFC, we are part of the solution now'. It is, however, hard to find empirical evidence in favor of this claim.

What does this mean for macroprudential policy-making? Although it is premature to answer this question, the Covid-19 crisis definitely highlighted the importance of both resilience in the banking sector (e.g., higher capitalization of banks) and quick policy response. Going forward, it is thus important to protect both resilience in the banking sector and macroprudential policy space to act countercyclically.

6.4.1.3 Functions and Independence of Central Banks

Over the past decade, the expansion of the toolkit of central banks to include macroprudential policies, as well as the large policy accommodation in response to the GFC and the Covid-19 crisis, including in the form of unconventional measures, raised public interest in the implications of these measures for developments outside the legal mandate of the central bank. For example, macroprudential measures (e.g., LTV ratios) have an impact on housing affordability.[56] Similarly, the increase in inequality during the pandemic (Furceri, Loungani & Ostry, 2020) and the large-scale policy response triggered some criticism of central banks, with the distributional power of central banks further brought to the fore. Igan, Kirti and Peria (2020) also argued that the debate about the potential distributional impact of monetary policy could be further fueled by the disconnect between elevated financial market valuations, supported by monetary policy easing, and low economic activity during Covid-19.

Monetary policy actions have also been criticized for their potential negative environmental effects. For example, Matikainen, Campiglio and Zenghelis (2017) point out that the corporate bond purchase programmes of the ECB and the Bank of England were skewed towards high-carbon sectors. (Dafermos, Gabor, Nikolaidi, Pawloff & van Lerven, 2021) also note that while carbon-intensive companies accounted for only 24 percent of EU employment and 29 percent of Gross Value Added, they issued 59 percent of the corporate bonds that the ECB accepts as collateral. Similarly to the case of inequality, these concerns are likely to prevail in the post-pandemic world.

How could these criticisms affect the objectives and independence of central banks?[57] Some central banks seem to have responded to the calls to take into account the potential impact of their actions on topics like inequality and climate change. For example, Lagarde (2020) notes that "This imperative has to cascade through all the elements of our review: our inflation aim, our inflation measure, our tools and their effectiveness, and how we take into account new challenges that people care about, like climate change or inequality", and added that "This environment poses fundamental questions for central banks. We need to thoroughly analyze the forces that are driving inflation dynamics today, and consider whether and how we should adjust our policy strategy in response". The Central Banks and Supervisors Network for Greening the Financial System (NGFS) has been set up to exchange experiences, share best practices, contribute to the development of the environment and climate risk management in the financial sector. Among the EEE, all central banks within the euro area as well as Hungary and Romania have become members of the group.[58]

There are, however, strong arguments in favor of the need for central banks to continue to focus on their objectives of price and financial stability. First, while there is no consensus in the literature yet, several papers pointed out the small magnitude of the net distributional effect of monetary policy, with long-term trends in inequality primarily driven by structural factors such as technology and globalization

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[56] The effect of monetary policy on housing prices – which is a kind of macroprudential approach - has been in the focus of recent research (Ehrenbergerová & Bajzík, 2020)

[57] The notion of central bank independence emerged long before the GFC in order to solve the time inconsistency problem. These institutions have been the designated authority to fight inflation and be the 'ombudsman' for long term price stability, especially in Europe where the mandate of central banks was clearly defined as 'to reach and sustain price stability'. In inflation targeting countries, a clear numerical was defined as well. Independence was grounded on clear mandate, a well-defined set of measures, transparency and democratic accountability.

[58] The MNB broadened the scope of topics even further, as they publish 21 regular reports on various issues, including productivity or competitiveness (see MNB (2021h)).

(Bonifacio et al., 2021). If the post-pandemic world continues to be associated with the active use of unconventional policies and unfavorable changes in income and wealth distribution, the association between inequality and macro policies might stay alive, thereby exerting pressure on policymakers.

Second, Bonifacio et al. (2021) note that "burdening monetary policy with other objectives is not desirable as it may reduce its overall effectiveness". As argued by Unsal and Garbers (2021), however, "exceptional times need exceptional communication to safeguard credibility", including the proactive definition and explanation of crisis responses, justification for the new measures, the intended duration of actions, continuous active communication on the crisis response, and the coherent integration of the crisis response into the monetary policy framework. Moreover, "monetary policy can make an important contribution by keeping the economy on an even keel in fulfilment of its mandate, i.e., by tackling macroeconomic, including financial, instability" (BIS, 2021b), while other policies (e.g., fiscal policy, structural reforms) are better suited to tackle distributional issues.

Finally, the more responsibility is taken by central banks, the less their independence is well founded. As such, increasing responsibilities of central banks could lead to confusion in the democratic structure. In fact, in the aftermath of the GFC, there have already been concerns around the 'unelected power' of central banks. "The model that evolved appeared, for a while, to deliver both credibility and legitimacy. But it was found badly wanting by the Great Financial Crisis, which prompted a wave of previously unimagined emergency operations and, later, an expansion of powers and functions. It is those circumstances that have posed the big question of just how much power and how many functions can be delegated with legitimacy to these institutions" (Tucker, 2018).

6.4.2 Fiscal Policy

The conduct of fiscal policy will be affected by several factors after the pandemic. While low-for-long interest rates lower monetary policy space, they enhance the room for fiscal policy, by lowering interest expenditures. In periods when r-g becomes negative, there is a strong incentive for governments to loosen fiscal policy. This space could ideally be used to finance public investments, including in the areas of climate policies. Moreover, investments in human capital could ensure that the increase in inequality during the pandemic be quickly reversed and scarring effects be minimized.

At the same time, it is important to keep risks around debt sustainability contained. As discussed in Section 6.3.3.2, the fiscal response to the pandemic led to a significant increase in public debt across countries in the EEE (by almost 12 percent of GDP on average in 2020, which is projected by the European Commission to be only slightly reduced by 2022). These elevated debt-to-GDP ratios in conjunction with the massive provision in new contingent liabilities (not yet shown up in the headline fiscal indicators) therefore clearly increased public sector vulnerabilities. Lian and

Presbitero (2020) find that higher initial public debt is associated with a shorter duration of negative r-g episodes, higher average r-g and higher downside risks. Moreover, they also show that high public debt increases the responsiveness of the interest rate to negative real and financial shocks. This highlights the importance of sustainable policies that would reduce risks around adverse changes in the country risk premium. Risks around r-g could also be mitigated by increasing potential growth. In addition to the implementation of crucial structural reforms, fiscal policy could also play an important role, including by reducing distortions in the tax system, as well as improving the composition of spending and the efficiency of public investments.

Fiscal space, however, would also be constrained by rule-based fiscal frameworks. Specifically, in the case of EEE, the combination of European and national fiscal rules will be at play. Even before the eruption of the pandemic, there was already a close to full consensus among academics and practitioners that the existing EU Stability and Growth Pact required revision. It was increasingly perceived as a fiendishly complex set of rules and benchmarks poorly tailored to country-specific debt reduction needs and capacities.[59] By leaving a legacy of high debts, the pandemic magnified a number of pre-existing challenges and vulnerabilities in public finances. In particular, further differentiation in the pace of debt reduction seems to be warranted as the traditional numerical guideposts (the 60 percent reference value in the EU Treaty and the debt reduction benchmark for countries above the threshold) will lose their guiding power. Moreover, it is important for the fiscal framework to provide sufficient flexibility to member countries. Indeed, "the purpose of EU fiscal rules or standards should only be to contain adverse debt-related externalities across members, by ensuring that each country's debt is indeed sustainable, and they should impose only the constraints needed for debt sustainability" (Blanchard, Leandro & Zettelmeyer, 2021).[60]

6.4.3 Policy Interactions

Given the potential decline in space and the interaction of policies, policy coordination will be even more important in the aftermath of Covid-19. Given that an increase in interest rates would lead to higher interest expenditures, thereby having a negative

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[59] The SGP's various design flaws and implementation shortcomings were acknowledged in the analysis of the European Commission (2020c), launching a comprehensive review on the European economic governance framework in February 2020. With the onset of the Covid pandemic, the review process was immediately put on hold, which is still the case at the time of the cut-off date of this chapter (July 2021).

[60] The recent reform proposal by Martin, Pisani-Ferry and Ragot (2021) also puts debt sustainability at the core of a new system. It constitutes a more gradual approach as it chiefly preserves the EU Treaty articles on fiscal policy coordination, but recommend replacing the uniform deficit and debt criteria with a five-year debt trajectory set individually by each Member State to be approved by the Council of the EU. Independent bodies would be entrusted with the development of a methodology for the assessment of debt sustainability and for assessing its implementation both at the EU and the national level.

impact on debt sustainability, fiscal dominance has been widely cited as a factor that could complicate the tightening of monetary policy (Bonatti, Fracasso & Tamborini, 2020; Dabrowski, 2021). Moreover, the unwinding of asset purchase programs could intensify roll-over risks for the government (Bonatti et al., 2020). (Goodhart, 2020) thus notes that “in the context of massive government deficits, and debt ratios rising sharply over 100 percent, [. . .] we may need to rethink how to adjust and protect the concept of central bank independence”. Against this backdrop, “sustainable fiscal policy amplifies the credibility of the central bank by ruling out fiscal dominance, and a credible central bank contributes to debt sustainability by reducing the likelihood of disruptive self-fulfilling crises” (Bartsch et al., 2020). At the same time, accommodative fiscal policy in response to shocks could also reduce the burden on monetary policy, thereby protecting monetary policy space. This could be especially important if monetary policy space continues to be constrained by the low neutral rate. As argued by Blanchard (2021), “the reason why many central banks have missed their target inflation is not that they did not try, but that they did not have enough fiscal support”.

Monetary policy and macroprudential policies should also be coordinated. Given the potential negative impact of UMPs on financial stability, the active use of unconventional measures should be complemented with the appropriate stance of macroprudential policies. Specifically, “the prevailing ’lower for longer’ interest rate environment reinforces the case for building up releasable capital buffers in good times to be consumed when a crisis hits” as the proactive countercyclical capital buffer could reduce the burden on monetary policy constrained by low interest rates (Pariès, Kok & Rottner, 2020). Finally, while FX interventions should be limited to counter disorderly market conditions, they could also help increase monetary policy space when facing external shocks.

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Chapter 7
Green Economy: Energy, Environment, and Sustainability

Michael Carnegie LaBelle and Tekla Szép

Abstract This chapter focuses on two United Nations Sustainable Development Goals to measure the impact of Covid 19 on the sustainability efforts in the Emerging European Economies (EEE). These goals are: SDG7 Affordable and Clean Energy, and SDG13, Climate Action. Analyzing indices connected to both SDG7 and SDG13 a demonstrable perpetual weakness in energy and climate issues being addressed. The results of our analysis show that the EEE were failing to improve their SDG7 and SDG13 in 2019. By 2020, Covid pushed the region further behind. Covid had a moderate negative impact on SDG7, but in the case of SDG13 the consequences are more uncertain. The European Union has set a 2050 target of carbon neutrality regarding the long-term goals, which means net zero emissions of greenhouse gases by this date. Based on historical trends, these targets will be missed unless new policies are implemented. Final energy consumption (TOE per capita) was higher in 2019 than in the prescribed 2020 targets adopted in 2012 (Eurostat, 2021). The failure to improve – that is to reduce energy consumption – demonstrates the overall lack of progress in decoupling economic growth from energy consumption. This chapter makes three policy recommendations: 1) 'Creative carbon accounting' cannot be a means to make the EEE 'succeed' in their SDGs. 2) Economic growth must be decoupled from energy consumption; and 3) National and regional economic recovery plans must prioritize energy efficiency improvements (including for the poorest households), and renewable energy sources need to be framed in terms of resiliency for the environment and society.

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7.1 Introduction

Progress in taking urgent action to address climate change and its impacts requires all countries to revamp their economies and ways of life. This challenge in the Emerging European Economies (EEE) is reminiscent of the dramatic shift from a centrally planned economy to a market economy. Under the new pressures, the entire energy infrastructure, from the built environment to resource extraction and to building new renewable generations, requires a fundamental revamp. Moreover, the Sustainable Development Goals (SDGs), which all the EEE are adhering to, require even more dedication after the Covid-19 pandemic. This chapter outlines the impact and action areas where effective policies can induce broader change to build a green and resilient economy. In December 2019, the European Green Deal was presented, opening the preparation period for the new Multiannual Financial Framework 2021-2027. It is a new growth strategy and an action plan: The 2030 Climate and Energy Framework set concrete legal instruments (Monti & Romera, 2020). After the 20-20-20 goals (by 2020), the EU reset targets for some SDGs(European Commission, 2020c). These are:[1]

- Minimum 32.5% improvement in energy efficiency by 2030 (related to primary and final energy consumption);
- Minimum 32% share of renewable energy in gross final energy consumption by 2030;
- Minimum 55% less greenhouse gas emissions by 2030, compared to 1990 (Climate Action - European Commission, 2021).

Here we note, that according to the (European Commission, 2020a) in the energy system, €260 billion of additional investment is needed annually (from 2021-2030) to achieve the 2030 energy and climate goals.

A final goal of these efforts, to build sustainable energy systems and improve the adaptability of communities and countries, is to enhance their resiliency during periods of crisis. As the UN Secretary-General António Guterres states, in a post-Covid world, there needs to be more significant equity for sustainable societies and economies that are "more resilient in the face of pandemics, climate change, and the many other global challenges we face" (Guterres, 2021). Resiliency, as this chapter outlines, provides a means to measure progress in SDGs. Resiliency in the past, through SDGs, addressed impacts of nature-based events in the biosphere (Grafton et al., 2019; Elmqvist et al., 2019; Marchese et al., 2018). This chapter sets out to open up the consideration that SDGs can also assist the EEE resiliency under the pressures of a pandemic. The literature has overlooked this natural occurrence. Resiliency also plays an important role in implementing SDGs more effectively under the European Green Deal.

This chapter provides an overview of the ability of the EEE to meet their SDG goals. In the next section, the goals most closely aligned with energy and sustainability and the progress of the EEE are assessed. The impact of Covid-19 on these

[1] These targets can be revised in 2021

countries to meet their SDG targets is addressed. The methods used in the assessment are also described. Section three provides a more detailed evaluation of using two SDGs to examine progress and where the countries are headed. Progress is shown to be happening in many areas, but why this progress is inadequate is explained. Section four addresses the importance of resiliency in terms of recovering from Covid-19 and ensuring a sustainable transition is an outcome of fulfilling the SDG targets. Within this section, the impact and resiliency of the household is central to understanding the benefits of an SDG path. Finally, section four provides an overview of the broader convergence of the EEE to the EU 27. Convergence of these economies is essential in ensuring sufficient resiliency levels and a greater degree of sustainability in the economies, thereby satisfying SDG goals. Section five articulates policy recommendations based on the assessment in this chapter. The outcome of this chapter demonstrates the progress to achieving the SDG targets and the likely trajectory with and without policy intervention to ensure the EEE remain on the path.

7.2 Background and Summary

The Sustainable Development Goals were launched in 2016. There are 17 global goals, which "aim to end poverty, protect the planet and ensure prosperity for everyone by 2030" (Sightsavers, 2017). The SDGs build upon previous efforts and serve to measure and end poverty and foster a greater sustainable development agenda. These efforts include the 'Agenda 2030', a UN effort building on the previous Millennium Development Goals, which are built on the environmental, social, and economic pillars of sustainability following a holistic approach. The progress of SDGs is global in scope but relies on localized adjustments.

The future of SDGs is inseparable from the so-called spillover effects. Strategies and all efforts to achieve SDGs need to be implemented without generating negative and indirect impacts on other countries (or at least the spillover effects should be minimized). The theory of ecological footprint, carbon debt, and energy debt represents this dilemma. Based on a holistic systems approach, for example, the energy consumption of a country (included in IEA energy balances) is not equal its total energy requirement (which is actually needed for the current level of development) (Arto, Capellán & Lago, 2014). The latter amount is much more because it contains the energy embodied in international trade and represents all products and services (export and import) demanded by the society.

Energy and climate goals now dominate EU policy making. Nonetheless, the high imports of goods into the EU mask emissions producing these items. Globalization and international trade spread national emissions around the world. Nowadays, the high import (especially imports of energy and material-intensive products from the Global South) provides Europe the buffer to increase its development level but using less energy, because the accounting of pollution is borne by developing countries. This international process is called 'spillover'. J. Sachs et al. (2020b) introduce a scoring system using "the best available data on countries' positive and negative spillovers." It is primarily valid for the European Union. However, data collection is essential for assessing the amount of spillover from EU consumption (and the EU's 'real' emission level). Despite this importance, Eurostat does not collect the following data:

- CO_2 emissions embodied in imports (tCO_2/capita);
- Scarce water consumption embodied in imports (m^3/capita);
- Fatal work-related accidents embodied in imports (per 100,000 population) (J. Sachs et al., 2020b).

Understanding both national SDG rankings based on domestic scores and the additional spillover score provides a snapshot of progress towards meeting the SDGs in the EU. J. Sachs et al. (2020a) report the SDG Index Score and Rank, and the Spillover Index Score for 166 countries [2] Figure 7.1 shows the shift between 2019 and 2020 and highlights some positive tendencies in eight of the EEE. The ranking of these EEE is relatively high out of 166 countries. However, as a result of Covid-19, significant changes can be observed in the SDG Index Rank. Five countries of the eight improved their position; the most considerable improvement is seen in Czechia (advanced by 28 places); their SDG index score increased from 74.5 to 80.6. At the end of the list, there is Bulgaria with the biggest decline from 2019 to 2020 (its score dropped from 79.4 to 74.8).

Except for Slovenia, changes in the Spillover Score are in line with the SDG Index Rank. Czechia, Croatia, Hungary, Poland, and the Slovak Republic reached a higher position (in the SDG Index Rank) from 2019 to 2020 and their trends in the Spillover Score are also promising. Romania and Bulgaria rank lowest among the EEE in 38th and 39th position, respectively (SDG Index Rank), and this low position is accompanied by a significant and increasing spillover effect. In Romania and Bulgaria, the Spillover Score increased from 71.4 to 91.6, and 70.0 to 85.4, respectively, between 2019 and 2020.

The index rankings provide a comparative example but do not show the evolutionary changes for each country. A broader picture that accounts for the two specific SDGs examined in this chapter indicates that it was one of the consequences of the Covid-19 pandemic which drives these countries further from meeting their SDG goals. There are two SDGs that will be the focus of this chapter: SDG7 Affordable and Clean Energy, and SDG13, Climate Action. In terms of assessing the EEE, both SDG7 and SDG13 indicate a perpetual weakness in energy and climate issues. The dashboard results show that in 2019 the EEE were failing to improve their SDG7 and SDG13. By 2020, Covid pushed the region further behind. Covid had a moderate negative impact on SDG7, but in the case of SDG13 the consequences have a higher uncertainty (the impact is still unclear) (J. Sachs et al., 2020b). The restrictions in the EEE caused a temporary reduction in global GHG emissions but hampered new energy investments. At this stage, it is hard to quantify the trend that will emerge.

[2] The methodology of calculating the SDG Index is continuously changing, which means that the rankings and scores cannot be compared with previous years' results. Based on this, the latest and comparable data (2019 and 2020) have been selected (Figure 7.1 and 7.2).

Fig. 7.1: Progress towards SDGs in the EEE (SDG Index Score and Rank, Spillover Score)
Data: own compilation based on J. Sachs et al. (2020a)
Note: A higher Spillover Score indicates higher spillover effect

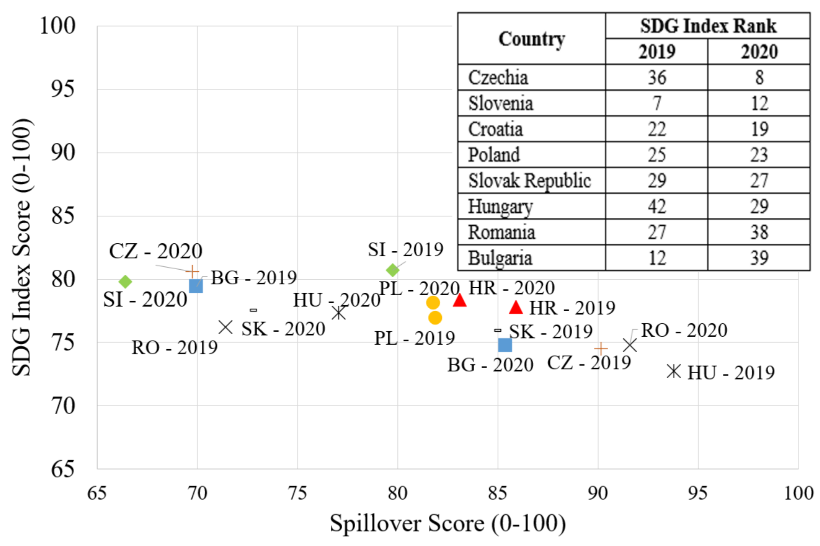
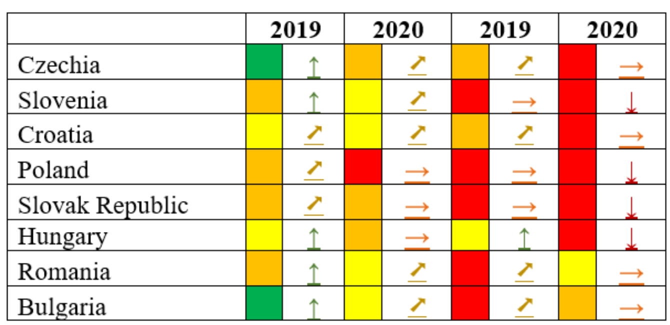


Fig. 7.2: Progress towards SDGs in the EEE (SDG Index Score and Rank, Spillover Score)
Data: own compilation based on J. Sachs et al. (2020a)



Legend: green – goal achievement, yellow – challenges remain , orange – significant challenges, red – major challenges; ↑ - on track, ↗ - increasing, → - stagnating, ↓ - decreasing.

The only positive effect of Covid-19 appears to be that declining economic activity decreases environmental pressure (for a while). Nonetheless, the main driver of ecological pollution is restrained. However, after the pandemic an economic rebound/recovery may eliminate these results. The question is how we can restart the economies without compromising environmental (e.g., emission) results and without "simply restoring old patterns of environmental degradation" (J. Sachs et al., 2020a). It should be accepted that Covid-19 is a wake-up call that requires new policy responses, particularly in areas that were hard-pressed to make progress – like energy. As Kharas and McArthur (2020) states, we need a new motto: the 'great reset' or 'build back better.' Nonetheless, the motto should be more than words, and this period needs to be started to build a new business as (un)usual approach (Weko et al., 2020).

7.2.1 The Great Reset: SDG as the Target

Our results show turning SDGs into common goals makes the transition easier and more efficient (see 4.2). While the European Union made good progress on earlier 2020 goals, meeting the target of 20% final energy consumption from renewable sources and cutting GHG emissions by 20%, there is a lag in SDG7 and SDG13. The importance of linking EU policies to SDGs is that if an SDG is connected to EU-wide targets and policy objectives, it pushes the Member States to focus on economic efforts and utilizing financial support.

The European Union has set a 2050 target of carbon neutrality regarding long-term goals, which means net zero emissions of greenhouse gases by this year (European Commission, 2021a). From now on, decades of action are required to achieve these goals. Nonetheless "Decades of inaction on ending greenhouse gas emissions have left humanity in the grips of dangerous and perhaps disastrous human-induced climate change," with the current pandemic reflecting the persistent imbalance of the interface of humans and nature (J. D. Sachs & Sachs, 2021). Establishing a new growth path by 2030 requires the global goal of a decade of action — which is an attempt to jump-start a new sustainable course for society and the economy.

Within the EU, the attempt is to decouple economic growth from resource use – a push to establish a circular economy. In 2015 the UN launched 'the 2030 Agenda for Sustainable Development' with the SDGs at its center. These 2030 goals also correspond with the EU's spending cycle. The Union's long-term budget is set for the 2021-2027 period with EUR 1.211 trillion. In 2020 a new financial package was launched to assist recovery from the Covid pandemic, the Next Generation EU fund (worth EUR 806.9 billion). In this stimulus, there is a total of EUR 2.018 trillion (at current prices). There is a package of cross-cutting priority areas, which will receive financial support from several programs. The priority areas are green transition, human capital, digital transition, fostering investments, and open strategic autonomy (Publications Office of the European Union, 2021). Regarding SDG7 and SDG13, the 'Programme for the Environment and Climate Action (LIFE)' and the

'Just Transition Fund' should be mentioned. These two programs involve EUR 24.75 billion in funding for initiatives.

The SDGs aim to set the world on a new environmentally and socially equitable course. This demonstrates a global effort with the EU contributing money to foster a deep transition within Member States. The next section utilizes SDG7 and SDG13 as multi-purpose indicators, as they underlie other indicators, both providing energy inputs to key economic and social sectors and measuring end-of-process outputs. As established above, Covid-19 has created a further setback for the EEE to meet their SDGs. The revamped EU funding cycle holds the potential to restart efforts to meet 2030 goals. The rest of the chapter delves into how a greater focus on SDG7 and SDG13 can assist in creating policies which hold the potential to ensure that the EEE reach their EU and global commitment along with embedding a greater resiliency in their economic and social systems to weather future crises.

7.2.2 Data and Methods

Within EU Member States, the European Commission has created a "reference indicator framework" with six indicators for each SDG (European Commission, 2016). While the UN indicators are global in scope, a localized or regionalized approach is necessary to account for variations. Table 7.11 and 7.12 in the Annex lists the UN indicators, that J. Sachs et al. (2020b) have compared with the European Union (Eurostat 2021) framework. The indicator framework of SDG7 and SDG13 is presented highlighting the overlaps and the differences.

The 'greenhouse gas emissions intensity of energy consumption' and the 'share of renewable energy in gross final energy consumption' indicators are special. They are called multi-purpose indicators, because they are used for monitoring more than one goal (European Commission, 2021b). Here we note that the 'mean near-surface temperature deviation', 'climate related economic losses by type of event - EU aggregate', 'global mean ocean surface acidity' and 'contribution to the international 100bn USD commitment on climate related expending' (Eurostat) indicators are not involved in this study (although Eurostat uses them for monitoring SDGs). For the first three, only EU aggregate data are available, while the regional and national differences can not be identified. For the fourth category of USD commitments, the past few years is too short a period to provide meaningful data.

In selected data, in this chapter, we prefer the 'per capita' approach, therefore the greenhouse gas emissions, primary and final energy consumption data are used in this way. As O'Neill, Fanning, Lamb and Steinberger (2018) argue, this approach "allows us to explore what quality of life could be universally achieved if resources were distributed equally" and to do direct comparisons of selected Member States. According to Bithas and Kalimeris (2013), this concept suggests that at the end of the supply chain products and services are actually used by humans.

In addition, a part of this chapter is dedicated to evaluating progress towards SDGs in the EEE. An important point is the distribution of selected indicators (regarding

SDG7 and SDG13) and how they change over time, including the differences between members of the EEE which tend to decrease or increase (Sala-i Martin, 1996). Ideally, countries with weaker (lower) performance (regarding a selected indicator) tend to develop faster than those with good (or high) initial levels. After a certain period, the less developed will literally ‘catch-up’ with the other Member States through their more robust performance.

The European Union sets specific common goals but regional gaps and differences may persist longer. The final section of this chapter provides a convergence analysis which contributes to identifying indicators or sub-goals where further measurements or interventions are needed. In this section, convergence is approached in three ways based on previous work (Szép, 2016): σ, γ, and β-convergence are calculated. Calculating the σ-convergence, we can conclude the convergence or divergence from the dispersion of the national cross-sectional data. If the value of the coefficient of variation (CV) is decreasing over time, the σ-convergence is verified across the countries. In fact, the σ-convergence presents the efficiency of the catching up of low-performing countries with developed ones (Liddle, 2012). One disadvantage of the indicator is that it is an absolute one, the value even being higher when only the absolute size increases. The σ-convergence is calculated with the CV, which is the ratio of the dispersion and simple arithmetic average of the data (Moutinho, Robaina-Alves & Mota, 2014).

It can happen that the value of the σ-convergence consistently decreases (so the examined territorial units converge), but the positions of nations with the highest and lowest values do not change in the sample. Boyle and McCarthy (1997) and Boyle and McCarthy (1999) worked out the γ-convergence to consider the rank of the nations. The closer the index value is to zero the greater the extent of the mobility within the distribution. The γ-convergence is suitable for the measurement of intra-distribution mobility: the country with a lower initial level of the selected indicator – if catching up is successful – moves up in the ranking and overtakes the developed ones (which lose their positions). A lack of γ-convergence coupled with a substantial σ-convergence could be interpreted as indicating that country differences in a selected indicator continue to exist, but that those differences have considerably reduced (Liddle, 2012).

The basic assumption of β-convergence is that countries with low initial levels of a selected indicator tend to grow comparatively faster than those with high initial levels and thus catch up with developed nations (Adhikari & Chen, 2014). In the long run, lower performing countries catch up with higher-developed ones. The detailed description (based on the Solow-model) is described by Major (2001). If the estimated value of β is negative, this verifies the presence of β-convergence. But the β-convergence is a necessary but not a sufficient condition for σ-convergence (Boyle & McCarthy, 1997, 1999; Liddle, 2012; Hajko, 2012).

The β-convergence concept can be approached in an unconditional (absolute) or a conditional way. In the unconditional approach, all economies are assumed to converge to a common pattern of energy use (or to any other selected indicator), while in the conditional approach, they hold their own steady state (Burnett, 2016). Furthermore, the absolute convergence calculation is applied, which means, that "the countries or units analysed converge to one another in the long run, independently of their initial conditions" (Morales-Lage, Bengochea-Morancho, Camarero & Martínez-Zarzoso, 2019). The EEE have similar structural characteristics (technological development, cultural background, similar growth path, etc.) and they tend to converge to the same steady state (Morales-Lage et al., 2019).

Here we note that greenhouse gas emissions (1990=100%) is a fixed-base index, it can not be taken into consideration in β-convergence analysis. Because of this (regarding air emission accounts), the indicator of greenhouse gas emissions (kilograms per capita) is involved. Similar to the study of Adhikari and Chen (2014), in certain cases we tested the inverse of the selected indicators, because this avoids the situation where the increasing indicator actually shows deterioration. Applying the inverse, the increasing index shows development and better performance.

Table 7.13 presents the calculation formula and the interpretation of convergence indexes.

7.3 Regional Assessment of Sustainable Development Goals

Gaining an EU-wide perspective can help understand the overall trends toward achieving the SDGs. Since 2017 Eurostat has published an annual monitoring report to assess the EU's progress towards the SDGs. Though the long-term trends over the past 15 years have been promising, the short-term trends show some contradictions (see Table 7.1). The progress in the case of five out of 11 SDGs is assessed as insufficient, or even worse, as a significant movement away from SDG objectives. The negative result in primary and final energy consumption (TOE per capita) is related to a lack of effective policies in energy efficiency. Before 2014 there was progress, when energy consumption was declining – making the 2020 targets likely to be reached. However, since then there has been growth in both primary and final energy consumption (TOE per capita). As a result *the final energy consumption (TOE per capita) was higher in 2019 than when the 2020 targets were adopted in 2012* (Eurostat, 2021)!

The failure to improve – that is to reduce energy consumption – demonstrates the overall lack of progress in decoupling economic growth from energy consumption. This relationship is demonstrated by the zero real GDP growth rate in 2013 (EU27); however in 2014, when economic growth increased so did energy consumption (Eurostat, 2021), between 2014-2019 the average real GDP growth rate was 2.1% (Eurostat, 2021). In 2018, more specifically, in the EU27 the primary and final energy consumption 2020 goals were still 5% and 3% off (Eurostat, 2020a). Coupling to economic growth means creating an environmentally sustainable energy system, where the economy can grow without an excessive amount of energy production or consumption. Not decoupling these two factors pushes fulfilling SDG goals further away. At the EU level, energy efficiency progress is weak, potentially sinking the EU climate targets. Table 7.1 shows this insufficiency between 2014 and 2019 in.

Table 7.1: **Progress towards SDG7 and SDG13, EU27**
Data: own compilation based on (Eurostat, 2020b; European Commission, 2017; Climate Action - European Commission, 2021; European Commission, 2014; Eurostat, 2020a)

	SDGs	**Long-term trend (past 15 years – 2004-2019)**	**Short-term trend (past 5 years – 2014-2019)**	**2020 EU-target**	**2030 EU-target**
Primary energy consumption (TOE per capita)	SDG7	Moderate progress towards the EU target	Insufficient progress towards the EU target	- (totally 1,312 Mtoe for EU27)	(totally 1,128 Mtoe for EU27)
Final energy consumption (TOE per capita)	SDG7	Moderate progress towards the EU target	Movement away from the EU target	-20% (in total 959 Mtoe for EU27	-32.5% (in total 846 Mtoe for EU27)
Final energy consumption in households per capita (KGOE)	SDG7	Moderate progress towards SD objectives	Significant progress towards SD objectives	-	-
Energy productivity (EUR per KGOE)	SDG7	Significant progress towards SD objectives	Significant progress towards SD objectives	-	-
Energy import dependency (%)	SDG7	Moderate movement away from SD objectives	Significant movement away from SD objectives	-	-

At the regional level large differences can be observed among Member States, with uneven progress towards the two SDGs. Focusing on the EEE, and SDG7 and SDG13 indicators, further analysis demonstrates which EU policy targets are and are not being met (Annex Table 7.14, 7.15 and 7.16. Between 2008 and 2018, the EEE made slow but balanced progress to reach the energy and climate goals for 2020 (see Figure 7.3 and 7.4). Primary energy consumption increased in Poland, while the growth of final energy consumption occurred in Bulgaria, Hungary and Poland from 2008 to 2018. In 2018, only Croatia, Romania and Slovenia were meeting their 2020 energy efficiency targets, the other members of the EEE were failing to meet the targets (European Commission, 2020a). This mixed bag of policy goal failures means the EEE lack a coherent plan to achieve the SDGs by implementing coherent policies over time.

Just as the decline of heavy industry in these former Communist countries enabled them to meet their Kyoto Protocol targets, the impact of Covid-19 also enables

Table 7.2: **Progress towards SDG7 and SDG13, EU27**
Data: own compilation based on (Eurostat, 2020b; European Commission, 2017; Climate Action - European Commission, 2021; European Commission, 2014; Eurostat, 2020a)

	SDGs	**Long-term trend (past 15 years – 2004-2019)**	**Short-term trend (past 5 years – 2014-2019)**	**2020 EU-target**	**2030 EU-target**
Population unable to keep home adequately warm (%)	SDG7	-	Significant progress towards SD objectives	-	-
Greenhouse gas emissions intensity of energy consumption (Index, 2000=100%)	SDG7 and SDG13	Moderate progress towards SD objectives	Moderate progress towards SD objectives	-	-
Share of renewable energy in gross final energy consumption (%)	SDG7 and SDG13	Significant progress towards the EU target	Significant progress towards the EU target	20%	20%
Greenhouse gas emissions (in CO2 equivalent, 1990=100%)	SDG13	Moderate progress towards the EU target	Insufficient progress towards the EU target	-20%	-55%
Average CO2 emissions from new passenger cars (Gram of CO2 per km)	SDG13	Moderate progress towards the EU target	Insufficient progress towards the EU target	-	-
Population covered by the Covenant of Mayors for Climate and Energy signatories	SDG13	-	Significant progress towards SD objectives	-	-

an economic (and health) crisis to assist in achieving climate change goals. This ‘accidental achievement’ of policy means countries can reduce energy consumption to meet their EU targets without actually implementing purposeful policies of action. Yes, the data demonstrate that the region is better able to achieve the SDG targets, but short-term wins should not be extrapolated to long-term goal achievements. Further, the overall trend indicates a temporary reduction in 2020, with an expected rebound in energy consumption. The results demonstrate that deeper structural changes are necessary, especially in the household sector. As the data indicate, technically obsolete and deteriorating buildings are a problem in the entire EEE. Therefore, a much more robust policy action area is improving energy efficiency in the existing building stock (3CSEP, 2012).

Decoupling the economies must continue with targeted residential buildings as a key action area in the EEE. The energy savings potential in the residential sector is significant (Szép & Weiner, 2020; LaBelle & Georgiev, 2016). More broadly, the 'Annual Sustainable Growth Strategy' (European Commission, 2020e) confirms the benefits of energy efficiency investments. The report emphasizes the importance of (deep) renovation and calls for increased actions and more-focused plans. Nonetheless, and demonstrating the lack of granular focus, the 'Renovate' flagship does not differentiate between private and public buildings. Due to household income differences between members of the EEE and non-EEE, renovation may consume a higher proportion of household expenses. Another key indicator in progress for the SDG targets is GHG emissions. These decreased significantly between 2008 and 2018 in the EU27 and in the EEE (European Commission, 2020d). Nonetheless, more needs to be done to decrease overall energy consumption in the region. The European Commission concludes in their 2020 assessment report that there is a likelihood that the EEE will miss their targets (European Commission, 2020b). The countries that will struggle the most to reach their targets are Bulgaria, Croatia, Czechia, Romania and Slovenia; while Hungary, Slovakia and Poland are likely or very likely to meet their targets. Just like in energy efficiency indicators, GHG indicators need to be assessed over a longer term to understand trends. And here, there is progress, but further action is necessary to achieve SDG targets.

Fig. 7.3: SDG7 in 2008 and 2018, EEE (2008=100%)
Data: own compilation based on European Commission (2017); Eurostat (2021)
Note: Stars mark insufficient progress

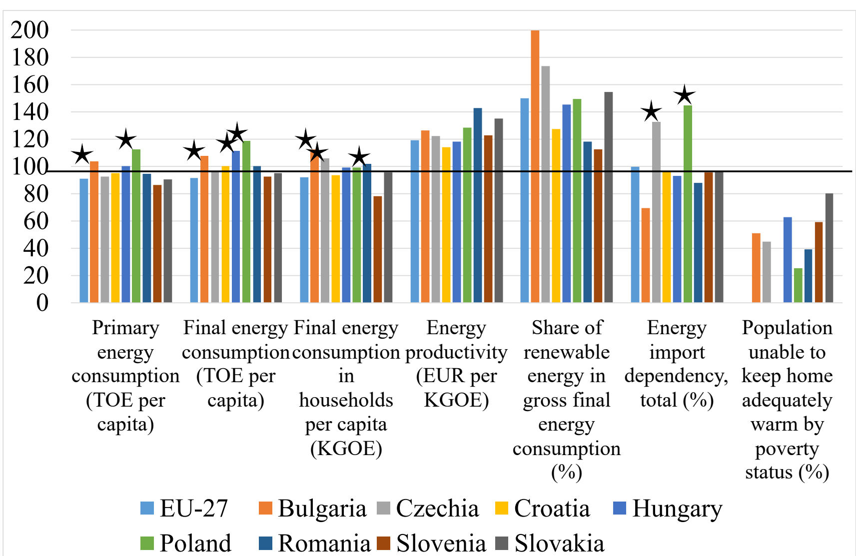
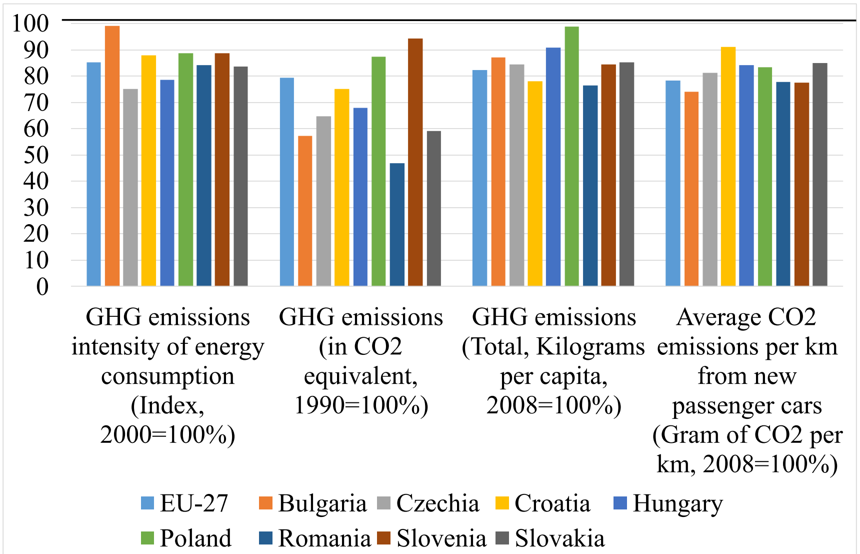


Fig. 7.4: SDG13 in 2008 and 2018, EEE (2008=100%)
Data: own compilation based on European Commission (2017); Eurostat (2021)
*:2013 data



Data trends must also be treated cautiously when measuring the progress in SDG indicators. At least in one case, changes in the statistical data contributed to improvements (the share of renewable energy in gross final energy consumption). In November 2017, data for biomass consumption were modified. In the official framework of the Renewable Energy Directive (2009/28/EC) Member States were allowed to measure more closely the renewable energy commodities in their economies (European Commission, 2009). This resulted in several Member States (e.g., Croatia and Hungary) revising their statistical methods to consider biomass – and the fuel wood, used by households, as renewable energy investments. The result was that the volume of biomass consumption increased in residential housing, which positively affected the share of energy from renewable sources (Eurostat, 2017). The changes in methodology combined with new renewable energy investments, have resulted in the EEE making significant progress in increasing the share of renewable energy in gross final energy consumption.

7.4 Impact of Covid-19: Resiliency and Sustainable Development Goals

Resiliency is "the ability of a system, entity, community, or person to adapt to a variety of changing conditions and to withstand shocks while still maintaining its essential functions" (World Bank, 2015).

When introducing resilience, we are building on our previous work (Szép, Szendi & Nagy, 2021). Defining resilience we accept the definition of the World Bank (2015) that 'essential functions' are retained during shocks. Adaptability (or adaptive capacity) is the key to it in periods of crisis (Bristow & Healy, 2018). The ability to keep functioning shows the resiliency of a city, a country (or a sector) and includes how fast it can react to external changes (World Bank, 2015). Therefore, adaptability is "a characteristic of a given system that ensures the long-term and sustainable operation of subsystems despite the changing external conditions, but also provides enough flexibility for partial or complete transformation" (Buzási, 2017). Adaptability enables cities/countries to ensure their residents' well-being and contribute to long-term sustainability. With sustainability they go hand in hand; one cannot exist without the other. As Bănică and Muntele (2017) highlight, resilience is not only a normative but also a strategic concept.

The basic approach of concerning resilience, adaptation and stability is that economies (nations, regions and cities) are usually in some equilibrium state. Even if an external shock creates an imbalance, they aim at getting back to the equilibrium or reaching a new equilibrium (i.e. finding stability). This corresponds to Pirisi's definition (2019): "adaptive resilience refers to the ability which enables the system to change as a result of external effects, which implies that it adapts to changing external circumstances" (Pirisi, 2019). However, Bănică and Muntele (2017) interpret this new state as progress amid imbalances. This implies that stability is relative, an economy operates not only in a certain equilibrium state but also in one in flux. The aim is to continuously "refine" each subsystem of the economy. Flexible adaptation alters how a steady and stable state is reached (Buzási, 2017). In our point of view, in a post-Covid world – the previous equilibrium will not return, instead a newly adapted mix of policy and economic conditions will be established. The rest of this section outlines where a new equilibrium for SDGs may be heading.

It is important to examine the role of time in reaching a new equilibrium and establish the likelihood of SDGs guiding an economic and social recovery. While in the short term, defense against the impacts of a pandemic may be the main aim, the focus in the long term is on recovery and adaptation to the new equilibrium. Resilience is important to consider as a key element of sustainable development that aligns with the goals of SDGs (World Bank, 2015). Resilience is, in fact, the means by which sustainability can be achieved (Buzási, 2017; Pirisi, 2019) and measured.

Drawing from a broader attempt to frame the SDGs in context of resilience recovery of the social-ecological system, an attempt is made here to address the SDGs in relation to socio-economic resiliency within the Covid-19 response. Grafton et al. develop 'management steps' to induce greater resiliency in ecosystems in order to achieve the SDG goals (Grafton et al., 2019). Here, we will be adopting these general categories to establish policy responses to suggest how systemic resiliency in the energy system is increased to meet SDG7 and SDG13. Table 7.3 outlines the interlinkage between the quantification of measuring progress on SDGs and meeting policy goals by defining management steps. By understanding ‘resilience management from a socio-economic perspective, areas of resistance, recovery and robustness can be identified and measured. This assists in “the planning, adaptation and transformation actions of decision-makers intended to influence key system characteristics for specified goals” (Grafton et al., 2019). The benefits of measuring and implementing actions for the SDGs can assist in reaching a more affordable, reliable and sustainable energy system by inducing a new equilibrium in the energy system – where socio-environmental considerations work in concert with economic goals.

Covid-19 brought resiliency to the surface, highlighting the practical side of the concept.Chong (2020) lists five early conclusions that can be drawn around resiliency and the impact of the coronavirus: 1) the importance of a holistic approach to a multi-hazard problem should be stressed, 2) proactive measures should be taken, 3) a big data approach should be used, 4) critical points should be identified, 5) an efficient framework should be created. Each of these elements is connected to resilience. This brings into focus the options to measure resilience: it can be measured at lower levels, such as the individual or household levels, although it is much more general at the city, regional or national level. In this chapter, we use the FM Global Resilience Index (FM Global, 2021), because it best fits our research goals. While the City Resilience Index, the Composite Resilience Index and the Savills Resilient Cities Index put cities into focus, the Resilience Index Measurement and Analysis Model is applied in around ten African countries. The FM Global Resilience Index is the only one on our list, which evaluates countries, covers all the developed economies and more than 80% of the global population.

There are many very different resilience indicators:

- City Resilience Index (The Rockefeller Foundation and ARUP 2021);
- Resilience Index Measurement and Analysis (RIMA) Model (Food and Agriculture Organization of the United Nations 2021);
- Composite Resilience Index (“The Composite Resilience Index” 2021);
- Savills Resilient Cities Index (Savills Research 2019);
- FM Global Resilience Index (FM Global 2021).

The FM Global Resilience Index examines 130 countries in the world and ranks them based on 12 key factors that determine resilience. This is intended to provide investors and companies with information about the security of the business environment (FM Global, 2021). It examines three components (economic, risk quality and supply chain components). The following indicators are related to the economic component: productivity, political risk, oil intensity and urbanization rate. The risk component takes into account natural disasters, the quality and type of the building stock (like fire protection rating or proportion of earthquake-proof buildings), and vulnerability to cyber-attacks. The supply chain component includes the indicators

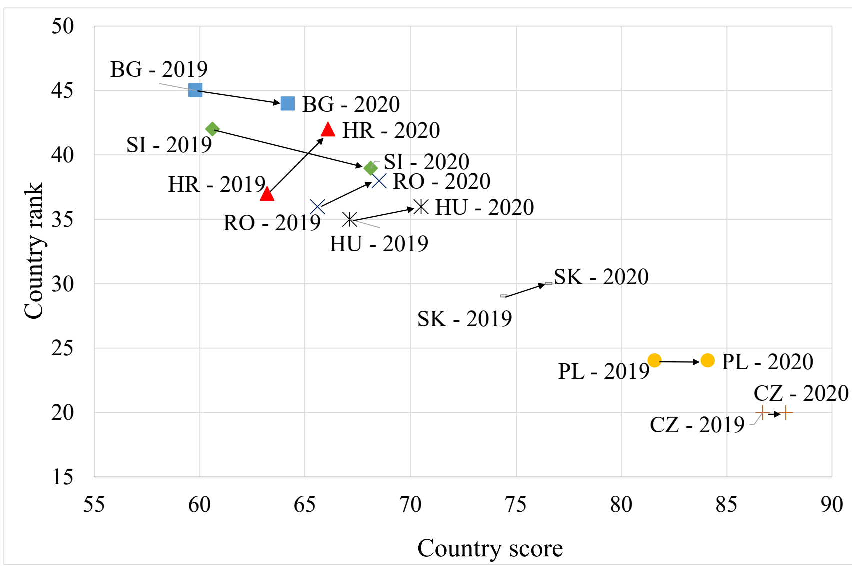
Table 7.3: **Resiliency boundaries and indicators: Managing the recovery**
Adapted from Grafton et al. (2019)

Management steps	**Resilience for SDG7 – Energy & SDG13 – Climate Change**
System definition, boundaries, and drivers	System definition: Generation and demand side management of the energy system, from resource extraction to end-use, including financial and environmental costs to consumers and the planet. Boundaries: energy efficiency improvement, more renewable energy and addressing energy poverty.
Stakeholders	Governments, businesses, and households
Metrics identification	FM Global Resilience Index; Energy Transition Index; electricity generation by fuel;
Viability goals and metrics	SDG7 goals – (Annex Table 7.12); SDG13 goals – (Annex Table 7.13) EU reset targets: • Minimum 32.5% improvement in energy efficiency in 2030 (related to primary and final energy consumption) , • Minimum 32% share of renewable energy in gross final energy consumption in 2030 • Minimum 55% less greenhouse gas emissions by 2030, compared to 1990 (Climate Action - European Commission, 2021).
Adverse events	Pandemic- Covid-19
Quantification of the three Rs	**Resistance:** Measures of SDG Index Rank, Spillover score **Recovery:** Projected time to reduce energy consumption, GHG emissions, financial situation (Figure 7.6); Consumer price index **Robustness** Likelihood of achieving SDG7 and SDG13 goals – Table 7.1
Resilience-management actions and benefits	Ensuring 'access to affordable, reliable, sustainable and modern energy for all.'

of corruption and the fight against it, the quality of the infrastructure, and the assessment of corporate governance (accounting standards, rules about incompatibility and shareholder rights).

Covid-19 can be interpreted as a stress test for the SDG goals (van Zanten & van Tulder, 2020) and it shows whether an economy is resilient and sustainable. Covid demonstrates the vulnerability of our current economic system and the necessity of higher robustness. Figure 7.5 shows the position of the EEE in the resilience ranking. Czechia has one of the best ratings for each component and in 2020 Bulgaria provides the worst performance. Czechia has outstanding results in the risk quality component (its score was 98.8 in 2019, and 100 in 2020), while Bulgaria underperforms in terms of economic productivity (its score is 17.7 in 2020) and control of corruption (35.9 in 2020) (detailed results are presented in Table 7.17 in the Annex).

Fig. 7.5: Position of the EEE based on FM Global Resilience Index (and its components, 2019-2020)
Data: own compilation based on FM Global (2021); FM Global and Pentland Analytics (2020)



7.4.1 Finance and Energy Transitions

It can be concluded (official statistical data are not yet available) that the social inequalities are increasing (within and among the world nations) due to Covid-19. Unemployment rates are soaring; people are (at the time of writing) dependent on government support. The poorest (who had no reserves before) suffer the most. As Nagaj and Korpysa (2020) point out, the lower a household's income, the more severe the effects of Covid-19 on energy expenditures. Covid-19 has a negative effect on the average disposable income of households in the EEE. In parallel with this, increasing energy prices result in the higher share of residential energy expenditure within total expenditure.

Table 7.4: **Energy Transition Index (EEE, 2020)**
Data: own compilation based on (World Economic Forum, 2020, 2019; Harvard Growth Lab, 2021)

	Economic Complexity Index	**Energy Transaction Index**				
		Overall Rank			**2020 ETI Score**	
	2018	**2019**	**2020**	**Changes**	**2019**	**2020**
Bulgaria	0.55	77	61	+16	51%	54.2%
Czechia	1.8	49	42	+7	57%	58.5%
Croatia	0.87	42	37	+5	59%	59.7%
Hungary	1.66	41	31	+10	59%	60.7%
Poland	1.1	75	69	+6	51%	52.9%
Romania	1.09	40	35	+5	59%	59.9%
Slovak Republic	1.41	33	33	no change	61%	60.5%
Slovenia	1.62	24	23	+1	64%	63.1%

The World Economic Forum has developed the Energy Transition Index (as a continuation of the previous Energy Architecture Performance Index) to measure the energy system performance and energy transition readiness of 115 countries. System performance is based on three key priorities and on the assessment of a balanced "energy triangle". The three priorities are: 1) the ability to support economic development and growth, 2) universal access to secure and reliable energy supply, and 3) environmental sustainability across the energy value chain (World Economic Forum, 2020).

The starting hypothesis of the World Economic Forum (2020) is that there is strong correlation between economic complexity (the Economic Complexity Index [3] shows the current state of a country's productive knowledge and progress toward energy transition) and the energy transition readiness level (Harvard Growth Lab, 2021). A higher degree of economic complexity is associated with higher Energy Transition Index value.

[3] latest data for 2018

Table 7.5: **Energy Transition Index (EEE, 2020)**
Data: own calculations based on World Economic Forum (2020, 2019) and Harvard Growth Lab (2021)

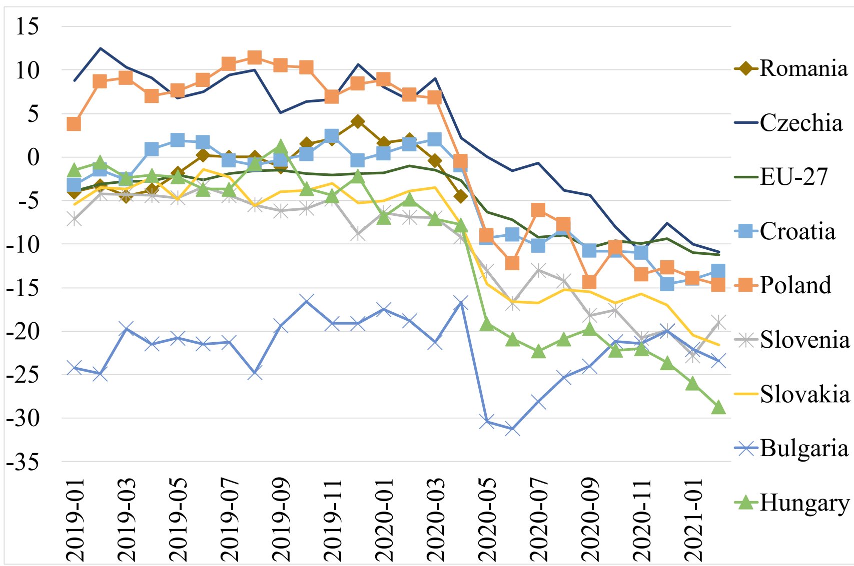
	Energy Transaction Index			
	System Performance		**Transition Process**	
	2019	**2020**	**2019**	**2020**
Bulgaria	54%	59%	48%	49%
Czechia	61%	61%	53%	56%
Croatia	66%	66%	52%	54%
Hungary	66%	66%	52%	55%
Poland	57%	57%	46%	48%
Romania	68%	68%	50%	52%
Slovakia	68%	66%	54%	55%
Slovenia	69%	66%	58%	60%

A substantial increase in the Energy Transition Index can be observed from 2019 to 2020 in the EEE. Renewable energy sources play a key role not only in energy transition, but in achieving sustainable development. They are connected to nearly all SDGs (Villavicencio Calzadilla & Mauger, 2018). According to Czech and Wielechowski (2021) the alternative energy sector and alternative energy commodity prices are more resistant to Covid-19 than the conventional energy sector (Czech & Wielechowski, 2021).

Rebuilding a more sustainable and resilient energy system after the Covid-19 pandemic requires gaining a new impetus in policy framing. 2011 represents the peak of new renewable investments, after which the EU slowed down in comparison to other regions (IRENA and European Commission, 2018). To reach the ambitious renewable energy goal for 2030, ca. 73 billion EUR investment would be required annually in the EU (which is one and a half times more than the current level) (IRENA and European Commission, 2018).

The next set of charts demonstrates more clearly the need for more investment and a shortfall in financing. But it is important to keep in mind, statistical data and short-term analysis have limitations, because usually there is a 2 to 3 year lag in annual data reporting. Thus, measuring and analyzing the effect of Covid-19 is only possible after some years. Nonetheless, some short-term indicators (monthly data) are available, which may allow to carry out an analysis and draw some conclusions. The financial situation data (see Figure 7.6) are based on surveys. The answers are aggregated in the form of balances, constructed as the difference between the percentages of respondents giving positive and negative replies (Eurostat, 2021). For example a financial situation with the value of -30 means that 30 percent more rated their situation as negative than positive. Consumers assess their financial situation very negatively. There is a strong correlation between the different waves and the survey' results.

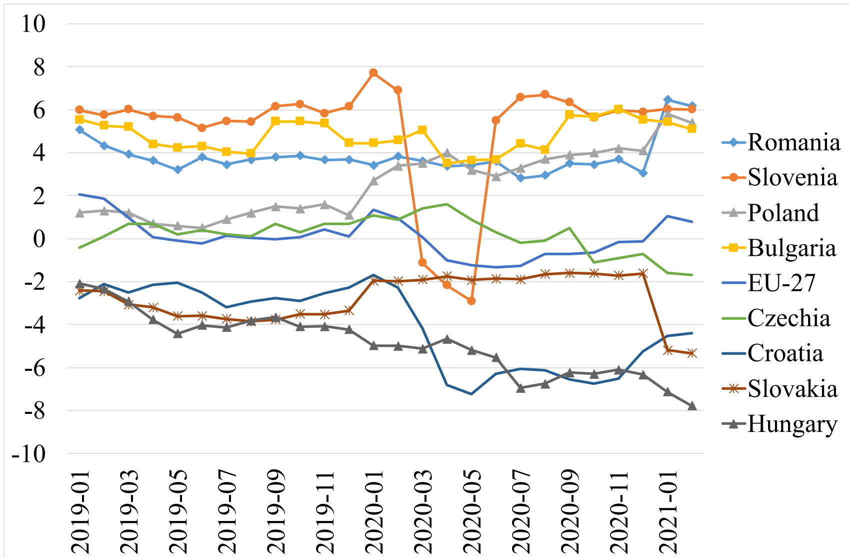
Fig. 7.6: Financial situation (over the last 12 months, between 2019-01 and 2021-02, seasonally adjusted data, but not calendar adjusted data)
Data: own compilations based on (Eurostat, 2021)
Note: The data are published as balances, i.e., differences between positive and negative answers (in percentage points of total answers) (Eurostat, 2021)



Analyzing the short-term impacts of Covid-19 on SDG7 and SDG13 J. Sachs et al. (2020a) state that the economic slowdown contributes to a reduction in energy prices (at the global level). On the one hand it favours people living in energy poverty (increasing access) but reduces energy investments and restrained incentives for renewable energy sources. However, in the EEE the tendencies identified do not confirm this drop, mainly because energy systems and prices are regulated. Hereinafter, this is explained in more detail.

While the first wave of Covid-19 caused a reduction in the Harmonized Consumer Price Index (HCPI) of housing, water, electricity, gas and other fuels in the household sector, the effect of the second wave was smaller. However, it is important to note, that since 2015 in four members of the EEE (Bulgaria, Poland, Romania and Slovenia) the HCPI of housing, water, electricity, gas and other fuels has increased at a rate higher than the HCPI for all items (the positive index value in Figure 7.7 indicates that the growth of HCPI of housing, water, electricity, gas and other fuels since 2015 has been higher than for all items).

Fig. 7.7: Difference of harmonized consumer price index of *housing, water, electricity, gas and other fuels,* and *all items* (2015=100, between 2019-01 and 2021-02)
Data: own compilation based on (Eurostat, 2021)



In countries where energy prices are officially regulated, the impact of Covid-19 was limited. In household electricity markets, the EEE that still have price caps are Bulgaria, Hungary, Poland, Romania and Slovakia. In household gas markets Bulgaria, Croatia, Hungary, Poland, Romania and Slovakia still maintain price regulation (European Commission, 2019). However, the European Commission (2019) and Szép and Weiner (2020) conclude that price caps do not make energy commodities more affordable nor do they contribute to the reduction of energy poverty. In our view, the main reason is that the most vulnerable households use low-quality fuels (e.g. primary solid biofuels) for space-heating (which cover the bulk of their energy consumption). The price of fuel wood or lignite is not regulated, moreover in most cases they are illegally harvested or traded.

During the first wave of the Covid-19 pandemic office workers shifted to remote work, which pushed energy consumption higher in the household sector. The effect can be seen in the massive drop in the average road transport and air transport. As a result, the daily consumption curve changed (in line with far more people staying at home). In the morning, electricity consumption ramps up slower, since there is no morning commute. The evening peak still exists (families do housework, prepare meals, turn the lights and television on), but it is much lower than usual (Ghiani, Galici, Mureddu & Pilo, 2020). However, growing residential consumption did not compensate for the general reduction in demand in the commercial and industrial sectors. It is important to distinguish electricity generation from fossil fuels and from

Table 7.6: **Net electricity generation by type of fuel (change compared to same month of previous year, GWh, 2019-01 and 2020-12)**
Data: own compilation based on (Eurostat, 2021)

		01	02	03	04
Renewables	BG	-267	143.2	175.5	270
	HR	170.6	-425.3	252	241.6
	CZ	-133.6	46.7	304.1	164.1
	HU	15.4	357.8	391.7	123
	PL	1121.6	543.7	474.4	490.7
	RO	163	-2119	1025	798
	SK	-63	393	355	343
	SI	133.4	-182.6	530.7	144.3
Fossil Fuels	BG	-912.7	-697.7	-919.6	-890.5
	HR	3.8	54.9	191.4	142.4
	CZ	-989.1	-1785.5	-1783.9	-624.7
	HU	367.3	-67.8	-160.6	-59.2
	PL	-2568.1	-4523.6	1794.5	-416.1
	RO	-941	-1354	-154.0	-809.0
	SK	57.0	-9	-60.0	72.0
	SI	-230.9	-141.3	136.1	165.9

renewable energy sources. While significant reduction can be identified regarding fossil fuel power generation, renewables (and renewable electricity generation) seem more resilient. The reduction in the demand for renewable energy was smaller than in the case of fossil fuels (in part due to low operation costs), moreover in certain periods (from July 2020) it increased slightly (see Table 7.6). At the end the "lower energy demand in systems with large amounts of renewable energy has also resulted in negative power prices in Europe – and revenue losses for power producers overall" (Waldholz, 2020; Weko et al., 2020). As a result, the share of coal declined.

During a crisis renewables seem to show higher resilience. As we pointed out in a former analysis (Szép, 2016), the 2008-2009 financial crisis did not cause downturn or divergence in the *share of renewable energy in the gross final energy consumption* in the European Union. At that time, one reason is likely to have been that the already installed capacity continued to operate (while many fossil-fuel power plants were shut down). On the other hand an increasing trend of renewable energy capacity investment can be observed (apart from temporary and smaller reductions) (Frankfurt School-UNEP Centre/BNEF, 2020). Though new investment in renewable power capacity was below the gross investment in fossil fuel capacity after 2008-2009, but as a result of the high growth rate, in 2020 more than three times as much was invested in renewables (excluding large hydro) than in new fossil fuel plants (Frankfurt School-UNEP Centre/BNEF, 2020).

Utilizing different metrics to measure resiliency in the EEE provides a means to establish – and measure – the status of a new equilibrium when it comes into being. By utilizing the FM Global Resilience Index, the foundational socio-economic changes emerging through a post-Covid recovery emerge as essential to ensure progress towards the SDGs. Both the quality of building stock to political risk along with the components of the Energy Transition Index provide a holistic perspective to resiliency. Aligning these indicators with the means to manage transition towards a more resilient energy system, utilizing the resiliency framework (Grafton et al., 2019) provides a structured approach to provide quantified policy advice. The quantification of the three R's, resistance, recovery, and robustness, delivers a means to track progress for the SDG7 and SDG13. This translates into the ability to track the EEE progress towards meeting the SDGs, but also building greater resiliency to weather future shocks in a much more robust manner.

7.4.2 Converging and Diverging Paths of Sustainability

Understanding the convergence and divergence in the EEE may contribute to assessing the resilience of countries. According to (Béla, 2008) "the convergence – in a narrower sense – means the catching up of the real economy performance of the less developed country to the more developed ones". Quah (1996) notes that understanding economic growth is important in relation to the application of the convergence calculations, but not the only area where these calculations can be useful. Analysing convergence also sheds useful light on polarization, income distribution, inequality and other economic processes. The topic of convergence across economies has been in focus since Barro (1991); Barro and Sala-i Martin (1992). Nowadays not only researchers of world, regional and spatial economics, but researchers of energy, environmental and ecological economics also focus on it.

Mielnik and Goldemberg (2000) launched the application of convergence calculations to the field of energy. It can be stated, that papers focusing on energy intensity are overrepresented and most of them verify convergence (in developed countries). Mielnik and Goldemberg (2000) examined the energy intensity of 41 countries (18 industrialized and 23 developing countries) between 1971 and 1992. Their results demonstrate that convergence processes can be a realistic goal for developing countries. In the long term, converging to a common pattern of energy use in developing and industrialized counties is achievable. Ezcurra (2007) worked with a bigger sample. As judged by energy intensity, the presence of convergence was revealed across 98 countries between 1971 and 2001.

Energy intensity is also analysed in the study of Liddle (2012) and Csereklyei, Rubio-Varas and Stern (2016). In the former, the σ, absolute β, and the γ-convergence were verified in the case of 28 OECD countries (1960-2006). The latter took a much larger sample (99 countries) into consideration. The convergence in energy intensity was shown between 1971 and 2010. However, in some regions (the Middle East and Africa) they found divergence, rather than convergence.

Markandya, Pedroso-Galinato and Streimikiene (2006) examined the energy intensity in the European Union, with regard to the group of the old (15 countries) and the new (those joining in 2004 and 2007) Member States. The time frame was 1960-2002. The centre of their study is the Energy 2020 goals and the evaluation of the implementation process. Their results verify their starting hypothesis: from the energy perspective, new members have been successfully catching up. Based on σ and the β-convergence analysis, Hajko (2012) confirms the results (energy intensity of EU27, 1990-2008): "It is found that even by the rough distinction between the new and the old member countries, the convergence in energy intensity in new member countries can be found" (Hajko, 2012). The post-2008 economic downturn and recovery is covered by Mussini (2020), with the examined time period 2003 to 2014. Measuring the β-convergence and the σ-convergence in energy intensity the results verify the convergence only in the first years of the period, while in the following years there is slowdown.

Extended research (longer time periods and different energy-related indicators) was carried out by Butnaru, Haller, Clipa, Ștefănică and Ifrim (2020), the σ and β-convergence processes are verified in the EU27 (weak convergence). The Member States show a convergence pattern of conventional and renewable energy consumption. However, our current study goes beyond these limits, and our most important objective is to analyse and evaluate the achievement of SDG7 and SDG13.

7.4.2.1 Results

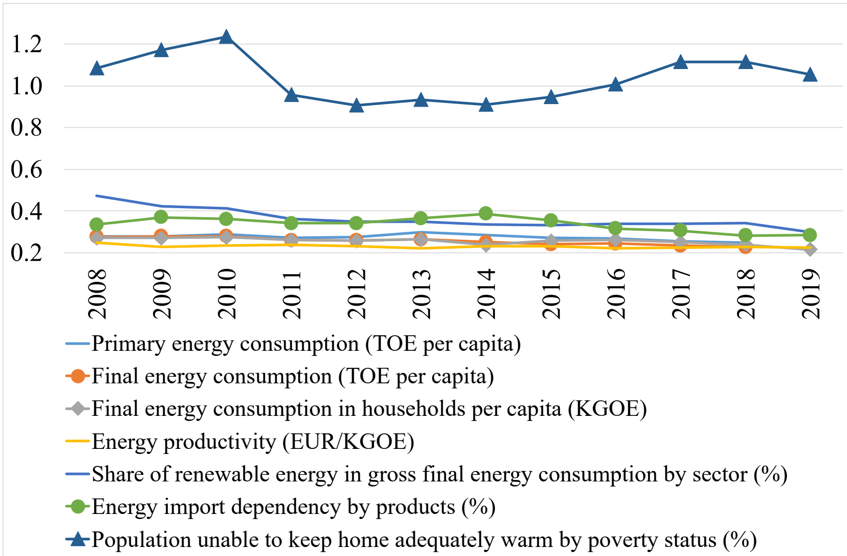
Convergence results can help forecasting. If countries with high energy intensity converge to the more developed ones, the equilibrium value will be lower; suddenly increasing energy use is not expected at that time with rapid convergence and balanced economic development (Markandya et al., 2006).

The presence of σ-convergence is verified in the EEE regarding SDG7. However, there are differences in the selected indicators. In cases where people were unable to keep their homes warm, those living in poverty had a tendency to go (in and out of poverty). However, after 2017, the presence of σ-convergence becomes significant. Smaller volatilities can be found in nearly all cases. The σ-convergence in energy productivity is weak, and the differences become permanent (Figure 7.8). They continue to live in energy poverty.

According to the γ-convergence results in the EEE, the differences across the tested units remain (the extent of mobility within the distribution is not significant), but the size of differences decreased between 2008 and 2018 (this can be explained by the short time period). A re-ranking effect can not be verified (see Table 7.7).

The results (see Table 7.8) show β convergence regarding two indicators: energy productivity and the share of renewable energy in gross final energy consumption, but the presence of convergence varies between different data samples. With regard to the investigated time period there is a negative relationship between the initial

Fig. 7.8: σ-convergence results of SDG7 in the EEE, 2008-2019.
Data: own compilation based on (Eurostat, 2021)



level of the share of renewable energy in gross final energy consumption and the changes in it; the calculated β coefficient obtained from the regression equation shows lower-performing countries catching up in the EEE (the β-convergence is verified). Countries with low initial values tend to grow faster, so the countries maintain a common pattern of renewable energy use. This means the more fossil-fuel based economies narrow the gap with the best performer countries (regarding energy transition). With regard to the t-statistics, the factors are significant at the 1% level in the regression model. The value of R^2 is strong. However, in the EU27 the presence of β-convergence cannot be confirmed, the β coefficient is not significant. Regarding energy productivity, the results draw the attention to opposite tendencies (confirming that the EEE are lagging behind the 2020 energy efficiency targets). In this case, the presence of β-convergence is verified only in the EU27. In the case of energy productivity the σ, γ, β-convergence are not fully in line with the Mussini (2020) main findings, in which a slowdown of the convergence process is identified in the EU28. However, our calculations confirm the presence of β-convergence in the EU27, but not in the EEE. This suggests that in the integration process the less energy productive countries tend to catch up with more energy productive ones (in terms of energy productivity levels), but it is not true for the EEE countries. Moreover, the γ and σ-convergence results also highlight divergence processes in the EEE.

In some cities, where the 'Covenant of Mayors' provides for the impetus for change at the local level some progress is notable. A declining tendency can be observed in the σ-convergence trends of the population covered by the Covenant of Mayors for Climate & Energy signatories (% of population) and average CO2 emissions

Table 7.7: γ**-convergence results of SDG7 in the EEE, 2009-2019**
Data: own compilation based on (Eurostat, 2021)

	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Primary energy consumption	0.96	0.99	1.01	1.00	1.00	1.02	1.00	0.98	1.00	1.00	
Final energy consumption	0.99	0.98	1.02	0.98	1.02	0.99	1.00	1.01	0.99	1.01	
Final energy consumption in households per capita (KGOE)	0.99	0.99	0.94	1.01	1.01	0.96	1.00	1.00	1.00	1.00	1.00
Energy productivity	0.94	1.00	1.00	0.99	1.01	1.00	0.96	1.00	0.97	1.00	1.00
Share of renewable energy in gross final energy consumption	0.99	0.99	1.00	1.00	1.00	1.02	1.00	1.00	1.00	1.00	0.96
Energy import dependency by products	0.99	1.00	1.01	0.96	1.01	1.00	1.00	1.00	1.02	0.96	1.00
Population unable to keep home adequately warm by poverty status			1.00	0.99	0.99	0.95	0.97	1.00	1.00	1.00	

per km from new passenger cars between 2008 and 2018. This suggests that the disparities decreased for the current period, confirming the presence of convergence. However, in the case of greenhouse gas emissions (kilograms per capita), the results highlight a lack of convergence. Despite progress in dedicated cities, disparities in the EEE are not reduced. A declining tendency can be observed in the trends of population covered by the Covenant of Mayors for Climate & Energy signatories (% of population) and average CO2 emissions per km from new passenger cars (σ-convergence) between 2008 and 2018, which suggests that the disparities decreased for the current period confirming the presence of convergence. However, in the case of the greenhouse gas emissions (kilograms per capita) the results highlight the lack of convergence. The disparities in the EEE are not reduced. (see Figure 7.9)

Regarding SDG13, the presence of γ-convergence can be verified only in the case of average CO2 emissions per km from new passenger cars. The process became stronger in 2016. With the other two goals, the mobility of distribution is restrained in

Table 7.8: β**-convergence results of SDG7 in the EEE and in the EU-27**
Data: own compilation based on (Eurostat, 2021)
*: inverse indicator

		EEE		EU27	
		coefficient	**t-ratio**	**coefficient**	**t-ratio**
Primary energy consumption (TOE per capita)*	**Constant**	-0.17	−0.134	−0,938	−1,197
	β	−0.746	−0.231	0,082	0,035
	R^2	0.009		0.000	
Final energy consumption (TOE per capita)*	**Constant**	−2.325	−1.404	−2,986	−3,246***
	β	4.857	1.743	5,908	3,144***
	R^2	0.336		0.283	
Final energy consumption in households per capita (KGOE)*	**Constant**	0.24	1.257	−0,248	−3,693***
	β	−132.326	−1.543	78,494	2,571**
	R^2	0.284		0.209	
Energy productivity (EUR/KGOE)	**Constant**	0.579	0.246	1,708	4,562***
	β	0.633	0.816	−0,102	−1,741*
	R^2	0.1		0.108	
Share of renewable energy in gross final energy consumption (%)	**Constant**	3.004	7.304***	0,627	0,293
	β	−0.116	−3.996***	0,033	0,273
	R^2	0.727		0.003	
Energy import dependency by products (%)*	**Constant**	0.060	0.083	1,531	0,659
	β	−1.99	−0.07	−184,379	−1,767*
	R^2	0.001		0.111	
Population unable to keep home adequately warm by poverty status (%)*	**Constant**	−3.064	−1.982*	−3,81	−2,088**
	β	0.108	0.008	19,36	3,976***
	R^2	0.000		0.387	

Fig. 7.9: σ-convergence results of SDG13 in the EEE
Data: own compilation based on (Eurostat, 2021)

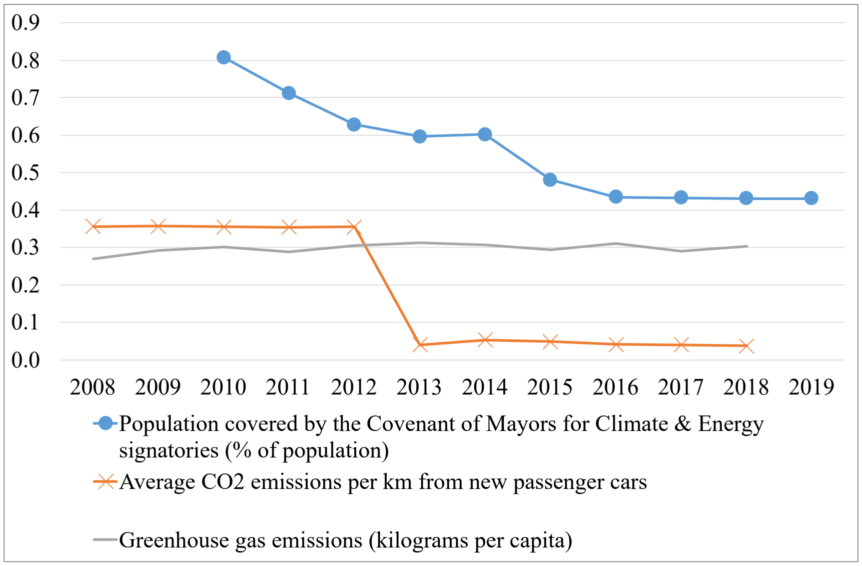


Table 7.9: γ-**convergence results of SDG13 in the EEE**
Data: own compilation based on (Eurostat, 2021)

	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Population covered by the Covenant of Mayors for Climate & Energy signatories (% of population)				0.90	0.97	0.99	1.00	0.96	1.04	1.07	1.03
Average CO2 emissions per km from new passenger cars	0.95	0.62	0.70	1.00	1.04	1.08	1.00	0.92	0.75	0.61	
Greenhouse gas emissions (kilograms per capita)	1.00	0.99	0.99	1.00	1.01	0.96	1.00	1.03	0.98	1.00	1.00

the examined period and the re-ranking of members of the EEE is limited (indicating only few changes in their respective positions) (see Table 7.9).

Table 7.10: **β-convergence results of SDG13 in the EEE and in the EU-27**
Data: own compilation based on (Eurostat, 2021)

		EEE		EU27	
		coefficient	**t-ratio**	**coefficient**	**t-ratio**
Population covered by the Covenant of Mayors for Climate & Energy signatories (% of population)	**Constant**	14.644	4.862***	0,135	0,049
	β	−0.566	−2.978**	0,298	0,675
	R^2	0.597		0.018	
Average CO2 emissions per km from new passenger cars*	**Constant**	−0.672	−1.677	−1,231	−3,509***
	β	32.956	0.544	107,927	1,967*
	R^2	0.047		0.139	
Greenhouse gas emissions (kilograms per capita)*	**Constant**	−0.033	−0.229	−1,035	−2,879***
	β	−1110.93	−1.056	2,751	0,808
	R^2	0.157		0.026	

For the β coefficient of the regression, the countries with lower levels of population covered by the Covenant of Mayors for Climate & Energy signatories tend to converge faster to the long-term steady state, so the growth rate of the poorly performing nations is higher, which confirms the occurrence of convergence in the EEE. Its convergence process shows a convergence pattern (R^2 is moderate). In other cases, the presence of β-convergence can not be verified (the results are insignificant) (see Table 7.10).

7.5 Policy Recommendation and Highlights

UN Secretary-General António Guterres calls for common actions. His words about post-Covid world are indisputable: “everything... must be with a strong focus on building more equal, inclusive and sustainable economies and societies that are more resilient in the face of pandemics, climate change, and the many other global challenges we face” (Guterres, 2021). Both the United Nations (2020) and J. Sachs et al. (2020b) argue that in the longer term the SDGs, as a roadmap, provide the framework for recovery. However, in our view the SDGs are not surely sufficient. The goal must be to change the economic incentives for business and society to address the persistent disparities of energy access and affordability in an environmentally aware manner. According to Kharas and McArthur (2020), SDGs should be rethought considering the following questions:

1. Should we give priority to the SDGs in the post-Covid world?
2. Do all SDGs serve the sustainable development well?
3. How do they contribute to higher resilience?

Hereinafter the main policy recommendations are grouped following the three main pillars of sustainable development: economic, environmental and social.

Economic pillar: Only a green economic recovery can contribute to the creation of low-carbon jobs. In developed countries the value of Covid-19 fiscal stimulus packages is 270 times higher than the stimulus packages after the 2008 financial crisis, while in developing countries the number is 18 times higher (UNCTAD, 2020). A market-orientated and technologically-driven economic expansion should be preferred (Taherzadeh, 2021). Clean energy industry and renewable energy sources need a strong policy support, and investments should be encouraged. Energy efficiency measures have to be in focus in the post-Covid recovery plans. The future of public transport is an important issue. In the EEE there is a big demand for the development in the railway sector (as an alternative of road and air transport). The post-Covid world can be 'the beginning of the end of oil'. On the surface the big push into electric vehicles in the US, China and the EU may indicate larger transport shifts in the future.

The 2030 Agenda and the SDG research presented above highlight the disparity between developed and developing countries. The disparities must be framed in terms of international spillovers, where developing countries are the manufacturing and polluting location for products used in the developed world. Within SDG 12 (Responsible Consumption and Production) there is stipulation that developed countries need to tackle spillovers. However, many radical viewpoints have appeared in the last few years. Greta Thunberg and other activists, researchers (e.g. ecological feminism, ecological economics, radical ecological democracy) have accused the developed world (Global North) of "creative carbon accounting" (preferring production-based emissions instead of consumption-based data) (J. Sachs et al., 2020a). However, consumption-based data collection also has some weaknesses. It does not take into account structural changes: after outsourcing, the share of other subsectors increases, the labour force flows to new emerging sectors and geographic areas (primarily to the service sector). Only in these distant places is the energy use accounted for – thereby by ignoring spillover, thereby making countries can look better on paper. The EU is set to tackle some aspects of this spillover in the form of the Carbon Border Adjustment Mechanism, as proposed by the Commission in July 2021. This needs policy approach needs to be implemented to account for the import of products into the EU which escape the current accounting method of GHG in the EU.

Environmental pillar: The 'great reset' should be built upon a reinvigorated policy response. The EEE were sustaining previous developments due to dynamic changes in their economies. Some of the low-hanging fruit was plucked but much remains to be done and there is the potential for greater efforts at convergence with the more developed EU-27 countries. Nonetheless, it should be acknowledged that Covid-19 is a game-changer for our current energy use and energy markets. In national and regional economic recovery plans, energy efficiency improvements (including for the poorest households) and renewable energy sources need to be framed in terms of resiliency for the environment and society. The environmental pillar, which emphasizes avoiding the rebound effect and other spillovers, can deliver a more just sustainable transition through the convergence of economic development. Fulfilling the goals of the EU's 2021-2027 Multiannual Financial Framework, which holds the target of improving energy efficiency and renewable deployment by 32% by 2030 along with cutting GHG emissions by 55% by 2030 can contribute to a cleaner environment in the EEE.

For the EEE, the lesson must be learned from the recent past that deep structural changes cannot occur unless there is a greater effort at decoupling economic growth from energy consumptions. The more developed countries in the EU have already achieved this. By roughly following the same playbook, with the implementation of energy efficiency measures and technology shifts, the EEE can also be expected to deliver results. Support and assistance from the EU and international organizations is insufficient if money or directives are just thrown at the inefficiency in environmental protection or market structures. The third pillar – society – needs to be supported and assisted to ensure that the political system delivers to its people a fair and equitable social reform agenda.

Social pillar: the economic recovery must result in more inclusive societies and at least not increase social inequalities. Solutions may emanate from society, but to achieve the goals of SDG7 and SDG13, there needs to be government support and action. Just as the SDG achievements were beginning to faulter before the pandemic, the data does not indicate a substantial policy revision in political circles to recommit decoupling economic growth from energy consumption or ensure that poorer households receive the necessary assistance for energy efficiency improvements or even for their monthly energy bills. Utilizing the FM Global Resilience Index to understand the resiliency of society beyond their stated political goals uncovers what is actually happening on the ground.

The social pillar, and the impact on the economic and environmental pillars, demonstrate that a sustainable energy system and therefore a sustainable economic system cannot occur unless the lower strata of society are included in the energy transition process. Societies and economies at the bottom of the resiliency indicator demonstrate they can rapidly grow, but begin to falter once there are greater reforms and the incorporation of more environmentally sustainable policies. Therefore, economic development should not impede any effort at creating a sustainable energy system; instead, greater assistance and assurance of continued economic growth should continue regardless of which line countries began from. A socially just energy transition underlines reductions in emissions and protection of the environment. Therefore, through implementation the three pillars for policy reform must be equally supported and followed.

7.6 Conclusion

The questions posed by (Kharas & McArthur, 2020) are about the priorities of the SDGs in a post-Covid world and ask how to raise the level of resiliency. It is hard to imagine someone objecting to these goals and the call for greater resiliency in communities. Nonetheless, the neglect of these goals in a post-Covid recovery at the national level, translates into policy inaction and further injustices for poorer households. Not creating policies for action is inversely creating policies of neglect (through negligent leadership), this disproportionately affects the lower strata of society. An unjust energy transition fails to deliver on the SDGs and reduces the resiliency of communities, leaving them exposed to future crises. Neither the European Union, nor the EEE were on the right track to achieve SDG7 and SDG13 in 2019 (before the pandemic hit). The slowing progress indicated the lack of political, economic, and social commitment.

The start of this chapter outlined the purpose of building a 'green economy' to revamp the energy system, improve the environment and ensure a sustainable economic growth within the resource constraints of the Earth. Underlining this transformative agenda is the notion that innovation, in technology, society and policies is the means to phase-out a polluting and socially unjust energy system. The potential within and with the EU's financial and governance resources of the Multiannual Financial Framework provides an opportunity to shift from marginal improvements in economic and policy tools to a more radical accounting of the EU's true environment footprint – even to the pollution outsourced to developing countries. The EU needs to revamp its accounting system and bear its full responsibility for assisting the EEE and other developing economies that need to be more sustainable and resilient to future shocks.

By EU accounting standards, outsourcing production should not outsource the responsibility for emissions. The EEE's SDG progress is lagging in achieving the 2030 target that 'the great reset' must become the 'green normal.' The SDGs should be linked to common EU targets (and numerical targets should be determined at Member State level). Legal targets (legally binding objectives) and the enforcement of legislation are needed. There is a large gap within the EU, demonstrating the challenges of economic convergence. Environmentally progressive countries, like Germany and those in Scandinavia push the integration toward more ambitious energy and climate goals, while some EEE (in most cases the Poland-Hungary duo) regularly use their veto rights to slow down common efforts. The lack of recent progress demonstrates the limits of evolutionary change. A new policy agenda is needed with strings attached to project financing and one that provides lower income households with assistance. To meet the SDG targets current policy failures, highlighted by the data need to be addressed through measures that encourage resiliency and convergence.

7.7 Annex

Table 7.11: **Indicators of Goal 7 – Affordable and clean energy**
*: For these indicators, a specific EU policy target is set.
Note: In square brackets the Eurostat data codes are presented.
Data: own compilation based on (Eurostat, 2021; J. Sachs et al., 2020b)

Sustainable Development Indicators (Sustainable Development Report 2020)	**Sustainable Development Goals (Eurostat)**
• Population with access to electricity (%) • Population with access to clean fuels and technology for cooking (%) • Share of renewable energy in total primary energy supply (%) • CO2 emissions from fuel combustion for electricity and heating per total electricity output (MtCO2/TWh)	• ***Primary energy consumption (TOE per capita)** [Online data code: sdg_07_10] • ***Final energy consumption (TOE per capita)** [Online data code: sdg_07_11] • Final energy consumption in households per capita (KGOE) [Online data code: sdg_07_20] • Energy productivity (EUR per KGOE) [Online data code: sdg_07_30] • Energy import dependency (%) [Online data code: sdg_07_50] • Population unable to keep home adequately warm (%) [Online data code: sdg_07_60] • ***Share of renewable energy in gross final energy consumption (%)** [Online data code: sdg_07_40] • Greenhouse gas emissions intensity of energy consumption (2000=100%) [Online data code: sdg_13_20]

Table 7.12: **Indicators of Goal 13 – Climate action**
*: For these indicators a specific EU policy target is set.
Note: In square brackets the Eurostat data codes are presented.
Data: own compilation based on (Eurostat, 2021; J. Sachs et al., 2020b)

Sustainable Development Indicators (Sustainable Development Report 2020)	**Sustainable Development Goals (Eurostat)**
• Energy-related CO2 emissions (tCO2/capita) • CO2 emissions embodied in imports (tCO2/capita) • CO2 emissions embodied in fossil fuel exports (kg/capita) • Effective carbon rate (EUR/tCO2)	• ***Share of renewable energy in gross final energy consumption (%)** [Online data code: sdg_07_40] • Greenhouse gas emissions intensity of energy consumption (2000=100%) [Online data code: sdg_13_20] • ***Greenhouse gas emissions (1990=100%)** [Online data code: sdg_13_10] • ***Greenhouse gas emissions (Kilograms of CO2 equivalent per capita)** [Online data code: sdg_13_10] • Population covered by the Covenant of Mayors for Climate & energy signatories (% of total population) [Online data code: sdg_13_60] Average CO2 emissions per km from new passenger cars (Gram of CO2 per km) [Online data code: sdg_12_30]

Table 7.13: **Convergence indicators**
Data: Boyle and McCarthy (1997, 1999); Nemes Nagy (2005)

Convergence Indicator	**Formula**	**Interpretation**
σ-convergence	$\sigma = \sqrt{\frac{\sum_{i=1}^{n}(x_i-\bar{x})^2}{n}}$ $CV = \frac{\sigma}{\bar{x}}$ $CV_t < CV_0$ where: x_i denotes the examined indicator $\bar{x}$ = arithmetic means of x_i σ denotes the dispersion, CV is the coefficient of variation.	If the value of the CV is decreasing over time, σ-convergence is verified across the countries.
γ-convergence	$\gamma = \frac{Variance(AR(I)_{it}+AR(I)_{i0})}{Variance(2*AR(I)_{i0}}$ where $AR(I)_{it}$ is the rank position of i country in t current period, $AR(I)_{i0}$ is the rank position of i country in 0 base period. $Variance = \frac{\sum_{i=1}^{n}(x_i-\bar{x})^2}{n-1}$ where: $\bar{x}$ is the mean, n denotes the sample size	The smaller the value of the indicator, the stronger the shift among the examined territorial units.
β-convergence	$\Delta lny_i = \alpha + \beta lny_{i0} + \varepsilon_i$ where: y denotes the examined indicator (such as energy intensity), α is the constant, β is the coefficient, 0 is the base period, i is the index of the examined country, ε_i is the error term (the excepted value is zero).	If β is negative, β-convergence is verified across the examined countries.

Table 7.14: **SDG7 in 2008 and 2018, the EEE**
Data: own compilation based on (European Commission, 2017; Eurostat, 2021)

		EU27	BG	CZ	HR	HU	PL	RO	SI	SK
Primary energy consumption (TOE per capita)	**2008**	3.4	2.5	4.1	2.1	2.5	2.4	1.8	3.7	3.2
	2018	3.1	2.6	3.8	2	2.5	2.7	1.7	3.2	2.9
Primary energy consumption (Mtoe)	**2008**	1,488.7	19.0	42.5	9.2	25.2	93.1	37.3	7.7	17.0
	2018	1,375.6	18.4	40.4	8.2	24.5	101.0	32.6	6.7	15.8
	2020 target	***1,312***	***16.9***	***39.6***	***11.5***	***24.1***	***96.4***	***43***	***7.3***	***16.4***
Final energy consumption (TOE per capita)	**2008**	2.4	1.3	2.5	1.7	1.7	1.6	1.2	2.6	2.1
	2018	2.2	1.4	2.4	1.7	1.9	1.9	1.2	2.4	2
Final energy consumption (Mtoe)	**2008**	1,036.5	10.0	25.9	7.4	17.4	62.5	24.7	5.5	11.5
	2018	989.8	9.9	25.3	6.9	18.5	71.8	23.6	5.0	11.1

Table 7.15: **SDG7 in 2008 and 2018, the EEE**
Data: own compilation based on (European Commission, 2017; Eurostat, 2021)

Final energy consumption in households per capita (KGOE)	**2008**	601	282	627	601	599	516	393	670	396
	2018	553	317	663	562	595	512	399	523	378
Energy productivity (EUR per KGOE)	**2008**	6.8	1.9	3.6	5	3.9	3.5	3.5	4.8	3.7
	2018	8.1	2.4	4.4	5.7	4.6	4.5	5	5.9	5
Share of renewable energy in gross final energy consumption (%)	**2008**	12.6	10.3	8.7	22	8.6	7.7	20.2	18.6	7.7
	2018	18.9	20.6	15.1	28	12.5	11.5	23.9	20.9	11.9
	2020 target	***20***	***16***	***13***	***20***	***13***	***15***	***24***	***25***	***14***
Energy import dependency, total (%)	**2008**	58.4	52.2	27.7	54.8	62.6	30.9	27.7	53.6	65.8
	2018	58.2	36.3	36.7	52.7	58.1	44.8	24.3	51.2	63.7
Final energy consumption (TOE per capita)	**2008**	:	66.3	6	:	9.7	20.1	24.4	5.6	6
	2018	7.6	33.7	2.7	7.7	6.1	5.1	9.6	3.3	4.8

Table 7.16: **SDG13 in 2008 and 2018, the EEE**
*: 2013 data
Data: own compilation based on(European Commission, 2017; Eurostat, 2021)

		EU27	**BG**	**CZ**	**HR**	**HU**	**PL**	**RO**	**SI**	**SK**
Greenhouse gas emissions intensity of energy consumption (Index, 2000=100%)	**2008**	94.2	113.8	86.3	101.7	90	94.7	97.5	95.6	93.3
	2018	85.2	99.1	75.2	88	78.7	88.6	84.3	88.8	83.6
Greenhouse gas emissions (in CO2 equivalent, 1990=100%)	**2008**	92	66.1	74.3	96.2	75.6	87.2	60.4	115.9	68.1
	2018	79.3	57.2	64.8	75.2	67.8	87.4	46.8	94.4	59.2
	2020 target	***-***	***+20***	***+9***	***+11***	***+10***	***+14***	***+19***	***+4***	***+13***
Greenhouse gas emissions (Kilograms per capita)	**2008**	8,67	7,748	12,011	5,714	5,637	9,790	6,655	8,921	7,910
	2018	7,132	6,749	10,130	4,453	5,120	9,674	5,088	7,523	6,734
Population covered by the Covenant of Mayors for Climate & Energy signatories (% of total population)	**2010**	20.4	10.1	0.1	29.7	20.1	5.3	18.8	15.3	1.7
	2018	41.2	36	20.4	48.9	43.8	12.4	39.9	36.7	15.7
Average CO2 emissions per km from new passenger cars (Gram of CO2 per km)	**2008**	152.8	171.5	154.4	127.1*	153.4	153.1	156	155.9	150.4
	2018	119.6	127.1	125.6	115.7	129	127.8	121.5	121	127.7

Table 7.17: **Position of the EEE based on the FM Global Resilience Index (and its components) (2019-2020)**
Data: Own compilation on (FM Global, 2021; FM Global and Pentland Analytics, 2020)

			BG	HR	CZ	HU	PL	RO	SK	SI
Resilience Index Factor Scores	Country Rank	2019	45	37	20	35	24	36	29	42
		2020	44	42	20	36	24	38	30	39
	Country Score	2019	59.8	63.2	86.7	67.1	81.6	65.6	74.3	60.6
		2020	64.2	66.1	87.8	70.5	84.1	68.5	76.4	68.1
	Economic Score	2019	52.0	55.6	70.2	62.0	66.0	59.4	73.0	60.4
		2020	54.7	57.4	72.5	64.2	68.6	61.6	73.1	62.1
	Risk Quality Score	2019	60.2	62.6	98.8	61.8	94.4	68.4	79.0	27.9
		2020	63.3	64.5	100.0	62.4	96.7	70.4	79.0	42.9
	Supply Chain Score	2019	56.4	58.6	71.2	61.3	67.5	57.4	58.1	67.4
		2020	57.2	58.3	70.7	63.0	68.1	56.9	59.7	69.5

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Chapter 8
Health and Social Security

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Abstract This chapter provides evidence that population health in the Emerging European Economies (EEE) lagged behind the EU average before the start of the Covid-19 pandemic. We then assess the direct health impacts of the pandemic in the EEE and how they differed from other European countries. We also offer early evidence on Covid-19 vaccination rates in the EEE. We analyse the policy responses implemented by the governments to mitigate the consequences of the Covid-19 shock and discuss the pandemic's indirect impacts on health and social security. Finally, we draw conclusions for health policy.

8.1 Health Status, Healthcare, and Social Security, 2009-2019

This section analyses the health status of the population and the general properties of the healthcare systems in the EEE, such as financing, service structure, and certain quality indicators. For all these dimensions, we provide information relevant from three somewhat different perspectives. The first perspective is the baseline — we give a general overview of the state of health and healthcare at the moment when Covid-19 first hit the EEE. The second perspective is to characterize EEE societies from the point of view of their probable vulnerability in the case of a widespread pandemic. And the third is the longer-term future — we give information on the

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factors we believe are important from the point of view of how successfully EEE countries can adapt to a post-Covid-19 reality, no matter how little we know about what we may expect.

The international literature points to three main risk areas related to healthcare systems and the Covid-19 pandemic. The first is the general vulnerability of countries facing the pandemic. According to the European Investment Bank's Covid-19 Economic Vulnerability Index (Davradakis, Santos, Zwart & Marchitto, 2020), this is mostly related to a wide array of economic conditions (which are analysed in other chapters of this volume), but also to the demographic and health status of the populations, and the structure and available capacities of the healthcare systems. The second risk area is access to healthcare, which is related to the individual affordability (and the change in affordability) of health services, e.g., insurance coverage (see for example Blumenthal, Fowler, Abrams and Collins (2020); Syed, Ajisola, Azeem and On behalf of the Improving Health in Slums Collaborative (2020)); to the overall and changing relative availability of these services, which is closely related to baseline capacities, and to other aspects that may affect people's access to healthcare, like postponing a medical treatment out of fear of infection, or healthcare institutions rejecting a patient for the same reason (Syed et al., 2020). And the third issue is the financial sustainability of healthcare in general, as well as of individual providers (Barnett, Mehrotra & Landon, 2020) during the economic recession and under officially administered restrictive pandemic measures (which, again, are interrelated). In the background of these various aspects, there is the concern that the pandemic threatens to increase social inequalities in every society all over the world, and its complex effects are channelled through the economic, educational, social, and health systems (Berkhout et al., 2021; Shadmi et al., 2020).

Another aspect to consider is the fact that health-related consequences of the pandemic, for example excess mortality, are not restricted to those directly affected by (infected with) Covid-19. As described later in this chapter, excess mortality rates are not entirely in line with Covid-19 mortality, which could be the result of inaccurate measurement, as well as of an increase in mortality due to other causes during the pandemic. This also corresponds to international experience (see for example Faust et al. (2021)). Regardless of the pandemic and the restrictive measures initiated, most of people's health needs still need to be met: they have their chronic diseases that require continuous care, with occasional acute episodes that need immediate health interventions. The fulfilment of both of these needs, as well as screening services, may be constrained because of the pandemic — either due to administrative restrictions affecting healthcare or mobility in general, or because healthcare is overloaded due to the pandemic.

Based on the limited data available regarding the experiences of countries that have handled Covid-19 relatively successfully (meaning, slowing the spread of the disease and keeping the mortality rate low), it is also to be noted that the role of the traditional healthcare system seems to be rather limited. On the one hand, there may be certain exogenous variables behind the success, which are out of reach not only of the traditional healthcare systems but – in the short run – also of public policies in general. Such factors could be a country's demographic structure, or the population's prior familiarity with other coronavirus types. On the other hand, the common feature in these countries is the implementation of strict, extensive, and immediate measures to prevent the spread of the disease: extensive contact tracing and testing, strict lockdowns in a timely manner, and other initiatives. Many, but not all, of these characteristics are outside the scope of the healthcare system: the testing capacities and practice, for instance, are closely related to structural properties of the healthcare system.

In the first part of this chapter, we provide an overview of the general health status of EEE countries' population, as well as of the main properties of their healthcare systems.

8.1.1 Health Status and Demographic Structure Based on Composite Indicators

The population's general health status and demographic composition affect the number of people at direct risk from Covid-19, as well as from the possible unmet needs and resulting health loss due to restrictions. In terms of health status, the distribution of health across the population (in other words, existing health inequalities), the prevalence of certain chronic conditions, and generally frail clinical status are of special importance (Tehrani, Killander, Åstrand, Jakobsson & Gille-Johnson, 2021), as they indicate the size of especially vulnerable groups in society. This vulnerability is multifaceted, manifesting not only in poorer health status and an increased risk of a severe outcome from a Covid-19 infection, but, based on our knowledge of the social determinants of health, also in disadvantages in access to healthcare and other resources. Life expectancy (LE) in EEE countries is among the lowest in the EU (only Latvia and Lithuania are in a worse position) (Figure 8.1). Additionally, with the exception of Croatia and Slovenia, EEE countries have lower life expectancy than what would be acceptable at their level of GDP per capita. This lag is the consequence of many complex social and economic factors, in general reflecting the inefficient utilization of social resources from the point of view of health. Moreover, this 'stock' of health is very unevenly distributed across the society (Figure 8.2).

Fig. 8.1: Life expectancy at birth and GDP/capita (PPS), total population, in EU28 countires, 2018
Data: Eurostat (2021f, 2021j, 2021o).
Note: PPS (purchasing power standard) is the technical term for common currency accounting for the different purchasing power of money in different countries - the Eurostat-version of PPP (purchasing power parity), with the same meaning. The dashed trendline is the fitted regression line of life expectancy on log GDP/capita.

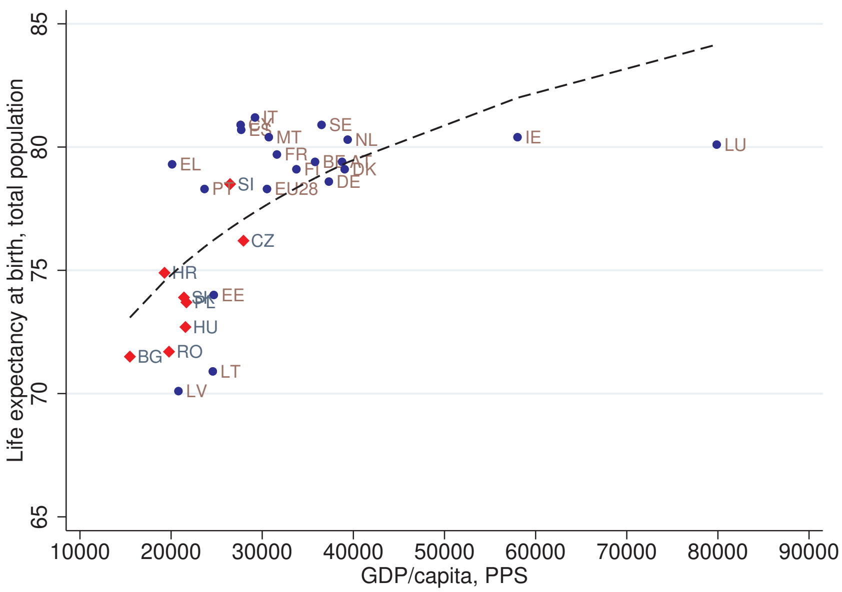
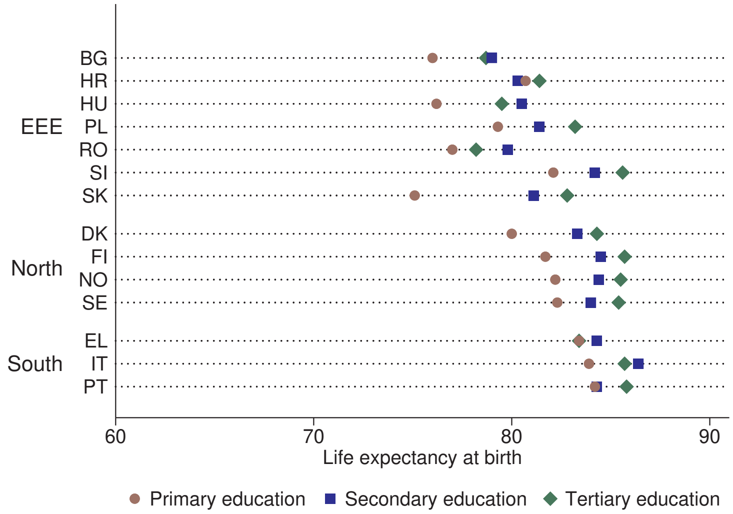
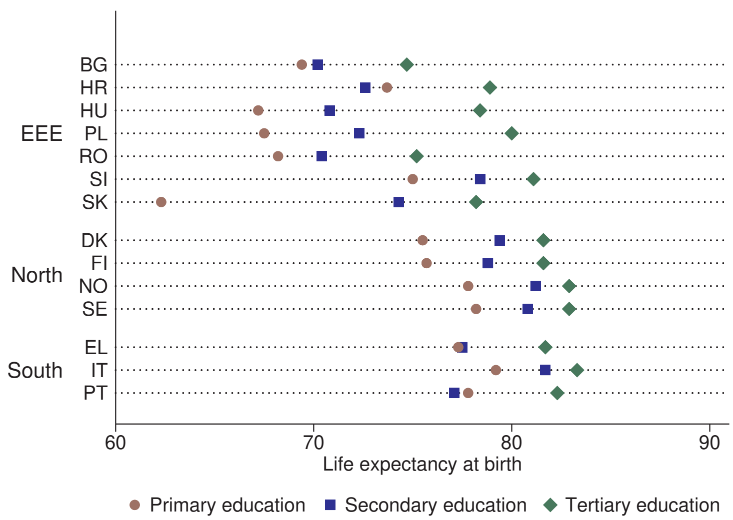


Fig. 8.2: Life expectancy at birth by educational attainment level, 2017
Data: Eurostat (2021k).
Note: data for Denmark 2016

(a) Females



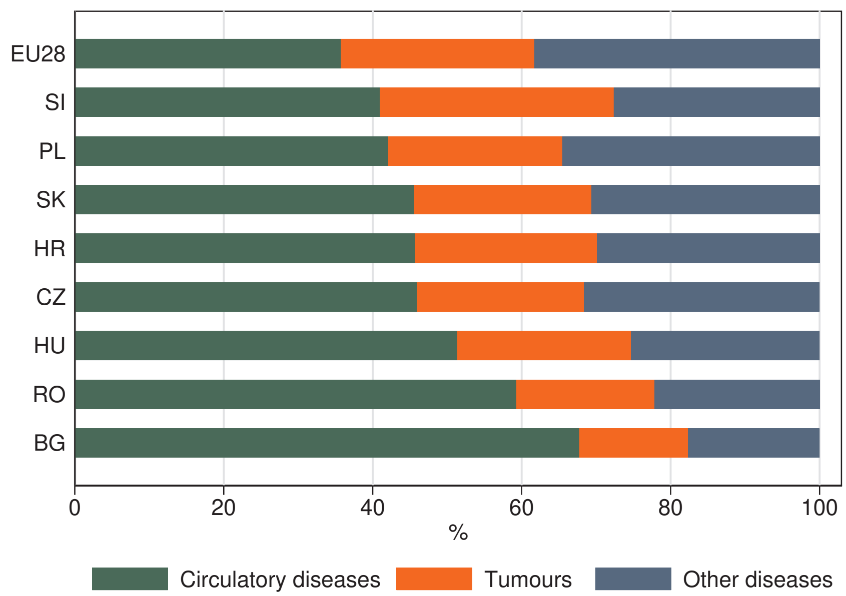
(b) Males



In the Visegrád (V4) countries presented in Figure 8.2, there are huge inequalities in relation to educational attainment levels and life expectancy especially for males: low educated men compared to their highly educated counterparts can expect to die almost 16 years earlier in Slovakia, 12.5 years earlier in Poland, and more than 11 years earlier in Hungary. This means that people of lower social status are probably more vulnerable in the pandemic, being – in general – in worse health status. The same deep inequalities, however, cannot be detected in the other four EEE countries. They show a different underlying pattern: in Bulgaria and Romania, even the highly educated have relatively low life expectancies, while in Croatia and Slovenia, greater equity means better health even for the poorly educated.

Regarding the causes of death, the leaders are cardiovascular diseases and malignant neoplasms (cancers) in all EEE countries, as well as in the EU28. However, their relative weight in total mortality differs significantly (Figure 8.3): while in Bulgaria and Romania, the share of these two disease categories in total mortality is around 80%, in Croatia, Czechia, Hungary, Poland and Slovakia, it is below 70%, while the EU28 average is slightly higher than 60%.

Fig. 8.3: Share of main causes of death in total mortality, 2018
Data: Eurostat (2021b).
Note: Data for EU28 refers to 2016.



The causal structure of mortality is closely related to the number of deaths overall and due to certain reasons. In Table 8.1, the standardized mortality rates (SMR) per 100,000 population are shown for the most common causes of death. With the exception of Slovenia, where the SMR is slightly below the EU28 average, mortality in the EEE is higher by 20 (CZ) to 60 (BG) percent in total than in the EU28.

Table 8.1: Standardized mortality rate total and by main causes, 2018
Data: Eurostat (2021b).
Note: Standardised for age and sex for 100,000 population. Data for EU28 refers to 2016.

	EU28	BG	CZ	HR	HU	PL	RO	SI	SK
All causes	998	1,589	1,212	1,332	1,439	1,249	1472	985	1,309
Circulatory	356	1,076	557	609	738	526	872	403	597
Ischaemic heart diseases	118	180	268	270	367	134	290	97	333
Other heart diseases	88	402	93	90	86	184	65	150	55
Cerebrovascular diseases	79	314	90	155	128	92	247	99	123
Malignant neoplasms (cancer)	259	233	272	324	336	291	273	309	311
Colon, rectum, anus, anal canal	30	33	35	52	53	37	35	36	48
Trachea, bronchus and lung	54	43	50	67	87	66	53	56	49
Breast	19	17	17	19	23	20	19	23	24
Respiratory	82	71	89.6	59	88	85	95	54	87
External	46	36	60	77	59	56	52	74	70
Mental	43	1	20	34	47	10	2	18	22
Digestive	43	54	49	55	67	49	81	43	72
Endocrine	30	24	57	70	38	29	16	17	24
Diabetes mellitus	22	23	47	70	34	27	15	14	20

The relatively greater weight of cardiovascular disease in Bulgaria and Romania seen in Figure 8.3 is due to the very high mortality rates in these diseases, and especially in cerebrovascular disease (like stroke). Cerebrovascular mortality in Bulgaria is almost four times the EU28 value, and more than threefold in Romania. Compared with the EU28, SMR due to ischaemic heart disease (IHD)[1] in Hungary and Slovakia is nearly threefold, and more than twofold in Croatia, Czechia and Romania. IHD itself, while causing the relative majority of heart related mortality in many countries, is less frequent in Bulgaria, while SMR of 'Other heart diseases' is the highest, and is 4.5 times higher than in the EU28.

Regarding malignant neoplasms, differences are smaller, but still significant: 70% more people die due to cancers of the colon, rectum, and anus in Croatia and Hungary,

[1] IHD is a condition when the heart's own blood provision is insufficient, and which can lead to an acute myocardial infarction or heart attack.

and nearly 60% more in Slovakia than in the EU28. Trachea, bronchus, and lung related mortality is especially high in Hungary: 63% higher than the EU28 average, with Croatia and Poland having the second worst values of around 25%.

These variances in life expectancy and mortality partly originate from differences in the prevalence of certain health conditions, and partly from other factors such as the performance of the healthcare systems. Though our knowledge regarding the most important risk factors and especially their likelihood to lead to a Covid-19 infection becoming severe or even lethal is still limited, besides older age and male sex, factors such as obesity, diabetes and cardiovascular conditions seem to increase the probability of poor outcomes (Goodman et al., 2020; Mehta, Li & Goodwin, 2021). Examining the population in the EEE and the EU28, the prevalence of elevated blood pressure is higher in all countries in the region than the EU28 average both below and above 65 years of age, with the exception of Romania in the younger group. In the older group, Bulgaria, Hungary, and Slovakia have high values, all three almost 20 percentage points above EU28 average prevalence of high blood pressure (Table 8.2).

Table 8.2: Prevalence of elevated blood pressure, diabetes and obesity, 2014
Data: Eurostat (2021a, 2021m).
Note: Data are based on surveys, not on medical records.

	Obesity				Diabetes		High blood pressure	
Sex	Males		Females		Total		Total	
Ages	18-64	65+	18-64	65+	15-64	65+	15-64	65+
EU28	15.4	18.8	14.1	20.7	3.9	17.8	13.3	49.4
BG	15.2	16.8	12.0	19.8	3.3	16.5	18.1	68.3
CZ	19.2	22.8	16.5	25.1	3.8	21.8	15.2	55.1
HR	20.7	21.1	14.5	23.3	4.4	16.6	15.8	53.7
HU	21.3	25.4	18.1	27.2	5.3	18.6	23.0	66.9
PL	17.7	24.2	13.0	26.6	3.6	20.2	15.5	57.1
RO	8.4	12.0	8.0	15.1	2.6	13.6	8.7	51.2
SI	20.2	25.0	15.8	22.6	4.1	17.3	16.5	54.5
SK	14.6	24.1	12.7	32.1	3.7	22.9	17.6	67.1

Regarding obesity and diabetes, no conclusive trends emerge. Concerning obesity in both sexes and both age groups, Romania has the lowest levels, with around 7 percentage points below the EU28 average in all groups. On the other end of the scale, older Slovakian women have the worst relative position, with more than twice as many obese as their Romanian counterparts (32% compared to 15%, respectively). Czechia and Hungary each have higher obesity rates in both sexes and age categories than the EU28 average, while in Slovenia males have higher rates (in both age categories), and in Poland and Slovakia the elderly (in both sexes). Concerning diabetes, the prevalence is rather homogeneous in the younger age category, while in the older age group, Czechia, Poland, and Slovakia have much higher rates (almost 22, 20, and almost 23%, respectively, compared to the EU28 average of almost 18%. In the first two waves of the pandemic, age proved to be one of the most important risk factors of Covid-19 mortality. The age structure of the eight examined EEE countries and the EU28 are largely similar, with the share of population older than 65 years in 2019 being the lowest in Poland (17.7%), and the highest in Bulgaria (21.3%) (Eurostat, 2021o).

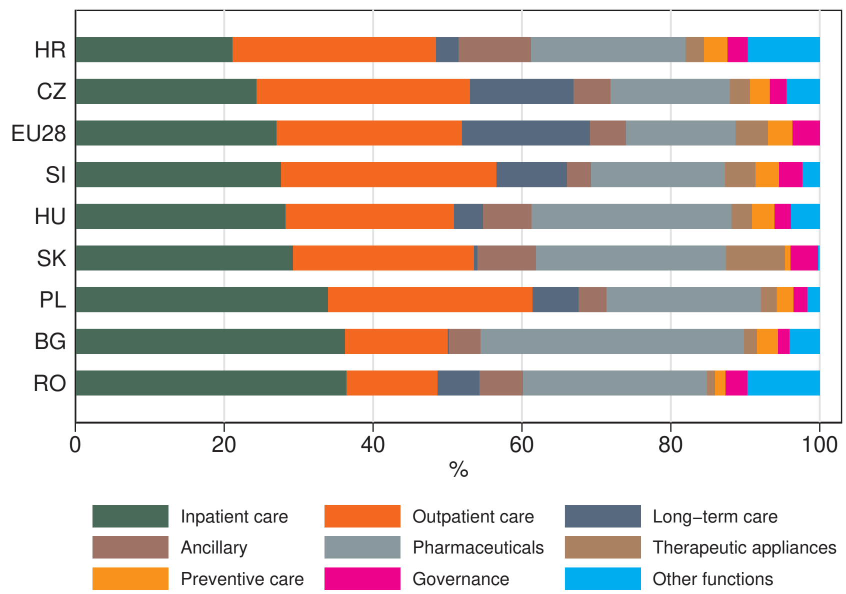
8.1.2 Size and Structure of Healthcare Expenditure and Structure of Health Services

One could believe that the main reason for the malfunctioning of our healthcare systems facing the pandemic is that these systems were not designed for handling huge numbers of people infected with communicable diseases. However, actually, this is not entirely true: our healthcare systems, and, in many cases, even physical facilities, are grounded in structures originating from 100-150 years ago, when most patients and diseases were related to infections and injuries. This is mirrored in the major weight given to inpatient care in the healthcare budget, and in the relatively small importance of advanced public health activities (not counting the now widespread basic sanitation and hygiene measures) (Figure 8.4).

The relative weight of inpatient care differs considerably across the EEE, with more than 35% in Bulgaria and Romania, and only a little above 20% in Croatia. The share of preventive care remains below 3% in all countries, apart from Czechia and Slovenia, which reach the EU28 average (3.1%). Governance expenditure on healthcare is usually considered an administrative cost: the lower, the better. However, when facing the pandemic, this distribution of resources gained great importance, significantly affecting the countries' administrative public health capacities.

Since the establishment of our healthcare systems, there have certainly been tremendous changes, on the one hand, in disease structure, and on the other, in the accumulated medical knowledge. The evolution of healthcare structures followed these trends with growing specialisation, which led to a fragmented 'siloed' healthcare. In the meantime, the typical patient today lives with one or more chronic conditions of non-communicable diseases, and typically needs coordinated outpatient care with shared responsibilities across different providers. All over the world, this has been the source of many critiques in the past decade, urging healthcare systems to adapt to the changing needs. Unquestionably, the pandemic has been a major game changer in this regard, and despite its origins, our healthcare systems were soon overwhelmed by the pressure.

Fig. 8.4: Distribution of total health spending across different functions of healthcare systems, 2018
Data: Eurostat (2021e).

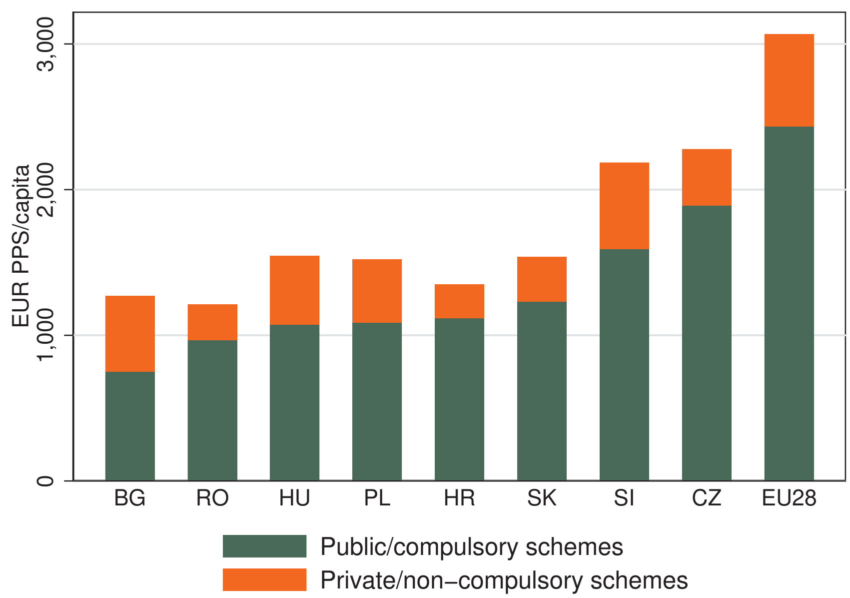


At the time of writing, there are many uncertainties regarding the demands on the healthcare systems related to the pandemic. These affect all the main branches: primary care, inpatient care, as well as outpatient specialised care. Primary care plays a crucial role in diagnosing and curing infected people with light symptoms, as well as in administering the vaccines; and these 'new' tasks interfere with the baseline activities. Neither do we know how future mutations of the virus will behave (in terms of the effectiveness of vaccines and the severity of the disease if someone is or is not vaccinated). This means that the pressure on inpatient care will not necessarily ease immediately even if vaccination programs are widespread and successful. Also, we do not know exactly how frequent and how severe complications will be due to Covid-19 infections, lasting months or years, which may increase the demand for specialised outpatient care.

8.1.2.1 Healthcare Financing

The first aspect of the structural attributes of healthcare systems is financing. Figure 8.5 shows the 'public' and 'private' per capita spending (the sum of which is overall spending) in PPS, filtering out the price differences between countries.

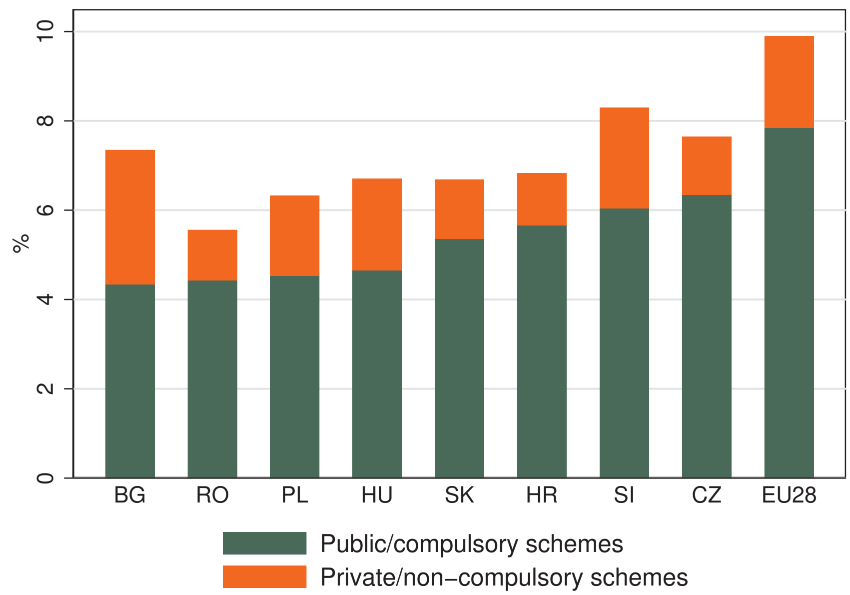
Fig. 8.5: Public and private health expenditure (2018)
Data: Eurostat (2021g).



Clearly, even accounting for price differences, there are great disparities between countries regarding how much they spend on healthcare with or without private resources, and - consequently - what they can afford. Apart from Czechia and Slovenia, where overall health spending is around 70-75% of that of the EU28, no other EEE country spends more than half as much as the EU28. These differences are equally marked when we consider the GDP share of health, and especially public health spending (which can be interpreted as the importance countries attach to healthcare and health) (Figure 8.6): while the EU28 average is 8%, public spending in Bulgaria, Hungary, Poland and Romania barely exceeds 4%.

The dominant part of healthcare financing in all the EEE countries is social health insurance (SHI), while direct governmental sources and 'private' (voluntary) sources play a smaller role. Institutional arrangements of the administration of SHI are heterogenous: multiple quasi-public SHI funds operate the system in Czechia (Alexa et al., 2015), there are multiple public and private insurance companies in

Fig. 8.6: Health expenditure as percentage of GDP, 2018
Data: Eurostat (2021g).



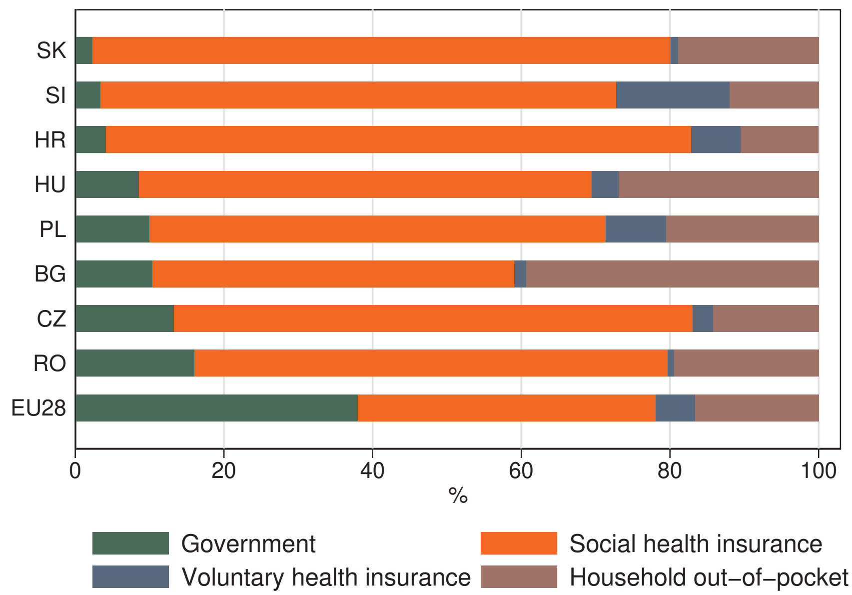
Slovakia (Smatana et al., 2016) and there are single payer systems in Bulgaria, Croatia, Hungary, Poland, Slovenia and Romania (Dimova et al., 2018; Dzakula, Sagan, Pavic, Loncarek & Sekelj-Kauzlaric, 2014; Gaál, Szigeti, Csere, Gaskins & Panteli, 2011; Sowada, Sagan & Kowalska-Bobko, 2019; Albrecht et al., 2016; Vladescu, Scintee, Olsavszky, Hernández-Quevedo & Sagan, 2016).

Only in Slovenia does voluntary health insurance play a significant role (accounting for more than 15% of total health expenditure), while out-of-pocket (OOP) payments range from around 10% in Croatia and Slovenia to nearly 40% in Bulgaria (Figure 8.7).

Regarding coverage provided by SHI, 90 to 100% of the population are entitled to the services in EEE countries (population without SHI coverage in Bulgaria and Romania is around 10%, while in Poland, Hungary and Slovakia 7, 6 and 5%, respectively; in Croatia, Czechia, and Slovenia the population coverage is 100%). Consequently, the differing share of private financing may reflect the cost coverage aspect of the financing system on the one hand (the size of co-payment to be covered by patients), and/or the 'substitutive' role of private financing, reflecting certain deficiencies of publicly financed services, on the other hand – a question further addressed in Figure 8.8.

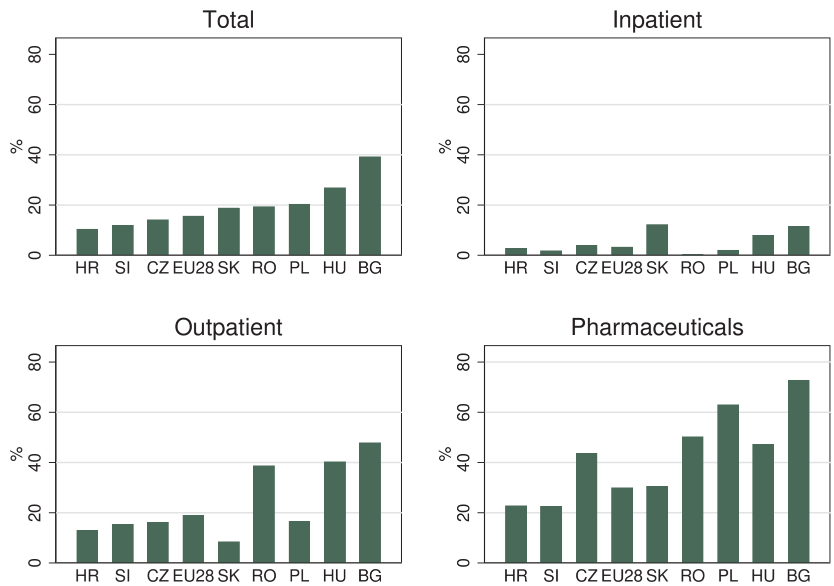
Figure 8.8 shows the share of out-of-pocket (OOP) financing in several main sectors of healthcare. The differences detected regarding inpatient care are minimal:

Fig. 8.7: Share of different financing schemes in health financing, 2018
Data: Eurostat (2021g).



80-100% of these services are financed from public resources. However, in terms of outpatient care and pharmaceuticals, the other two main categories of healthcare expenditures, EEE countries differ considerably. In the case of pharmaceuticals, 70% of the costs are covered from private sources in Bulgaria, while at the other end, in Slovakia the share is only 30%. Bulgarians pay 50%, Hungarians 45% of outpatient care expenses, while Slovakians pay only 10%. Some of these differences can be attributed to differing cost sharing practices (for example, in Slovenia adult patients have to cover a certain percentage of most of the health services themselves (Albrecht et al., 2016), while in other countries co-payment is prevalent only in the case of financing pharmaceuticals). However, out-of-pocket payments typically happen either as informal payments (a practice still widespread in many post-socialist health systems (Stepurko, Pavlova, Gryga & Groot, 2015)), or in 'private' care, meaning not financed by any public or compulsory scheme. Extensive usage of private services necessarily reflects some weakness of the publicly financed system, either in terms of availability or of acceptability. Also, though no official data are available regarding the extent of this 'private' health sector in EEE countries (for instance, because of problems with the definition of 'private'), OOP spent in outpatient care may cover mostly private service fees or informal payments, which means that the private sector in terms of payment may account for around 50% of outpatient services in Bulgaria, 40% in Hungary and Romania, 15% in Czechia, Poland, and Slovenia, and even less

Fig. 8.8: Share of private spending in health expenditure by function, 2018
Data: Eurostat (2021e).
Note: Total = Current healthcare expenditure; Inpatient = Inpatient curative and rehabilitative care; Outpatient = Outpatient curative and rehabilitative care (general as well as specialised); Pharmaceuticals = Pharmaceuticals and other medical non-durable goods.

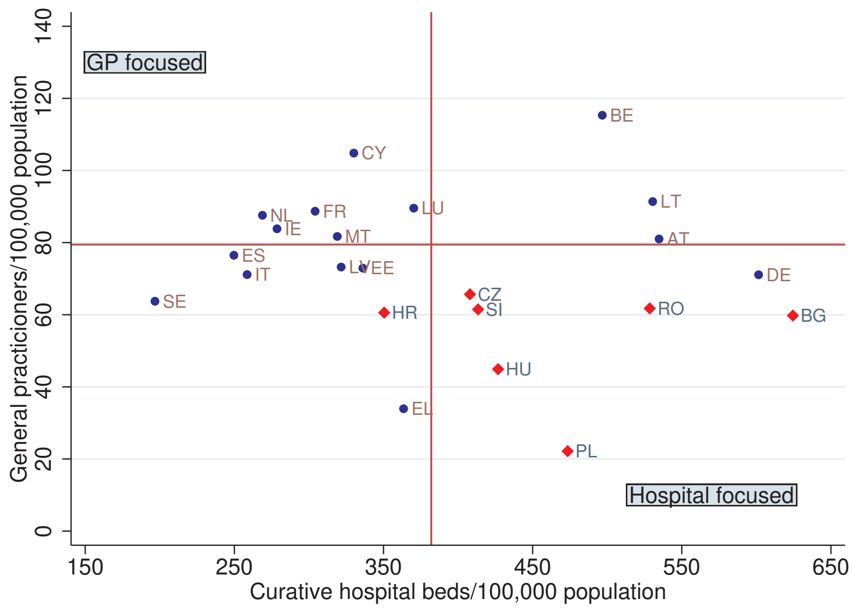


in Croatia and Slovakia, while the EU28 average is around 18%. Considering that OOP spending is the least progressive among all the possible financing schemes, and that a high share of OOP is prevalent typically in countries with low levels of public health spending, as well as countries with the lowest GDP and overall level of social and economic development (Bulgaria, Hungary, Romania), health systems in these countries are definitely lagging behind in terms of their health systems being a tool to increase solidarity and equity not only compared to the EU28, but also to other EEE countries.

8.1.2.2 Healthcare Provision Structure

Besides financing, European countries also differ significantly in terms of the structure of service provision. Figure 8.9 shows the 'density' of hospital care versus primary care, in terms of number of hospital beds and number of general practitioners (GPs) per 100,000 population.

Fig. 8.9: Healthcare capacities - number of hospital beds and general practitioners (family doctors) per 100,000 population, 2018
Data: Eurostat (2021i, 2021n).
Note: Only curative hospital beds and general practitioners (family doctors or similar) are presented. The horizontal and vertical red lines indicate the EU average values.

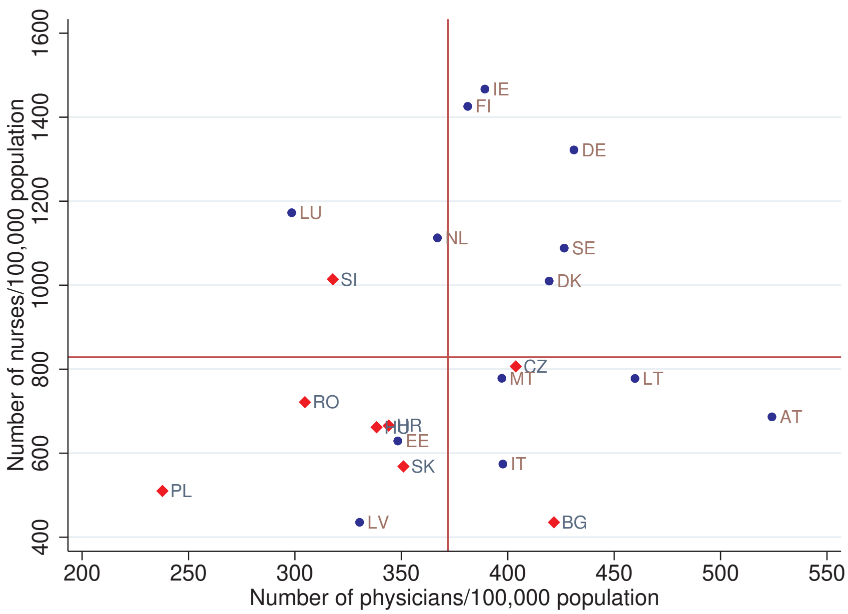


Countries in the upper-left quarter of Figure 8.9 can be regarded as primary care-focused, while countries in the lower-right quarter are more hospital-focused. Apart from the possible effects on efficiency, a focus on primary care may also indicate greater emphasis on a more proactive, public health-focused operation of the system. An obvious structural pattern is observable with EEE countries populating the hospital-focused part of the figure – apart from Croatia all countries of interest are positioned here. This probably means that countries in the region have mainly old-fashioned, cure-focused healthcare systems, with less emphasis on prevention and health promotion, and other more flexible (and efficient) ways of service provision. From the point of view of the extent health systems can stay functional and avoid overload in the case of the Covid-19 (or any other pandemic) outbreak, greater availability of hospital capacities may be an advantage, however, the exact nature (specialty, geographical distribution, etc.) of capacities is of great importance.

In addition to hospital capacities, the availability of health personnel (medical doctors as well as trained nurses and other professionals) is a crucial factor of health system resiliency – a dimension in which most EEE countries face critical challenges.

According to Figure 8.10, in many EEE countries (as well as in the Baltic countries) the availability of these professionals is restricted. This is especially true concerning the number of nurses: in the region, only Slovenia has more nurses proportionally than the average of countries indicated.

Fig. 8.10: Healthcare professionals - number of medical doctors and trained nurses per 100,000 population, 2018
Data: Eurostat (2021h, 2021l); Worldbank (2016); Statista.com (2018)
Note: Physicians of all specialities are captured. Data both for medical doctors and nurses in case of Luxembourg and Poland refer to 2017; for nurses in case of Belgium, Sweden and Finland refer to 2017, 2017 and 2014, accordingly. The horizontal and vertical red lines indicate the EU average values.



The vast differences seen in Figure 8.10 occur between the EEE and the 'old' EU, as well as inside the EEE region: relative to population size, Poland, for instance, has only slightly more than half as many physicians as Bulgaria, and half as many nurses as Slovenia. However, this relative shortage is present in most of the EEE, regarding both doctors and nurses. The general structure of health systems can be directly influenced by policy interventions, even though it often resists change due to traditions and institutional inertia (North, 1990). However, the possibility to influence the availability and supply of health workforce is even more restricted, involving indirect measures and long time lags. The enticement of the 'West' has for a long time been compelling for healthcare professionals in the EEE region.

Since 2000, altogether some 55,000 medical doctors have left the EEE and obtained registration to practice in another OECD country, also taking into consideration the share of native-born but foreign-trained doctors by country (Table 8.3).

Table 8.3: Flow of physicians from EEE to OECD countries (headcount)
Data: OECD (2021b).
Note: The figures are based on the sum of annual inflow of physicians. Only the non-native but abroad trained physicians were considered. The time range of the data available for the destination countries is: 2000-2019 for CA, CZ, DK, HU, IS, NZ, NO, SE, TR, UK; 2002-2019 for US; 2003-2019 for CH; 2004-2019 for BE, DE; 2010-2019 for IE; 2011-2018 for FR.

	EEE country of training								
	BG	HR	CZ	HU	PL	RO	SK	SI	Total
Destination									
BE	109	22	54	63	98	1410	23	3	1,782
CA	110	41	108	168	521	592	72	5	1,617
CZ	18	0	0	2	37	11	2654	0	2,722
FR	217	10	24	46	49	2639	15	0	3,000
DE	1,092	284	1,089	1,683	1,512	3047	1,144	69	9,920
HU	5	0	9	0	5	1151	54	2	1,226
IE	223	170	212	549	363	1362	97	12	2,988
IS	23	2	19	757	41	676	0	43	1,561
NO	82	41	251	936	1713	297	322	8	3,650
SI	33	194	5	8	3	5	6	0	254
SE	153	0	249	778	1326	794	0	0	3,300
CH	150	72	134	300	352	478	164	62	1,712
UK	1,521	352	2,058	2,538	4,050	4,171	841	138	15,669
US	242	88	180	515	1,487	1,106	73	10	3,701
Other	197	89	167	573	636	433	214	56	2,365
Total	4,175	1,365	4,559	8,916	12,193	18,172	5,679	408	55,467
% of physicians in 2018	14.1	9.7	10.6	27.0	13.5	30.6	29.6	6.2	18.8

The last row of Table 8.3 gives the total number of physicians who left the EEE compared to the yearly stock of physicians in 2018. There are large differences in the size of the outflow: Slovenia lost only a group amounting to 6% of its current number of medical doctors, while Hungary, Romania, and Slovakia lost close to 30%. It is important to note that in the past two decades, there has been serious migration within the EEE region: more than 2,600 doctors left Slovakia for Czechia, 1,100 left Romania for Hungary, and almost 200 moved from Croatia for Slovenia. The reason for this is most probably of a different, geopolitical nature. Outflow figures regarding nurses could be even more dramatic, but they are nearly impossible to detect based on available statistics – as many of these professionals will not be working abroad as registered nurses (or perhaps are leaving the health sector but staying in their home countries).

Remuneration is definitely one of the most important reasons for health workflow emigration, or at least it is the easiest to quantify. Compared to the average of the ten OECD countries in Europe and in North America with the highest salaries (in PPPs) with available data, hospital nurses earn around half as much in EEE OECD countries. Slovakia and Hungary are in the worst, and Poland and Slovenia in the best position (nurses' salaries being 42, 44, 60 and 62% of the average of the 10 countries with the highest salaries, respectively) (OECD, 2021a). In these data, only OECD member states are covered – most probably the figures for Bulgaria and Romania would not be very favourable either.

Apart from financial, physical, and human resources, which define the external boundaries of healthcare systems, the way these resources are used is also of key importance from the point of view of overall performance. The utilisation of info-communication technologies (ICT) in healthcare is an important aspect of this. ICT in healthcare has great potential for improving the performance of health systems in many dimensions: it may improve access, safety, quality, responsiveness, efficiency, and so on. ICT may appear in many different forms in healthcare provision, from keeping electronic patient records to remote consultations (telemedicine), from technology-supported diagnostics to using mobile devices in monitoring and assisting patients (mHealth). The area of telemedicine, or any feature enabling service provision with reduced personal contact gained special importance during the pandemic, as an opportunity to maintain service provision for non-Covid-19 patients when lockdowns were imposed or healthcare facilities were overwhelmed by Covid-19 patients.

According to a 2016 WHO survey, certain forms of e-health seemed widespread worldwide, with around 75% of respondent countries reporting some kind of telemedicine program in operation – many of which, however, were diagnostic activities, not involving direct physician-patient contact (World Health Organization, 2016). On the other hand, the introduction or, at least, the official recognition of other forms of telemedicine was hindered by the reluctance to regulate, as well as by non-supportive payment systems (Kichloo, Albosta, Dettloff et al., 2020). Regarding the prevalence of telemedicine activities, this means restricted data availability: in Romania, for example, family doctors provided remote services well before the pandemic, but without official recognition and no official data (Florea et al., 2021). Healthcare systems in all of the EEE are in the process of adopting e-health technologies, however, to different extents in different areas. Electronic patient records are used everywhere (if not always comprehensively), and remote analysis of diagnostic materials is also present. Similarly, e-prescriptions and e-referrals are available in several countries. However, only as an effect of the pandemic has actual telemedicine emerged, when a doctor and a patient meet and consult remotely. This is a new phenomenon in most countries in the region, at least in the public sector.

In Bulgaria, prior to the pandemic, telemedicine had been virtually nonexistent: even prescribing medicine had to be done in person, and with the exception of professional-to-professional consultations and emergencies, according to law no telehealth activity had been accepted (Radlova & Kehayova, 2020). In Croatia, the development of e-health started in 2001, and covered the electronic support of prescriptions, referrals, patient records and other administrative healthcare tasks (Dzakula et al., 2014). E-prescription was used as early as 2013 by nearly all general practitioners (European Commission and PWC, 2018). In Czechia, there has been an e-prescription system in effect since 2018, and the reimbursement of other forms of telemedicine is also regulated (Matejovsky & Drimal, 2020).

In Hungary, the use of electronic information management in health- care has been in place since the early 2000's, mostly due to reasons of reimbursement (Gaál et al., 2011). The country launched its comprehensive and unified e-health system in 2017, an online service available for providers and patients with functions of data management and transparency, e-prescriptions, e-referrals, and possibilities for disease management, also enabling the flawless sharing of patient data between providers (National Healthcare Service Center, 2017). The pandemic gave a momentum to this e-health system to get widely utilized. In Poland, reimbursement of telemedicine services has been regulated since 2013, with no restrictions (Malgorzata, Koryzma & Starzynska, 2020). According to a survey, in 2018, 10.9% of providers in ambulatory care and 40.4% of hospitals used some kind of telemedicine (Sowada et al., 2019).

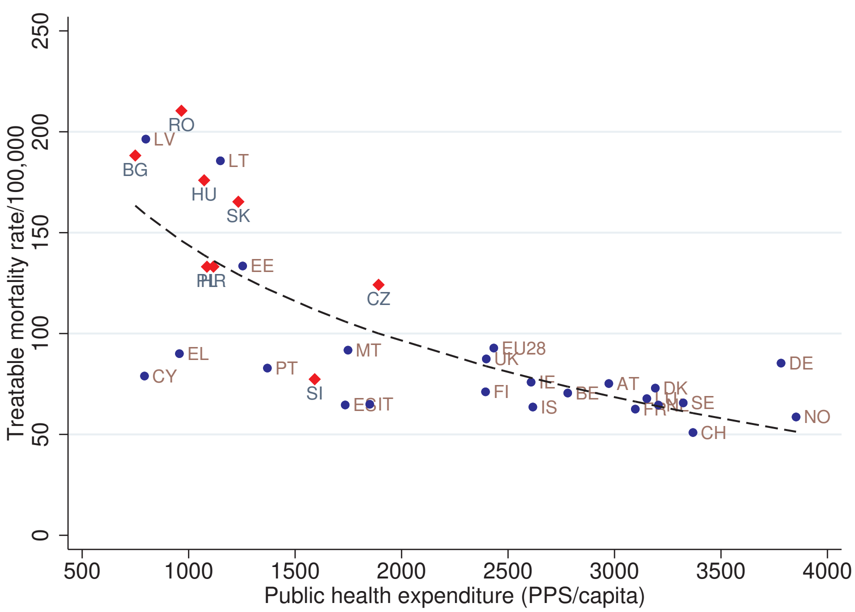
Slovakia launched a nationwide e-health program in 2008; however, due to repeated postponements, implementation did not start before 2017, while health insurance companies operating the SHI in Slovakia started to develop their own tools, resulting in a fragmented and not inter-operable system (Smatana et al., 2016). Overall, certain emerging solutions were adopted by insurers and providers, but the legal and financial telemedicine framework had not been established before the pandemic (Kinstellar, 2021).

Slovenia launched a national e-health project in 2005, whose success was moderate due to factors related to regulation, finance, and the institutional and technological environment (Albrecht et al., 2016). However, after 2013, there was significant development with the establishment of the operational framework for e-prescriptions, e-referrals and central patient data registries instead of the fragmented system of patient registries developed on an institutional level (Albrecht et al., 2016). In Romania, electronic reporting requirements have been in place since 1999, and in 2012 an e-prescription system was also established (Vladescu et al., 2016). However, the first telemedicine legislation was adopted only in 2018 (Kinstellar, 2021).

8.1.2.3 Performance of Healthcare Systems: Treatable Mortality

Health is a complex phenomenon, with outcomes affected by a wide array of interrelated factors, often operating in a non-linear manner, having different effects under different circumstances. Healthcare is just one of these factors; consequently, to calculate the direct effects of healthcare on health outcomes is far from straightforward. Treatable mortality (in non-EU terminology: 'amenable mortality') refers to the number of deaths which, at the given level of medical knowledge could have been avoided, given the proper functioning of the healthcare system. This measure is often interpreted as the ultimate performance indicator of healthcare systems, measuring the effectiveness - its ability to treat ill people - of healthcare (Allin & Gringon, 2014). Treatable mortality in the EU, if contrasted with public health expenditure, gives us two important lessons (Figure 8.11).

Fig. 8.11: Treatable mortality (SMR/100,000) and public health expenditure (PPS/capita), EU, 2018
Data: Eurostat (2021p, 2021g)
Note: The dashed trendline is the fitted regression line of treatable mortality on log public health expenditure (PPS/capita).



First, seemingly, there is a 'floor' of treatable mortality: even countries spending the most have treatable mortality rates between 50 and 100. However, second, this 'floor' may be achievable at a relatively low rate of public health expenditure. On low levels of public health expenditure, the level of treatable mortality (with the exemption of some low-spending Mediterranean countries, in case of which most probably environmental factors dominate the effects) seems highly responsive to even small increases in spending.

8.2 The Impact of the Covid-19 Shock

8.2.1 Direct Health Impacts

EEE countries were affected by the epidemiological crisis of Covid-19, but the course of the epidemic was somewhat different in nature and timing than in other European countries. In the early stages of the pandemic in Europe, these countries quite unanimously took radical preventive steps, like closing borders and limiting the mobility of citizens, and then implementing severe sanitary restrictions, including transport restrictions and the actual lockdown of the entire country (Petrović, Petrović, Bojković & Čokić, 2020; European Centre for Disease Prevention and Control, 2021c; UNECE, 2021). Actions of this kind had a clearly positive effect during the spring wave of the disease, as in this group of countries it was visibly milder than in the rest of Europe.

The protracted restrictions were, however, the cause of increasing social discontent, as well as a source of serious threats to many sectors of the economy (Chu, Alam, Larson & Lin, 2020; Palomino, Rodríguez & Sebastian, 2020; Sedik & Xu, 2020), which resulted in the easing of restrictions around the summer months. The consequence was an increased incidence in the autumn months, with a significantly higher scale than during the first pandemic wave, in this case not differing from the one observed in the entire EU, or even periodically exceeding it. This established a kind of paradox, where the initial success of the EEE in preventing the disease outbreak to some extent conditioned the later breakdown. One of the reasons for this situation was probably the increased mobility in the summer period due to holiday trips, including foreign ones (Chang et al., 2021; Lemey et al., 2021). In countries with a high share of tourism in their GDP (Bulgaria and Croatia), the waves of incoming foreign visitors from various directions probably played a significant role. Undoubtedly, however, the general loosening of sanitary restrictions and the change in social behaviours were factors of considerable importance. The consequence of the intensified wave of disease in the autumn months was the return to severe sanitary and movement restrictions. Due to the economic risks, decisions about closing individual sectors of the economy were made in a less decisive manner, often taking the form of what is sometimes referred to as the 'creeping lockdown'. This element should also be considered a possible cause of the increased incidence rates in the second wave of the pandemic.

The next part of this chapter presents epidemiological data from the course of the coronavirus pandemic in the EEE in 2020 and early 2021. For better comparability of the data, we use generally available international data sources. These data well reflect the course of the pandemic, especially the periods of severity of the incidence and mortality rates, however they are burdened with a potential error in presenting the real scale of incidence, due to individual countries' differences in reporting systems, as well as changes in the policy on testing the population for disease detection. For example, in Poland, in the first period, the testing policy was based on the assumption of detecting, first of all, individuals in contact with the sick or those suspected of having the disease. Several larger screening programs were also carried out in selected populations (e.g., coal miners). In the autumn, however, the focus was on testing symptomatic patients, with the decision to perform the test taken mainly by GPs. The number of occupied hospital beds and people connected to respiratory devices were adopted as the main indicators of the epidemic situation. As a result, most probably the real number of infected persons was higher than the official statistics show, although, as mentioned, regarding the trends in the number of cases and the overall picture of the epidemic, the data presented remains credible.

Figure 8.12 presents weekly data on 14-day Covid-19 incidence rates in the EEE in 2020 and 2021. Average data for the European Union are presented as a reference. All the indicator values are per 100,000 population.

The first cases in the EU were reported in the last week of January 2020. At this point, the general incidence rate was still low but started to rise a month later. The peak of the incidence data for the EU appeared around the end of March, reaching 84 cases. In the EEE, the first reported cases appeared around the end of February and beginning of March 2020. The highest incidence rate at that time appeared in Slovenia, which was soon overtaken by Czechia. Still, however, the highest incidence rate registered at the peak was 32 in Czechia, which is 62% lower than the average incidence rate for the EU. The lowest rates in the group were registered in Bulgaria (4.94).

In subsequent weeks, while the average data for the EU started to show some stabilisation, in some of the EEE countries the incidence rate increased. In the summer months, this was the case of Bulgaria, Croatia, and Romania, where the incidence rate exceeded the EU average by more than 200%. The real change in the trend, however, appeared in the autumn months, starting from around the end of September, beginning of October. After a rapid increase, in all EEE countries the incidence rate exceeded the EU average at some point, with a new trend visible of two (as in the case of Croatia, Hungary, Poland, and Romania) or three (Bulgaria, Czechia, Slovakia, and Slovenia) incidence rate peaks appearing first in November-December 2020, then in the first week of 2021, and again around March 2021. The first and third peaks were the highest in Czechia (1,569 and 1,572 cases, respectively), while the second was highest in Slovakia (1,685 cases). On the other hand, in the first seven weeks of 2021, in all countries in question, with the exception of Czechia, Slovakia, and Slovenia, incidence rates fell below the EU average. The same happened after the third peak in April 2021, with the exception of Croatia and Slovenia. In general, in all EEE countries, the disease outbreak since the autumn wave was much more dramatic than in the case of the first spring wave, additionally showing much higher fluctuations between periods of incidence severity and decline, compared to the EU average. The only exception here is Romania, with incidence rates below the EU average for most of the analysed period, and with the course of the incidence curve quite precisely reflecting the trend characterising the EU average.

Fig. 8.12: Covid-19 new cases per 100,000 population in EEE countries and the EU, January 2020-May 2021
Data: European Centre for Disease Prevention and Control (2021a).
Note: Weekly data on 14-days Covid-19 incidence.

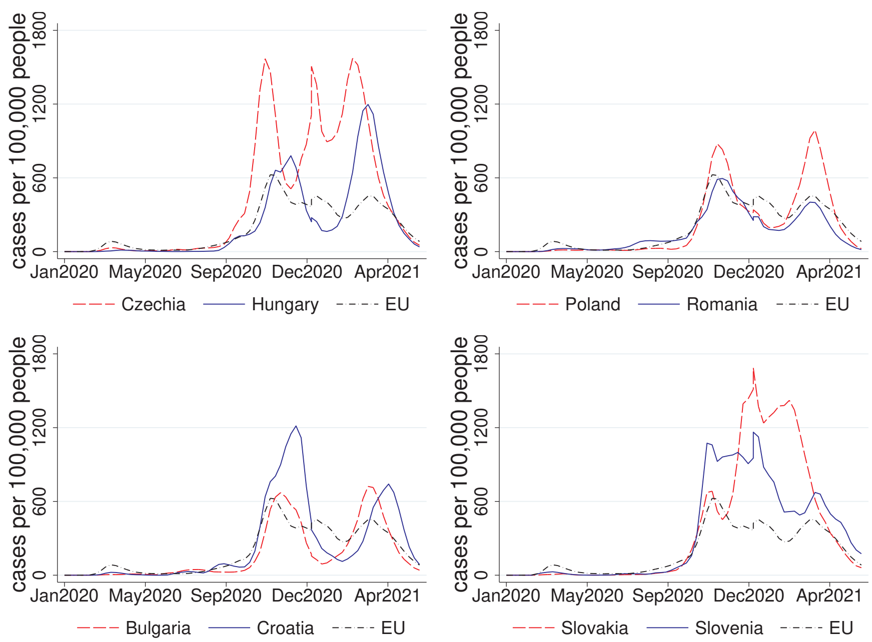


Figure 8.13 presents data on 14-day Covid-19 fatalities. Again, all the indicator values are per 100,000 population. The general picture of Covid-19-related mortality was similar to that of incidence. While the first fatal cases in the EU appeared at the end of February, no deaths were reported before the end of March in EEE countries. The end of April appeared to be the peak in terms of fatality in Europe, with as many as 94 deaths per 100,000 population reported for the entire EU. In the EEE, the peak had a one-week delay and was definitely less dramatic, with the worst data for Slovenia in week 16 (22 deaths) and Hungary in week 17 (18 deaths). Again, after a decline in late spring and early summer, the mortality rates started to rise anew in the late summer months, which first happened in Croatia and Romania. The real explosion of deaths occurred from around the end of September, beginning of October. Each of the EEE countries experienced a dramatic mortality crisis in the autumn wave, with the worst situation registered in Slovenia in the middle of December, where the mortality rate reached 618 deaths per 100,000 population.

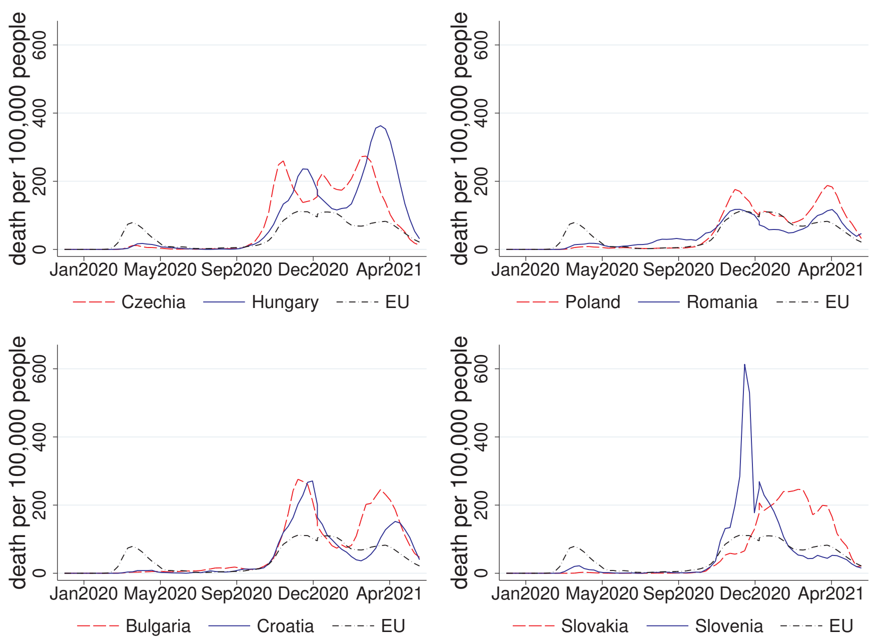
The second highest peak was observed in Bulgaria in early December (274 deaths), followed by Czechia in the middle of November (261 deaths). At this time, in all the EEE countries, the mortality rates were significantly higher than the EU average, with the exception of Slovakia. In Slovakia, however, a rise in mortality started in week 50, and 2 weeks later their mortality rates also exceeded the EU average, and between weeks 4 and 9 of 2021 had the highest rate in the analysed group (246 deaths at the highest point at the end of February - early March). At the same time, in the case of Slovakia, there was an extended long peak of fatality, which ended in the middle of April 2021. In the remaining countries, there was an observable decline in fatality from the end of 2020, and then the second peak appeared in March-April 2021. The peak was the highest in Hungary in week 14 (363 deaths), followed by Czechia in week 11 (274 deaths) and Bulgaria in week 14 (346 deaths). The exception is Slovenia, where the fatality by the end of February 2021 fell below the EU average and from then remained stable with a slight declining trend, up to the end of the analysed period. The trend in Romania again reflected that of the entire EU, with relatively low mortality up to the middle of March 2021. In subsequent weeks, mortality rates exceeded the EU average and reached a peak of 117 deaths per 100,000 population reported in the middle of April. In the remaining countries, the trend was similar to that of the incidence with high fluctuations between peaks and troughs. In general, fatality rates in the EEE were much higher than the EU average.

The data on mortality still lacks full accuracy, due to differences in reporting and qualifying individual fatal cases, such as for example, deaths of people suffering comorbidities (i.e., simultaneous presence of at least one disease other than Covid-19) qualified differently depending on a given country's policy. The final data to depict the epidemiological situation in the EEE during the Covid-19 pandemic are those about excess deaths (Figure 8.14). Although the data presented are for the entire population, which does not make it possible to catch trends in different age groups, they still give some interesting insights into the epidemiological trends during the Covid-19 pandemic. The spring wave of 2020 is well reflected in the excess mortality in the EU[2], with a significant rise in March and April (25% in the latter case). At the same time, in the case of the EEE, there was a drop in general mortality in most countries, or no more than a slight increase, as in the case of Czechia, Poland, and Slovenia in April 2020.

Despite the mortality due to Covid-19, the generally good epidemiological situation is most probably due to the restrictions implemented, which decreased the incidence rates of other communicable diseases, as well as mortality due to external causes. Starting from September 2020, a rise appeared, which was the case in each of the countries considered, as well as the EU as a whole. Nonetheless, this rise was not even, with an especially dramatic surge in November in Bulgaria, Poland, and Slovenia, where it was close to showing a 100% increase compared to the previous year. Although in other EEE countries the rise in excess mortality was not so high, in

[2] Excess mortality is defined by Eurostat as the number of deaths from all causes measured during a crisis, above what could be observed in 'normal' conditions. The reference data adopted by Eurostat for mortality statistics during the Covid-19 pandemis are the average mortality data for years 2016-2019 (Eurostat, 2021d).

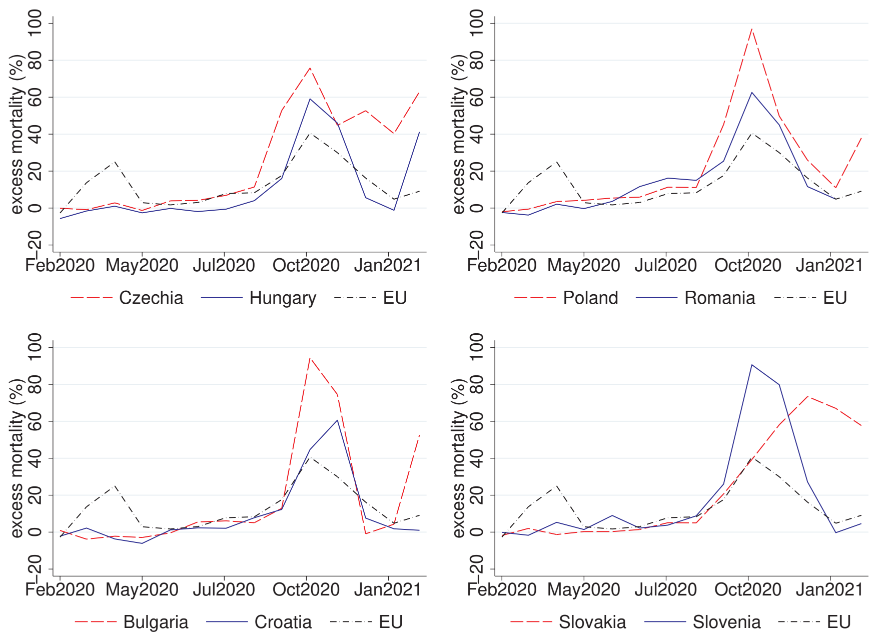
Fig. 8.13: Covid-19 death cases per 100,000 population in EEE countries and the EU, January 2020-May 2021
Data: European Centre for Disease Prevention and Control (2021a).
Note: Weekly data on 14-days Covid-19 fatality.



each of the EEE countries it was visibly higher than the EU average in November and December 2020, with only Slovakia being close to the EU average in November, but with a growing trend in the following months, which resulted in the highest excess mortality in the entire group in January and February 2021. Except in Czechia and Slovakia, a recovery seemed to be starting at the beginning of 2021 in the EEE, with the factor falling below the EU average in some. However, between February and March 2021, there was again a significant increase in Bulgaria, Czechia, Hungary, and Poland, with only Croatia and Slovenia remaining at low levels (no data for Romania).

The excess mortality data show the actual scale of the epidemiological crisis caused by the Covid-19 pandemic in the EEE. What is especially worth noting is that the trend here is not fully consistent with the trends for Covid-19 incidence and mortality rates. This may be a symptom of underestimating the actual number of deaths in some countries (i.e., Bulgaria or Poland), and it definitely shows the actual scale of the overload or breakdown of the health system in some countries, as they lost the ability to effectively secure treatment for patients suffering from different diseases, not necessarily from Covid-19. This is also clear evidence that the indirect

Fig. 8.14: Excess mortality in EEE countries and the EU, February 2020-March 2021
Data: Eurostat (2021c).
Note: Rate of additional deaths in a month compared to the average number of deaths in the same month over 2016-2019.



burden of the pandemic is much higher than the sole data on Covid-19 incidence and mortality rates might suggest.

8.2.2 Vaccinations

Since all EEE countries we analyse are European Union Member States, their vaccination policies are strongly determined by the European Commission's centralised approach on procuring Covid-19 vaccines on behalf of the Member States (European Commission, 2020). This includes the controversies related to purchase strategy, and the limitations caused by supply constraints that have affected the entire EU. Due to these difficulties, some countries started to consider extending the vaccination program independently to include products developed in Russia and China. Originally, only Hungary decided to allow the Russian and Chinese vaccines to boost the vaccination rollout. At the beginning of June, the Russian Sputnik V was also approved in Slovakia (Euronews, 2021). In Poland, the Chinese Sinovac was considered as a potential alternative to vaccines procured by the European Commission, but finally the idea was dropped due to limited public confidence in the Chinese product (Rzeczpospolita, 2021).

Figure 8.15 presents the progress in vaccinations for Covid-19 in the EEE, compared to the average data for the European Union. The dynamics of vaccination are the slowest in Bulgaria, resulting in 15.2% of the population receiving at least one dose of the vaccine, and 12.4% fully vaccinated by June 2021. In Romania, 28.3% of the population received at least one dose by the end of the analysed period, and 25.3% received full vaccination. In Croatia, Slovakia, and Slovenia, the dynamics of the vaccination process were similar for the entire period, resulting in around 40% of the populations receiving at least one dose by June 2021, and 17.5% (Croatia) to 28% (Slovenia) being fully vaccinated in the same period. In Czechia and Poland, the process seems to be somewhat faster, reflecting quite precisely the dynamics for the entire EU based on the number of people with at least one dose injected, although in Poland a higher percentage of the population is fully vaccinated. While in Czechia in June 2021, this was 21.9% of the population, in Poland it exceeded 32%, compared to 27.3% for the EU. In the case of both factors, Hungary continued to be the regional leader, with over 64% of the population receiving at least one dose, and nearly 51% fully vaccinated by June 2021.

The data presented reveal some differences between countries in terms of vaccination policy and efficiency. While Hungary lead the vaccination rate due to using Russian and Chinese vaccines next to the European purchase scheme, the cases of Czechia and Poland seem to be the most effective in terms of general vaccination rollout. On the other hand, Romania, despite a low percentage of the population receiving at least one dose, presents a relatively high percentage of those fully vaccinated, close to the EU average. Similar, although with higher percentages in both groups, is the case of Slovenia, and to some extent Poland, especially in the last four weeks of the analysed period.

The differences between the countries in vaccination rates may result from different approaches to the distribution of the vaccines, or to limited efficiency, as might be the case in Bulgaria, but may also be a consequence of the prevalence of vaccine hesitancy. In 2020, the highest willingness to take the vaccine was seen in Hungary and Romania (45% in both cases), followed by Poland (43%), Slovakia (36%), and Czechia (35%). Bulgaria showed the lowest enthusiasm for vaccination, with as much as 23% of the population declaring willingness to use it (Hajdu, Milo, Klingová & Sawiris, 2020). The perception of vaccination changed somewhat in early 2021, with Hungary still showing the highest public interest in getting the vaccine (72% of the population were already vaccinated or willing to take the shot), followed by Slovakia (71%), Czechia, and Poland (68%). Romania and Bulgaria demonstrated the smallest interest in getting vaccinated, with 45% and 38% of the population, respectively, willing to take the shot, or already being vaccinated (Hajdu, Klingová & Sawiris, 2020). These data show rising interest in vaccinations, which might have been the result of both positive information about their efficiency available after the first months following their admission to usage, and of the severe experiences of disease outbreak in the EEE in late 2020 and early 2021. The willingness indicators also correspond with statistics regarding actual vaccination, as presented above, with the exception of Romania, where, unlike in the other countries, social scepticism towards vaccination seems to increase. The data also show that in all the EEE, the social limits to increasing the vaccination rate makes it challenging for public authorities to provide effective convincing campaigns, and also stirs a debate about making the vaccine obligatory.

8.2.3 Healthcare Responses

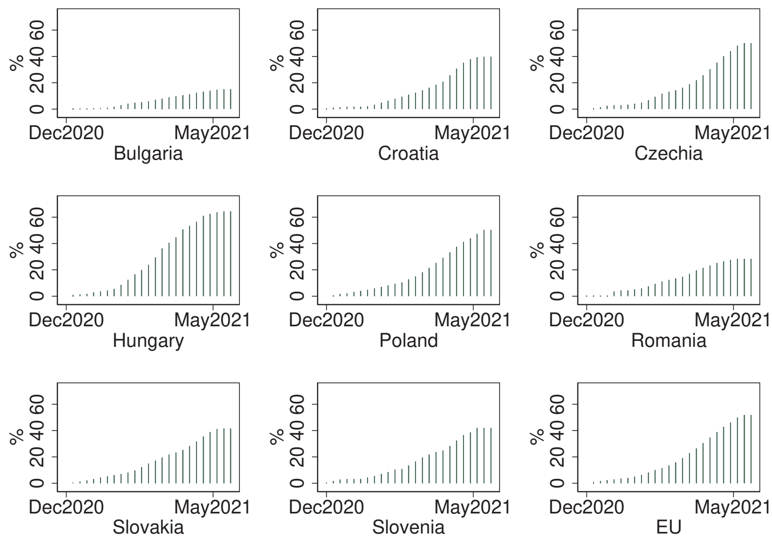
Based on the Oxford Covid-19 Government Response Tracker (Hale et al., 2021), we analyse how the governments of EEE countries responded to the pandemic. We focus on the overall government response index as an aggregate policy index. This index records how the response of governments has varied over all indicators in the Oxford Covid-19 Government Response Tracker database, including lockdown restrictions, economic support policies, Covid-19 testing and contact tracing policies, and short-term healthcare investments. Note that while we focus on this composite index, the cross-country differences and time patterns are very similar to the so-called containment and health index and the stringency index developed by (Hale et al., 2021).

The government response index varies between 1 and100, with 1 reflecting the lowest, and 100 the highest level of government action. Figure 8.16 displays the time pattern of the index. During the first wave of the pandemic (around April-May 2020), the government response was generally at least as intense in the EEE as in the EU-14 countries. The response by Croatia and Slovenia was particularly intense. During the summer of 2020, the government response relaxed substantially: it fell below the EU-14 average in all the analysed EEE countries. Then, during the second and third waves of the pandemic (from around October 2020), the government response intensified again, albeit to different extents across countries. In Bulgaria, Croatia, and Hungary, response intensity remained below the EU-14 average.

The significant relaxation of policies in the EEE is likely to have led to a dramatic increase in Covid-19 cases and deaths in late 2020 and early 2021.

Fig. 8.15: Covid-19 vaccine cumulative uptake (%) among adults 18+, December 2020–June 2021
Data: European Centre for Disease Prevention and Control (2021b).

(a) At least one dose



(b) Full vaccination

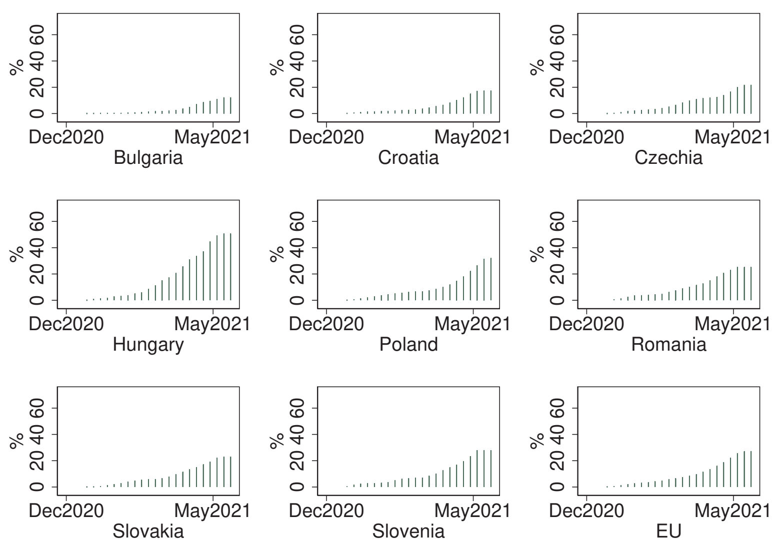
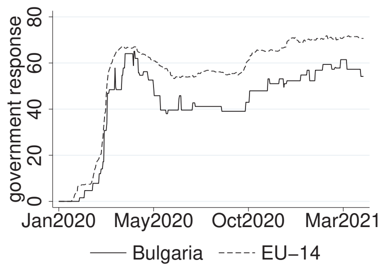
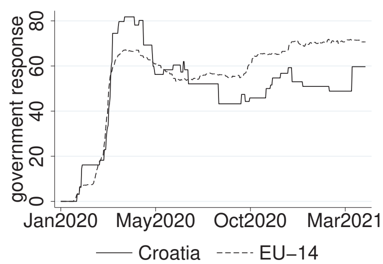


Fig. 8.16: Government response index, January 2020-April 2021
Data: Hale et al. (2021).
Note: The index runs between 1-100.

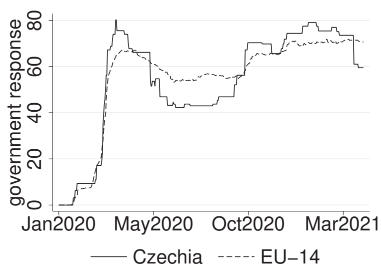
(a) Bulgaria



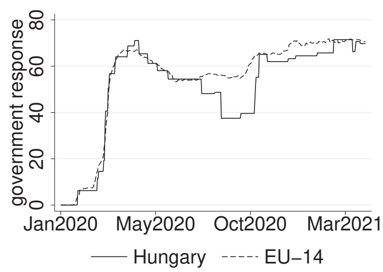
(b) Croatia



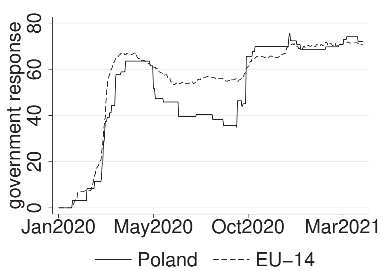
(c) Czechia



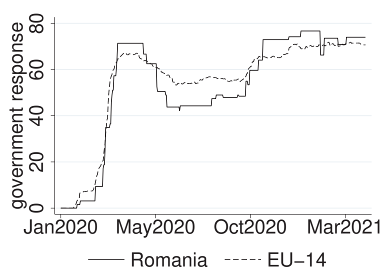
(d) Hungary



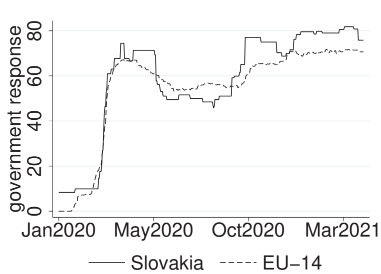
(e) Poland



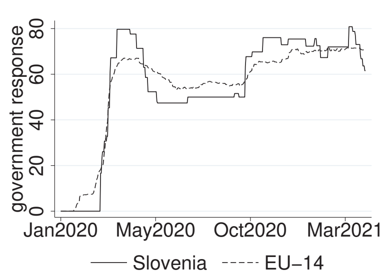
(f) Romania



(g) Slovakia



(h) Slovenia



8.2.4 Indirect Impacts of Covid-19 on Health Status and Healthcare Use of People Aged 50+

In this section, we analyse the impact of Covid-19 on health status (primarily mental health) and healthcare use in the EEE. Our primary aim is to use comparable indicators across all the countries analysed; therefore we use data from the SHARE (Survey of Health, Ageing and Retirement in Europe) Corona survey (Börsch-Supan, 2020b)[3], which is based on telephone interviews taking place during June-August 2020, covering people aged 50 and above, using the same questionnaire across Europe. Our analytic sample consists of 22,775 individuals from the eight EEE countries plus Belgium, Denmark, Finland, France, Germany, Greece, Italy, Luxembourg, Spain and Sweden. The latter ten countries serve as our comparison group, which we call 'South-West Europe', for short. Due to data limitations, we could not include the remaining five EU15 countries in the analysis.

To capture the health impacts of the Covid-19 crisis, we use the following four self-reported indicators:

1. Worse health (composite indicator of subjective health): equals one if the respondent reports that their health decreased since the outbreak of the pandemic (zero otherwise).
2. Nervousness: equals one if the respondent reports having felt nervous in the last month, and more so than before the outbreak of the pandemic (zero otherwise).
3. Depression: equals one if the respondent reports having felt sad or depressed in the last month, and more so than before the outbreak of the pandemic (zero otherwise).
4. Unmet healthcare need: equals one if the respondent reports having foregone, postponed or denied healthcare since the outbreak of the pandemic (zero otherwise).

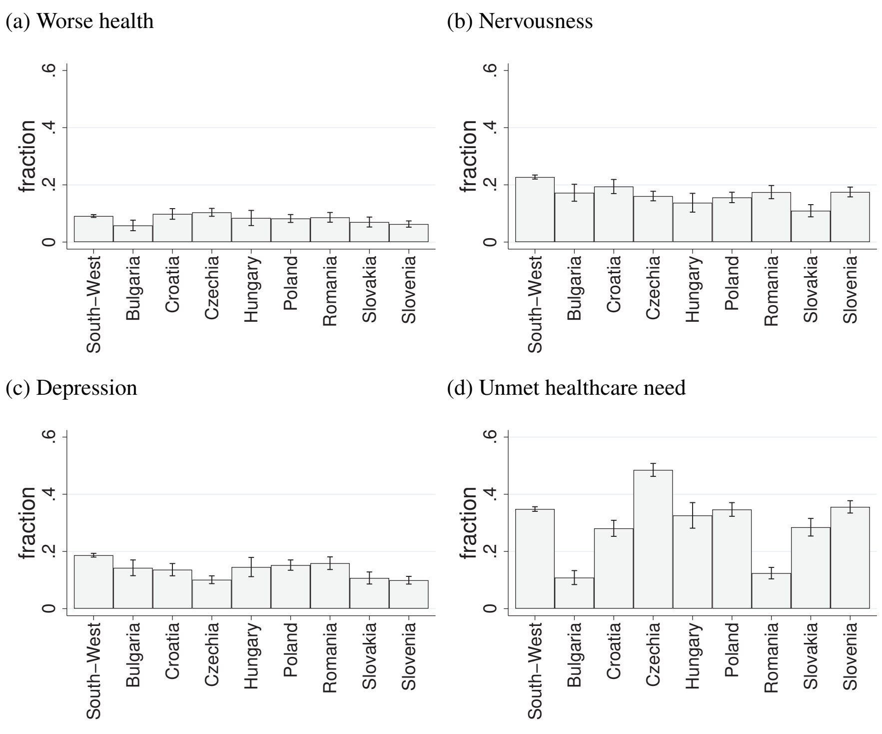
We also use a few demographic, socio-economic and health indicators in our analysis. We use gender and age, the latter split into four similar-sized categories (age up to 63, 64-70, 71-76, and above 76). We generate a binary indicator of being employed (including self-employment) at the time of the Covid-19 outbreak, and a binary indicator of living alone (i.e., of the household size being equal to one). Based on ISCED-97 (International Standard Classification of Education) codes in the SHARE wave 7 data, we create three categories of education level: primary, secondary, and tertiary education (ISCED-97 levels 0-1, 2-4 and 5-6, respectively). As a proxy for physical health ('chronic condition', for short), we use a binary indicator of drugs taken regularly for high blood cholesterol, high blood pressure, heart disease, diabetes, or chronic bronchitis. Finally, we use a binary indicator of having been sad or depressed at the time of the last SHARE-interview (late 2019 - early 2020, but before the Covid-19 crisis). We use calibrated survey weights as included

[3] We use SHARE Waves 7 and 8 (DOIs: 10.6103/SHARE.w7.711, 10.6103/SHARE.w8cabeta.001), see (Börsch-Supan et al., 2013; Scherpenzeel et al., 2020) for methodological details.

in the SHARE Corona Survey data, to make the analysis sample representative of the target population.

Figure 8.17 indicates that compared to South-West Europe, the change in subjective health since the outbreak of Covid-19 was similar in the EEE, whereas mental health problems (nervousness and depression) were slightly less prevalent in the summer of 2020. Except for Czechia, nor do we see evidence that unmet healthcare needs were more prevalent in the EEE than in South-West Europe. On the contrary, about 30 percentage points fewer respondents reported unmet healthcare needs in Bulgaria and Romania than in South-West Europe.

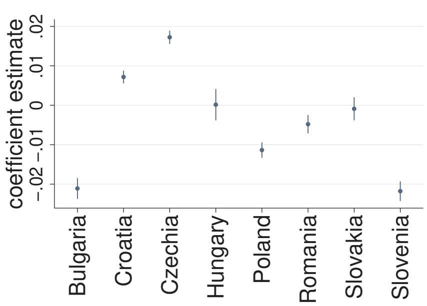
Fig. 8.17: Self-reported health and healthcare use, June-August 2020
Data: Börsch-Supan (2020b).
Note: Mean with 95% confidence interval. The exact definition of the indicators is provided in the text.



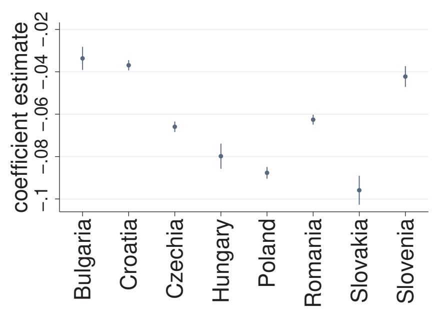
These patterns are reinforced by the results of linear probability models presented in Figure 8.18. Reported nervousness and depression were 2-10 percentage points less prevalent in the EEE than in South-West Europe in the summer of 2020, ceteris paribus. The prevalence of unmet healthcare needs was 0-25 percentage points lower in the EEE than in South-West Europe, except for Czechia, where the prevalence was more than 10 percentage points higher.

Fig. 8.18: Linear probability regressions of self-reported health and healthcare use, June-August 2020
Data: Börsch-Supan (2020a) and Börsch-Supan (2020b).
Note: Coefficient estimates with 95% confidence interval. The exact definition of the dependent variables is provided in the text. Control variables: gender, age categories, chronic condition, education categories, working, living alone, depression in late 2019 - early 2020.

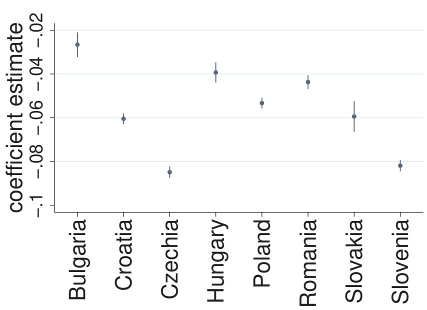
(a) Worse health



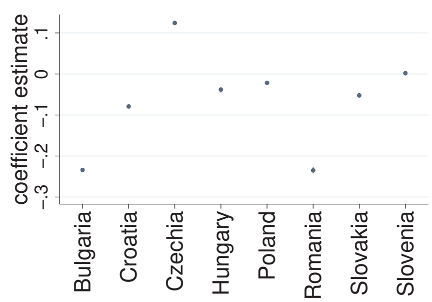
(b) Nervousness



(c) Depression



(d) Unmet healthcare need



Overall, the results based on the SHARE-Covid19 survey indicate that in summer 2020, the indirect health impacts of the Covid-19 crisis were more benign in the EEE than in South-West Europe. We do not see clear patterns of differences in these impacts across EEE countries.

8.2.5 Impacts of Covid-19 on Social Security

The Covid-19 crisis imposes challenges on the social security systems primarily due to the increasing unemployment rate and pressure on the healthcare systems. Without exception, in each analysed country there is full and universal coverage of Covid-19 related treatment costs, irrespective of insurance status. The costs are covered either by the state budget or by the social insurance fund. Testing is also provided free of charge in each country, although eligibility for free testing varies across the countries (COVID-19 Health System Response Monitor, 2021).

As unemployment rose due to lockdown measures, social security contributions flowing to the healthcare budget declined. Thus, governments had to allocate additional funds to the healthcare sector to cover Covid-19 related additional healthcare costs. At the same time, in almost every country the government made allowances on the payments of social security contributions, so as to ease the burden both on employers and employees. Also, in some countries, families received additional financial support to compensate for the loss of earnings due to home-schooling. In the following, we provide a brief overview of measures affecting the social security system in the analysed eight EEE countries. These measures formed a subset of a broader set of measures having far-reaching fiscal effects outside of the social security system.

1. **Bulgaria:** The government supported companies with proven impact from the epidemic by covering 60% of the employees' wages and social security contributions for up to three months, both in 2020 and 2021 (European Commission, 2021a). Parents of children under age 14 who had to go on unpaid leave were provided means-tested one-off cash transfers (International Social Security Association, 2021).
2. **Croatia:** The government allowed three-month deferrals for payment of social contributions for all businesses subject to experiencing a drop in revenue of at least 20%. For companies experiencing a drop in revenue of at least 50%, social contributions were waived or cut in the second quarter of 2020, depending on the amount of the loss in revenues (European Commission, 2021a).
3. **Czechia:** To alleviate the economic burden of the Covid-19 crisis, the government deferred the payroll tax and labour market contributions payment deadlines from April to June by four months (Tax Foundation, 2021). The self-employed were also made exempt from social and health insurance payments from March until August 2020 (European Commission, 2021a).
4. **Hungary:** In the most affected sectors (e.g., tourism and catering), employers were not required to pay the employer side of social security contributions (19%) from March to June 2020. Employees in the affected sectors were only liable for their 4% healthcare contribution rather than the total 18.5% social security contribution. Such exemptions from the payment of social security contributions were in place also in the first quarter of 2021 (Tax Foundation, 2021; European Commission, 2021a).

5. **Poland:** A special allowance was paid to employees to take care of children under the age of 8 in the case childcare facilities were closed. Also, between March and May 2020, depending on company size, companies received full or partial exemption from social security contributions for three months or deferral of social security contributions (European Commission, 2021a).
6. **Romania:** During the first wave of the pandemic, the government provided a benefit amounting to 75% of wages but no more than 75% of the average wage to parents who could not work remotely and had to stay home with kids younger than 12 years old (European Commission, 2021a). The state also paid the unemployment benefits on behalf of the companies who suspended their activity due to the Covid-19 crisis. Additionally, the government waived 50% and postponed the other half of the social security contributions for three months for firms that demonstrated major financial losses generated by the coronavirus pandemic. However, the companies had to agree to keep on their personnel for at least 12 months (European Commission, 2021a).
7. **Slovakia:** Payments of health and social insurance contributions paid by employers were postponed if the firm's revenue decreased by more than 40% (European Commission, 2021a). These deferrals were announced in spring 2020 and were extended in 2021. Parents of children up to age 11 were entitled to nursing compensation of about 70% of the net wage (International Social Security Association, 2021). The unemployment benefit period was extended to those insured persons whose 6-month unemployment benefit period would have expired during the crisis situation related to the spread of Covid-19 (International Social Security Association, 2021).
8. **Slovenia:** During the first wave of the pandemic (March - May 2020), a set of measures were implemented to reduce the social burden and the economic costs of the Covid-19 crisis. The state covered the pay compensations for temporary layoffs due to Covid-19. Workers who had been forced to stay at home to look after their children due to school closures were also entitled to 80% salary compensation and the compensation of all social security contributions. Furthermore, all pension insurance contributions for employees who remained in the workplace were paid by the state in April and May 2020, except for companies in financial insurance activity with more than 10 employees or entities financed from public sources. Most of these policy measures were extended in 2021 (European Commission, 2021a).

It follows from the above summary that governments enacted temporary reforms to the social security system, so as to reduce the economic burden of the Covid-19 crisis. Most of the measures were introduced in spring 2020 and then extended in the second half of 2020 - early 2021. A permanent reform was implemented to the social security system in Hungary, where the total social contribution rate payable by employers was reduced from a total of 19% to 17% as of July 2020.

8.3 Long-term Prospects and Conclusions

In this section, we reflect on several important questions that have been raised and analysed in previous parts of the chapter. First, we discuss the extent the EEE countries managed to adapt their healthcare systems in a timely and effective manner to the Covid-19 crisis, and then explore the immediate and long-term consequences of the restricted provision of healthcare services. Second, we examine the preparedness of the EEE for this global health crisis—after more than a year of the onset—and beyond in the near future. Finally, we explore the weak spots the Covid-19 crisis revealed within the healthcare and social security systems of the EEE countries, and how these challenges should be mitigated in the future, for example, challenges related to financial uncertainty in the economic downturn, shortages of the health workforce, vaccination, lack of hospital capacities, relinquishing care due to limited access, and a rise in health inequalities.

Population health in the EEE countries before the outbreak was generally worse than the EU average. This is evident form the data on SMRs, for example, in all EEE countries SMR for circulatory diseases were far over the EU average. Conversely, we observe significant differences in the leading causes of death and life expectancy at birth between the EEE. Furthermore, there are still large health inequalities within the EEE (e.g. in Czechia, Hungary, Poland and Slovakia), and certain population groups might be more vulnerable during the Covid-19 pandemic, for example, people with lower social status. The flaws and low performance of EEE's healthcare systems have probably contributed to worse health of their populations compared to more developed EU member states.

The SHI based healthcare systems in the EEE countries vary significantly in total health spending, with Czechia and Slovenia at 70-75% and Bulgaria and Romania at 40% of the EU average in 2018. Health spending as a portion of EEE's GDP has been less heterogeneous, but yet 20-50% below the average figure for entire EU. In addition, share of inpatient care or pharmaceuticals in the overall health spending differ considerably between the EEE, and almost all, except Czechia and Slovenia, spend too little on preventive medical care (<3% of total health spending). Although private health spending does not play a great role in financing the EEE healthcare systems, except in Bulgaria, OOP payments seems to be large for outpatient care in Bulgaria, Hungary and Romania and for pharmaceuticals in Bulgaria, Hungary, Poland and Romania. On the other hand, a big portion of OOP payments comes in form of informal payments, and actual size of private health spending in the EEE might be underestimated. Therefore, patients in the EEE countries with high OOP payments could experience increased barriers in accessing health service during this health crisis. For many vulnerable groups, certain health services and products such as pharmaceuticals might become less affordable due to the economic crisis as a consequence of the Covid-19 pandemic. This combination of factors might make some groups less likely to use health services, which is even more likely to deteriorate population health status.

Another important aspect of the Covid-19 crisis is Covid-19-related healthcare costs and resource use burden on healthcare systems. In their response to the pandemic, European countries allocated substantial financial resources to their healthcare systems in order to meet suddenly increased needs. Central government direct budgetary commitment to support health system responses to Covid-19 ranged from almost EUR 450 per person in the United Kingdom, and around EUR 300 per person in Germany and Ireland, to under EUR 50 per person in Iceland, Latvia, and the Netherlands (PPS adjusted). In the EEE, according to the available data for 2020, Czechia committed EUR 214 per capita to additional health spending, Poland EUR 80, and Slovenia EUR 99 (OECD & EU, 2020). In addition, the total Covid-19 related healthcare costs in Croatia in 2020 amounted to EUR 150 million or 0.3% of its GDP (EUR 37 per capita) (HZZO, 2021), while Romania spent 0.4% of its GDP on purchasing medical materials to treat Covid-19 (European Commission, 2021b). However, the numbers related to the financial burden of Covid-19 on healthcare systems should be interpreted with caution, as we do not account for all indirect costs of the pandemic.

On the one hand, the EEE countries rely heavily on hospitals while other forms lag behind, for example, preventive care and health promotion. On the other hand, healthcare is provided with limited number of health personnel—per capita number of medical doctors and/or nurses in the EEE countries was below the EU average values. Bulgaria and Poland had the biggest shortage of nurses recently, while Poland and Romania had the lowest number of doctors per capita. Emigration of doctors could partially explain these shortages, especially in Hungary, Slovakia and Romania. Other EEE countries, e.g. Croatia, Czechia or Slovenia did not experience significant losses of doctors in the 2000-2019 period. The Covid-19 pandemic changed somewhat the healthcare systems by encouraging them to adopt digital health technologies, but not all EEE were at the same stage of their implementation—Croatia, Hungary and Slovenia started introducing them in early 2000s, Poland, Slovakia and Romania around 2010s, while Bulgaria did not have any prior to this pandemic. However, this does not mean that advanced EEE countries actually used the existing e-health technologies efficiently in the Covid-19 pandemic. Further development of digital medicine could serve as a substitute to interrupted healthcare provision in the current or any future pandemics, it might help reduce the spread of the virus and protect the most vulnerable patients.

Radical steps implemented to control the Coronavirus outbreak in the early stages resulted in relatively milder health shock in the EEE countries compared to the rest of EU. The EEE countries did not experience significant increase in deaths due to Covid-19 during spring and summer of 2020. However, restrictions that have been introduced to contain the spread of the virus had serious impact on economic activities. A straightforward conclusion from the data that emerges from the initial stage of the pandemic (roughly the first half of 2020) is that most of the EEE can be identified as successful in both containing the spread of the epidemic, and keeping healthcare systems stable. Unlike the countries most affected by the Covid-19 outbreak, for example Belgium, France, Italy or Spain, where healthcare capacities, especially hospitals, were quickly overwhelmed (Arango, 2020; Ceylan, 2020; Paterlini, 2020; Salje et al., 2020; Verelst, Kuylen & Beutels, 2020; Volpato, Landi & Incalzi, 2020), nearly all EEE countries managed to avoid such scenarios.

The predictions of epidemic curves for European countries from early 2020 revealed that most EEE countries were lagging two weeks or more behind the reference Italian scenario (Remuzzi & Remuzzi, 2020; Saglietto, D'Ascenzo, Zoccai & De Ferrari, 2020) and this can be considered as an important fact giving policymakers in the EEE enough time to implement restrictive epidemic-control measures. The Czech so-called 'blanket' quarantine i.e., fast introduction of strict nationwide preventive measures in the first pandemic wave, served as a good example of an immediate and resolute response to the Covid-19 crisis. It has been proclaimed a 'great success' (Kouřil & Ferenčuhová, 2020) that allowed the lifting of temporary restrictions.

Another example is Poland that started to restrict gatherings in late February 2020, much earlier than other EU countries and managed to keep the 7-day average of daily new cases below 1,000 until mid-September 2020 (European Centre for Disease Prevention and Control, 2021a). In Bulgaria, Czechia, Hungary, and Romania, measures targeting older, the most vulnerable population, were put in place, and Croatia implemented a restriction of movement at the county level (COVID-19 Health System Response Monitor, 2021). Along with the fact that many of the EEE countries introduced measures within the 'state of emergency' (Dascalu, 2020; Drinóczi & Bień-Kacała, 2020; COVID-19 Health System Response Monitor, 2021; Urbanovics, Sasvári & Teleki, 2021) the average values of the Containment and Health Index (CHI) in March, April and May 2020 show that EEE countries had relatively strict epidemic containment measures (Roser, Ritchie & Hasell, 2020).

In the following, mainly summer months, we witnessed the relaxation of epidemic containment measures in EEE countries, and saw their governments officially putting an end to the state of emergency in May (e.g., Czechia, Romania) and June (Hungary) 2020 (Dascalu, 2020; Karáth, 2020). Then, the end of 2020 was marked by the severe reappearance of new and more transmissible strains of the virus in the entire EEE. This led to a dramatic resurgence of the infections and an increase in deaths due to the Covid-19 in October, November, and December. As we have shown in our analysis, the autumn-winter wave has been much more dramatic, marked with mortality crisis in every EEE country.

The true scale of health and epidemiological crisis in the EEE is reflected in the excess mortality data—in November 2020, Bulgaria, Poland and Slovenia have reported twice as many deaths compared with 2019. For example, in November only, eight EEE countries recorded nearly half of all Covid-19 deaths in 2020 (European Centre for Disease Prevention and Control, 2021a), while their healthcare systems were on the brink of collapse due to the huge number of hospitalisations and severe medical staff shortages. Hospitals in Czechia, Poland, and Romania were running out of capacity in the second wave (end of 2020) (Salzmann, 2020), and a similar scenario was observed in the first months of 2021 (Euronews, 2021). In early 2021, the number of confirmed positive cases fell sharply in all the countries except Czechia and Slovakia, however, in March 2021, daily new cases were once again on the rise especially in Bulgaria, Hungary, and Poland. The very high rates of positive Covid-19 tests—at the end of March 2021 around 30% in Poland and Hungary or around 20% in Bulgaria, Croatia, Romania, and Slovenia—could indicate that cases were probably higher than officially reported. In terms of deaths per capita, Bulgaria, Czechia, Hungary, and Slovakia were among the 10 countries with the highest Covid-19 death rates in Europe at the end of June 2021. Moreover, Croatia, Poland, Slovenia and Romania were only a few places behind.

Healthcare systems in several EEE countries collapsed and were unable to provide appropriate care for conditions unrelated to Covid-19, and that also contributed to increased official death toll. Shortages in the supply of healthcare and, in some countries, travel restrictions, may have added to the transport and transaction costs for using healthcare services, thereby causing additional difficulties in accessing healthcare. Some people may also have forgone care for fear of Covid-19 infection. This fear may have been worsened by misleading public health recommendations or difficulties in obtaining and processing relevant health information. This notion comes from the fact that hospitals as the main suppliers of healthcare sometimes saw the virus spread across hospital units, while patients were discouraged to access hospital services in order to avoid the risk of infection (Lazzerini et al., 2020; Masroor, 2020).

It is important to stress that this pressure on hospitals is related to the considerable rationing of healthcare services for conditions unrelated to Covid-19, and only the most urgent treatments were maintained. For example, the data on hospital system performance in Croatia in 2020 indicate an almost 20% overall reduction in the number of health services provided in 46 public hospitals compared with 2019 (CEZIH, 2021). In addition, total number of visits in family practice in Croatia in April 2020 fell by almost 20% compared with the same month of 2019 (HZJZ, 2021). Similar findings concerning the drop in general practitioner appointments have been found elsewhere (Levene, Seidu, Greenhalgh & Khunti, 2020; Maluchnik, Podwójcic & Więckowska, 2021). In Hungary, there are reports from doctors about drastic cuts in the surgeries performed. According to (Karáth, 2020) study, the government had also ordered "... all hospitals to free up 60% of their beds by discharging non-Covid-19 patients". These trajectories in hospital management and treatment of serious medical conditions raise great concern about the long-term health effects of forced health system lockdowns.

In conclusion, the intense government responses to the pandemic in its early stage helped maintain the low death toll, but significant relaxation during the summer 2020 was probably the main reason for a dramatic increase in Covid-19 cases and deaths in late 2020 and early 2021.

Rapid development of new vaccines against Covid-19 in 2020 is viewed as a key tool to stop the pandemic. The expectations were set high, but many challenges arose in the vaccine distribution to the general population. Once the vaccine was approved by authorities, the progress of the vaccination became the biggest issue. The Covid-19 vaccine rollout began at the end of December 2020 in most of the EEE. The ongoing Covid-19 crisis has highlighted the severe inequality of access to healthcare. Access to vaccines is another striking example. The administration of vaccines in the EEE was uneven—ranging from around 15 doses per 100 people in Bulgaria, to more than 64 doses per 100 people in Hungary by June 2021. The share of people fully vaccinated against Covid-19 by June 2021 ranged from around 12% in Bulgaria to 51% in Hungary (Roser, Ritchie & Hasell, 2021). Further complications in vaccination programs were supported by delays in vaccine imports, lack of organisation and general reluctance to accept some vaccine types or even their suspension (Roser et al., 2021; Wise, 2021). The reasons for such low participation in the vaccination programme are not yet understood completely, but public opinion research confirmed the lowest willingness of people to take a shot in Bulgaria and Romania—two countries with the slowest vaccination rollout.

Governments and experts in the EEE insist on the policy of rapid Covid-19 vaccination, but still face many obstacles in reaching acceptable vaccination rates. Very good initial responses to large-scale vaccination for Covid-19, and high daily numbers of vaccination doses administered are tapering off in several EEE countries. Due to the vaccination slowdown, it is going to be extremely difficult to reach the numbers of fully vaccinated that could enable collective immunity. As the number of vaccinated people is approaching the flat of the curve, the EEE government messages of mandatory vaccination are getting louder. However, to make the vaccination against Covid-19 mandatory will be extremely hard, except maybe for some professions like health or social security sectors. On the other side, many EEE countries failed to fully vaccinate the most vulnerable population groups, the elderly and those with chronic health conditions.

This is an important reason why we analysed the indirect impacts of the Covid-19 pandemic on health status and healthcare use of people aged 50 and over in the EEE. We based our analyses on data from ‘SHARE Corona Survey’ conducted in June and July 2020. We should consider that EEE countries are facing the process of rapid ageing, where persons aged 65+ and those in poor health account for a high share of the total population, and health systems might experience big challenges when it comes to meeting their healthcare needs. Overall, the results indicate that in summer 2020, the indirect health impacts of the Covid-19 crisis were more benign in the EEE than in South-West Europe. In addition, we did not see clear patterns of differences in these impacts across EEE countries.

The Covid-19 crisis is challenging for social security systems, as well. To maintain the measures supporting work and the increased healthcare spending, EEE governments had provided significant financial resources and/or contribution payment exemption, but at the price of rising fiscal deficits and public debt. In addition, several EEE countries addressed the increased burden on health workers in the Covid-19 pandemic. In particular, hefty salary raises were implemented for employees in some hospitals in Poland, and for health workers in Romania. The governments in other EEE countries, for example, in Croatia, Czechia and Hungary, approved bonuses for health workers who were working in hospitals that took care for Covid-19 patients, while Bulgaria secured a monthly premium for both medical and non-medical workers involved in treating patients with Covid-19 (Williams et al., 2020).

We could easily describe the management of the Covid-19 pandemic in the EEE countries as a combination of a ‘progress and regress phase’—successful management in the outbreak (the so-called ‘first wave’) and a regress phase since autumn 2020 (second, third or even fourth wave of the pandemic). In the middle of 2021, and with some time lag from the outbreak in 2020, we realize that the timely implementation of epidemic control measures could be more effective than late lockdown or a wide range of measures. Furthermore, epidemic containment measures targeting specific subpopulations have proven to be more effective compared with synchronized interventions (Di Lauro, Kiss & Miller, 2021). A combination of early interventions and aggressive control is considered to be successful in controlling the Covid-19 transmission (Pei, Kandula & Shaman, 2020) or reduction in hospitalizations and deaths (Huber & Langen, 2020). Therefore, we can argue that earlier interventions by EEE policymakers were responsible for taking control over the pandemic.

Our investigation of healthcare systems, the health status of the population and the responses of the EEE countries to the Covid-19 crisis sheds light on many future challenges that require effective responses from policymakers. Healthcare systems in almost all the EEE countries experienced a huge shock and some of them, although unofficially, were at the edge of collapse at the end of 2020—a scenario that was unknown in their recent history. Special attention should be placed on the most vulnerable groups within the population, for example, older adults, people with chronic health conditions and those in a poor socio-economic situation. For example, a bad economic situation, poor overall health, and higher healthcare utilisation among Europeans aged 50+ were robust predictors of unmet healthcare in the Covid-19 outbreak. In addition, stricter containment and closure policies were associated with more medical services being postponed (Smolić, Čipin & Međimurec, 2021). Finally, based on our research, there are four main policy implications from this chapter:

First, we have seen that the utilization of healthcare services was lower due to the pandemic, and this indicates that many people experienced barriers in accessing healthcare. In addition, we have shown that the population's current health status in the EEE is quite challenging—SMRs from all causes are well above the EU28 average, and life expectancy at birth follows a similar pattern with major socio-demographic inequalities. Healthcare systems in the EEE are fragmented, hospital-focused, poorly financed, and suffer from a shortage of health professionals. These are not favourable 'initial health conditions' and could determine the resilience and long-term recovery of population health from the Covid-19 crisis in most EEE countries. Policymakers should take this message seriously and buffer potential medium and long-term unwanted effects of the Covid-19 pandemic for the most vulnerable groups. Healthcare systems might experience a great revival in healthcare demand following the pandemic, and this challenge should be addressed efficiently in order to prevent an increase in health inequalities. Healthcare systems should expand capacities for treatment of patients with post-Covid-19 conditions. Separating Covid-19 patients from mothers should be another priority, for example, organising separate Covid-19-related units, establishing 'mobile' hospitals for Covid-19 patients, and increasing overall healthcare flexibility.

Second, policymakers should reconsider the shape of healthcare systems that have been hit by the Covid-19 crisis and its major implications on hospital healthcare in the future. An optimal model could be achieved within the studies based on scientific evidence. Third, policymakers will have to find solutions to deal with vaccination stagnation and try to attract the millions of people who have not had their first shot yet. The vaccination, however, is not the sole event that reveals the general issue of trust in governments and institutions—a problem that is much deeper in the EEE. Finally, policymakers should put greater emphasis on a more proactive, public health-focused functioning of healthcare systems and less on cure-focused (and much expensive) hospital care, even though hospital capacities played a crucial role in the Covid-19 crisis.

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Chapter 9
Aging and Pension Systens

András Simonovits and Ádam Reiff

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Abstract Max 200 words – Abstract for the book

9.1 Introduction

Population aging and working of a pension system are long-term processes. Nevertheless, a shock like the Covid-19 pandemic may have an important impact on them, through economic crisis and changes in migration. Analysing this topic, we shall focus on Emerging European Economies (EEE)[1] which in aggregate are only a small part of EU27 and EEE is less developed than the core EU.

There is a huge literature on the post-1990 development of the region but !! in addition to Chapter 1!!, we only refer to Medgyesi and Tóth (2021) which is a rather comprehensive and up-to-date review. There are very good surveys on the aging and pension systems in general, and in EEE in particular. The main problem of the latter is that after 30 years of post-communist development, the corresponding populations live shorter than the core EU's populations, including the poorer ones, and their

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[1] We enlist the following countries into this group: Bulgaria, Croatia, Czechia, Hungary, Poland, Romania, Slovakia and Slovenia.

fertility is rising slowly. The EEE have reached or even surpassed the development level of the poorest old EU countries, and their labour markets left behind the deep recession after the regime change.

The EE countries have modernized their public pension systems as well. Except for Czechia and Slovenia, they have partially privatized their monopillar but during or after the Great Recession of 2007-2010, some of them (Hungary and Poland) renationalized their second pillars, while others (Romania, Slovakia) have kept it.

The Covid-19 interrupted the economic growth of these countries as well. In 2020, the GDPs declined by 2.7-8%, despite massive government intervention and even if normalcy returns to the mid or late 2021, the impact will remain for a while. Looking ahead, the future of the pension systems of these and other countries was dark already before the pandemics: the rising retirement age can offset the impact of rising life expectancy but cannot help on low fertility and emigration. The short-run impact of the Covid is unfavourable: unemployment is rising, employment is dropping and pension expenditures cannot be reduced. The public finances are strained by the deep recession. We expect no important changes in the long-term functioning of these pension systems.

Pension policy can improve or make worse the pension system. Rising retirement age is an improvement in general but if it is achieved by the combination of rigid and lax rules (e.g. Hungary, 2011–), then it is of dubious value. The strengthening of the link between lifetime contributions and lifetime benefits is promising in general but if it is coupled with heterogeneous life expectancies that depend heavily on lifetime contributions, then it is unfair. Due to lack of reliable information, this study will skip this aspect.

The structure of the remainder of the Chapter is the following. Section 2 discusses aging in EU in general and in EEE in particular. Section 3 gives an overview on the pension developments between 1990 and 2019. Section 4 presents pre-Covid forecasts on aging and pension systems, and discusses the assumptions behind these forecasts. Section 5 evaluates the probable impact of Covid-19 on the future population aging and pension systems. Section 6 concludes.

9.2 Aging in EU and EEE

Population aging can be defined as a significant rise in the share of old-age population. It has three causes: (i) drop in the total fertility rate; (ii) rise in life expectancy and (iii) age-dependent emigration rate.

- *Drop in Total Fertility Rates.*[2] Before the regime change around 1990, in EEE, TFR was everywhere near or above 2, while in the EU-15, it oscillated between low and high values. After the regime change, TFR has declined in every EE

[2] The *total fertility rate* is the average number of children born to a typical female during her lifetime. *Period* TFR refers to the average number of children born in a given year, *cohort* TFR refers to the corresponding average by females of a given cohort.

country well below 2, while in several countries of the core EU, it rose above 1.6, sometimes close to 2 (e.g. France). The past and the future development of TFR in EEE is displayed in Table 9.1. There is a hope that after 2030 it will reach 1.6–1.7 and then it will rise a little bit further.

Table 9.1: Past trends and projections of total fertility rate
Source: European Commission (2021). * The 1985 data refers to 1980.

Country	1985	2019	2030	2050	2070	2100
Bulgaria	1.97	1.58	1.65	1.70	1.71	1.73
Croatia*	1.90	1.47	1.48	1.54	1.59	1.68
Czechia	1.95	1.71	1.75	1.78	1.78	1.78
Hungary	1.85	1.55	1.61	1.69	1.70	1.71
Poland*	2.28	1.44	1.40	1.49	1.56	1.65
Romania	2.31	1.77	1.66	1.72	1.74	1.76
Slovakia	2.26	1.57	1.59	1.63	1.67	1.73
Slovenia	1.71	1.61	1.59	1.65	1.68	1.72
EU27	1.99	1.53	1.55	1.61	1.65	..

- *Rise in Life Expectancy.* After a long stagnation and eventual drop in the 1990s, and with a large gap with EU-15, especially for males, life expectancy at birth (LE0) started to rise steeply in EEE (Figure 7 in Chapter 1 depicts the development of LE in EEE and compares it with Austria and Sweden). But this indicator reflects early as well as late death, therefore other indicators, something like life expectancy at old age is better to analyze aging.[3] Therefore we shall consider life expectancy at age 65 (LE65, relevant for old-age retirement), which also rose, and is forecasted to rise further (Tables 9.2 and 9.3, respectively).[4] For example, for the males of the shortest and longest duration, Bulgaria and Slovenia, between 2019 and 2100, the indicator will rise from 14.2 and 18.1 years to 24.8 and 25.7 years, respectively. For females, this indicator is even higher than for males. At the two extremes, Bulgarian and Slovenian females are expected to live another 27.9 and 29.1 years as retirees in 2100 with respect to 18.1 and 21.8 years in 2019, respectively. We shall not analyse the health sector in detail !!(for details, see Chapter 8)!!, but we

[3] The *life expectancy at age a in year t* is the expected number of years lived by those who were a years old in year t if the age-specific mortality remained constant. In reality, mortality is decreasing, therefore the foregoing indicator is the average ages at death in year t. The same distinction is to be made between period and cohort LEXP as between period and cohort TFR.

[4] In order to ensure easy comparability, this chapter frequently uses a uniform retirement age of 65 for constructing demographic, labour market and pension system indicators. As a first approximation, we also assume that the age of separation from the labour market coincides with retirement into the pension system—again, both at 65. In principle, one may determine a dynamic age which separates working- and old-age populations but it is quite a demanding task.

mention that it is closely connected with aging and pensions. The healthier the population, the longer the citizens live and the later they can and should retire.

Table 9.2: Past trends and projections of life expectancy at 65, males, years. Source: European Commission (2021).

Country	1990	2019	2030	2050	2070	2100
Bulgaria	12.7	14.2	15.9	18.8	21.4	24.8
Croatia	..	15.9	17.2	19.7	22.1	25.0
Czechia	11.7	16.4	17.8	20.3	22.5	25.3
Hungary	12.1	14.8	16.4	19.3	21.9	25.1
Poland	12.4	16.1	17.6	20.2	22.6	25.5
Romania	13.2	14.9	16.5	19.5	22.1	25.3
Slovakia	12.3	15.7	17.0	19.7	22.1	25.2
Slovenia	13.3	18.1	19.2	21.3	23.2	25.7
EU27	..	18.3	19.7	21.6	23.5	..

Table 9.3: Past trends and projections of life expectancy at 65, females, years. Source: European Commission (2021).

Country	1990	2019	2030	2050	2070	2100
Bulgaria	15.2	18.1	19.6	22.3	24.7	27.9
Croatia	..	19.5	20.7	23.1	25.3	28.1
Czechia	15.3	20.1	21.3	23.6	25.7	28.4
Hungary	15.4	18.6	20.2	23.0	25.4	28.4
Poland	16.2	20.4	21.8	24.3	26.2	28.8
Romania	15.2	18.6	20.1	22.9	25.4	28.4
Slovakia	16.0	19.7	20.8	23.4	25.7	28.5
Slovenia	17.1	21.8	23.0	25.0	26.8	29.1
EU27	..	21.8	23.0	25.0	26.8	..

- *Age-dependent emigration.* The effects of aging on a country's demographic structure may be modified by age-specific migration balances which varies greatly across countries and time periods, depending on whether a country, in a given period, is a source, transit route or a destination. During the last one or two decades, a significant share of the population of EEE left and others from non-

EU countries arrived. Among the EE countries, Bulgaria, Croatia, Poland and Romania were hit especially hard by this process. Although estimates are very uncertain for emigration, for these countries the population share which emigrated is usually estimated to exceed 10%. As emigration mostly affects the working-age population, large-scale emigration can also contribute to population aging.

Table 9.4: Past trends and projections of share of working age population (20-64), %.
Source: European Commission (2021).

Country	1990	2019	2030	2050	2070	2100
Bulgaria	59.2	59.8	57.0	51.1	50.8	49.8
Croatia	..	60.0	56.8	53.0	50.7	49.6
Czechia	57.9	60.1	57.4	51.9	52.0	50.7
Hungary	58.8	61.1	59.2	53.6	51.7	50.4
Poland	57.4	62.2	58.6	53.5	50.1	49.2
Romania	57.9	60.5	58.8	51.5	50.7	50.1
Slovakia	56.3	63.4	58.8	52.6	50.2	49.2
Slovenia	61.2	60.6	56.8	51.5	51.7	50.4
EU27	..	59.4	56.6	52.0	51.2	49.9

The *share of the working-age population* will decrease and that of the old will rise (Tables 9.4–9.6). Table 9.4 shows the decline of the *share of working-age population*, starting from slightly higher values in EEE than in EU.[5] Confining attention to the two initial extremes, the Bulgarian and the Slovenian shares decrease from 59.2 and 61.2% in 2019 to 49.8 and 49.2% by 2100, respectively. The *share of old-age population* (above 65) may double from 2019 to 2100 in the developed world, including EEE. According to Table 9.5, again, the Bulgarian and Slovakian indicators increase from 21.3 and 16.0% in 2019 to 31.7 and 32.0% in 2100, respectively. The EU average rises similarly, from 20.2 to 31.3%.

The *share of very old within the old-age population* (i.e. above 80 to above 65) has steeply risen and will continue rising in the world in general and in the EEE in particular (Table 9.6). The (initially) lowest and highest ratios of Slovakia and Slovenia will grow from 20.6 and 26.8% in 2019 to 46.6 and 47.3% in 2100, respectively, and in all EEE will be close to the projected EU average 46.6% (2100).

From the point of view of the pension system, the *old-age dependency ratio*, the ratio of citizens above 65 and that of between 20 and 64 is a very important factor.[6]

[5] Note that during the demographic transition, the share of the third category, namely that of children may decrease so fast that both other shares rise at the same time.

[6] Obviously, OADR is by definition equal to the ratio of the old-age share to the working-age share.

Table 9.5: Past trends and projections of share of old-age population (65+), %.
Source: (European Commission, 2021).

Country	1990	2019	2030	2050	2070	2100
Bulgaria	13.0	21.3	24.3	30.7	31.0	31.7
Croatia	..	20.6	25.1	30.2	32.7	32.9
Czechia	12.5	19.6	22.0	28.2	28.0	29.4
Hungary	13.2	19.3	21.6	27.7	29.6	31.0
Poland	10.0	17.7	22.7	30.1	34.0	33.9
Romania	10.3	18.5	21.8	30.6	31.5	31.7
Slovakia	10.3	16.0	20.9	29.4	31.7	32.0
Slovenia	10.6	19.8	24.4	30.7	30.5	31.3
EU27	..	20.2	24.2	29.5	30.3	31.3

Table 9.6: Past trends and projections of the share of very old within the old, 80+/65+, %.
Source: own calculations from the projections of European Commission (2021).

Country	1990	2019	2030	2050	2070	2100
Bulgaria	16.2	22.5	26.7	31.3	44.8	46.1
Croatia	..	25.7	25.5	35.4	41.3	46.2
Czechia	19.2	20.9	29.1	30.5	45.0	45.2
Hungary	18.9	22.8	26.9	30.7	40.9	44.8
Poland	20.0	24.9	25.1	32.2	45.9	48.4
Romania	16.5	25.4	26.1	33.0	45.4	46.7
Slovakia	19.4	20.6	23.0	30.3	45.7	46.6
Slovenia	20.8	26.8	27.0	36.5	45.2	47.3
EU27	..	28.7	29.8	38.3	43.6	46.6

Table 9.7 displays the relevant time-series of old-age dependency ratios. In 2019, Bulgaria had the highest value: 35.7%, while Slovakia had the lowest: 25.3%. At the end of our forecast period, in 2100 both will be around to 64-65%, while some other countries may reach a lower value (Czechia is projected to have a ratio of 58% in 2100). The EU average in 2019 was close to the highest EEE ratio (Bulgaria), but by 2100 it is projected to stay below the EEE average.

Labour markets since transition. During the state-socialist system, with the exception of Croatia, there was full employment. After the collapse of the state-socialist system, the transformation inevitably led to the contraction of the labour

Table 9.7: Past trends and projections of old-age dependency ratio, %.
Source: (European Commission, 2021). The old-age dependency ratio is defined as a percentage of population aged 65 and more, relative to population aged between 20 and 64. (65+/(20-64))

Country	1990	2019	2030	2050	2070	2100
Bulgaria	21.9	35.7	42.6	60.0	61.0	63.8
Croatia	..	34.3	44.1	56.9	64.5	66.3
Czechia	21.5	32.6	38.4	54.4	53.8	58.0
Hungary	22.5	31.6	36.5	51.8	57.4	61.4
Poland	17.3	28.4	38.7	56.2	67.9	68.9
Romania	17.8	30.6	37.1	59.4	62.1	63.2
Slovakia	18.3	25.3	35.6	55.8	63.3	64.9
Slovenia	17.3	32.7	43.0	59.6	58.9	62.2
EU27	..	34.1	42.7	56.7	59.1	62.7

force. It took decades when the low employment and huge unemployment rates have been normalized. In addition, early and extended disability retirement expended.

9.3 Pension Systems of EEE, 1990–2019

9.3.1 Public Finance

Before turning to the pension systems, it is worth discussing the present and the future of the public finances. The public debt ratio and the public deficit ratio are the two most important indicators of public finances. In the EU, they had corresponding upper limits: 60 and 3% in terms of the GDP. In contrast to old EU countries, the EE countries generally satisfied these two limits, except for Hungary and Croatia (see Figures 23 and 24 in Chapter 1). But the Great Recession raised these indicators close to the limits and the Covid-19 will further undermine the public finances in countries of both groups.

In connection with pension systems, the issue of explicit and implicit public debt is important. Explicit public debt is reported, while implicit public debt is calculated as the present value of future public pension obligations. There has been a heated debate whether the accumulated wealth of mandatory private pension pillar should be deducted from the explicit public debt or not. As will be clearer, introduction of a mandatory private pension pillar shifts a significant part of the implicit debt into the explicit one, while its phasing out just reverses this process. The measurement of implicit pension debt is not very reliable.

9.3.2 Pensions

History. Despite our concentration on the future of the pension systems, we have to discuss briefly their past and present. When public pension systems have emerged in Europe between 1890 and 1950, the old-age dependency ratio was very low, the *replacement rate* (first benefit/last wage) or *benefit ratio* (average benefit/average wage) was quite modest, therefore the public pension burden was rather low. With population aging and adequacy requirement rising, the public burden (on public health as well as pension) has become substantial.

Continental vs. Anglo-Saxon countries: The so-called continental countries basically operated a monopillar public pension system, while other countries (US, UK but also Northern countries and Switzerland etc.) added a private pillar.

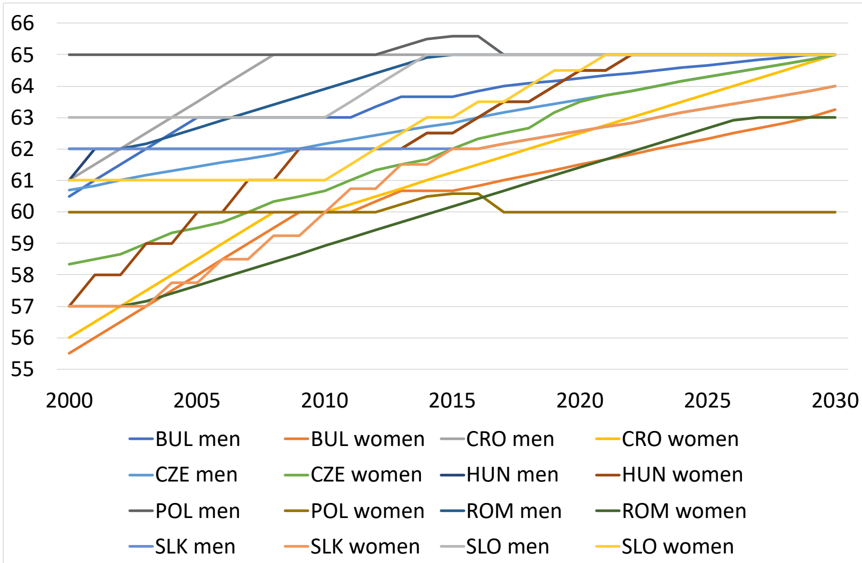
There are two pure types of public pension systems: (i) *flat* benefit and (ii) *earnings-related (or proportional)* benefits. In the former, the monthly benefit is independent of the individual earnings, while in the latter, the benefit is proportional to the individual earnings, averaged for shorter or longer periods. Between these two types, there is a continuum of *progressive* systems (Disney, 2004). Except for Czechia, the public pension systems in EEE are weakly progressive in the traditional sense and may be regressive on a lifetime basis.

There is another dimension of pension systems typology: *Defined Benefit* (DB) and *Defined Contribution* (DC). In a DB system, the benefit is preset and independent of the actual contributions, while in a DC system, the actual contributions define the benefit. A special version of DC is the so-called NDC (Nonfinancial DC), where the annual benefit is equal to the ratio of the accumulated nonfinancial assets divided by the remaining life expectancy.

Complications. The correlation between life expectancy and lifetime income strongly influences the sum and the distribution of lifetime pension benefits. Typically, the higher is the lifetime income, the longer is the life expectancy, especially for males. This long neglected topic eventually attracted the attention of leading experts: e.g. National Academies of Sciences, Engineering, and Medicine and Committee on Population and others (2015), Bosworth, Burtless and Zhang (2016), Chetty et al. (2016), Auerbach et al. (2017), Ayuso, Bravo and Holzmann (2016), Lee and Niguel (2019), but it hardy affected the literature on EEE pension system.

Normal retirement age is the age at which the members of a cohort can retire with normal benefits. Figure 9.1 displays the rise in normal male and female retirement ages between 2000 and 2030. The *flexibility (or variability) of retirement age* is also an important issue. In most countries, workers can choose their retirement age freely within limits, but there are countries with rigid retirement ages. In the former case, the delayed benefit increases, the earlier benefit diminishes with the deviation from the norm. We speak of *seniority pensions* when a sufficiently long career length allows workers to retire with no or small deduction below the normal retirement age. *Partial (or flexible) retirement* means that a worker partially retires while partially works and his pension reflects this process. The idea is attractive but hardly any country has applied it on a large scale.

Fig. 9.1: Rise in normal retirement ages in EEE, 2000-2030



Another neglected topic is *fragmented careers*, which complicates the impact of rising retirement ages on pension finances, both on the revenue and on the expenditure side (Augusztinovics, Köllő, Gál, Iwasaki & Széman, 2008). Seniority pensions (especially for females) are quite widespread in a number of countries, and this may turn the usually positive correlation between the retirement ages and lengths of career into negative (Granseth, Keck, Nagl, Simonovits & Tir, 2019)

9.3.3 Pensions in EEE

Analysing pension systems in the EEE, we have to separate the past and the future. The past is divided by the Great Recession around 2009. Fultz (2002) and (Kenichi, 2011) give a comprehensive description of the topic before 2009, while Drahokoupil and Domonkos (2012), Domonkos and Simonovits (2017); Fultz and Hirose (2019) discuss developments after 2009. Note that in a well-designed public finance system in general and in a public pension system in particular, economic acceleration and deceleration activate the automatic stabilizers. For example, fast real growth increases tax revenues and diminishes government expenditures, and therefore fiscal policy becomes countercyclical. Similarly, in the upswing, the pension system collects relatively higher revenues and spends relatively less on benefits. In poorly designed systems, the opposite occurs and the system is procyclical.

Due to the state-socialist heritage, the old-age pension systems were monopillar in the EEE until 1998 with rather progressive benefits–wages-schedules. As there was no (official) unemployment and inflation was generally low, this made the quite primitive pension design sufficient.

Returning to a topic mentioned earlier, Table 9.8 displays the life expectancy–pension-schedule of Hungarian males, died in 2012 (Molnár & Marosi, 2015). The table divides the pensioners into four equal classes or quartiles, according to their pension benefits. For example, pensioners in the first quartile (whose last year's average pension benefit was equal to 62% of the average pension) live only 17 years as pensioners, while the richest quartile (whose last year's average benefit equaled 152% of the average pension) live another 21 years in retirement on average.

Table 9.8: Male life expectancy and pension, Hungary, 2012
Souce:(Molnár & Marosi, 2015), Tables 1 and 2.

Class of benefits	Relative benefits (%)	Life expectancy at 60 (years)
1	61.9	17.1
2	81.1	18.3
3	105.0	19.5
4	152.0	21.1
Average	100.0	19.0

During the deep recession after the regime change, the employment rate steeply declined, unemployment emerged and gray economy became widespread in this region. Following the general practice of mature market economies in the stagflation period of 1973–1984, in several EE countries, the governments tried to fight mass unemployment with generous early and disability retirement schemes just to discover that such a policy made employment quite expensive. (Artificially enlarged early and disability retirement systems required a rise in the contribution rates and slowed down the necessary labour market restructuring.) Moreover, the gap between the demographic and economic (system) dependency ratios widened. In sum, long-term aging and slow economic recovery have made the pension system financing quite problematic.

World Bank (1994) suggested carving out of the *mandatory private pillar* to increase participation and avoid the impact of aging on pensions for every country in general and for ex-socialist countries in particular. For a number of years, this was conceived as a miracle weapon which solves most if not all the problems, in both the mature and the emerging market economies. The initial idea was that everything which is private is better than anything which is public. Another conceived advantage of privatization was the prefunding of the system. Forgetting about, or at least downsizing the problems of transition, many experts and politicians acted on the premise of *dynamic efficiency*: the real rate of interest is higher than the growth rate of the output or wages. Even if this were true, the presumed saving would be spent on debt financing during the transition.[7] We only mention few papers on the topic. World Bank (1994) , Feldstein (1998), Feldstein (2005) supported privatisation; Müller (2004), Orszag and Stiglitz (2001) , Diamond (2004), Barr and Diamond (2008) were against it; while Holzmann and Stiglitz (2001) were in between.

Following the World Bank's suggestions, a number of EE countries introduced so-called second pillars before the Great Recession. For example, the EEE-pioneer in the introduction of this system, Hungary had 75% membership by 2010, and 24 vs 8% of the gross wage was paid to the first (public) and the second (private) pillars, respectively. Other countries had different frameworks, and Czechia and Slovenia had no second pillar at all. During the Great Recession, the majority of EE countries which had a second pillar considered the suspension or the closing down of this institution, to ease the fiscal pressure (Drahokoupil & Domonkos, 2012; Fultz & Hirose, 2019); Chapter 6. Hungary acted first and closed down the second pillar (Simonovits, 2011). Table 9.9 presents the contribution rates to the second pillar at three dates: at the start, in 2007 and in 2018. It can be seen that in some countries (e.g. Bulgaria) the starting rate was lower than the peak value, but in other countries (e.g. Slovakia) only the final value is lower.

Table 9.9: Second pillar's changing contribution rate, %.
Source: (Fultz & Hirose, 2019) p. 5, Table 1. Czechia and Slovenia had no second pillar.

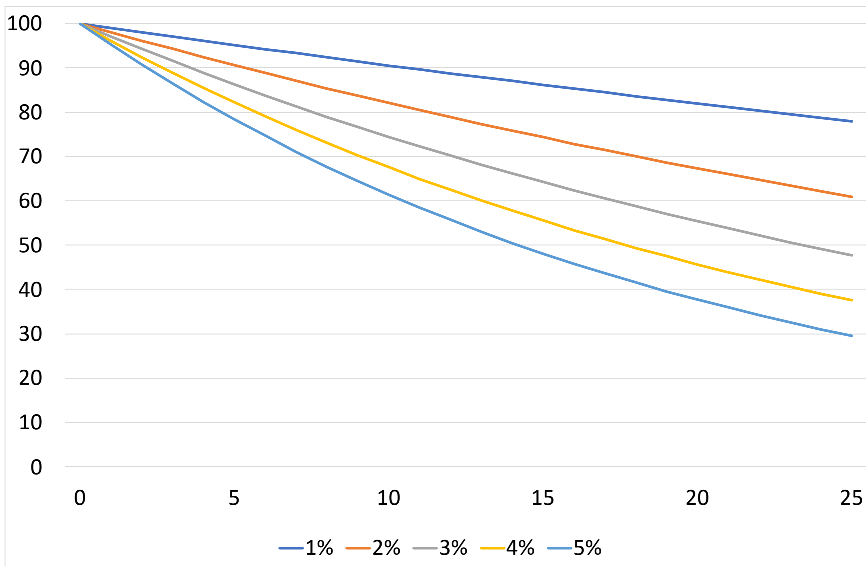
Country	Start	Contribution rate		
name	date	at start	in 2007	in 2018
Bulgaria	2000	2.0	5.0	5.0
Croatia	2007	5.0	5.0	5.0
Hungary	1998	6.0	8.0	0.0
Poland	1999	7.3	7.3	2.3
Romania	2007	2.0	2.0	3.75
Slovakia	2004	9.0	9.0	4.5

To contain the most destructive impact of the newly emerging inflation, the calculation of *initial pension* was modernised in the 1990s, i.e. the reference period was radically extended from years to decades and the *benefits in payment* was indexed. The various governments experimented with various combination of indexation

[7] During the decades of transition when workers pay part of their contributions to their private accounts, and these contributions cannot finance the current pensioners of the first (state) pillar, the government has to finance the pension system from external sources, e.g. with increased budget deficit.

to prices and to wages, but the complex effects have not been well understood.[8] For example, a number of governments have only seen the replacement of wage indexation by price indexation as a tool of reducing total pension expenditures without realizing the consequence that the relative benefits of the very old decrease significantly (Figure 9.2, taken from (Kenichi (2011), Figure 1.4)).

Fig. 9.2: Devaluation of older to the initial benefits



The other side of the coin, namely the sustainability of the pension system was based on a permanent rise in the normal retirement age. As a result of rising normal retirement ages, the average retirement ages also rose but some governments in certain periods allowed workers with longer contribution periods to retire earlier without penalty (Auerbach & Lee, 2011).

Another important aspect of the pension system is the heterogeneity of wages and benefits. If the pension system is proportional, i.e. annual benefits are proportional to lifetime wages, then wages and pensions are equally heterogeneous. There are, however, countries, where higher wages imply higher but proportionally lower benefits (progressive pension system). Table 9.10 displays the *replacement ratios* for various wage categories and the size of the public pension system in five countries, two of them EEE, three other are not. The first one, Czechia, has a strongly progressive pension system, while the second, Hungary has a proportional system. Typically, the progressive pension systems are smaller than the proportional ones, but not in this case.

[8] () gives a detailed analysis of indexation in Hungary from 1990 to 2018.

Table 9.10: Progressivity of benefits and size of the public system, 2000, %. Source: (Simonovits, 2003), Table 4.5

Country name	Replacement rate for earnings			Pension system type	Total pension /GDP
	Half	Average	Double		
Czechia	81	49	28	progressive	9.6
Hungary	78	79	73	proportional	9.5
Germany	76	72	75	proportional	12.8
Great Britain	72	50	35	progressive	4.4
Netherlands	73	43	25	progressive	5.2

Table 9.11 shows the same problem with a narrower wage distribution and adding other OECD EE countries.[9] Czechia stands out with an almost flat benefit system, while Poland betrays a particularly low replacement ratio. The remaining Hungarian and Slovakian schedules are almost linear, and indicate quite high replacement.

Table 9.11: Net replacement ratios for various wages, %. Source: (OECD, 2018)

Country name	Relative wages		
	0.5	1	1.5
Czechia	91.6	60.3	47.9
Hungary	84.3	84.3	84.3
Poland	35.9	35.1	34.7
Slovakia	71.7	65.1	63.3
Slovenia	62.8	57.5	53.7
OECD	68.3	58.6	54.7

Note that in addition to income replacement, the second function of any public pension system is *poverty relief*. In the Anglo-Saxon tradition, this is ensured by a quite progressive public pillar, while in the continental tradition, wage policy and other measures lead to adequate minimal benefits. Table 9.12 compares old-age poverty rates with general poverty rates in EEE. The official figures are quite low.

Table 9.13 shows the *ratio of time spent* in retirement vs. in work for cohorts entering and leaving the labour force.[10] It is easy to see that the stabilization of this ratio helps to sustain the pension system. It turns out that this ratio is and will be

[9] Bulgaria, Croatia and Romania are not members of the OECD.

[10] The cohort entering the labour force in 2020 will leave it around 2070.

Table 9.12: Overall and old-age poverty rates, %.
Source: (OECD, 2018), Figure 1.11.

Country	Poverty rates	
name	old-age	overall
Czechia	4.5	5.6
Hungary	5.2	7.8
Poland	9.3	10.3
Slovakia	4.3	8.5
Slovenia	12.3	8.7
OECD	13.5	11.8

around 1/3, though Hungary and Poland are below: 28.0% and 28.6% (2020), and Slovenia will be above: 39% (2070).[11] Note that this indicator is only relevant if the TFR is close to 2.

Table 9.13: Share of time spent in retirement of adult lifetime, %.
Source: (OECD, 2018), Figure 1.7. The ratios are calculated for cohorts entering and leaving the labour force.

Country	Ratio for cohort	
name	leaving	entering
Czechia	31.0	33.7
Hungary	28.0	31.7
Poland	28.6	32.9
Slovakia	30.5	33.4
Slovenia	35.0	39.0
OECD	32.0	33.6

Table 9.14 displays the *earliest retirement age* at the moment. Typically, this threshold is several years lower than the normal retirement age, though in Hungary and Poland the two ages are the same. It is outside the scope of this paper to judge whether this is sensible or not.

Table 9.15 shows the future *net replacement rates*, defined as the ratio of the first benefit to the last net wage. They vary from Poland's 35% to Bulgaria's 89%, undermining the sensibility or the political sustainability of these measures.

[11] (Gál & Radó, 2019) showed how the rise in exit ages has prevented the lengthening of the time spent in retirement in several EE countries.

Table 9.14: Earliest male retirement ages in EE countries, 2018, years.
Source:(OECD, 2018), Figure 1.12. Earliest retirement ages in Hungary and Poland are the same as the normal retirement ages.

Country	EAR (yrs)
Czechia	60.0
Hungary	63.5
Poland	65.0
Slovakia	60.2
Slovenia	60.0

Table 9.15: Future net replacement rates for full-career average-wage workers, % .
Source: (OECD, 2018), Figure 1.13. First mandatory benefit to last gross wage.
Mandatory + voluntary for OECD: 65.4% .

Country	Replacement rate
Bulgaria	89.3
Croatia	53.8
Czechia	60.3
Hungary	84.3
Poland	35.1
Romania	41.6
Slovakia	65.1
Slovenia	57.5
OECD	58.6

The Great Recession originated in the US in 2007 and reached the EU in late 2008, necessitated a drastic government intervention. Those countries (e.g. Greece and Hungary) which had been heavily overindebted, had to reduce rather than enlarge their public pension expenditures. To make room for counter-cyclical interventions, other countries also reduced the contributions paid into the newly created second pillars. Normal retirement ages were further increased and early retirement was curtailed.

It is interesting that pensioners' poverty has not increased, at least according to the official data. Knowing the country specifics it is difficult to accept that poverty is highest in Slovenia (Table 9.12). (Figures 15 and 17 in Chapter 1 give informative pictures on the paths of inequality measures as the 80/20 ratio and poverty, respectively.

9.3.4 Country Specifics

Kenichi (2011) contains detailed country-studies but they have probably lost their relevance for the present and the future. It would be desirable to create a framework to evaluate the foregoing countries' specifics but for the moment we only follow the country-appendices of the Aging Report 2021 (European Commission, 2021). Table 9.16 summarizes the main characteristics. Here we concentrate on the structure of the system, the contribution rates and the requirements of retirement. It is quite surprising that—unlike mature market economies—no EE country operates a fully fledged variable (flexible) retirement age, they require long contribution periods, often with positive gender discrimination.

Table 9.16: Characteristics of EE countries
Source: (European Commission, 2021)

Country	Mixed or pure	Type of public pillar
Bulgaria	M	proportional
Czechia	P	DB, progressive
Hungary	P	DB, almost proportional
Poland	M	NDC
Romania	M	proportional
Slovakia	M	weakly progressive
Slovenia	P	proportional

- *Bulgaria* is far the poorest county in the EEE. It has lost a huge part of its population through emigration. Bulgaria operates a three-pillar system since 2000. The total pension rate 19.8% is distributed between the employees and employers as 11+8.8%, with a varying second-pillar rate (5% in 2019), and a point-system in the first pillar. The normal retirement age for females/males is equal to 61.33/64.17 years, and the corresponding minimal contribution years are 35.67/38.33, respectively. Pensioners can retire with shorter contribution periods if they are older than 66.33 years.
- *Croatia* joined the EU only in 2013, below the EE-average of GDP-per capita. It has lost a huge part of its population through emigration. It has introduced the second pillar in 2007. Those born between 1953 and 1962 were free to choose between joining the mixed system or staying in the monopillar one. Originally the system favored the stayers but then it was harmonized. Still, as late as 2016, 99% of the would-be retirees returned to the monopillar, which pays benefits according to a point system. The female normal retirement age is only 62.5 years, and it will rise to 65 by 2030, while the male counterpart is already 65 years. If a worker has

at least 41 years of contributions, he/she can retire without any reduction, having reached 60/57.5 years. Otherwise, he/she can opt for early retirement with a mild reduction: 0.2%/month for 5 years below the normal retirement age if he/she has a minimum period of 35/32.5 years, and the delayed retirement credit is also too low: annually 4.08%.

- *Czechia* is one of the most developed countries in the EEE. It is the only EE country which attracted a large mass of guest workers without losing its own workers and has the highest employment rate (around 75%). Its contribution rate is broken down as 6.5+21.5% between employees and employers, which is unhealthy, because the second part is less visible than the first. Its public pension system is strongly progressive, despite not having a sizable private pension system: marginal replacement rate is 100% below 44% of the pension base, 26% between 44 and 400%, and zero above 400%. Theoretical arguments would suggest that at least the higher earners would have entered the proposed second-pillar to get rid of part of the redistribution, but nothing similar happened. Pension indexation is mixed: wage growth gets a 30% weight, and inflation gets 70%. The normal retirement age is relatively low: 61.2 vs. 63.5 years. The system allows for early retirement if the retiree has at last 35 years of contributions and even normal old-age retirement requires 30 years of contributions.
- *Hungary*[12] has an average GDP/capita in the EEE. It has recently lost a significant part of its labour force because of emigration, but it also increased its employment rate from 55% in 2010 to around 70% in 2020 mostly through a social public work system. Its pension system is defined benefit (DB) but gradually eliminates any redistribution, except redistribution from longer employment towards shorter ones. The pension contribution rate is dropping quite fast, currently about 10+10=20%.[13] Since 2011, there is practically no second pillar (Simonovits, 2011); since 2013, there is no progressive personal income tax, and no cap on contributions. Furthermore, the interval of reference wages where the benefit is less than proportional (progressive) is rather limited, but since its thresholds are defined in nominal terms, with strong nominal wage increases progression becomes more and more important. The rigidity of retirement age is combined with a very generous seniority system (Female 40, where women with at least 40 years of eligibility can retire before reaching the normal retirement age without any deduction).[14] Officially, the 13th month pension—proportional for individual pensions—is in the process of rebuilding between 2021 and 2024 just to help the pensioners suffering from the Covid-19.

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[12] For an early analysis of the Hungarian pension system, see Augusztinovics et al. (2002); for a fresh up-date see (Freudenberg, Berki & Reiff, 2016)

[13] 10% is the employee's contribution, and out of 15% employer's contribution, around two-third (or 10% of the gross wage) goes to the pension fund.

[14] As benefits in progress are increased with a pure price indexation rule, when real wage growth was remarkably large in the second half of the 2010s a large part of those participating in the Female-40 program lost rather than gained from it, not only on a monthly but also on a lifetime basis (Simonovits, 2019).

- *Poland* has an average GDP/capita in the EEE. While it has exported a huge share of its workforce to the West, it attracts an impressive share of immigrants. Poland has an NDC system, implying a sustainable but inadequate public pension system and its second pillar is being phased out.[15] The current distribution of the contribution rate is 12.22+4.38+2.92% for the pure and mixed first pillar plus the second pillar, respectively. The Polish government also introduced a 13th month pensions but with a uniform benefit, cc. 250 EUR (in 2020). Now the female and male normal retirement ages are equal to 60 and 64 years, respectively but its application is quite loose.
- *Romania* was one of the poorest countries in the region but it has recently been catching up even if relying too much on foreign loans. It has also lost a huge part of its population through emigration. Romania introduced the second pillar quite late (2007): it was optional for those who were between 35 and 45 years, mandatory for younger and excluded for older workers. The Romanian government preserved the second pillar for the moment but due to the Covid-19, 0.4 million workers returned to the monopillar between January and August of 2020. Its pension policy is sometimes hectic, e.g. the governments promised a 60% hike in the average benefits from 2018 to 2020, though this promise has just been withdrawn. Normal retirement ages are 63 and 65 years for females and males, respectively. Early retirement is allowed but reductions are quite large: 45% if somebody retires 5 years early. Reduction decreases with the length of extra contributive years above 35 years.
- *Slovakia* was much poorer than its sister country before 1990, but is converging to Czechia in terms of economic development. Until 2004, it had a very progressive pension system á la Czechia, but since then it has been operating a slightly progressive public pillar with a point system and a funded DC pillar, with quite high initial share for the latter. The contribution rates are broken down as follows: employers paid 5+7.75% to the first pillar and 9% to the second, while employees only paid 7% to the first. Female normal retirement age is 62.67 years, converging to 64 years by 2030, already the male normal retirement age. It operates a variable (flexible) retirement system but the actuarially reduced initial benefit should be equal to or greater than the minimum wage. The benefits in progress are indexed to prices. Recently a 13th month pension was introduced, starting at 300 EUR for monthly benefits at most 220 EUR and decreasing to 50 EUR for monthly pensions benefits of 920 EUR or above.
- *Slovenia* is the other most developed EE country, though in the last decade it lost its earlier advantage over Czechia. Like Czechia, Slovenia has not introduced a second pillar and its first pillar was already unsustainable before the Covid-crisis started. The contribution rate consists of 15.5+8.85%. Since 2019, its unisex normal retirement age is equal to 65 years but the effective retirement ages are much lower: 60 for females, and 61.58 years for males. The actuarial reduction is too low: 18% for retiring 5 years earlier, and the bonuses are too modest: 4%/year.

[15] (Buchholtz, Chłoń-Domińczak & Góra, 2019) gives a very thorough and up-to-date analysis on the Polish NDC pillar plus other pillars.The title of the paper contrasts success and adversity, meaning that populist governments tried to weaken the theoretically superb pillar's functioning.

The main problem is that the life expectancy at 65 is very high and retirement ages are very low: females/males spend 25/18 years in retirement, respectively. Indexation is 60% of wages and 40% of prices, but the drop cannot be higher than 50% of the inflationary drop.

9.4 Pre-Covid Forecasts

In this section, we present pre-Covid EU forecasts on population aging and its impact on pension systems cf. (European Commission, 2018, 2021; OECD, 2018). Though we are discussing long-term processes, whose dynamics are partly determined by events in past decades, we still concentrate on the future.

9.4.1 Pension Systems

The other chapters of the book survey the public economics and other aspects of aging. Turning to the pension system, it should be emphasized that population aging is a very important but not the only relevant factor in the development of the pension system.[16] Below we summarize the evolution of the most important factors that influence the pension system.

- The simplest way of fighting population aging, especially the rise in LE is to raise the *average retirement age*. By Table 9.17, the lowest and highest *male* average exit ages were achieved in Slovakia and Bulgaria with 62.0 and 64.7 years in 2019, respectively, while the corresponding minimum and maximum are forecast in Slovakia and Hungary at 62.7 and 65.3 years for 2070, respectively. By Table 9.18, the lowest and highest *female* average exit ages were achieved in Poland and Bulgaria with 61.3 and 63.2 years in 2019, respectively, while the corresponding minimum and maximum are forecast in Poland and Hungary at 61.3 and 64.8 years in 2070, respectively. The EU averages are higher than EEE averages during the forecast period.
- The *employment rate* is defined as the share of workers in the working age-population. Traditionally this meant the age group of 15–64, but recently many studies are changing to the age group of 20–64 as in most countries the minimal leaving age from school is 18 years. Besides this, the normal retirement age, especially for females, is well below 64 years in many countries. Table 9.19 presents wildly diverging starting values in 2019: Croatia had only 66.8%, while Czechia had a remarkable 80.4%.[17] The projected values for 2070 are higher:

[16] For example, if people live longer, then it is natural that they can work longer but fear of mass unemployment may lead governments to open the gates for early retirement or disability pension.

[17] We note that the LFS-definition of employment changed from 2021, as now mothers who are on maternity leave but have a regular job to which they can return are also regarded as employed. This

Table 9.17: Projection of average labour market exit ages, males, years.
Source: (European Commission, 2021).
Remark. The statutory retirement age is projected to remain constant between 2030-2070 in all EE countries, except for Bulgaria, where the statutory retirement age for females is projected to rise from 63.6 years in 2030 to 65 years in 2050 and 2070. For the EU27, statutory retirement age is projected to increase continuously in those eight (non-EE) countries, where it is automatically linked to increases in life expectancy.

Country	2019	2030	2050	2070
Bulgaria	64.7	64.7	64.7	64.7
Croatia	62.7	62.9	63.2	63.2
Czechia	63.5	64.2	64.2	64.2
Hungary	63.2	65.3	65.3	65.3
Poland	64.5	64.5	64.5	64.5
Romania	64.1	64.1	64.1	64.1
Slovakia	62.0	62.7	62.7	62.7
Slovenia	62.1	63.0	63.0	63.0
EU27	63.8	64.5	65.0	65.5

Table 9.18: Projection of average labour market exit ages, females, years.
Source: (European Commission, 2021). See also the remark for Table 9.17

Country	2019	2030	2050	2070
Bulgaria	63.2	63.6	64.1	64.1
Croatia	61.4	62.4	62.7	62.7
Czechia	61.4	63.4	63.4	63.4
Hungary	62.4	64.8	64.8	64.8
Poland	61.3	61.3	61.3	61.3
Romania	62.7	62.6	62.6	62.6
Slovakia	61.4	61.7	61.7	61.7
Slovenia	62.0	62.8	62.8	62.8
EU27	63.0	63.9	64.4	64.8

according to the projection, Croatia will lag with 69.6%, while Hungary is forecast to be the leader with 81.9%.

methodological change lead to a couple of percentage points upwards revision of employment rate data (the exact magnitude of the change is of course varying across countries.)

Table 9.19: Time series and projection of employment rates (20–64), %. Source:(European Commission, 2021).
** = The data refers to 2002. ** = The data refers to the 19 countries that are members of the Euro Area since 2015.*

Country	2000	2019	2030	2050	2070
Bulgaria	56.5	75.2	73.3	73.0	73.5
Croatia	57.9*	66.8	68.2	69.6	69.6
Czechia	70.9	80.4	78.9	78.2	78.5
Hungary	60.9	75.4	81.2	81.9	81.9
Poland	61.1	73.3	73.1	71.5	72.1
Romania	70.5	71.0	71.1	72.2	72.7
Slovakia	63.0	73.6	71.8	70.3	71.3
Slovenia	68.5	76.4	77.9	78.4	78.3
EU27	65.4**	73.1	74.0	75.9	76.2

- The *length of the contributions* (Table 9.20) is important because the expenditures of the pension system are financed from contributions, and the pension benefit benefit is also related (if not proportional) to the length of contributory period.[18] Contrary to the simplistic idea of continuous career paths, in practice individual careers are often fragmented, which means that the length of contributory time is not equal to the difference between the retirement age and the age when one started to work. For many individuals, there are shorter or longer periods when they do not work or their caring activities are not recorded.[19] Croatia and Romania stand out with their low starting and ending lengths: 32 vs. around 34 years, respectively. On the other hand, in Czechia the average working career is very long relative to the other EE countries, and it stays well above 40 years during the entire period of projection.
- Table 9.21 shows the *economic dependency ratio* (EDR), i.e. the ratio of pensioners and workers, which is an influenced by demography as well as economic policy. In contrast to the old-age dependency ratio in Table 9.7, which is determined by demographic trends only and therefore cannot be influenced in the short and medium run, the economic dependency ratio can be improved within shorter time horizons by boosting activity and employment. Moreover, this measure is more relevant from the pension system's point of view, as it reflects the ratio of old-age pensioners and contribution payers, i.e. those who actually finance the

[18] For example, in Hungary it is not proportional: the accrual rate after the first 20 years of contributory time is equal to 53%, while after the second 20 years (i.e. for contributory years 21-40) it is only to 27%.

[19] On the other hand, university studies or periods spent on unemployment benefits can be counted as contributions, as is the case in Hungary with studies finished before 1998.

Table 9.20: Projection of the average length of contributory period, years.
Source: (European Commission, 2021)

Country	2019	2030	2050	2070
Bulgaria	34.8	37.0	37.1	36.4
Croatia	32.0	32.9	33.7	33.7
Czechia	44.1	47.0	43.0	42.0
Hungary	34.6	37.8	37.7	38.1
Poland	34.9	35.8	35.4	35.8
Romania	32.0	34.4	34.4	34.4
Slovakia	39.3	39.9	39.6	39.6
Slovenia	38.8	39.0	39.2	39.3
EU27	..	..	..	..

pension system. Here we observe that in 2019, EDR ranged from Slovakia's low of 33.6% to Croatia's high of 50.6%. All countries will experience a steep rise in this indicator by 2070, when Czechia and Poland are projected to have the lowest and highest values, respectively, with 65.3% and 90.0%, respectively. We note that the relative increase of this indicator is typically smaller than the relative increase of the old-age dependency ratio in Table 9.7, because the employment rate in the working age population (20-64) is generally increasing.

Table 9.21: Time series and projection of economic dependency ratio (20–64), %.
Source: (European Commission, 2021).
The economic dependency ratio is defined as a percentage of inactive population aged 65 and more, relative to employed population aged between 20 and 64. ((Inactive 65+)/(Employed 20-64)).

Country	2019	2030	2050	2070
Bulgaria	44.8	53.9	76.8	78.1
Croatia	50.6	63.0	79.0	89.8
Czechia	38.4	46.4	66.2	65.3
Hungary	41.0	42.9	60.2	66.9
Poland	37.5	49.9	74.7	90.0
Romania	40.5	48.1	76.5	79.8
Slovakia	33.6	48.5	78.1	86.7
Slovenia	42.4	53.5	73.3	72.4
EU27	44.7	53.9	69.5	71.7

- The adequacy of the pensions is best measured by the *average replacement rate* or the *benefit ratio*, showing the ratio of benefits to wages. It is obvious that the higher this ratio, the better the relative position of the average pensioner to the average worker, but the more difficult to sustain the pension system. Table 9.22 displays the projections of gross benefit ratios, when gross benefits are compared to gross wages. The lowest initial value in 2019 belongs to Bulgaria (26.7%), while the highest (43.8%) is achieved by Poland. By 2070, the benefit ratios are expected to decrease. In Poland, for example, the 2070 benefit ratio (22.8%) is just slightly larger than the half of the initial value, while the final Bulgarian value is just slightly smaller than the initial one. The EU average is also sinking, from 42.1% to 32.8%.

Table 9.22: Benefit ratio, %.
Source: (European Commission, 2021).
Explanation. The benefit ratio is the ratio of average pension benefits to average gross wages.

Country	2019	2030	2050	2070
Bulgaria	26.7	25.1	23.5	23.5
Croatia	31.2	29.9	24.7	21.8
Czechia	38.5	39.3	38.8	37.3
Hungary	37.5	37.8	38.7	39.6
Poland	43.8	38.7	26.4	22.8
Romania	32.5	41.8	36.3	30.8
Slovakia	37.0	35.4	32.0	32.4
Slovenia	30.8	29.7	33.3	34.2
EU27	42.1	40.8	35.0	32.8

- As a result of all these (and other) factors, we can project the evolution of the *share of pension expenditures in the GDP*. This number is clearly related to the benefit ratio (discussed in Table 9.22) and the economic dependency rate (discussed in Table 9.21). The rows in Table 9.23 show the path of pension expenditures share in the GDP. The picture is mixed: the current Croatian value of 10.2% is expected to sink to 9.5%, and the Polish projection is also relatively stable: from 10.6 it decreases to 10.5% by 2070. On the other hand, the Slovenian figure rises steeply, from 10.0 to 16.0%, which means that it probably requires further interventions to remain sustainable. The EU average is almost stable, oscillating between 11.6 and 12.6%.
- The counterpart of Table 9.23 is Table 9.24, which shows the *share of pension contributions in the GDP*. These numbers are typically significantly lower than the expenditure shares. In 2019, the Bulgarian starting value lagged by 4.3%

Table 9.23: Time series and projection of pension expenditures/GDP, %.
Source: (European Commission, 2021).
* = Taken from (Kenichi, 2011), Table 1.C.3.

Country	1990*	2019	2030	2050	2070
Bulgaria	8.8	8.3	8.5	9.3	9.7
Croatia	..	10.2	11.0	9.9	9.5
Czechia	13.0	8.0	8.8	11.4	10.9
Hungary	9.1	8.3	8.3	11.2	12.4
Poland	6.6	10.6	11.0	10.7	10.5
Romania	6.3	8.1	12.9	14.8	11.9
Slovakia	11.7	8.3	10.2	13.4	14.2
Slovenia	9.7	10.0	10.8	15.7	16.0
EU27	..	11.6	12.5	12.6	11.7

points behind the counterpart, undermining the relevance of pension contribution payments. A similar gap menaces the Slovenian public finances, where the gap will be 6.7% point in 2070. Even the EU's gap is around 3%-points during the entire period.

Table 9.24: Projection of pension contributions/GDP, %.
Source:(European Commission, 2021)

Country	2019	2030	2050	2070
Bulgaria	5.0	5.0	5.4	5.4
Croatia	6.0	7.1	7.1	7.1
Czechia	8.5	5.8	8.5	8.5
Hungary	7.7	7.4	7.4	7.4
Poland	8.4	8.6	8.7	8.7
Romania	6.8	6.8	6.5	6.5
Slovakia	7.4	7.0	7.4	7.5
Slovenia	9.3	9.3	9.3	9.3
EU27	9.5	9.6	9.8	9.8

9.4.2 Discussion of the Forecasts

In this subsection we shall argue that—apart from unavoidable errors—the foregoing forecasts have often been overly optimistic, frequently reflecting the foregoing countries' governments influence on the forecasters.

Probably the demographic forecasts are much more reliable than the economic and pension forecasts, the more so that they are made in variants. The problem with too many variants is, however, that the reader might lose her orientation.

Returning to exit ages with rising normal retirement ages, they also rose but certain governments in certain periods allowed workers with longer contribution periods to retire earlier without penalty. In our opinion, several countries' forecasts reflect the unfunded optimism of the various governments. One example is Slovenia, who—as mentioned above—is unlikely to be able to sustain the lowest retirement age with the longest LE65 at the same time. Another example is the female average labour market exit age in 2030 in Hungary, 64.8 years, which is unlikely to happen if females continue to retire with 40 service years irrespective of their age, even if the rigid retirement age will be maintained. Or the projected high retirement age in Slovakia presupposes that everybody follows the steeply rising life expectancy.

In all EU countries, there is some valorization of initial pensions and indexation of current pension benefits. The only way to reduce the real value of benefits of subsequent cohorts is by decreasing the their initial benefits. Some future benefit ratios are incredibly low: the Polish and Croatian numbers (22.8% and 21.8%) are probably so inadequate that they cannot be taken seriously.

Turning to the growing gaps between revenues and expenditures of several countries, note that theoretically, public pensions could be financed from taxes rather than contributions, but in that case, the planning of the system is much more difficult.[20]

The population aging and the emigration make the financing of public pension system rather difficult. The contribution rates are quite high, therefore they cannot be sharply lifted. The absolute level of the pensions is quite low, e.g. 400 EUR/month in Hungary, therefore it cannot be reduced in general. The further rise in normal and effective retirement ages is problematic, especially for the poorer part of the workers. The only solution is to strengthen the progressivity of the benefits (except for Czechia) and then reduce the general replacement rate.

[20] A basic difference between contributions and personal income taxes is that typically the former are capped while the latter are not. Another difference lies in linearity vs. progressivity. If pensions are financed from indirect taxes like value added tax, then the incidence of the inputs are totally different.

9.5 The Impact of Covid-19

9.5.1 Introduction

At the time of finalizing this chapter (June 2021), it is still uncertain how and when exactly the pandemic and the resulting economic crisis will end. In this—admittedly speculative—section, we assume that the pandemic will be brought under control and normalcy would resume within a time frame comparable to other major economic disruptions, i.e. 2-3 years. This section attempts to assess the possible effects of the pandemic and the resulting economic disruptions on pension systems.

Pension systems' sustainability, benefit adequacy and their redistributive features are determined by demographic, labour market, macroeconomic and fiscal developments—and by the government policies driving or responding to these developments. Below, we take a look at the most important channels through which Covid-19 may manifest its impact on pension systems, and the outcomes that may result.

It is important to separate pension systems' 'pre-existing conditions', i.e. concerns present irrespective of the current crisis, from the effects of the pandemic. In this respect, we can expect to see three types of impacts: the pandemic creating new problems; eliminating existing ones; and accelerating or decelerating changes that already began in the past: individual decisions, social choices, political prerogatives and events of economic history.

It is also important to realize that when viewed in isolation, none of the existing trends or phenomena are specific to the 8 EE countries covered by this volume. The particular combination of issues may present unique region or/and country-specific challenges, however, not the least of the common experience of transition—a major paradigm shift of economic and political governance models.

9.5.2 Demographic Impact

By mid-June 2021, according to reports of national authorities on Covid-related deaths, the epidemic has cost approximately 210 thousand lives in the eight EE countries or 0.22% of these countries' populations, on average (see columns 2-3 of Table 9.25). The highest per capita incidence, 0.31% was observed in Hungary, while the lowest incidence (0.17%) was reported in Romania.

From the pension system's point of view, however, the increase in all-cause mortality—as opposed to Covid-related mortality—is more important. Therefore in column 4 of Table 9.25 we also report the estimated relative increase in all-cause mortalities (or in short: the *excess mortality*) in these countries. The excess mortality can be expected to be higher than Covid-related mortality, as not all divergence from trend mortality can be clinically attributed to Covid: late interventions in

Table 9.25: Covid-19-related deaths and mortality rates in 8 EE countries.
Source: Our World in Data: https://ourworldindata.org/coronavirus. Date of download: June 21, 2021.
** = According to national classifications of Covid-related deaths; until June 20, 2021.*
*** = Increase in all-cause deaths relative to all-cause deaths in previous years, for the period of May 2020-April 2021.*

Country	Total deaths*	Deaths per million*	Excess mortality**
Bulgaria	17,990	2,589	25.9%
Croatia	8,174	1,991	12.7%
Czechia	30,280	2,828	31.2%
Hungary	29,950	3,100	17.2%
Poland	74,828	1,977	30.8%
Romania	32,326	1,680	20.7%
Slovakia	12,478	2,286	27.9%
Slovenia	4,412	2,122	21.5%
EEE8	210,438	2,191	23.5%

overburdened health care systems, other causes of death in infected people may also be added to the total number.[21]

The large number of reported Covid-related deaths, and the significant excess mortality (an estimated 13-31% in the 8 EE countries with an average of 23.5%) both indicate that Covid-19 should have a substantial impact on demographics in general, and pension system demographics in particular. However, the purely demographic impact of the pandemic depends on a number of factors. Of these, age structure is the dominant one. For instance, total fatality rates are between 1 and 2% in North America and most of Europe but only half of this in Latin America, the Caribbean and Southeast Asia, and just one-fifth in Sub-Saharan Africa—despite very different per capita GDPs, health care qualities and government responses. The explanation is age-specific heterogeneity in fatalities and the greater vulnerability of elderly people—and, by extension, older populations.

In Table 9.26, we report the estimated excess mortality rates in seven EE countries for four different age categories: 15-64 years, 65-74 years, 75-84 years and 85+ years.[22] As can be seen from the table, older generations are indeed more vulnerable

[21] Interestingly, while Hungary reported the highest number of Covid-related deaths per million people, in terms of excess mortality it performs better than most of the other EE countries: 17.2% increase in all-cause mortality in Hungary vs 23.5% in EEE. This probably suggests significant heterogeneities across EE countries in their classification of Covid-related deaths.

[22] For Romania, there are no data for the different age categories. Data suitable for cross-country comparison was only available for these age categories.

to the Covid-19 pandemic: while the estimated excess mortality is only 7.6% for the 15-64 age category (and in some countries they are not even positive), estimates are much larger for all other age categories in all countries.

Table 9.26: Excess mortality (in %) by age groups in 7 EE countries.
Source: (Our World in Data, 2021)

Country	15-64 years	65-74 years	75-84 years	85+ years	**TOTAL**
Bulgaria	21.2	39.9	22.0	23.5	**25.9**
Croatia	–1.0	25.8	4.5	23.0	**12.7**
Czechia	13.8	34.4	44.1	27.6	**31.2**
Hungary	5.3	30.4	19.7	14.1	**17.2**
Poland	7.4	56.4	23.6	40.0	**30.8**
Romania	..	..	..	..	**20.7**
Slovakia	11.4	47.7	34.4	21.3	**27.9**
Slovenia	–5.2	23.0	18.6	36.2	**21.5**
EEE	7.6	36.8	23.9	26.5	**23.5**

Interestingly, and probably contrary to our expectations, excess mortality is not monotonically increasing with age. This happens because the pandemic hit most seriously the EE countries at different times. In Table 9.27, we report excess mortality by the 'waves' of the pandemic. We define wave 1 as the pandemic between May-August, 2020; wave 2 between September-December, 2020; and wave 3 between January-April, 2021.[23] As the table shows, excess mortality was lower than 3% during the initial wave of the pandemic, in summer 2020. In fact, many country-specific excess mortality rates were close to zero in this period—which is in line with our intuition that initially, this region was not hit severely by the pandemic. In contrast, excess mortality was very large, around 40% during the second wave of the pandemic. For the working-age population, excess mortality in this period is estimated around 15%, while for all other cohorts, estimates are around 45-50%. The third wave in 2021 has similar excess mortality figures as the second wave for those under 75 years of age. However, as during this period the oldest generations were—at least partially—vaccinated, excess mortality rates are relatively smaller (but still large) for these cohorts. We attribute the country-specific differences in age-specific mortalities of Table 9.26 to differences in the severity of waves between countries. For example in Czechia, where the second wave was probably the most severe, excess mortality is similar for the relatively old cohorts—a general characteristics of the second wave. But in Hungary, where wave 3 had the highest number of fatalities, the

[23] Unfortunately, at the time of finalizing this manuscript, mortality data is only available until April 2021. The definition of waves is admittedly a bit *ad hoc*—but for the sake of comparability, their lengths are the same, 4 months.

age pattern of the overall excess mortality is more similar to the general EEE pattern observed in wave 3.

Table 9.27: Estimated age-specific excess mortality (in %) by waves in 7 EE countries.
Source: (Our World in Data, 2021).
Note: for Romania, there is no age-specific data on mortality. "Wave 1" covers the period of May-August, 2020. "Wave 2" refers to the period of September-December, 2020. "Wave 3" covers the period of January-April, 2021.

Country	15-64 years	65-74 years	75-84 years	85+ years	**TOTAL**
Wawe 1	–7.1	9.5	–0.8	7.0	**2.9**
Wawe 2	15.9	50.3	44.5	48.7	**40.5**
Wawe 3	14.3	51.4	29.0	25.1	**28.1**
Total	7.6	36.8	23.9	26.5	**23.5**

It should also be noted that demographic shocks (wars, epidemics, temporarily successful pronatalist policies) may, in addition to their contemporaneous impact, generate demographic echoes following the rhythm of new generations reaching childbearing age. Whether this happens depends on the age structure of the directly affected population. Given the skewedness of age-specific Covid-mortalities towards older cohorts and the particularly low death toll among people below 40, the pandemic is not expected to lead to echoes and introduce additional, cyclical volatility to demographically driven public spending—such as pensions. In other words, the impact of Covid is a one-off.

Finally we should also note that since vaccines are widely available by June 2021, we do not expect significant Covid-related mortality after the summer of 2021. Therefore in terms of timing, the mortality effect of the Covid is also temporary.

Consequently, if the impact of the pandemic on pension schemes only manifested through demographics, pension systems would see a temporary improvement in their dependency ratios and their financial positions. Lower expenditures would lead to lower financing needs, with benefits that could find expression in lower contribution rates, lower budget-financed deficits, etc. Given the region's history, the demographic impact of the pandemic is not greater than the echo of previous events (world wars, large waves of emigration, pro-natalist policies).

Case study: Effect of Covid-19 Mortality Shock to Pension Expenses in Hungary

To demonstrate this limited demographic effect of the mortality shock of the Covid-19 pandemic, we now present a case study for Hungary. In this case study we estimate the gender- and cohort-specific excess mortality rates in Hungary from highly disaggregated weekly mortality data, and based on them we prepare two alternative population projections: the baseline projection will be without this Covid-related mortality shock, while the Covid-projection will contain this temporary shock of excess mortality. Finally, we use a micro simulation that is calibrated to the current Hungarian pension system, and estimate quantitatively the effect of the temporarily increased mortality on pension expenses.

The solid line of Figure 9.3 depicts the weekly number of deaths in Hungary for the period of March 30, 2020 (Week 14 of 2020) – May 2, 2021 (Week 17 of 2021), i.e. covering 57 weeks (around 13 months), together with the average number of deaths on the corresponding weeks in the period 2015-2019 (dashed line).[24] The difference between the lines in the figure can be interpreted as the Covid-related excess mortality. We see that the first wave of the pandemic until September 2020 did not cause a significant increase in all-cause mortality; the second and third waves, however, are quite apparent.

Fig. 9.3: Total number of weekly deaths in Hungary, 2020 April-2021 May vs weekly averages in 2015-2020

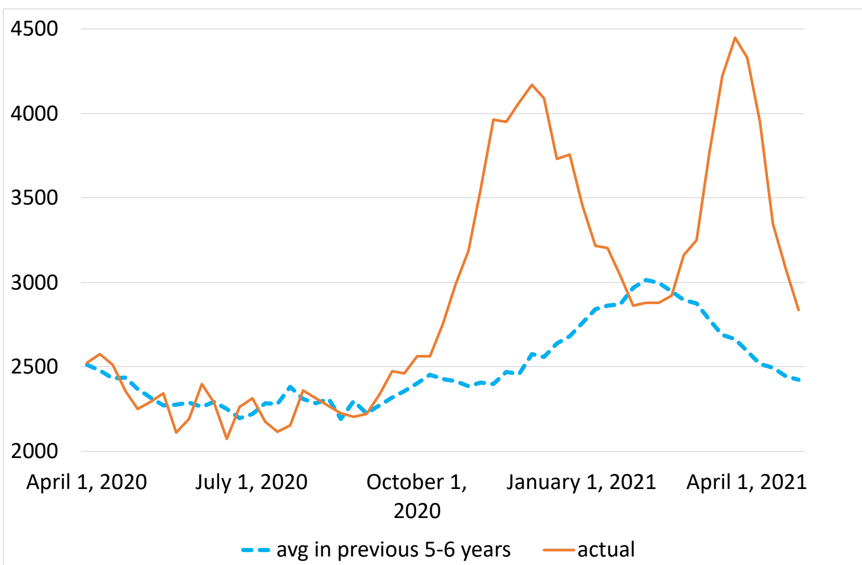


Table 9.28 shows the estimated gender- and cohort-specific excess mortalities (in percent), based on data shown on Figure 9.3. In particular, columns 2-4 of Table 9.28

[24] We chose the 14th week of 2020 as a starting point as that was the first week when the number of newly reported Covid-related deaths exceeded 10 (until March 29, the *cumulative* number of reported deaths was 13); moreover, this is about four weeks after the first Covid case was announced in Hungary (March 4). Regarding the end of the estimation period, at the time of wiring this chapter, reliable mortality data is only available until Week 17 of 2021.

show “raw ”estimates of excess mortality. In this, we simply compare the gender- and cohort-specific number of deaths to the average number of gender- and cohort-specific deaths in the same weeks in 2015-2019. These estimates are correct as long as there are no significant changes in the sizes of the investigated cohorts.

Table 9.28: Estimated gender- and cohort-specific excess mortality (in %) in Hungary.
Source: own calculations based on Hungary’s Central Statistical Office’s data on weekly number of deaths www.ksh.hu. Date of download: June 9, 2021.

	Raw estimates			Demography-corrected			Number of
Cohort	Males	Females	All	Males	Females	All	persons
0-34 years	–1.1	0.1	–0.7	3.4	1.3	2.7	48
35-39 years	0.7	6.5	2.8	19.6	29.1	22.7	197
40-44 years	16.2	11.9	14.8	21.6	12.3	18.4	287
45-49 years	13.3	20.4	15.5	26.9	32.5	28.7	774
50-54 years	17.9	16.4	17.4	22.5	22.4	22.5	1,009
55-59 years	–0.5	–0.4	–0.4	14.9	15.2	15.0	1,156
60-64 years	2.5	1.1	2.0	14.4	13.0	13.9	1,852
65-69 years	30.1	28.8	29.6	20.2	21.5	20.7	3,192
70-74 years	28.2	30.6	29.3	24.8	27.4	26.0	4,254
75-79 years	27.4	20.0	23.5	20.9	15.6	18.2	3,517
80-84 years	17.3	13.9	15.2	21.7	16.7	18.6	4,115
85-89 years	17.0	11.8	13.5	13.6	7.6	9.5	1,985
90+ years	15.0	14.1	14.3	10.2	11.2	11.0	1,693
TOTAL	18.0	15.8	16.9	18.9	15.2	17.0	24,078

This is, however, not the case: there is relatively large variation between the size of different cohorts even in the short run.[25] This demographic variation is reflected in the relatively large heterogeneity between the estimated raw excess mortalities even in neighboring cohorts. For example, our raw estimate for the excess mortality of the cohort aged 55-59 is −0.4%, i.e. the number of deaths even decreased in this cohort during the pandemic. But this cohort was born in 1961-65, which is a relatively small cohort. The cohort which had the same age (55-59 years) in 2015, one of the years of comparison, was born in 1956-1960 – when the average number of yearly births

[25] This is due to very large number of births in the 1950s, which has an echo effect in the second half of the 1970s.

was around 30% larger.[26] So the absolute number of deaths had to decrease due to demographic reasons, and most probably by way more than our estimate of -0.4%.

In order to correct for this demographic variation, we compare our estimates for the period of April-December 2020 with Tóth (2021), who also estimates excess mortality for that period while also accounting for the demographic changes with a serious demographic model.[27] From this comparison, we obtain relative (multiplicative) correction factors for each cohort and both genders, and we modify our raw estimates with these correction factors for the entire sample period. The result is reported in Columns 5-7 of Table 9.28. We note that these demography-corrected excess mortality estimates are much less heterogeneous across cohorts.

Interestingly, and contrary to our expectations, we see relatively large excess mortalities for all cohorts older than 35 years. But a 20% excess mortality is very different for the 35-39 years old cohort and for the 65-69 years old cohort. For the former, the baseline number of deaths is very small, so a 22% increase in this means around 200 extra deaths. In contrast, for the 65-69 years old cohort, a 20.7% increase in mortality means almost 3,200 extra fatalities. To illustrate this effect, we show the absolute number of extra deaths, as a consequence of excess mortality estimates, in column 8 of Table 9.28.

We quantify the effect of the mortality shock for Hungarian pension expenses with the pension micro simulation model of Freudenberg et al. (2016). In principle, we need to use a micro simulation model because of the highly non-linear nature of the Hungarian pension system, due to which aggregate developments cannot be approximated even with cohort- and gender-specific averages. The exact details of how this micro simulation works are in Freudenberg et al. (2016).

To see the effect of mortality shock, we ran the micro simulation twice: first with the baseline Europop-2018 population projection, that does not take into account the Covid-related extra mortality in 2020-21, and then with our own population projection, in which the only difference was the increased mortality—calibrated exactly to the gender- and cohort-specific estimates of excess mortality in Table 9.28—in 2020.[28] Then we calculated total pension expenditures, relative to GDP in 2020, for both scenarios, and we interpret the difference between the expenditures as the effect of Covid-mortality. Figure 9.4 shows the result.

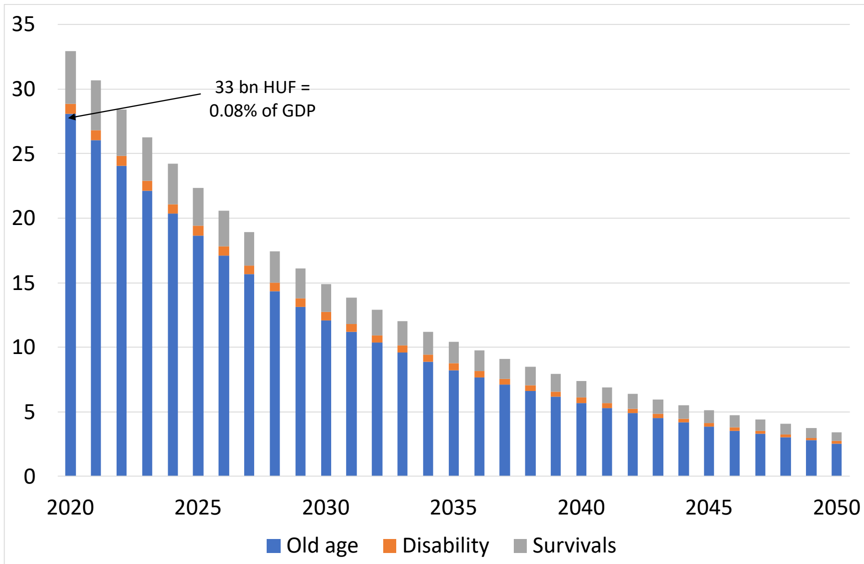
In line with our initial expectation, the effect is estimated to be small: 33 bn Hungarian forints (around 100 mn Euros), or 0.08% of GDP. In terms of total pension expenditures, it is slightly less than 1% of total expenditures. We can also see that the lion share of the decrease comes from the decrease in old-age pension benefits. This is not only because old-age pensions are by far the largest item among all types of pension expenditures, but also because the Covid-related excess mortality affected the older cohorts much more heavily.

[26] Between 1956-1960, on average more than 175 thousand babies were born in each year; the same number is around 133 thousands for the years 1961-65.

[27] Unfortunately, Tóth (2021) does not report results beyond December 31, 2020.

[28] As the micro simulation model is yearly, we had to choose a specific calendar year when we took into account the extra deaths. We chose 2020.

Fig. 9.4: The effect of the Covid mortality shock on pension expenditures in Hungary, 2020-2050



Another important aspect of Figure 9.4 is that the decrease in pension expenditure dies out relatively quickly. After 10 years, in 2030 the decrease in pension expenditures is just 40% of the initial decrease (12 bn vs 33 bn Hungarian forints, or 36 mn vs 100 mn Euros, in constant prices)—which is an indication that many of the people who passed away due to the pandemic would not have survived until 2030.

In summary, the demographic impact is relatively small—and certainly not large enough to cause material changes in old-age dependency ratio; it is also one-off, generating no future echoes; and the demographic shock is expected to mostly disappear within 10-15 years, without any lasting impact, i.e. causing a secular change in pre-crisis trends. Consequently, we do not expect any material, lasting effects on pension systems.

However, demographics is just one and, as discussed above, not necessarily the most important channel through which the pandemic may trigger changes in pension systems.

9.5.3 Labor Market Impact

The EEE8 share some commonalities but their labour markets also differ, as determined by the pre-transition state of their economies, the policies pursued during the transition, sectoral structure, informality and tax compliance, participation rates, migration balances, etc. These commonalities and differences will influence whether developments already observed in high income countries—especially inter-sectoral mobility, increasingly fragmented careers, temporary withdrawals from the labour market, short-term, occasional 'gigs', etc.—will become similarly important. These factors will also influence whether the current crisis may impose long-term changes in the labour market.

With the onset of the transition in the late 1980s and early 1990s, informality in the labour market increased significantly, although not uniformly, in Central and Eastern Europe (cf. (Kenichi, 2011)). Whereas informality is present in every economy, its sudden and significant increase in the region was not only due to the newly introduced freedom of enterprise but also to the unpreparedness of agencies responsible for tax collection and enforcement. From the perspective of contributory pension systems, this translated into a widening heterogeneity of contribution histories and pension calculation bases—depending on the extent of complete labour tax evasion vs underreporting of taxable earnings. The impact of these changes only started to manifest itself with a long lag as workers with short contribution histories and underreported wage records start to enter retirement. Short contribution histories and low reported earnings will result in low pensions and a widening benefit distribution—especially in light of the pension reforms introduced in the region which made contribution-benefit links stricter and more uniform (along linear accrual rates).

Case Study: Covid-19 Employment Shock, and its Effect to Future Pensions in Hungary

In addition to the transition shock after 1990, the Covid-19 pandemic also increased labour market heterogeneities, as the career paths of many individuals became even more fragmented as they lost their jobs. We demonstrate this effect again with a case study on Hungary, for which we have detailed data on labour market effects, as well as a micro simulation model of its pension system.

For Hungary, at the time of writing this paper the Labor Force Surveys (LFS-s) on activity and employment are readily available until the first quarter of 2021—so we can investigate the labour market effects of the Covid-19 pandemic for a whole year: 2020 Q2-2021 Q1. For pension modelling employment (as opposed to activity) rates are the most important, so we work with employment rates. These employment rates and their changes are available at the gender and age category level. Hungary increased its employment rate quite significantly during the past decade: while in 2008 it was among the countries that had the lowest employment rates within the European Union, by 2020 it has surpassed the EU average.[29] We can observe an increasing trend (although with a smaller pace) in employment rate even in the second half of the last decade, and most importantly, also in 2019; so we assume that this slightly positive trend would have continued in 2020-21 as well.

[29] This remarkable increase in participation rates is partly due to the large-scale public work scheme that Hungary introduced during the 2010s. This entails non-market employment of mostly low skilled employees. While the employment rate increased, labour productivity stayed constant.

Therefore we collected employment data for both males and females, for different age categories,[30] and estimated a short-term trend component for each of them based on data from 2015-2019. In this period, the increase in employment was close to linear in all age categories. Although the rate of increase was moderate (relative to increases in the first half of the decade), it was nevertheless significant in almost all age categories for both genders. We also estimated the seasonal effects on employment at the age category level separately. So with these age- and gender-specific seasonal effects and estimated trends we obtained counterfactual employment rates for both genders and all age-categories, which could have occurred if we did not have a pandemic. The difference between the actual and these estimated counterfactual employment rates are the estimated employment effects.

Fig. 9.5: Estimated employment changes by gender and age categories in Hungary in 2020-21,
Source: own calculations based on the Labor Force Survey of the Central Statistical Office.

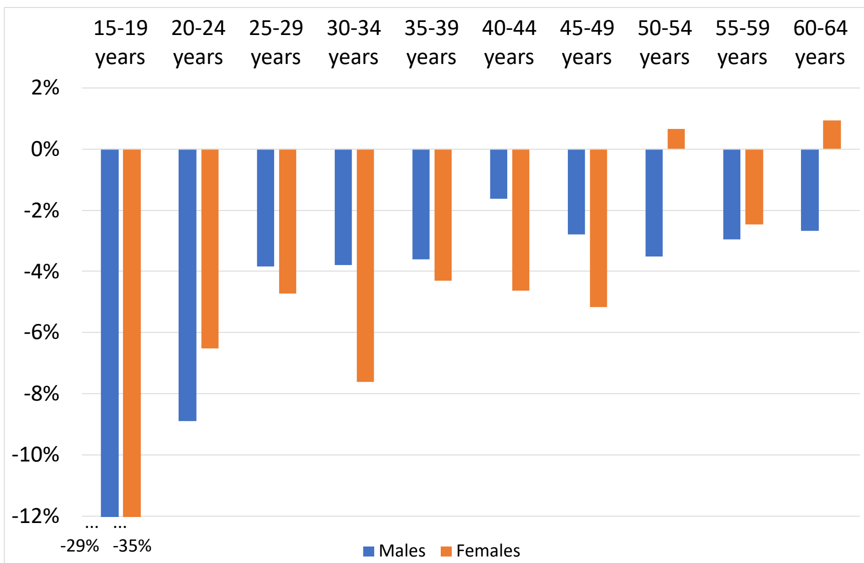


Figure 9.5 shows the estimated changes in employment due to the lockdown during the Covid-19 pandemic, by gender and age categories. Apparently, for males younger cohorts were more heavily affected by the lockdowns: while 29% and 9% of the 15-19 and 20-24 years old males lost their jobs due to the lockdowns, respectively,

[30] Data is available for age categories that cover 5 cohorts: 15-19 years, 20-24 years, ..., 60-64 years. We do not collect data on people who are at least 65 years old, as almost all of them are already retired.

the estimated effects are between 2-4% for the older age categories. For females, younger cohorts also seem to be more affected, while for mothers at child-bearing ages (25-49) we see relatively large drops of around 5%. For females older than 50 years, we so not see significant changes, and for some age categories we do not even see any losses.

In the micro simulation exercise, when we simulate the career paths and contribution histories of individuals, we assume that on top of the usual labor market reallocation (that is, some people lose their jobs and some other people start working again), some percentage in age cohorts and for both genders will lose their jobs due to the pandemic. These percentages are calibrated based on the results of Figure 9.5.

Although this loss of employment is a one-time shock in the activity status for the affected individuals, in the micro simulation it has longer effects. This is because when studying labor market histories in Hungary, it is a general pattern that if somebody loses her job, it is harder for her to become employed again. (That is, the probability of being active is smaller after a spell if inactivity, than the probability of being active after an active period.) So losing a job due to the pandemic might not only have the one-time effect which only lasts until the pandemic is over; it might have more persistent effects, and this fact is reflected in the way we do the micro simulation.

One related question is to what extent wages are affected by the pandemic. As evidence is mixed on this, we consider two alternative scenarios. In the first "Baseline Covid scenario"we assume that there will be no permanent loss in the affected individuals' wages: once they find a job again, their career wage path is the same as it would have been without the job loss. However, in a second "Alternative Covid scenario"we assume that people will suffer a permanent wage loss of 1% due to the Covid. This is because some people will have to start a new job (and even change a sector) in which they are less productive or simply lose experience. As this 1% loss in the career wages (after the Covid pandemic) is not calibrated to any kind of real-world estimate, this alternative Covid scenario should only be taken as a thought experiment that demonstrates what happens if we also have a permanent wage effect (as opposed to only a temporary job loss) after the pandemic.

In sum, we ran three simulations and compared the outcomes.

- First, we ran a benchmark scenario (from now on, we will refer to this simulation as "Benchmark") when we did not take into account the effect of the pandemic. This can be considered as our best projection on the information basis at the end of 2019, when nobody foresaw the unfolding pandemic.
- Then we ran an alternative scenario which takes into account job losses that we experienced during the pandemic, as a result of lockdowns. (In what follows, we will refer to this run as the "Baseline Covid"scenario.) The magnitude of these job losses are calibrated to match empirical estimates about actual job losses that we presented on Figure 9.5. We also took into account that the proportion of those who lost their jobs were different for males and females, and also for different age categories. With the micro simulation method, we could quantify the effect of these heterogenous effects of the Covid pandemic on expected future pension entitlements.

- Finally, we repeated the second scenario with Covid-related job losses, in which we additionally assumed that there is a permanent wage loss of 1% for those affected by the pandemic. We refer to this scenario as the "Alternative Covid"scenario.

Technically, we prepared all simulations with the very same set of random numbers, which ensured that up to 2019, each individuals have exactly the same career paths in the Benchmark and in the Baseline Covid and Alternative Covid scenarios. Then comes 2020, when some people lose their jobs (and end up not paying any pension contributions) in the Baseline Covid and Alternative Covid scenarios. Based on observations of typical career paths in the past, we assume that the labor market is sluggish to recover, and therefore there will be job losses for two more years, i.e. in 2021 and 2022.

Fig. 9.6: Job and wage losses in different simulations relative to the Benchmark simulation, 2020-2050.
Source: own calculations based on the micro simulation model.

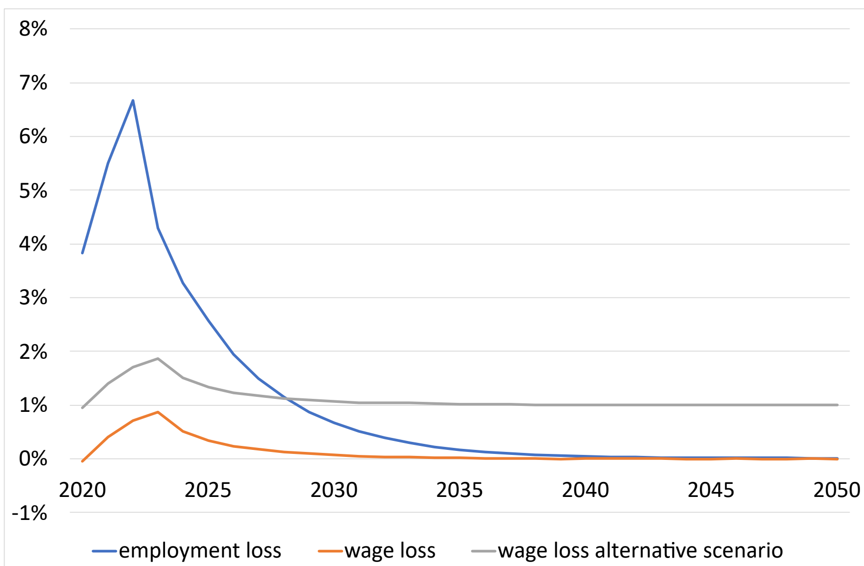


Figure 9.6 summarizes the main assumptions of the Baseline and Alternative Covid scenarios, relative to the Benchmark. In 2020-2022, individuals continue to lose jobs due to the pandemic, and these economies which suffer from the Covid pandemic end up having around 7% less jobs in 2022 than the Benchmark economy (see the solid line of Figure 9.6). Then from 2023 a gradual recovery begins, and employment rate slowly catches up to the employment rate in the Benchmark scenario. The reason of this gradual recovery is in the way we do the extensive margin

simulation: people that are currently inactive are less likely to be active in the coming year than those individuals that are currently active; so Covid-related job losses will be persistent and will only recover slowly.

The dashed lines on Figure 9.6 show the effect of the Covid pandemic on wages. Although in the Baseline Covid scenario we assumed away any effects of the Covid pandemic on average wages, we do see some temporary wage losses. The reason is that people returning from inactivity, on average, work less in our simulations, and therefore they end up with lower salaries upon their return into the labor market. So these people not only have smaller chances to become active again on the labor market, they also earn less when they finally manage to reactivate themselves. We emphasize that this assumption is not related to the Covid pandemic: this is what we observe in administrative data between 1997-2006, and this is how we construct the micro simulation of individual career paths already in the Benchmark simulation. These specificities come from the regularities of the labor market behavior in "normal times".

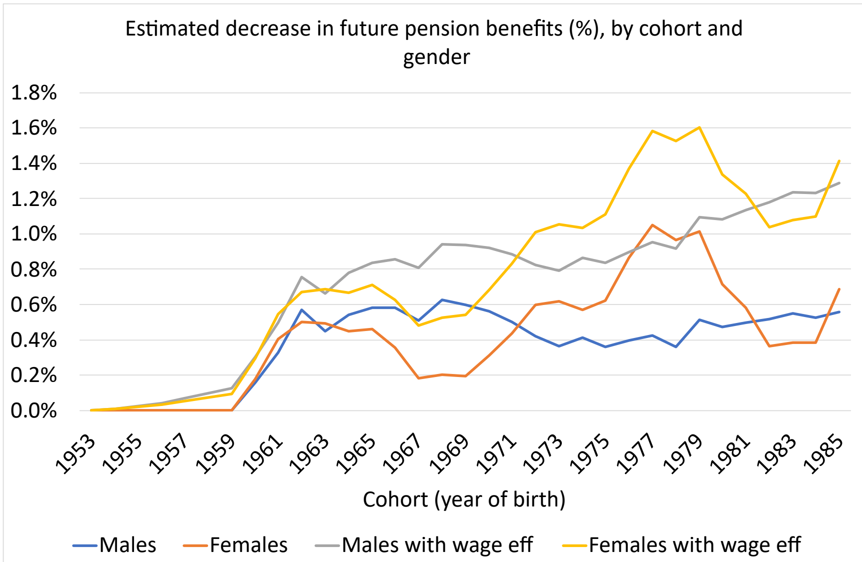
As in the Baseline Covid scenario we do not have any specific assumptions on wages, the loss in average earnings that we see on the dashed line of Figure 9.6 is only temporary: as employment gradually returns to the Benchmark model's employment, so do wages. It is possible, however, that the effect of the pandemic on wages will be permanent: for example, some people will never be able to return to their original jobs at their previous employers, so experience will be lost. It is also well-known that during periods of inactivity, the human capital of individuals tends to depreciate, just as physical capital does. These factors, and possible others as well, might have a permanent effect on future wages.

As we do not yet have estimates on whether there is a long-term loss in wage levels due to the Codid-related job disruptions, we can just speculate on its possible magnitude. Nevertheless, we ran the alternative Covid scenario in which the wage path is permanently 1% lower than in the Baseline Covid scenario, due to losses in productivity and/or human capital. Again, this magnitude is not calibrated to any empirical estimates, at this point this is just a thought experiment about the possible effects of possible permanent wage losses on pensions. The dashed line with markers shows the magnitude of wage losses in this Alternative Covid scenario: it is consistently 1% above the (only temporary) wage loss in the Baseline Covid scenario.[31]

Figure 9.7 shows the effect of labor market disruptions under the two different Covid scenarios on average initial pension entitlements that individuals can expect in the future. As the probability of losing jobs due to the Covid pandemic are different for males and females, and also depend on ages, the estimated change in expected pension entitlements is also heterogeneous across genders and cohorts. Different cohorts (represented by their birth years) are depicted along the horizontal axis; while the effects on males and females are shown separately by the dashed and dotted lines, respectively. Moreover, the lines without markers refer to the Baseline

[31] Note that the Baseline Covid and Alternative Covid scenarios are exactly the same in terms of employment. Therefore we do not have different solid lines (for the employment losses) with and without markers for the two different Covid scenarios.

Fig. 9.7: Decrease in expected future pension entitlements due to Covid-related job losses.
Source: own calculations based on the micro simulation model.



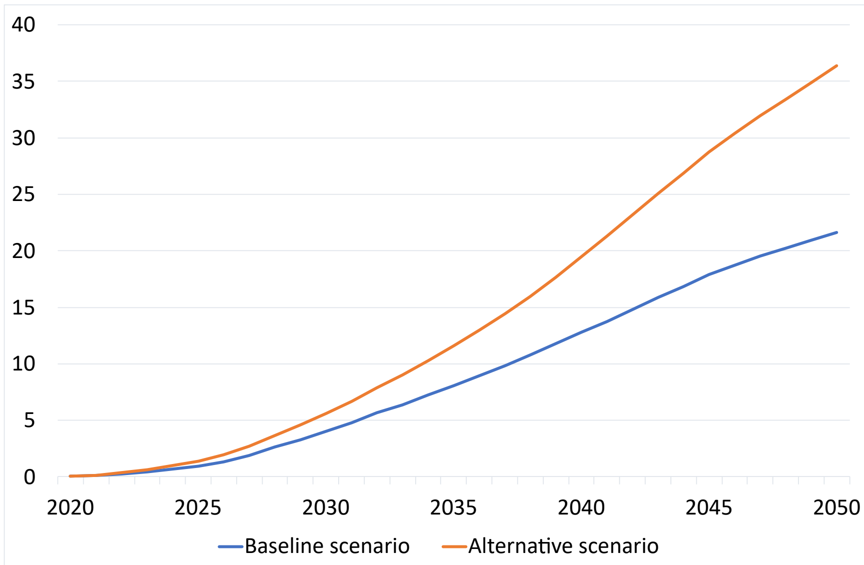
Covid scenario (in which no permanent wage effects were assumed), and the lines with added markers refer to the Alternative Covid scenario—when we additionally assumed a permanent wage decrease of 1% due to the Covid pandemic.

It as apparent from the Figure 9.7 that although older cohorts (on the leftmost part of the Figure) are less likely to lose their jobs in the Baseline Covid scenario (without markers), their loss, in terms of expected future pension entitlements, is similar to the losses of younger cohorts (on the right part of the horizontal axis). The reason is that these younger cohorts have still a relatively long career path ahead of them, during which they can make up for the losses that they suffered at younger ages. The magnitude of the typical loss is between 0.4-1% of pension entitlements, for both genders and all cohorts.

If we assume, in addition, permanent wage losses as in the Alternative Covid scenario (lines with markers), then younger cohorts will suffer permanently from lower wages, and they cannot make up for the initial losses that they suffered due to Covid-related disruptions, and end up losing a bigger proportion of their expected future pension entitlements than the older cohorts. With these extra wage losses, the magnitude of losses in pension entitlements increases to 0.8-1.6% (depending on gender and age), and it gets relatively larger for younger cohorts.

How do these decreases in expected future pension entitlements translate to decreases in total pension expenditures? Figure 9.8 addresses this question. As we saw above, in the Baseline Covid scenario expected future pension entitlements

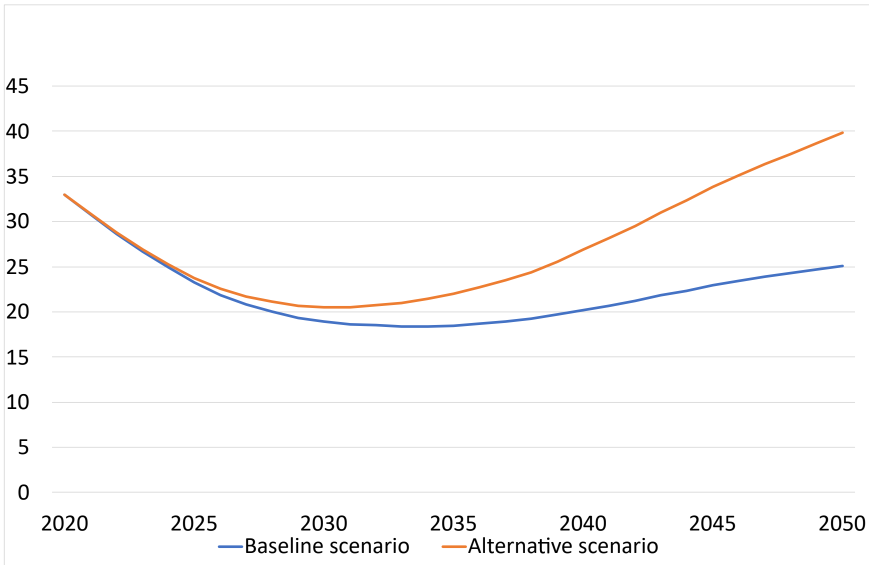
Fig. 9.8: Decrease in pension expenditures due to Covid-related job losses, 2020-2050.
Source: own calculations based on the micro simulation model.



decrease by less than 1% for all cohorts. But these cohorts will only gradually retire, and there will be many current retirees whose average pension benefits have not decreased—so the decrease in pension expenditures should only gradually (over several decades) converge to 0.7-0.8% of total pension expenditures. Expressed in terms of GDP, this is again a very small effect, less than 0.1% of GDP. It is also apparent from the figure that total pension expenditures will only decrease somewhat after 2030-2040, when the currently active cohorts who suffer from current job losses will retire in large numbers.

Figure 9.9 puts together the decreases in pension expenditures due to extra mortality (shown earlier on Figure 9.4) and due to labor market disruptions (shown above on Figure 9.8). As extra mortality decreased expenditures mostly until 2030, while job losses decreased expenditures on a longer horizon, the sum of these two effects shows a more balanced decrease in expenditures over time. Overall we see that the total yearly decrease in pension expenditures (due to extra mortality and labour market disruptions) fluctuates between 20-40 bn Hungarian forints (or 60-120 mn Euros), which is less than 0.1% of the 2020 GDP—which is a nice illustration of moderate effects of the Covid-19 on future total pension expenditures.

Fig. 9.9: Total decrease in pension expenditures due to Covid-related mortality and job losses, 2020-2050.
Source: own calculations based on the micro simulation model.



9.5.4 Regulatory and Behavioral Impact

As the Covid-19 crisis began slightly more than a year ago, it is too early to assess what kind of impact it might have had on pension scheme members and/or regulators. This is because data on behavioral changes (for example, on individual retirement decisions, or on the number of new disability pension recipients) is not yet readily available, either due to publication lags, or due to time lags until these decisions are implemented. Therefore the discussion of the next two subsections on the possible regulatory and behavioral impacts is still speculative.

The current crisis influences pension schemes through various channels: (a) increased likelihood of individuals exiting the labour market and claiming pension benefits; (b) labour market effects, as contracting employment and stagnating or declining real wages may result in a declining wage tax base; (c) asset price shocks negatively impacting funded pension schemes' balance sheets; (d) capacity of governments and private enterprises, as underwriters of pension obligations, to maintain solvency of defined benefit pension scheme under adverse conditions.

The extent to which pension schemes can accommodate these risks, and the risk-sharing between schemes' underwriters (such as the state) and members, will vary across pension schemes. The severity of the financial and welfare consequences suffered by scheme underwriters and members depend on the schemes' pre-crises financial position and basic characteristics, including: the relationship between their assets and liabilities (including whether they can diverge, creating a funding gap); their capacity to access additional resources; and the risk-sharing between members and underwriters. For instance, (i) defined benefit schemes, where liabilities are less directly linked to assets and revenues, are more vulnerable than defined contribution schemes, where liabilities by definition equal the value of assets; (ii) private pension schemes would typically find it more difficult to generate or access additional resources than public schemes; (iii) in defined benefit schemes, the risk of resources (from contributions or liquidating invested reserves) falling short of obligations is borne by underwriters (i.e., sponsoring employers, financial service companies or, as in the case of public schemes, the government), whereas in a defined contribution arrangement the risk of insufficient retirement balances is borne by the individual scheme member. These characteristics determine the impact of the crisis on pension schemes and the types of responses governments may consider.

Most contributory public pension schemes allow members to retire before the statutory retirement age, subject to certain conditions. In the short run, the crisis may lead to an acceleration of early retirement applications and disability benefit claims.

Contributory old-age pensions are conditioned on reaching the statutory retirement age and having accrued a sufficiently long contribution record ('service history'). However, most contributory pension schemes permit *early retirement* based on occupation, long service records, or individual choice (general early retirement). Best practice requires that early retirement is linked to lower benefits in order to balance the present value of expected pension benefits with total contributions paid. Social security regulations reflecting actuarially neutral[32] adjustments typically require early retirement deductions of between 0.3–0.6% per month of early retirement, which translates into benefits that are on average between 3.6–7.2% lower per year of early retirement. Lower pensions may result in higher old-age poverty and necessitate further welfare transfers, especially since it is often less-educated, lower-earning workers whose labour market prospects are most jeopardized by a long crisis.

Evidence from past crises indicates that the impact on retirement patterns is determined by two factors: while a decline in retirement wealth may push people to seek longer working careers, poor labour market prospects among workers who have the option to claim early retirement benefits generate incentives to exit the labour market as an alternative to unemployment. The overall impact of these factors depends on the structure of the pension system, the ease of accessing early retirement pensions, employment prospects, and the availability of transfers that can help workers to wait out the crisis. Whether it is the wealth or the employment effect that dominates workers' retirement decisions depends on the effectiveness of government efforts to help employers maintain labour demand, the relative importance of pension savings within expected old age income, the regulations determining the valuation of pen-

[32] Actuarial neutrality is a marginal concept (as opposed to actuarial fairness), requiring that the present value of accrued pension benefits for working an additional year is the same as in the year before, i.e. benefits increase only by the additional entitlement earned in that year or are reduced by the entitlements lost through contributing for one year less.

sion savings (i.e. the extent to which asset prices volatilities are directly reflected in the valuation of individual pension accounts), and the availability and generosity of welfare transfers which may encourage workers to stay economically active even at times of increasing unemployment.

9.5.5 Impact on EEE8

Disability pension awards differ from early retirement in that difficulty in establishing clear and easily verifiable eligibility rules means that there is a greater role for subjectivity both in terms of self-assessment of health status and the decision to apply for benefits, and also in terms of the administrative process of determining eligibility. Disability benefit applications have long been observed to be countercyclical, displaying an uptick at times of economic crisis and increasing unemployment. This suggests that disability status—and subsequent benefits—is possibly used as an early retirement option and as an alternative to unemployment. This approach is disadvantageous from macroeconomic and fiscal perspectives in that it: (i) permanently removes workers from the labour force and weakens the incentives to seek health-appropriate employment opportunities; (ii) replaces a temporary fiscal expenditure (unemployment benefit and possibly retraining and other active labour market instruments) with a permanent benefit thus increasing the present value of transfers per person; (iii) reduces the income tax and social contribution base permanently; and (iv) reduces output. Given that longer absences from the labour market reduce the probability of re-employment, it may also have negative welfare consequence for the individual as it denies workers the incremental pension benefit based on future real wage increases. During crises, governments' willingness to revise eligibility rules or the way they are applied can reinforce these behavioral responses and aggravate their economic consequences.

While the long-term impact of these developments on baseline pension expenditures may be low, the initial expenditure shock remains present for years and further increases the short-term fiscal pressures arising from the crisis. An early retirement 'boom' is later compensated for by smaller inflows: unless there is a permanent reduction in the effective retirement age, the impact will disappear in 4–8 years, given that usually the minimal retirement age limits the extent of early retirement. In the case of disability pensions, the marginal inflow works differently: the additional inflow is not compensated for by lower inflow in later years and the impact may be present for much longer, potentially decades, depending on the age distribution of the marginal beneficiaries. In general, if increased inflows are reinforced by permanently relaxed eligibility rules, then the increase in pension spending will tend to persist over the long term. This risk is increased by political economy considerations: high or increasing unemployment is seen as a common measure of the failure of economic policies and reflects more poorly on governments than lower labour force participation (which is rarely noticed by the electorate) or worsening financial and dependency indicators of social security schemes.

The crisis also influences the financial position of defined benefit pension schemes, irrespective of whether they are funded or pay-as-you-go financed, or privately or publicly underwritten. In the case of contributory defined benefit schemes, the most immediate effect is the reduction of contribution revenues, driven by the contracting wage tax base. This will result in a deteriorating social security balance and a declining funding ratio. While lower wages and higher unemployment also affect pension scheme liabilities through the reduction in future benefits, this reduction is more evenly distributed over time and is influenced by the combined effect of the age distribution of contributors, contribution histories, and the pension formula. Thus, while the revenue impact is immediate, the compensating effect of lower expenditures happens in the future and its magnitude is likely to be smaller, in present value terms, due to the various non-linearities present in DB security schemes.[33]

Asset price shocks reduce the value of pension reserves in funded defined benefit schemes, negatively influencing funding ratios. Ideally, funding ratios—the relationship between a defined benefit scheme's assets and liabilities measured over the same horizon—should fluctuate around 100%, without permanently remaining below full funding.

Declining asset prices also negatively affect defined contribution schemes, but in this case the risk of insufficient assets is borne by scheme members. Since the liabilities of defined contribution schemes equal the value of their assets, there is no risk of obligations exceeding assets (although efficient asset-liability management remains important for matching maturities and ensuring liquidity). At the same time, lower asset values translate into lower benefits for members who retire—or otherwise liquidate their account balances — during a slump. This, in turn, may result in higher old-age poverty and additional welfare spending in later years, especially in countries where defined contribution schemes play a dominant role. An issue specific to defined contribution schemes is that from a purely technical perspective it is much easier to liquidate savings and withdraw them early than it is in the case of defined benefit arrangements. Governments should exercise caution when considering supplementing or substituting budget-financed welfare transfers with policy measures that allow early withdrawal from defined contribution pension schemes.

Contributions have also been reduced through temporarily lowering of contribution rates or the pension base in several countries. These measures are introduced to reduce labour costs directly borne by employers, thereby keeping companies from going out of business and allowing them to retain their workers in paid employment. It is important to note that lower contribution rates—unless accompanied by actuarially neutral reductions in benefit accrual rates—increase the unfunded liabilities of defined benefit pension schemes. These, in the future, may translate into additional scheme deficits and subsidy needs.

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[33] This latter point was very nicely illustrated by the Hungarian case study about the potential future decreases in pension-related expenditures: these reductions were indeed quite small, at most 0.1% of GDP for the next 20-30 years. The immediate effect of declining tax base and contribution revenues is much larger.

While the measures above are all temporary, their introduction and possible extension (depending on the speed of recovery) raises important issues that need to be addressed by detailed implementation regulations. It is important that regulations clearly set out how crisis measures will evolve as economies emerge from the crisis so that long-term fiscal costs and undesirable incentives do not persist (!!Chapter 6!!).

9.5.6 Long-term Policy Considerations

Governments need to avoid using the pension system to address the negative consequences of the crisis and to implement temporary regulatory changes only sparingly. Pension systems do not lend themselves easily to addressing short- and medium-term economic problems, including the current crisis, since they respond slowly to changing macroeconomic and demographic circumstances yet generate long-term obligations and expectations. Responses to temporary shocks, therefore, need to be limited in time to avoid inadvertently setting the pension system on a course—in terms of sustainability, adequacy and efficiency—which does not reflect policymakers' objectives, expectations of society, or the constraints faced by the country.

It is equally important to directly address specific economic problems where they arise, instead of relying on the pension system, e.g., addressing rising unemployment through labour market policies and employer support, increasing poverty through well-designed welfare transfers, declining fertility through child and family subsidies and public health issues via improved access, quality and affordability of public health care.

It is also important that ongoing pension policy reforms aimed at containing pension spending should not be stalled or reversed, especially since fiscal pressures are likely to be greater after the crisis. Most governments have so far refrained from changing pension policy in response to the crisis. It is crucial that, even if recovery proves slower than expected, no major changes are introduced without careful analyses of their fiscal and welfare impacts. It is equally important that reforms introduced in the past or currently under implementation (in particular, systematic benefit indexation, retirement age increases, lengthening calculation periods, revising accrual rates, and the application of various types of automatic adjustments) are fully implemented since the pandemic-induced recession will most likely further worsen the sustainability of public pension systems, making reforms even more important than prior to the crisis.

9.6 Conclusions

At the end of the Chapter, we draw some conclusions. (i) Long-term pension prospects depend both on demography and labour/social policy: total fertility rate close to 2 and the duration to employment ratio close to 1/2 conducive to a sustainable pension system. (ii) Concerning public pension systems, there is a basic contradiction: the more progressive the pension system, the smaller the size of the public pension system but the weaker the incentives to contribute.

We compose the following recommendations, underlying a long-term strategy: (i) Do not introduce unsustainable rewards because it is extremely difficult to withdraw them. (ii) Do not reduce contribution rates for few years below the value which is sustainable in the long-run. (iii) It is worth introducing automatic feedbacks (like normal retirement age linked to life expectancy at 65 or NDC benefits) because they may ease the adjustments.

We see no major and lasting demographic impact on pensions attributable to Covid-19. The main impact of the pandemia lies in labour market developments, both in terms of entitlements accruing to future retirees and structural changes–but these changes will be more significant for the individuals whose labour market prospects are negatively affected than at the aggregate level. The drastically increasing public debt ratios may expose sustainability problems. The limited and diminished importance of mandatory funded schemes in EEE8 means that the low-yield, low return, low growth environment will do no damage to 2nd pillars but may hurt voluntary, 3rd pillar schemes. Over-reacting policies may do more damage than the crisis itself.

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Chapter 10
Public Education

Judit Lannert and Júlia Varga

Abstract This chapter presents evidence that even before the pandemic, there were large differences between members of the Emerging European Economies (EEE) in the effectiveness of their public education, and accordingly, their stock of human capital. While in the majority of the EEE, in terms of expected years of schooling, young people get the same or even more public education than in the EU15 average, the quality measures of public education are very variable in these countries. In most of the EEE, the level of basic skills of young people is below that in more advanced economies. There is growing evidence that the inability of middle-income countries to improve the quality of public education is an important factor in the emergence and persistence of the middle-income trap. The education systems, although of very different quality in the EEE were equally severely affected by the pandemic during the last two academic years (the second half of 2019/2020 and 2020/2021). Schools were closed, and on average, only one-fifth of schooling took place under 'normal' conditions in the EEE. This has resulted in large learning losses, the extent of which this chapter examines via the published statistics and the authors' own estimates and calculations. On this basis, the claim is made that not only did the pandemic heighten the pre-existing disparities, but it also exposed the EEE with previously successful public education policies to the risk that their former advantage could disappear if they fail to offset the effects of the pandemic. This, in turn, has the potential to contribute to these countries falling into a middle-income trap. This, however, can be avoided through appropriate educational policy responses, to which the chapter also offers some suggestions.

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10.1 Introduction

The Covid-19 pandemic has caused by far the largest global disruption to education systems since World War II. In response to the coronavirus epidemic that, in Europe, began in February 2020, schools were closed in 188 countries, fundamentally affecting the lives of some 1.6 billion children, young people, and their families. In much of Europe, the first wave receded, and schools opened in autumn that year, just as the first signs of the rising second wave were already becoming visible on the continent. The second wave of the epidemic swept across Central and Eastern Europe, which had previously remained relatively untouched, and schools (at least in secondary education) switched back to digital education.

There had been school interruptions before due to different reasons, natural disasters (floods, hurricanes, and earthquakes) endemics or teacher strikes, and the effects of some of these on students' performance have been analysed in detail (Marcotte & Hemelt, 2008; Baker, 2013; Andrabi, Daniels & Das, 2021). Nevertheless, the duration of these closures was much shorter, and they were only regional. A warning sign of the possible long-term effects of the Covid-19 related public education interruptions might be that World War II led to a significant loss of human capital, a drop in the educational attainment of individuals who were of school age during or immediately after the war. For two German-speaking countries, Austria and Germany the educational loss was 20 per cent of a year of schooling for those born during the thirties, as opposed to those being born in the previous or subsequent decades (Ichino & Winter-Ebmer, 2004). This caused an earnings loss that was still noticeable even in the 1980s. In the summer of 2020, the Secretary-General of the UN was already warning of a generational disaster if access to education for children and young people worldwide remains limited (United Nations, 2020). A McKinsey report (Dorn, Hancock, Sarakatsannis & Viruleg, 2020) on Covid-19 and student learning in the United States was entitled "The hurt could last a lifetime". Without appropriate policy responses, learning losses caused by Covid-19 may hinder the catching-up process of Emerging European Economies (EEE).

It is now widely accepted that raising the quality of human capital is one of the key policies to follow if middle-income countries are to escape the middle-income trap (Agénor & Canuto, 2015; Agénor, 2017). Education and labour economists have been convinced for decades that not only higher education and high-quality scientific knowledge and technical skills are important determinants of economic growth, but also the degree of diversification of skills and competencies (Schultz, 1972; Mincer, 1981; Hanushek & Kimko, 2000; Hanushek & Woessmann, 2008). The role of basic skills and the quality of education in avoiding the middle-income trap has only been widely recognised by growth economists and other experts recently (Agénor, 2017). The understanding of the role of basic skills and good public education in the growth process and in avoiding the middle-income trap was facilitated by better measures of school quality on the one hand and by skills-biased technological change or skills upgrading on the other hand.

For a long time, the most common measure of human capital was the average years of educational attainment, as compiled by Lee and Barro (1997); Barro and

Lee (2001). Nevertheless, students who have completed the same number of years of school often have very different learning outcomes in different countries, because the quality of education varies considerably across nations. As data on students' and adults' internationally comparable tests scores were gradually becoming available for an increasing number of countries and years, it became possible to measure not only the quantity of schooling but its quality as well. Following the pioneering work of (Hanushek & Kimko, 2000), several studies have shown that the quality of public education and the acquisition of basic skills affect economic growth (Barro, 2001; Hanushek & Woessmann, 2008, 2012). There is growing evidence that the inability of middle-income countries to improve the quality of public education as they get closer to the world technology frontier is an important factor in the emergence, and persistence of the middle-income trap (Jimenez, Nguyen & Patrinos, 2012; Jitsuchon, 2012).

Recently, a new macro measure, the 'Learning Adjusted Years of Schooling' (LAYS) has been developed to adjust the standard years-of-schooling measure using a measure of learning productivity—how much students learn each year they are in school (Filmer, Rogers, Angrist & Sabarwal, 2020). This measure has become a component of the Human Capital Index used by the World Bank, too (Angrist, Djankov, Goldberg & Patrinos, 2021). The present analysis will also use it in assessing the effectiveness of the public education systems of the EEE.

Over the last decades, skills upgrading, and skills-biased technological change have characterised the labour markets of the developed economies (Machin, 2002; Autor, Katz & Kearney, 2008). Employers have shifted their demand requirements to employ more workers with higher skills levels. The task content of jobs has changed substantially in these countries. The share of routine tasks, both routine cognitive and routine non-cognitive tasks has decreased sharply and the share of non-routine tasks has increased as technological change, computerisation, digitalisation, and automation have enabled machines to replace middle-skill workers performing routine tasks (Autor, Levy & Murnane, 2003; Acemoglu & Autor, 2011; Goos, Manning & Salomons, 2014). Although outsourcing routine tasks has also played a role in the process, technological change has had the largest impact on changes in labour composition (Morrison Paul & Siegel, 2001). The reshaping of the occupational task structure has raised the cognitive content of occupations and made it more important to improve the quality of education.

In the EEE, the restructuring of the task content of jobs was different, in part at least, from that of the advanced economies. The share of non-routine tasks has increased in this region too and the share of routine non-cognitive tasks has decreased in a way similar to the changes experienced in advanced economies. Nevertheless, unlike changes in advanced countries, the routine cognitive content of jobs has increased in several EEE countries and has also risen among tertiary graduates (Hardy, Keister & Lewandowski, 2016; Lewandowski, 2017), leaving them potentially vulnerable to being left behind by future technical progress, to routine-biased technological change and technology-driven worker displacement in the future. Research into the potential share of jobs at a high risk of automation in different countries has found that in most of the EEE, with the exception of Estonia, the share of jobs at high risk is higher than the OECD average (OECD, 2018). While some members of EEE have succeeded in improving the quantity and quality of public education, in others the need for further upskilling and improving the quality of public education was already necessary already before the pandemic.

At present, there are many studies reporting about the loss of education caused by Covid. The UNESCO, the UN, and the World Bank report deals with the global impacts, focusing on the less developed regions and countries of the world. OECD reports feature case studies from more developed countries. Meanwhile, much less information is available on the Central and Eastern European region. This study seeks to fill this gap, at least partially. We are interested in how this region has dealt with problems in education caused by Covid, how prepared their education systems have been for this, what the long-term effects of school closures might be, and finally, how this might affect the emergence of a middle-income trap in this region.

The first and second sections of this chapter summarise how the effectiveness of public education changed before the Covid crises, and what we know about the effect of different public educational policies on students' performance. In the following sections, we present how education policies have changed in response to the Covid crises, what forms of education policies have been employed, and how well-prepared schools, teachers and families were for the prospect of a shift to digital education. Results are presented for a simulation of the learning losses suffered by students between March 2020 and May 2021, due to school closures and the possible short and long-run potential economic effects of learning losses in the different members of EEE. The final section of the chapter sums up some recommendations on how countries can enhance the basic skills of students, avoid early school leaving and how they can catch up with learning losses.

In addition to Bulgaria, Czechia, Croatia, Hungary, Poland, Romania, Slovenia and Slovakia this chapter also covers the emerging Baltic countries: Estonia, Latvia, and Lithuania. Estonia has become one of the top performers in the last ten years in international student performance measurements. Latvia has also developed considerably and is performing well. Therefore, the experience of these countries in the development of their public education may be of interest to the other emerging European economies. Thus,in this chapter, in addition to the eight members usually listed, the abbreviation EEE also includes the Baltic countries.

10.2 The Effectiveness of Public Education in the EEE Before the Pandemic

Before the pandemic, significant variations in the effectiveness of public education had evolved across the EEE. Table 10.1. shows the public education-related components of the World Bank's Human Capital Index (HCI) for 2010 and 2020 in the EEE and the averages of the EU15. The HCI incorporates measures of the quantity and quality of schooling (expected years of schooling [1] and harmonised international test scores[2]).

Table 10.1: Public education-related components of the Human Capital Index, 2010 and 2020
Data: Angrist et al. (2021)

Country/ Region	2010		2020	
	Expected years of school	Harmonised test scores	Expected years of school	Harmonised test scores
Bulgaria	12.9	447	12.3	441
Croatia	13.2	490	13.4	488
Czechia	13.4	507	13.6	512
Estonia	13.2	531	13.5	543
Hungary	13.0	512	13.0	495
Latvia	13.3	503	13.6	504
Lithuania	13.8	495	13.8	496
Poland	12.9	518	13.4	530
Romania	12.7	441	11.8	442
Slovakia	12.7	505	12.6	485
Slovenia	13.6	516	13.6	521
EU15	13.5	515	13.5	510

In 2010 the number of expected years of schooling was higher or close to the EU15 average in Czechia, Lithuania, and Slovenia. By 2020 Poland and Estonia had made the largest gains (0.5 and 0.4 percentage points, respectively). Some other countries also managed to achieve increases in the quantity of education: Croatia, Czechia, and Latvia. However, the number of expected years of schooling declined in some other members of the EEE countries, namely, Bulgaria, Romania and to a small extent Slovakia. The decrease was sizeable in Romania and Bulgaria (0.9 and 0.6 years, respectively).

There were also large differences in the direction and rate of changes in the quality of education across countries in the region. The quality of public education has de-

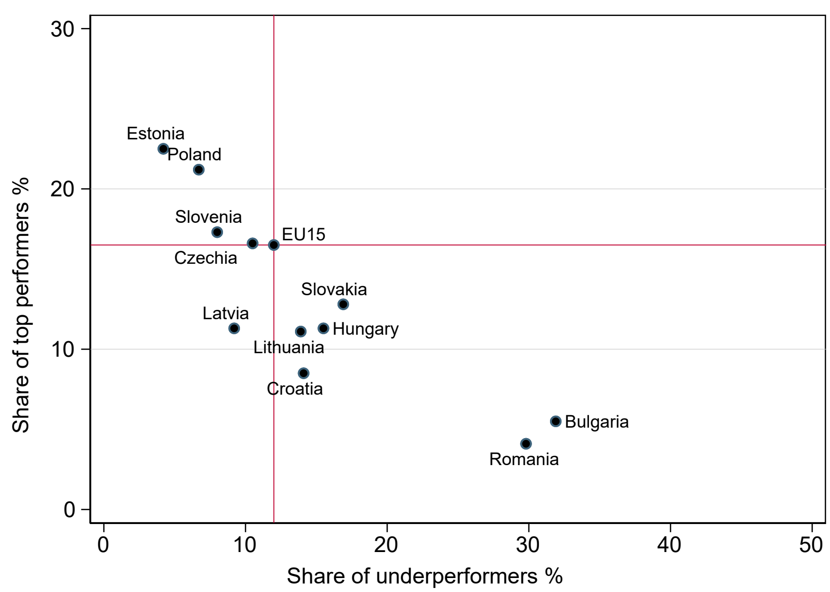
[1] The figure for expected years of schooling is calculated as the sum of age-specific enrolment rates between ages 4 and 17. Age-specific enrolment rates are approximated using school enrolment rates at different levels: pre-primary enrolment rates approximate the age-specific enrolment rates for 4- and 5-year-olds, the primary rate for 6–11-year-olds, the lower-secondary rate for 12–14-year-olds, and the upper-secondary for 15–17-year-olds.

[2] Harmonised Test Scores measure performance on international testing programs (PISA, TIMMS, PIRLs etc) that have been converted into common units with a mean of 500 and a standard deviation of 100 across students.

teriorated over time in Bulgaria, Hungary, and Slovakia. The largest decrease can be observed in Slovakia and Hungary, where the harmonised test scores dropped by 20 and 17 points, respectively. Other members of the EEE have succeeded in improving students' performance: Estonia and Poland have shown a steady improvement across all tests and over time, with their harmonised test scores increasing by 12 points in both cases. These two countries are also at the top of the lists in international student assessments.

Differences in education quality within the EEE are large not only as measured by the average student performance, but also in performance distribution. Figure 10.1 compares the share of top performers [3] and underachievers based on data from the latest (2018) round of the OECD's Programme for International Student Assessment (PISA), which is a component of the HCI, and which provides comparative data on 15-year olds' performance in reading, mathematics, and science. The horizontal and vertical lines indicate the EU15 means.

Fig. 10.1: Share of underachieving and top performing students 2018, %
Data: Based on PISA (2018) database (OECD, 2019) Tables I.B1.26 and I.B1.27.



[3] Top performers are defined as students whose performance was at level 5 or 6 on the 6-level scale in at least one subject. Underachievers are students whose performance was below level 2 in all three subjects.

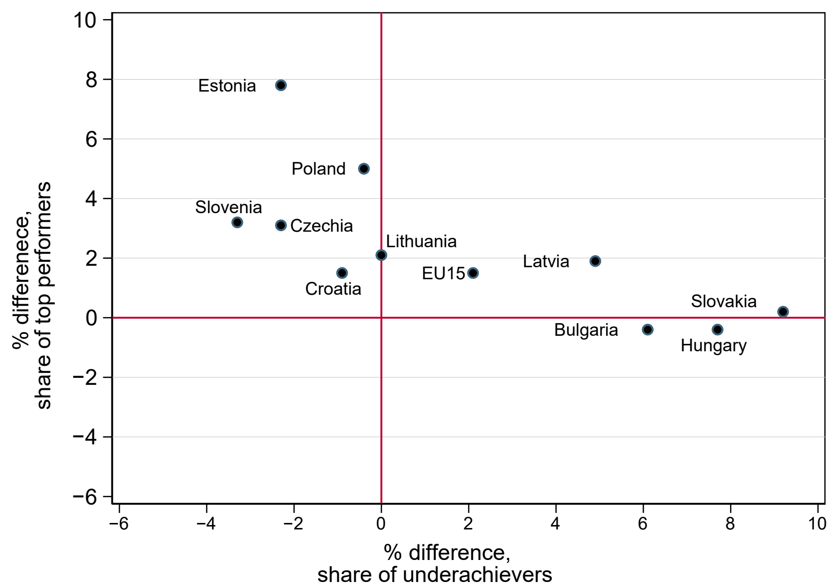
Estonia and Poland perform outstandingly well, with their share of underachieving students less than the EU15 average and well below the Europe 2020 target (15 %). The share of top performers is more than 20 per cent is in these countries. Czechia and Slovenia are also performing well. Their results are close to the EU15 average. At the other end of the spectrum are Bulgaria and Romania where not only the average student performance is low, but the number of pupils below level 2 in all subjects was more than 30 per cent, while fewer than 5 per cent performed well, at level 5 or above. Croatia, Hungary, Lithuania, and Slovakia form another cluster. The share of underachievers is larger, and the share of top performers is lower in these countries than the EU15 averages, but the lag is smaller in the case of these countries than that of Bulgaria and Romania. Not only the share of those performing either very well or badly is widely different across the EEE, but the changes in these proportions also vary widely, as well. Figure 10.2 presents how the share of top performers (level 5 and above on a 6-level scale) and the share of underachievers in reading (level 2 or below) changed during the decade 2009 - 2018. There are three countries where the share of low achievers increased to a large extent, while that of top performers decreased: Bulgaria, Hungary, and Slovakia. In these countries, the quality of public education appears to be getting worse, rather than better. In Latvia, the share of underachievers increased, but a rise in the share of top performers was also observable. Croatia, Czechia, Poland, and Slovenia were successful in reducing the share of low achievers and adding to that of top performers.

Before the outbreak of the pandemic, there was a great degree of variation in the ability of public education systems in the EEE to correct or reduce the effect of family background on student performance. Figure 10.3 presents two different measures of socio-economic disparities on student performance. The first is the difference in test scores in reading between average pupils with high and low socioeconomic status [4] . This is referred to as the size of the effect. The second shows how strong the correlation between students' socio-economic status and their performance. This, then, is the strength of the effect. The two endpoints are Hungary and Estonia: in Hungary, both the size and the strength of the effect are the largest within the EEE, and in Estonia, both measures are the lowest. In addition to Estonia, the countries with the most equitable distribution are Croatia and Latvia. In addition to Hungary, the countries whose values cluster around the values indicating the least equitable distribution are Bulgaria, Czechia, Romania and Slovakia.

The large or growing share of underachieving students and the inability of the public education system in some of the EEE to narrow the effect of family background on student performance ought already to have been a cause for great concern before the pandemic. Students with such weak basic skills can hardly succeed in upper secondary education, and these are the very students who are at a high risk of leaving public education without adequate education or basic skills and without learning how to learn skills. It is also highly questionable if they will have the adequate skills to succeed in today's and future's jobs. As work becomes more demanding even for this

[4] An advantaged student is one in the top quarter of ESCS, the PISA index of economic, social, and cultural status in their own country. A disadvantaged student is one in its bottom quarter.

Fig. 10.2: Change in the share of top performers and low achievers in reading, 2009-2018
Data: Based on PISA (2018) database (OECD, 2019) Tables I.B1.7.

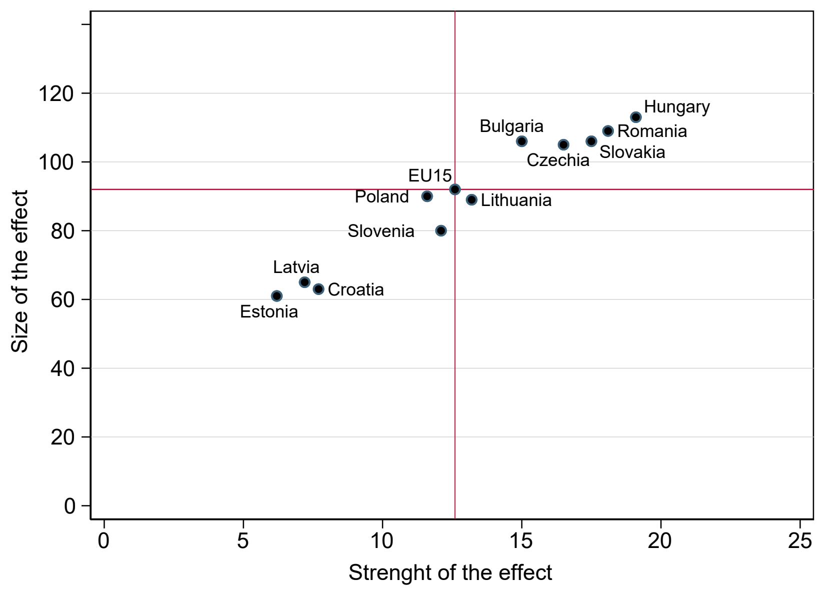


group, their poor skills will become more apparent and might become an obstacle to their future employment or their participation in lifelong learning.

Figure 10.4 presents how the share of early leavers from education and training (ELET) changed between 2010 and 2020 by gender. Early school leavers are those 18-24-olds who have, at most, lower secondary educational attainment [5], and who are no longer in formal or non-formal education and training. According to the Europe 2020 target, the ELET rate should have been lowered to less than 10% by 2020. In 2010 the ELET share was lower in most of the EEE, except for Romania than the then EU15 average both for men and women, but in most of the EEE it was above the target. By 2020, the EU15 average had decreased, but the figure was still above the target for men while for women it had already reached the target in 2015. By 2020 only three members of the EEE were above the target both for males and females: Bulgaria, Hungary, and Romania. In Europe, the rate of early school leavers is highest in Southern European countries, where generally boys are more likely to drop out from education than girls. The same is true for Bulgaria and Hungary, though the difference between boys and girls is small. In Romania, more girls drop out of the system than boys.

[5] According to the International Standard Classification of Education (ISCED) 0-2 levels.

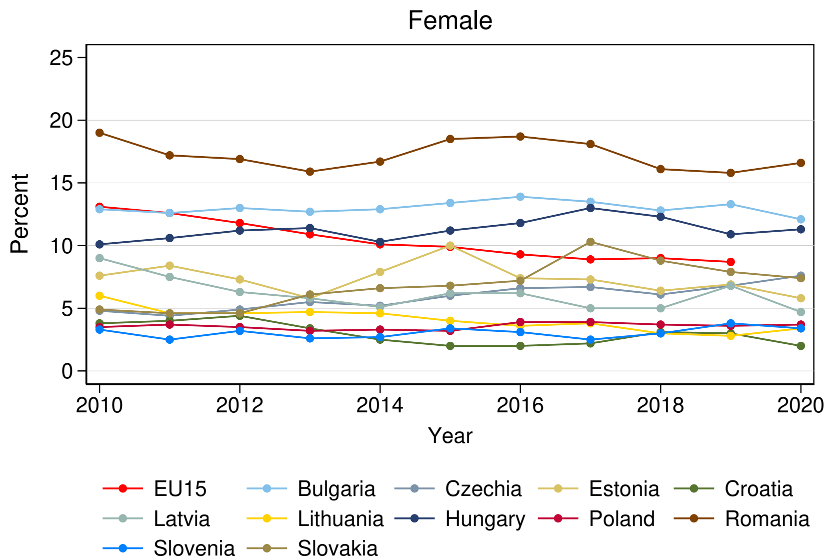
Fig. 10.3: Socio-economic disparities in students' academic performance
Data: Based on PISA (2018) database OECD (2019) Tables I.B1.7.
*Percentage of variance in reading explained by ESCS index, the PISA index of economic, social, and cultural status (R^2).



The gender differences in the ELET rates might be of interest in this context, as there is evidence that having more education reduces the probability of early childbearing and delays motherhood (Cygan-Rehm & Maeder, 2013; Adamecz-Völgyi & Scharle, 2020). In fact, in Europe, the highest shares of births of a first child to teenage mothers were recorded in Bulgaria and Romania, ahead of Hungary (Eurostat, 2019).

Early school leaving worsens young people's chances of finding work and staying in work in the short run, and without further training, also in the long run. In some of the EEE (Bulgaria, Hungary, and Romania) a relatively high proportion of young people are neither in employment nor in education or training (NEET) and this may probably have a detrimental effect on their employability in the long run. There is a wide range of factors that may contribute to young people being NEETs. Besides early school leaving and other family or individual reasons, education policy also plays a role, if the education system does not have any second-chance programs for dropouts, or if it does, but the programs are not very effective.

Fig. 10.4: Early school leavers from education and training by gender, 2010-2020
Data: Eurostat (2021a)



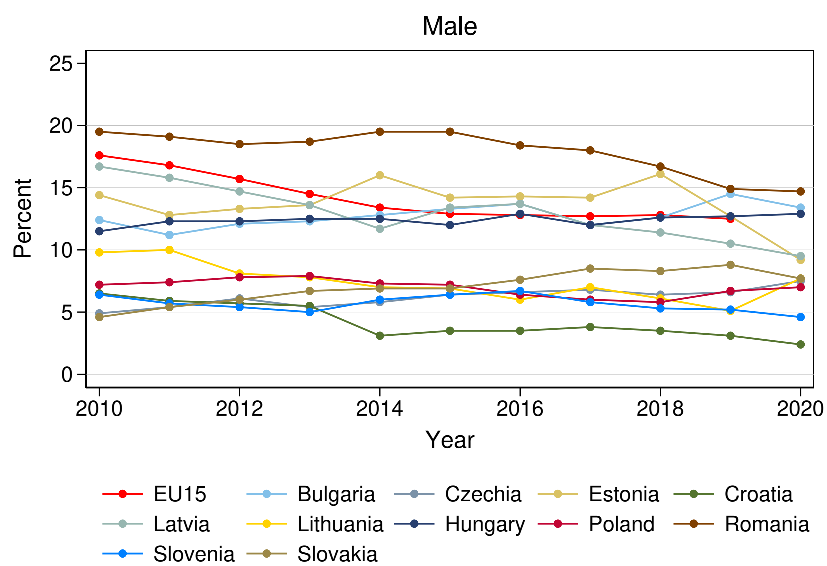


Figure 10.5 presents the changes in the share of 15–19-year-old NEETs between 2010 and 2020, the percentage of 15–19-year-olds, who are not employed and have

not received any formal or non-formal education or training in the preceding four weeks. In 2010 there were four countries in the EEE where the NEET rate was higher than the EU15 average both for men and women: Bulgaria, Croatia, Latvia, and Romania. By 2020 Latvia had succeeded in decreasing this share, while Hungary also fell beneath the EU15 average. The Baltic countries, Czechia, and Poland not only had below-average values at the beginning of the decade, but they were able to improve even on these by 2020.

The performance of the public education systems in the EEE was highly variable at the outbreak of the pandemic. Based on the quantity and quality indicators presented so far, four different groups can be distinguished. The first, those systems which are performing well and improving public education; Estonia, Poland, and Slovenia belong to this group. These countries are ranked top in the international assessments of students. (In PISA 2018, Estonian students ranked first among European countries in all three domains of assessment.) Their results are improving, and the variance between their students' results is lower than the EU average. The second, the group which is 'lagging behind', consists of Bulgaria and Romania. The quantity and quality of their education are worse than the EU average and their results are not improving. The third group comprises countries with deteriorating public education systems: Hungary and Slovakia. Around 2010 their performance was close to the EEE average, but now their results are declining, and their public education systems are more unequal than the EEE average. The fourth group consists of countries with close to average results.

As more and more jobs and tasks become automated, the so-called soft skills [6], which cannot yet be replicated by machines are becoming more important (Deming, 2017). According to some forecasts, soft skill-intensive occupations will account for two-thirds of all jobs by 2030 (DeakinCo, 2017). In assessing how well certain public education systems are preparing students for the future, soft skills [7] need to be taken into account, too. Nevertheless, these skills are much more difficult to measure than cognitive abilities. Recognising this shortcoming, the OECD has broadened its scope for collaborative problem solving [8] and global competence in PISA measurements [9].

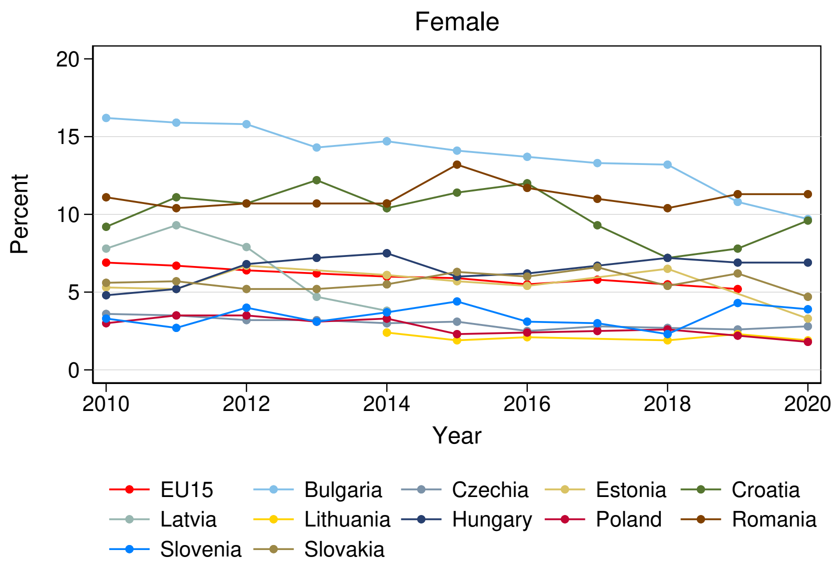
[6] Soft skills are non-technical skills related to how someone works. They include social skills, such as interacting with colleagues, solving problems etc.

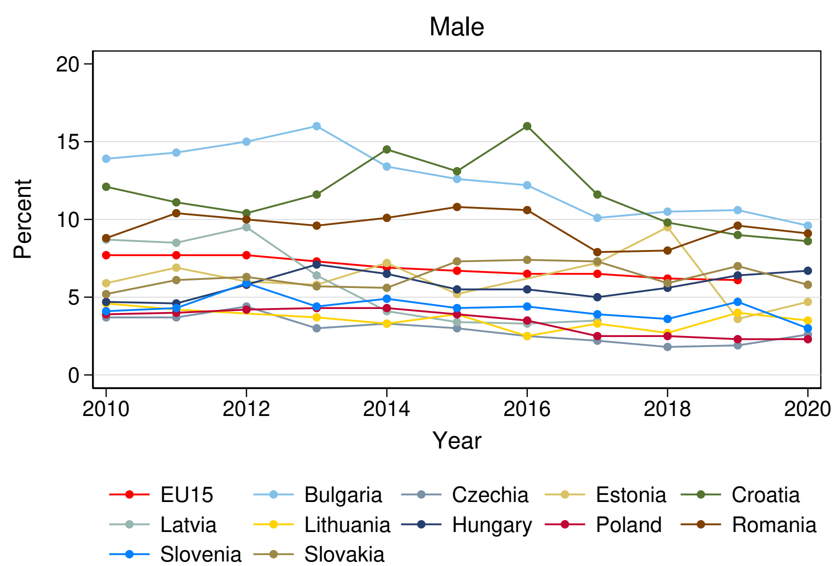
[7] In recent years the concept of the so called 6 C's has gained popularity among educators. The 6 C's are soft skills: Character, Citizenship, Collaboration, Communication, Creativity and Critical Thinking. Schools now are striving to educate their students to achieve the competences of thinking critically and solving real-world problems, conducting clear communication, having collaborative practices, respecting culture, developing creativity, and making good use of connectivity. (e.g. Anugerahwati, 2019).

[8] The PISA 2015 'Collaborative Problem Solving' assessment was the first large-scale, international assessment to evaluate students' competency in collaborative problem solving. To solve tasks, it required students to interact with simulated computer co-workers.

[9] Global Competence is a multi-dimensional construct that requires a combination of knowledge, skills, attitudes and values to be applied successfully to global issues or intercultural situations. The PISA 2018 Global Competence assessment measures students' capacity to examine local, global

Fig. 10.5: Share of 15-19 years olds in neither employment nor education and training, %
Data: Eurostat (2021c)





It seems that the academically successful public education systems perform better in providing students with soft skills too, and the academically poor performers lag behind in this respect as well. Nevertheless, this connection will need to be further examined. In terms of collaborative problem solving, Estonia performed best in Europe, well above the EU15 average. Slovenia also performed above the EU15 average and, Czechia around the EU15 (and OECD) average. All other members of the EEE [10] performed below average, with Bulgaria performing worst (OECD, 2017).

10.3 Education Policy and Student Performance

Before the pandemic the performance of public education systems both in terms of average performance and in the distribution of skills acquired by students in public education displayed a high degree of variation within the EEE. Among the EEE, there were top performers as well as laggards, and the share of underachieving students also varied. Although successful public education systems can operate in very different organisational, financial, and institutional environments (Deng & Gopinathan, 2016), there is growing evidence that differences between countries in terms of student achievements tend to be systematically related to certain differences in education policies, and in the organisation and governance of school systems (Hanushek & Woessmann, 2011; Ammermueller, 2013).

Based on recent international research this section gives a summary of how various factors in public education systems are associated with between-country achievement differences in general, and in the EEE in particular. It is difficult to identify the causal effects of the different inputs, or the different public education institutions or organisational settings on student performance in comparisons between countries because there may be a high degree of variation in unobservable factors that may affect both financial, institutional, or organisational choices and student performance (Webbink, 2005; Hanushek & Woessmann, 2017) such as those arising from culture, or government institutions for example. Nevertheless, in recent years more and more evidence has been accumulated in support of the view that successful public education systems do after all share certain common characteristics.

At the beginning of the 1990s the public education systems of the EEE shared many common characteristics, but later followed very different educational policies which may have contributed to the divergent achievements. Herbst and Wojciuk (2017) investigated four members of the EEE (Czechia, Hungary, Poland and Slovakia) and presented evidence that despite the many common characteristics that these countries shared at the beginning of transition (in the early 1990s), the educational reforms implemented during over the decades since then have contributed to their students' different achievements. Table 10.2 summarises some descriptive statistics

and intercultural issues, to engage in open, appropriate and effective interactions with people from different cultures, and to act for the collective well-being and sustainable development.

[10] Data for Poland and Romania are not available because they did not participate in the assessment.

of school inputs in the EEE, and table 10.3 summarises some characteristics of their public education systems using the latest available comparable data.

There has been a long-standing debate whether educational quantitative inputs (expenditure, class size, instruction time, etc.) influence student performance and also whether they play a role in the development of cross-country variations in student performance. Most of the results of previous between country comparative analyses have suggested that there is no strong or systematic relationship between education spending and student performance, that neither the level of nor changes in expenditure affect student results (see the review of research results in Hanushek (1986); Hanushek and Woessmann (2017)). Nevertheless, recent studies have found a positive relationship between education spending and average performance, though only up to a certain threshold (Vegas & Coffin, 2015; Jackson, 2020). Beyond that threshold, there is almost no relationship between the amount invested in education and student performance [11] (Schleicher, 2019). Column (1) and Column (2) of Table 10.2 present public expenditure on public education institutions as a percentage of GDP in 2010 and 2019. This simple comparison shows that Bulgaria and Romania, the two lagger countries in terms of students' performance, spent the least in proportion to their GDP both in 2010 and 2019. It is worth mentioning that these countries did increase their spending between 2010 and 2019, but because they were starting from a very low level, they were unable to advance from their position as last in the field. The cumulative expenditure per student in equivalent USD calculated using Purchasing Power Parity (PPP) over the theoretical duration of studies to age 15 is also the lowest in Bulgaria and Romania (and also falls below the estimated threshold) within the EEE. This means that up to the point when students take their PISA tests at age 15, these two counties spend the least on their students. Estonia and Slovenia, on the other hand, are two good performers, and in terms of the proportion of GDP, they spent the most on public education in the period under consideration. Nevertheless, some other members of the EEE, for example, Czechia and Poland, invest in public education in similar proportions, yet scored very differently in terms of student test results. This may be because once a certain threshold has been passed, the way resources are allocated seems to matter more.

Public education is a very labour-intensive sector in general, more than 75 per cent of current expenditure on public education goes to financing wages. Previous research has highlighted the importance of teacher quality in student achievement (Darling-Hammond, 2000; Hanushek & Wößmann, 2006). Research results also show that there is a strong relationship between teacher quality, teachers' cognitive skills and student achievement (Hanushek & Woessmann, 2020). International differences in teachers' cognitive skills reflect which part of each country's skills distribution those who choose to be – and remain – teachers are drawn from, as well as the overall skill level of the population. The attractiveness of the teaching profession depends on several factors (alternative career opportunities, working conditions, the opportunity to do meaningful intellectual work within public education etc.), but one of the key factors is the salaries of teachers relative to the earnings profile of a given

[11] PISA results showed that educational spending had a positive effect on average performance, in 2018 – up to a threshold of USD 50 000 in cumulative expenditure per student from age 6 to 15.

country's workforce. Teachers' salaries—both when measured in absolute terms and relative to wages of other tertiary-educated workers—are positively associated with student achievement. Countries that pay teachers relatively well can recruit teachers from higher up the skill distribution profile and can retain teachers in their profession (Dolton & Marcenaro-Gutierrez, 2011). Starting salaries are important determinants of who becomes a teacher, but a teacher's decision to enter the profession or stay in it depends not only on the starting salary but on the potential salary increase over time. Column (3) of table 10.2 shows actual salaries [12] of teachers relative to the earnings of tertiary workers, while column (4) shows how many years of experience teachers need to reach the top of the salary scale.

Figure 10.6 shows teachers' statutory starting salary and their salary with 10 and 15 years' experience in the EEE relative to per capita GDP. Teachers in the EEE on average earn less than other tertiary-educated workers and teachers in the EU15. Within the EEE (in countries for which data is available), the relative salary of teachers is the best in Slovenia and in Estonia, Latvia, and Lithuania. The average number of years necessary to reach the top of the salary scale ranges from 20 years in Poland to 42 years in Hungary. The age-earnings profile of teachers, based on statutory salaries relative to per capita GDP, is at a lower level than in the EU15 average at every point on the experience scale, and the age-experience profiles for teachers are flatter in the EEE in the first 15 years of their career, except in Slovenia [13]. It seems that as far as wages are concerned in the EEE it is more difficult to attract and retain teachers in the profession than in most of the EU15.

Public education systems differ in their institutional structure across Europe and the EEE, and countries also vary in the extent and age to which students are tracked into different school types by their ability. Table 10.3 columns (1) to (3) show the theoretical duration of primary, lower secondary and upper secondary education. Primary education lasts four years in Bulgaria, Croatia, Hungary, Lithuania, and Slovakia. In Czechia and Romania, the theoretical duration of primary education is five years. By contrast, in Estonia, Latvia, Slovenia, and Poland the duration of primary education is six years, and these countries have a long single structure of comprehensive education similar to that of the Northern European countries. The duration of different educational programs together with recommended annual instruction time determines the minimum instruction time children receive by the end of their compulsory schooling and by the end of their studies. Column (4) of table 10.3. shows the minimum cumulative instruction time by the end of primary education, and Column (5) by the end of compulsory schooling. Instruction time by the end of primary education is lower in the EEE than the average in EU15. Within the EEE, Bulgaria, Croatia, Hungary, and Slovakia provide pupils with the least amount of instruction time by the end of primary education, and Estonia, Lithuania, Slovenia, and Poland the most. With the exception of Romania the total cumulative number of recommended hours by the end of full-time compulsory education is also smaller in most of the EEE than the EU15 average.

[12] Actual salaries: average salaries including bonuses and allowances.

[13] Data for Estonia is available only for statutory starting salaries.

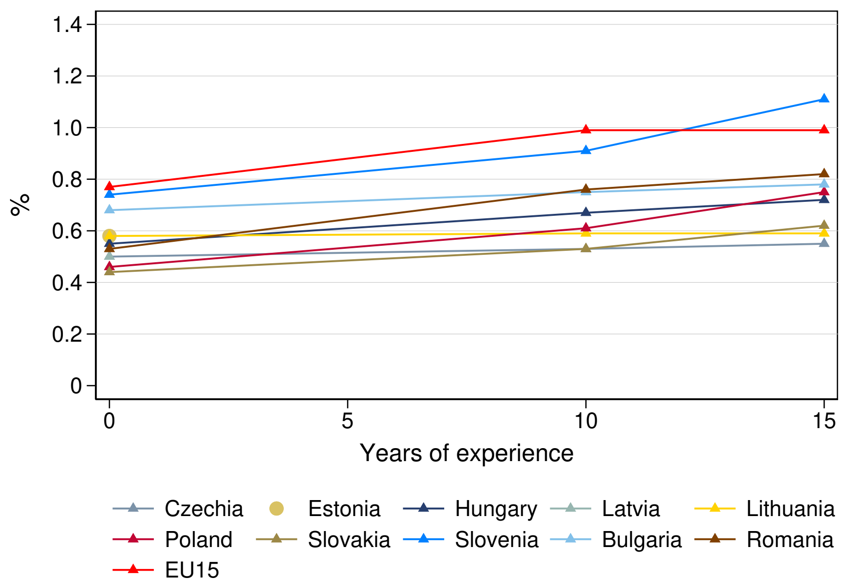
Table 10.2: Public expenditure on public education and some characteristic of teachers' salaries in the EEE (latest available year)
Data: Columns (1) and (2): Eurostat (2021b)
Column (3): OECD (2019): PISA 2018 Results. Vol II. Annex B3. Table B3.1.1.
Column (4): OECD (2019),
Column (5): Column (3): OECD (2019): PISA 2018 Results. Vol II. Annex B3. Table B3.1.2.

Column	(1)	(2)	(3)	(4)	(5)
Country	Public expenditure on pre-primary, primary and secondary education as a % of GDP		Total cumulative expenditure per student by age 16 USD*	Actual salaries of teachers relative to earnings of tertiary-educated workers	Years from starting to top salary (Lower secondary level ISCED2)
Year	2010	2019	2015	2017	2017
Bulgaria	25	2,8	31029	n.a	n.a
Croatia	3.4	3.3	52491	n.a	40
Czechia	3.1	3.3	69143	0.64	32
Estonia	3.9	3.9	64315	0.91	39
Hungary	3.6	3.0	53002	0.68	42
Latvia	4	3.6	65515	1.40	n.a
Lithuania	3.6	2.8	53133	0.92	25
Poland	3.5	3.2	67720	n.a	20
Romania	2.0	2.3	24608	n.a	40
Slovakia	2.6	2.6	66012	0.65	40
Slovenia	4.7	4.0	88255	0.90	25
EU15	3.9	3.5	105884	0.90	26

Research results have shown that the length of school instruction time plays a role in educational achievement (Lavy, 2015; Rivkin & Schiman, 2015), but the benefit of additional instruction time appears to vary with the quality of the classroom environment. Schools with low-quality classroom environments are likely to realise a much smaller benefit from additional instruction time.

Column (6) of table 10.3 shows the youngest age at which students can be tracked to different programs according to ability and Column (7) gives the number of school types or distinct education programmes available to 15-year-old students. Considered from this perspective, there are three groups within the EEE. The first, the late tracker countries, are Estonia, Latvia and Poland, where children can go on to different types of learning pathways only at age 16. The second group, the early selecting countries have very selective school systems. This group includes Bulgaria, Czechia, Hungary,

Fig. 10.6: Statutory salary of teachers as a percentage of per capita GDP by years of experience (Lower secondary education), 2017
Data: OECD (2019): PISA 2018 Results. Vol II. Annex B3. Table B3.1.3 and B3.1.4. For Estonia data are not available, except for statutory starting salaries.



and Slovakia. In Hungary, student tracking starts as soon as grade 4 is completed. The third, the middle group, comprises Croatia, Lithuania, Romania, and Slovenia, where one has to choose a school type at the age of 14.

The role of early tracking in student performance is a much-researched question. Research results consistently show that early tracking reduces performance levels and reinforces the role of parental background in educational achievement, Hanushek and Wößmann (2006); Brunello and Checchi (2007); Schütz, Ursprung and Wößmann (2008); Horn (2009); Pekkarinen, Uusitalo and Kerr (2009); Lavrijsen and Nicaise (2016) and hinders the improvement of the performance of underachievers, whereas the postponement of the tracking age may increase average levels by improving the achievement of poor performers and fostering social equity in educational achievement.

Other institutional features have also been found to matter for between-country differences in student achievement, for example, external exams, school autonomy, competition from private alternatives (see the review of research results in Woessmann (2016)). Nevertheless, the results are not unanimous, and so lie beyond the scope of this summary.

Table 10.3: Some characteristic features of the public education systems within the EEE (latest available year)
Data: Column (1) – Column (3): European Commission/EACEA/Eurydice (2019d)
Column (4) and Column (5): European Commission/EACEA/Eurydice (2019c)
Column (6) – Column (7): European Commission/EACEA/Eurydice (2019d)

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Theoretical duration (in years)						
Country	Primary education	Lower secondary education	Upper secondary education	Minimum cumulative instruction time by the end of primary schooling hours	Minimum cumulative instruction time by the end of compulsory schooling hours	Age of first selection in the education system	Number of school types or distinct education programmes available to 15-year-old students
Year	2019	2019	2019	2019	2019	2019	2019
Bulgaria	4	4	4	1949	6984	13	3
Czechia	5	4	4	3434	6984	11	5
Croatia	4	4	4	1890	4541	14	3
Estonia	6	3	3	3964	6432	16	1
Hungary	4	4	4	2769	7890	10	3
Latvia	6	3	3	3589	5970	16	4
Lithuania	4	6	2	3740	7426	14	2
Poland	6	3	3	3619	6297	16	1
Romania	5	4	4	3360	9109	14	4
Slovakia	4	5	5	2678	7616	11	4
Slovenia	6	3	4	4091	6389	14	3
EU15	5	4	3	4801	8931	14	3

In recent years new education reforms have taken place everywhere in the EEE, partly because EU structural funds were used for the development and modernisation of public education. However, some members of the EEE have different interpretations of the modernisation of public education, and in their approach and communication. Space does not permit the description of each member's public education reforms in detail, but it is worth highlighting some of the more important changes.

Estonia implemented a series of comprehensive education reforms in the last decades and the rate of increase in teachers' salaries has been one of the quickest in the last 10 years (Lees, 2016). The reforms have not only improved students' test scores, but also have a positive effect on adults' skills (Byrne & Plekhanov, 2021).

In many countries, large-scale interventions are taking place, mainly in the areas of the national curriculum, vocational training and funding, and teacher salaries. The latter was also forced by the fact that teacher strikes took place in some countries (e.g., Croatia, Lithuania) due to low salaries. Reforms can also be distinguished in how far they go beyond the simple desire to meet the needs of the labour market. The latter target is a particularly strong feature of the Hungarian and Slovak reforms. In the case of the latter, political instability also caused the reforms to lack effectiveness: in Slovakia from 2012 to 2020, there were six ministers of education, four of them in the last five years. Each came from a different area of expertise and pursued a different agenda, exacerbating the unsystematic, fragmented nature of education policy (Kascak, 2021).

Besides continuous stop-and-go modernisation, the signs of rearrangement can also be seen. In Hungary, although the content development was initially carried out by the Academy of Sciences, which tried to bring in the expectations and competencies of the 21st century, the final, politically accepted national core curriculum has already become strongly nationalist and traditional knowledge oriented. Although Poland's good and continuously improving PISA outcomes seem to be the result of school reforms launched in 1999 (Jakubowski, Patrinos, Porta & Wisniewski, 2010; Jakubowski, Patrinos, Porta & Wiśniewski, 2016; Herbst & Wojciuk, 2017), when their primary and lower secondary education switched to a 6-3 system extending the duration of studies by one year (from 8 to 9 years), a new system will come into force from 2022 on-wards. Primary and lower secondary education organised in one single structure will be one year shorter and upper secondary education will be extended by one year.

10.4 The COVID Shock – Countries' Education Responses

To reduce the spread of Covid-19, most countries around the world decided to temporarily close educational institutions. All members of the EEE introduced school closures as early as mid-March of 2020, although at that time the EEE were experiencing far fewer Covid cases and deaths than Western countries. In the first wave of the epidemic, during the spring of 2020, schools were completely closed almost everywhere in the area. The second wave hit the region in the autumn of 2020, when, to avoid the costs of previous closures, mostly only upper secondary schools in the region were closed. The third wave in the spring of 2021 hit the region so hard that primary schools had also once again to close.

As of the time of writing (June 2021), school closures have affected two academic years. Figure 11. shows the number of school days that were disrupted by the pandemic in the last two academic years, based on data from the Oxford COVID-19 Government Response Tracker (Hale et al., 2021). The Oxford tracker data is collected and updated in real-time. Here, the closures between January 1, 2020, and

May 7, 2021, will be followed. Three types of school closure are distinguished in the data. First, when schools at all levels are required to close. The second is when only some levels or categories of schools are required to close – most often this means that primary schools were allowed to remain open while secondary schools had to close, or in some cases, the closures were just regional. The third type was when the closure of certain types of schools is not required but only recommended.

Speaking of only the academic year 2019/2020, a few countries used the tool to recommend just closing, and most closing days were required at all levels, except for Czechia. During the academic year 2020/21 the recommendation to close, but not the requirement became more widespread across the EEE, and in most countries, an attempt was made to keep primary schools open. Nevertheless, the number of days when secondary schools were closed was very high, even exceeding 200 days in some countries, and the number of days when primary schools were closed was close to 100 in Czechia, Poland, Romania, and Slovenia.

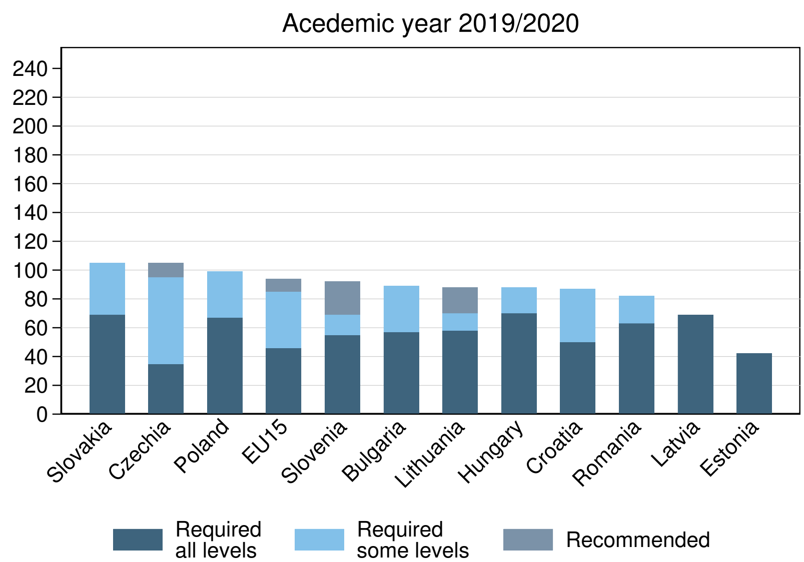
Although there were assumptions that countries with lower educational performance tended to close their schools completely for longer periods in 2020 (OECD, 2020a), such a pattern could not be observed during the academic year 2020/21, and over the total time in which there were school closures. Nevertheless, across the EEE the extent of school closures was unprecedented since World War II.

In most countries, schools were closed almost overnight, with very little or no preparation. This is well illustrated by a comment made by a teacher in a guest commentary on one of the largest Lithuanian news portals (Lrytas). "It's disappointing that in this dire situation the prime minister, the health and education ministers and the government as a whole are shirking their responsibility and passing the buck to municipalities and schools, which must now decide for themselves which measures to take. ... Currently, apart from distance learning, no real measures have been taken(Oliver Pink, n.d.).

Schools had to respond quickly, and the success depended on how adaptive and innovative teachers, school heads, and other educators are. Nevertheless, learning and teaching did not stop, though they were in part or in full taking place online or with the use of other distance teaching solutions. Teachers in many schools, especially at the very beginning, in spring 2020 stayed with traditional online methods and sent emails to their students or sent the curriculum in ppt format. Some experimented with more advanced solutions where they tried to create virtual learning spaces using some software (e.g., Microsoft Teams, Google Classroom etc.) or already existing school digital platforms. Countries where the digital transformation had begun before the pandemic were in a better position. In those countries which were behind in this respect, teachers and schools tried to strike a balance between the traditional and modern digital methodologies with online consultation and videos. In addition to online platforms, countries used different remote teaching solutions. Table 10.4 gives an overview of the different combinations of distance teaching solutions countries have used.

Some of the countries, like Czechia, Estonia, Latvia, and Romania chose a strategy of combining several methods: TV broadcasts with on-demand video lessons. The Romanian Ministry of Education established a partnership with Romanian Televi-

Fig. 10.7: Number of days when school were closed
Data: Own calculations based on data from the Oxford COVID-19 Government Response Tracker (Hale et al., 2021) corrected by the number of school holidays and public holidays, using data from European Commission/EACEA/Eurydice (2019a, 2019b).
Data for academic year 2020/2021 ending on 7 May 2021



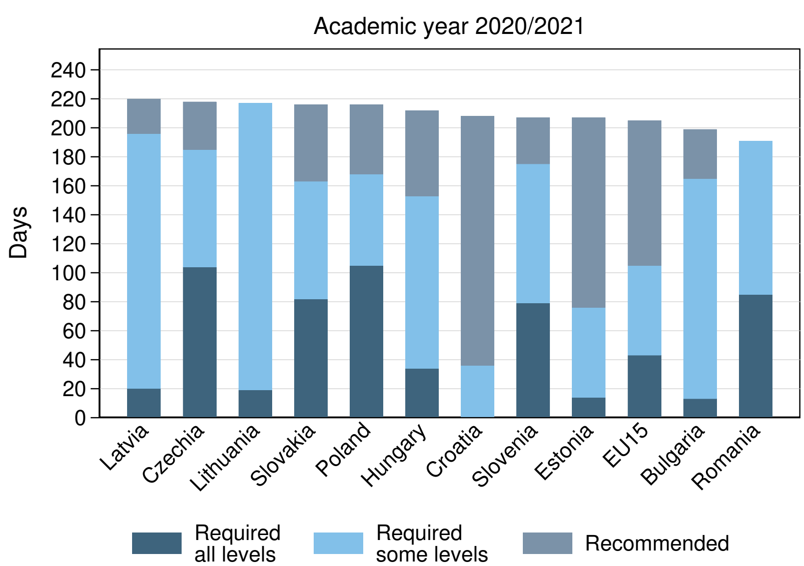


Table 10.4: Distance learning solutions offered during 2020 and/or 2021*
Data: OECD (2021)
For Croatia and Romania data are not available.

	Online platform	Take-home packages	Television	Mobile phones	Radio	Other distancing learning modality
Czechia	Yes	Yes	Yes	No	No	No
Estonia	Yes	No	No	Yes	No	Yes
Hungary	Yes	No	Yes	No	No	No
Latvia	Yes	Yes	Yes	Yes	No	No
Lithuania	Yes	No	Yes	No	No	No
Poland	Yes	Yes	Yes	Yes	Yes	Yes
Slovakia	Yes	Yes	Yes	No	No	No
Slovenia	Yes	Yes	Yes	Yes	Yes	No

sion to facilitate access to education for those children who could not access online platforms. In Poland, the government launched a raft of measures, including gamification, financing technological equipment, websites for teachers with online textbooks, TV lessons, and internet bundles (Redep, 2021). To complement digital provision, Latvia launched Your Class, a series of daily educational programmes broadcast on national television and online (Latvia 2020). Czech Television broadcast daily educational programmes and launched an online bank of educational videos. (Czech 2020).

Estonia also launched a platform to promote distance learning opportunities for adults. From early April 2020, weekly, televised lessons supported students in managing their learning from home (Estonia 2020). Estonia had a very high share of students who reported that during school closures, they had good access to the internet. Evidence suggests that pre-existing resources in the education system facilitated Estonia's initial response. The switch to distance learning saw a considerable increase in the use of already existing digital platforms (e.g eSchool, E-Schoolbag). Estonia's network of Pathfinder Centres, regional services offering support and counselling to children with SEN and their families, switched to remote services, including phone or video counselling. Regular webinars were provided for teachers, school leaders and parents to support distance education. Estonia's team of educational technologists started providing remote support to teachers, parents, and principals; new specialists were recruited to meet demand. Estonia has long supported Ed-Tech companies, many of whom started providing services to schools and families for free. There were certainly differences between countries in the effectiveness of distance learning, but there are no comparable data yet.

Nor are any comparative data yet available on what share of students was left out of distance learning in the EEE, but it seems a reasonable assumption that the more distance learning solutions were used to reach students, the lower the left-out rate was. According to UNICEF (Unicef et al., 2020), one-third of schoolchildren worldwide could not be reached by the remote learning methods used during the epidemic, and even in the developed part of the world, 5-15 per cent of pupils could not be reached. In Hungary, one-fifth of students could not be reached, and in the case of disadvantaged students this proportion went up to one third (Hermann, 2020). Data on Czechia shows (Czech School Inspectorate, 2021)) that about 250 000 pupils did not attend online distance learning in 2020 due to technical difficulties, (about 18 per cent of students), but by 2021 they had succeeded in reducing this to three per cent of students.

There are significant differences between countries in the ways they monitor the situation. In some countries, the changes in the schools were continuously monitored and they tried to adjust their policy to the evidence they received. From the survey the Latvian Ministry of Education and Science conducted among teachers, parents, and pupils at the end of the 2019-2020 academic year it turns out that during the pandemic each actor's workload increased significantly. 74% of the teachers often or very often felt overwhelmed, while on average, 42% of the surveyed parents spent three or more hours a day helping their children with their studies and in years 10-12 one in five pupils spent more than seven hours a day learning. A recent Hungarian qualitative study based on focus group discussions assessing learning experiences of among parents and children reveals that although students had the experience of taking of responsibility for their learning, they missed teachers because they were only sending tasks, but they were not available for consultation. In addition, they typically used textbooks, with less processing of online content. Students also complained that teachers online did not take into account how tired and how stressed they were. According to the parents, what happened in the spring of 2020 was not even digital education, because there were very few online lessons, meaning lessons conducted by a teaching. Students used several platforms in parallel, with one student saying that "an assignment, task, or homework could appear anywhere, anytime all day, you always had to watch everything". Creating suitable conditions for home learning for families with low socio-economic status was not easy either; many did not have internet, so children tried to get involved in digital education over the phone, but prepaid mobile internet soon ran out. Moreover, many times, the child did not have a suitable, calm environment to study in. Parents also found themselves in a new role, as they had the task of teachers, explaining and, first, understanding the material, a particular problem for parents with lower levels of education. The younger the child, the more parents needed help, but with high school students, parents tended to report that their child effectively disappeared and often parents had no idea what or how much they were studying. (Szilvia & Rajnai, 2021).

The dual facts that some students could not access remote learning, and that the effectiveness of remote learning could not be as good as that of face-to-face learning inevitably led to learning losses. In Section 6 we present estimates of the magnitude of potential learning losses on the basis of these data will be presented. Whatever their magnitude, the fact that school closures may also have resulted in losses in the development of important soft skills, such as emotional intelligence, communication, cooperation, and empathy must also be taken into account. Alongside this, the narrowing of community life caused by the epidemic - the absence of direct contact with classmates and especially friends – is also likely to have harmed young people's mental health. According to an OECD survey, self-reported mental health issues are more prevalent among young people compared to other age groups across many OECD countries, and symptoms of anxiety and depression or the prevalence of anxiety and depression are higher among young people than in the general population (OECD, 2021). These are further costs of the epidemic and are by their very nature, hard to measure, but are nonetheless certainly worth bearing in mind.

10.5 The Preparedness of the EEE for Remote Teaching

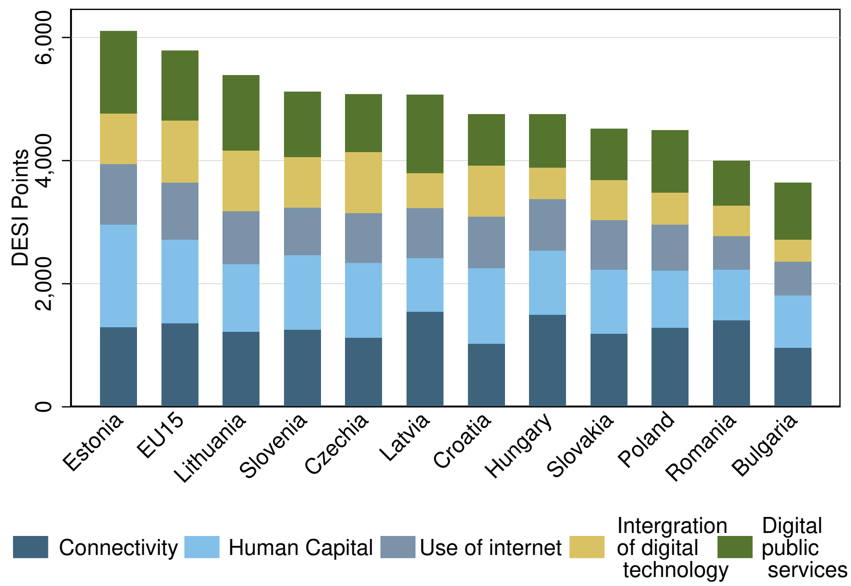
This section reviews from several angles how prepared the EEE were for the introduction of remote learning, and most importantly, for the transition to digital education. The degree of preparedness has different aspects: access to digital tools; ensuring the conditions are in place at home to enable learning from home; the prior experience of students, teachers, and parents with digital devices; and digital learning itself. Successful online learning requires that students (and teachers) be familiar with and proficient in the use of digital devices, as well as knowing how to learn on their own.

First, it is necessary to examine the quality of digitalisation in the region. This is often characterised by the Digital Economy and Society Index (DESI), a composite index developed by the European Commission that summarises different aspects of Europe's digital performance and tracks the evolution of EU Member States in terms of digital competitiveness. The index collects data on five areas (connectivity; human capital, that is digital skills, software skills, ICT graduates and specialists; use of internet services; integration of digital technology and digital public services). Each summarises different indicators into sub-indicators, and finally, their weighted average yields the final composite indicator [14]. Figure 10.8 presents the overall DESI indicators and their sub-indicators for the five areas for the EEE and the EU15 average.

As for the final index, all members of the EEE except Estonia lagged behind the EU15 average. The connectivity index was better in Hungary, Latvia, and Romania than the EU15 average. All the EEE with the exception of Estonia has a smaller sub-index for digital human capital and the use of the internet than the EU15 average. All the EEE performed worse in the integration of digital technology than the average of the EU15. Estonia, Latvia, and Lithuania have better digital public services than the EU15 average, while all other members of the EEE have worse ones. Nevertheless, except for Estonia, the overall DESI in the EEE has still not caught up with the more developed countries of Europe. This may indicate the limits of preparedness

[14] The DESI overall index is calculated as the weighted average of the five main DESI dimensions: 1 Connectivity (25%), 2 Human Capital (25%), 3 Use of Internet (15%), 4 Integration of Digital Technology (20%) and 5 Digital Public Services (15%). The score for each of the five dimensions are between 0 to 100. For further details about the DESI see: (European Commission, 2020)

Fig. 10.8: Digital Economy and Society Index, 2020
Data: European Commission (2020).



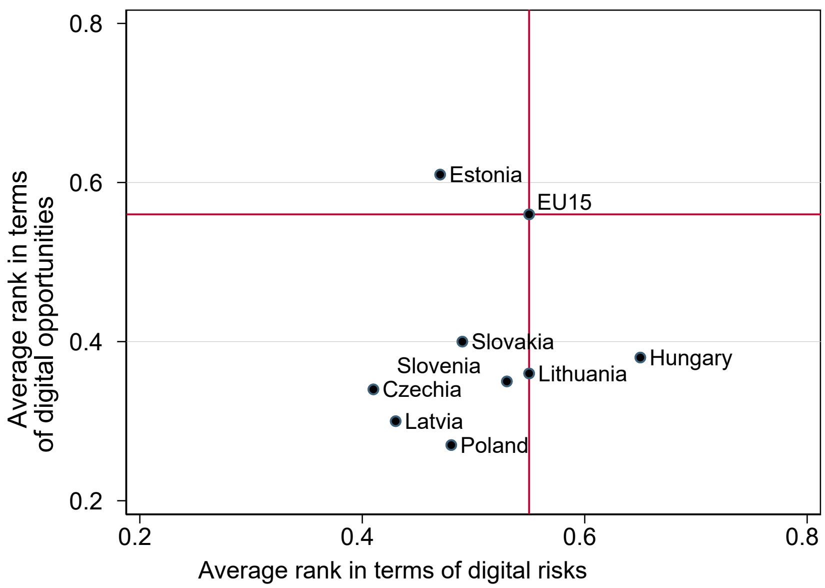
for digital teaching in these countries, as the question is not only whether people have internet access, but how they can benefit from access to it. Hungary, Latvia, and Romania are good in connectivity, but their digital technology is poorly integrated. According to a World Bank report "Romania has top internet infrastructure but fails to reap the digital dividends" (Redep, 2021). Inequalities in the use of digital technologies are also much higher in some members of the EEE than the OECD or EU15 average. Although it is common in most countries that the disadvantaged use the internet to a lesser extent, the difference between the lowest and highest 25% in terms of income in this respect is outstanding the case of Hungary and is also large in the case of Latvians and Poles (OECD, 2019). This may also have made it more difficult for certain groups of learners to participate in digital education.

A very similar picture unfolds in another summary characterisation of the different countries degrees of digitalisation made by the OECD. This summary classified countries along several dimensions, according to the risks and opportunities of digital transformation. The risks of the digital transformation encompass 13 indicators [15] across nine dimensions, while opportunities of the digital transformation are

[15] ICT access and usage, education and skills, jobs, work-life balance, health status, social connections, civic engagement and governance, environmental quality, and digital security.

measured through 20 indicators across 9 dimensions [16] . For each indicator, countries are ranked according to their comparative performance such that the country with the lowest values has a score of 0 and the country with the highest outcome has a score of 100. Figure 10.9 presents these two dimensions of digital transformation in the EEE and the EU15. Except for Estonia, the EEE are characterized by low opportunities, but this group is also divided according to how much risk the process entails. Estonia stands out from the group again, being characterized by both low risk and high opportunities. The OECD report highlights that people in Estonia have high levels of access to the internet and use it for a wide range of purposes. (OECD, 2019).

Fig. 10.9: Mapping countries by their opportunities and risks of digital transformation
Data: OECD (2019)



In the 'low risks and low opportunities' group (Czechia, Latvia, Poland, Slovakia) in most of the countries there is a comparatively high level of inequality of use, meaning that while some groups take advantage of a wide variety of internet uses, most of the population makes use of only a few possibilities. High risk and low

[16] ICT access and usage, education and skills, income, consumption and wealth, jobs, work-life balance, health status, social connections, governance and civic engagement, and subjective well-being.

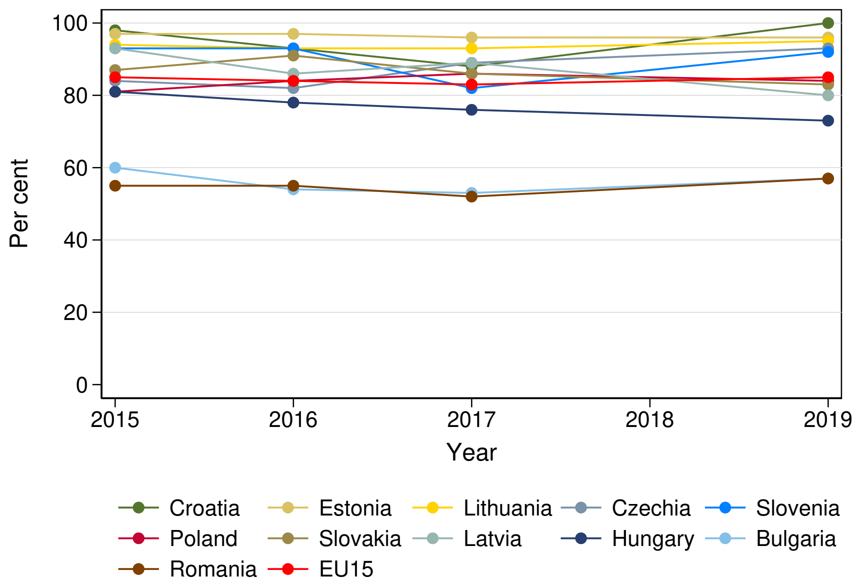
opportunities characterise Hungary, Lithuania, and Slovenia, with a very high level of inequality in internet use. (OECD, 2019). Children are particularly affected by online risks: the share of extreme internet users among children is above the OECD average and the proportion of children reporting cyberbullying is high (OECD, 2019).

Online learning requires that students and teachers should be familiar with and proficient in their uses of digital devices for learning and that the devices actually exist. First, the preparedness of students will be examined. Figure 10.10. presents how the share of 15-to 17-year-olds who have ‘basic,’ or ‘above basic’ overall digital skills changed between 2015 and 2019. These levels represent the two highest levels used in the overall digital skills indicator of Eurostat (For further details about the indicator see: European Commission (2015)). The indicator is a composite indicator based on selected activities performed by individuals on the internet in four specific areas (information, communication, problem-solving, and software). It is assumed that individuals who have undertaken certain activities have the corresponding skills; thus, the indicator can be considered a proxy of the digital competencies and skills of individuals. In the EU15, on average 84-85 per cent of young people had basic, or above basic level digital skills. In 2019, the share was even higher in Croatia (100 per cent), Estonia (96 per cent), Czechia (93 per cent), and Slovenia (92 per cent). Bulgaria and Romania have the lowest levels of digital competence among young people and unfortunately, this has not improved over time. In 2019 57 per cent of 15-17-year-olds in those countries had basic or above basic levels of digital skills. It is worth mentioning that there was a deteriorating trend in terms of digital competencies in the case of Latvia and Hungary. In Latvia, the share decreased from 93 to 80, in Hungary from 81 to 73 per cent. It seems, therefore, that students in different members of the EEE countries very differently prepared for digital education. This may be unsurprising, but it is unfortunate that it was precisely in those countries where levels of student performance were lower that they were also less prepared for digital education.

In addition to the level of digital skills, the preparedness of students for remote learning also depends on how prepared for learning on their own they are. The PISA 2018 survey contains some variables that can be used as a proxy for measuring this kind of readiness in students. Of these, one is a variable that assesses how well students can distinguish opinions from facts while another describes how aware they are of the need to check the credibility of sources (see Figure 10.11.). The students in the EEE, except for Estonia performed worse than the EU15 average in both skills. A smaller share of them was able to distinguish facts and opinions, and a smaller share of them knew that it might be necessary to check the reliability of sources or were able to do this. Poland and Slovenia were close to the EU average, while students in Bulgaria very much lagged behind. Hungarian, Croatian, and Slovak students were far less aware than the EU15 average that the credibility of sources should be checked (Suarez-Alvarez, 2021).

Finally, students’ preparedness for remote learning also depends on what tools students have at home and whether there is a quiet place where they can study with their computers or other devices. Table 10.5. presents some aspects of students’

Fig. 10.10: Percentage of 16-19-year-olds who have basic or above basic overall digital skills, 2015-2019
Data: Eurostat (2021b)



home learning environment based on the background students' questionnaire from the PISA 2018 Survey. The share of students who have a desk, or a quiet place to study, or a computer they can use for schoolwork is even higher in most of the EEE than in the EU15 average. Only in Bulgaria and Croatia was the share smaller and – surprisingly – in Estonia in terms of having a computer at home that they can use for schoolwork. It seems that the physical learning environment does not represent as great a barrier to distance learning in most of the EEE than in the average of the EU15. The lack of skills that help self-directed learning seems to be a bigger hurdle in most of the EEE.

Fig. 10.11: The relationship between distinguishing facts from opinions and the index of knowledge of reading strategies for assessing the credibility of sources in the EEE and the EU15 average (PISA 2018)
Data: Based on PISA 2018 database. oecd2019b Figure 5.7 Data is not available for Romania.

Table 10.5: Students' home learning environment. Share of students who have access to a desk, to a quiet place, to a computer and internet access at home,%, 2018.
Data: Own calculations based on PISA 2018 individual-level students database. (*How's Life in the Digital Age? Opportunities and Risks of the Digital Transformation for People's Well-being, author=OECD*, 2019)

	A desk to study at	Quiet place to study at	A computer that can be used for schoolwork
Bulgaria	91.2	81.0	90.1
Croatia	93.7	88.1	91.2
Czechia	97.8	90.5	94.7
Estonia	96.6	93.1	86.9
Hungary	96.1	94.2	91.4
Latvia	98.1	92.7	98.1
Lithuania	98.8	94.6	96.2
Poland	96.1	95.3	96.5
Romania	97.2	94.6	97.2
Slovakia	96.1	95.3	96.5
Slovenia	98.5	92.9	96.7
EU15	94.6	92.9	91.8

The effectiveness of digital schooling depends to a large extent on teachers' digital competencies and whether technology had been integrated into pedagogical practices before the pandemic. As the use of digital technologies has expanded in education, the traditional classroom environment has evolved to include a range of modalities, from the traditional face-to-face approach to the use of information technology to 'blended' face-to-face and online learning, to fully online programs (Redep, 2021). Nevertheless, digital education is more than the use of ICT; the use of digital devices alone does not guarantee success. What is more, online teaching in the form of the remote classroom is not identical with a smart class or blended education. Virtual learning spaces and/or artificial intelligence are tools that can effectively complement traditional interpersonal learning.

Table 10.6 summarizes some characteristics of schools and teachers' ICT usage in the EEE before the pandemic. Schools in the EEE had a much smaller proportion of virtual learning environment, again, except for Estonia. It was less common for teachers to have school-email addresses in Hungary, Lithuania and Slovakia, which may be taken as a possible sign that before the pandemic teachers in these countries did not keep in touch with students and parents via email. Although a larger proportion of teachers in most of the EEE had learned how to use ICT for teaching, in most of these countries (except for Slovenia) teachers used ICT less frequently in lessons than the EU15 average.

Table 10.6: Schools and teachers' ICT usage in the EEE before the pandemic
Data: Column (1): European Commission (2020): Fig. 1.11.b;
Column (2) Fig.1.10. b; Column (3) Fig.1.24. b.
Column (4): OECD TALIS Indicators OECD (2020b). Data extracted on 25 Jun 2021 12:54 UTC (GMT) from OECD. Stat
* Average of EU15 for which data were available.

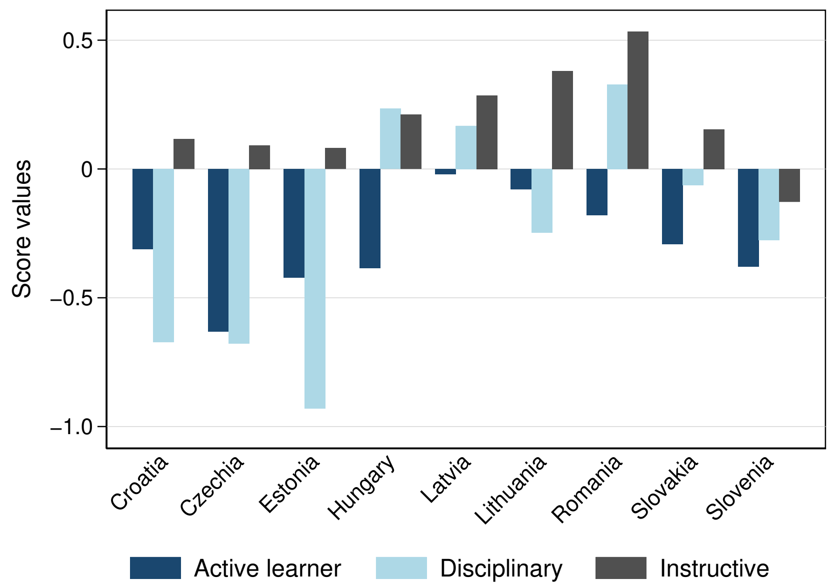
	Schools with a virtual learning environment %	Schools where more than 50 % of teachers have a school e-mail address	Teachers' use of ICT in more than 25 % of lessons	Teachers for whom the 'use of ICT for teaching' was included in their formal education or training
Year	2017-18	2017-18	2017-18	2018
Bulgaria	33	64	40	58
Croatia	12	97	62	45
Czechia	19	84	64	47
Estonia	79	88	56	54
Hungary	12	54	38	51
Latvia	47	68	64	55
Lithuania	44	50	81	45
Poland	17	58	n.a	n.a
Romania	15	74	48	53
Slovakia	17	50	56	62
Slovenia	51	88	71	70
EU15*	67	86	64	49

To be successful in digital distance teaching, the possession of digital skills alone may not prove sufficient; adequate pedagogical attitudes and methods are also necessary. Based on data from (OECD, 2020b) the preferred pedagogical methods of teachers were analysed. With the help of principal component analysis, it was possible to isolate three typical clusters of pedagogical methodological factors among lower secondary teachers: a pedagogical behaviour based on student activity, a disciplinary behaviour and an instructive teacher behaviour closely planning and controlling the steps of learning. An activity-based attitude seems to be more productive and more useful in digital schooling. Nevertheless, pedagogical attitudes based on active student behaviour are the least typical in the region. Disciplinary behaviour is most common among Hungarian, Latvian, and Romanian teachers, while it is the least common among Croats, Czechs, and Estonians (Figure 10.12.).

No matter how prepared the various countries' school systems were, it is very likely that online classes for most students will not be as effective as in-person classes (Heppen et al., 2017; Ahn & McEachin, 2017; Gopal, Singh & Aggarwal, 2021).

During the pandemic, students learnt less than they would have if there had been no school closures. The real-world presence of teachers and other students creates social pressures and benefits that can help motivate students to engage. Usually, students who struggle in in-person classes are even more likely to struggle online. In the next section, we present estimates of the scale of students' possible learning losses.

Fig. 10.12: Score values of the factors characterising teachers' pedagogical behaviour.
OECD (2020b) TALIS data



10.6 Learning Losses due to the COVID Crisis

In the three school semesters since the Covid outbreak, students have lost an unprecedented number of weeks of face-to-face schooling. Despite various governments' efforts to mitigate the effect of closures using different remote teaching methods, this has inevitably caused and continues to cause learning loss for students. Learning loss means that, because of school closures, students are unable to learn at the same rate as they had during previous years. In this section, we present the results of estimates of the possible magnitude of learning losses in the EEE.

Research into how to quantify the learning losses caused by the pandemic has already commenced. The World Bank's projection Azevedo, Hasan, Goldemberg, Geven and Iqbal (2021) first published in June 2020 and updated in February 2021 Azevedo et al. (2021) presented four different scenarios of possible learning losses calculating by making different assumptions about the duration of school closures. First, three scenarios in which the pessimistic scenario assumed a seven-month closure were examined, then the updated version was supplemented by a fourth scenario with a nine-month closure. The possible learning losses were formulated in terms of Learning Adjusted Years of Schooling (LAYS), average PISA points and the share of students falling below a minimum proficiency threshold. The results showed that worldwide the average loss would be 0.3 LAYS in the optimistic scenario, while in the worst-case scenario, this increased to 1.1 LAYS. In terms of PISA points, the average loss would be 7 PISA points in the optimistic, and 35 PISA points in the most pessimistic scenario. Blaskó, da Costa and Schnepf (2021) examined how 4th graders' school achievements would change due to school closures in Europe using Trends in International Mathematics and Science Study (TIMSS) data and found that throughout Europe educational inequalities both between and within countries are likely to increase substantially. Using a pedagogical production function model Kaffenberger and Pritchett (2020) developed earlier, Kaffenberger (2021) found that without adequate mitigation methods today's grade 3 students will lose 1.5 years' worth of learning or more by the time they reach grade 10 because of their time out of school.

The studies mentioned so far have made different assumptions about the duration of school closures and the effectiveness of distance learning. There are also research papers taking as their starting point measurements of student performance which have been able to consider learning losses in 2020 due to school closures during the Covid-19 pandemic. Patrinos and Donnelly (2021) give a review of the results of these papers. In the Netherlands (Engzell, Frey & Verhagen, 2021) eight weeks of school closure during the pandemic resulted in an average of 0.08 standard deviation learning loss in Math, Spelling and Reading for Grades 4-7 students. In Belgium, nine weeks of closure caused a 0.19 standard deviation learning loss in Math and a 0.29 standard deviation loss in Dutch for Grade 6 students. Schult and Lindner (2021) found that in Germany eight and a half weeks of closure resulted in standard deviation losses in Math of 0.03 – 0.09 and 0.07 in Reading for Grade 5 students. Tomasik, Helbling and Moser (2020) found the learning progress of primary school students in Switzerland during face-to-face learning was more than twice as high compared to the progress made during the eight-week school closure. Kuhfeld et al. (2020) found that Grades 3-8 students in the USA scored 5-10 percentile points below historic levels in Math. Some of these studies have revealed that students from varying family backgrounds were affected differently. According to Engzell et al. (2021), learning losses were up to 60 per cent larger among students from lower educated homes than the average (low educated homes are where both parents have a degree above primary but neither has one above lower secondary education). Schult and Lindner (2021) reported that losses in Math were more severe among low achieving students, while in Reading losses were higher among middle to high achieving students. These results will be used in estimates hereinafter, as up to the time of writing (June, 2021), no such results have been published for the EEE.

In the following, learning losses will be measured in PISA points. The estimates offered here assume that learning is a linear function of the amount of time spent at school, and the rate of learning depends on the quality of education. A further assumption is that remote learning methods are not as effective as face-to-face learning, and that. the longer the schools are closed, and the more time students spend in remote learning, the higher the expected learning loss is. Estimates are for the last 1.5 academic years. The first calculation concerns what the observed PISA scores would have been as the result of the learning in the last 1.5 academic years if there had been no epidemic and no closures. Then the learning gains of students in the last 1.5 years are calculated, by taking into consideration the actual school closure periods that took place, and by making various assumptions about the effectiveness of distance learning. The difference between the two estimated learning gains will be interpreted as the learning loss caused by the epidemic in the last 1.5 academic years [17]. These estimates are similar to the model used by (Azevedo et al., 2021) for modelling the effect of mean PISA scores, but in distinction to that study, here assumptions are not made about the duration of school closures, rather, the duration of actual closures during the last 1.5 years is used. We address the question of the extent of the learning loss during the last academic year and a half.

The estimates presented here are based on different data-sets:

1. The data used in the estimation of school closures come from the Oxford COVID-19 Government Response Tracker data [18] (Hale et al., 2021). A key advantage of the OxCGRT data is that it began to follow closures as early as 24 January 2020, and gives data from 1 January 2020, thus capturing the second half of the academic year 2019/2020. This, in turn, simplifies the process of estimation. As OxCGRT data does not differentiate between normal school holidays and closures due to the pandemic, the data have been corrected for school holidays and public holidays using Eurydice publications (European Commission/EACEA/Eurydice, 2019a, 2019b). Holidays are not related to the epidemic, are not surplus closures and do not affect learning losses.

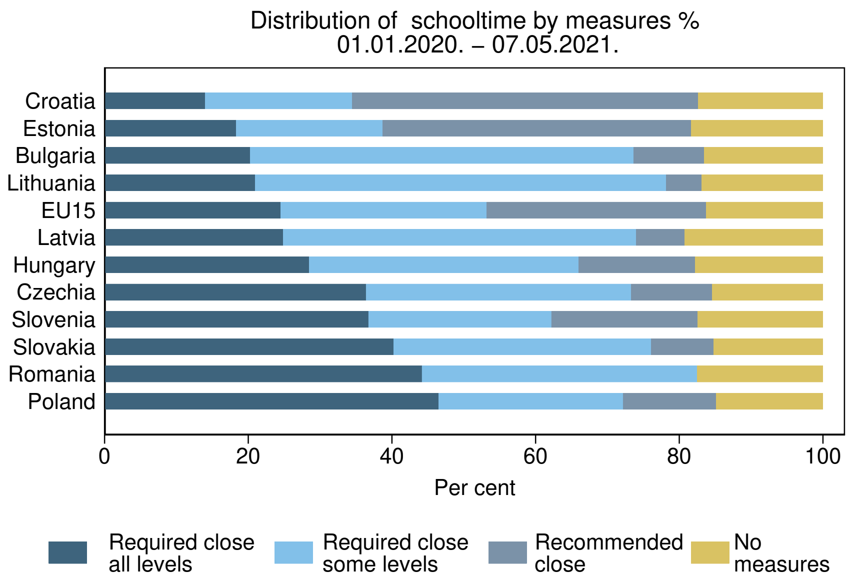
   Data were available for three different types of closures: closures required at all school levels; closures required at some school levels; and recommended closures, or alternatively, all schools open but with alterations resulting in significant differences to their usual, non-Covid-19 operation. Figure 10.13 shows the distribution of teaching time in the EEE in terms of the different measures during the last 1.5 academic years. In the EEE countries and also in the EU15 average, less than 20 per cent of teaching time was undisturbed. For the rest of the time, some kind of closure was in force. To compare the different types of closures partial closures

[17] Technically we corrected all plausible values in the PISA individual-level database. PISA uses the imputation methodology referred to as plausible values (PVs). PVs are a selection of likely proficiencies for students that attained each score. For each scale and subscale, ten plausible values per student are included in the PISA 2018 database. The analysis herein was conducted using PVs.

[18] Data use policy for OxCGRT data is: Creative Commons Attribution CC BY standard.

and recommended closures have been converted to "equivalent days". Each day of a required school closure at school levels is assumed to be equivalent to half a day of full closure in this analysis and each day of a recommended closure or an open with alteration day is assumed to be one-third of a day of full closure. These conversions are somewhat arbitrary, and what partial and recommended closures mean may vary across countries and over time, but the different measures might have had different effects on students' learning, which needed to be taken into account.

Fig. 10.13: Distribution of teaching time in the EEE in terms of the different measures during the last 1.5 academic years.
Data: Own estimations.



The duration of the academic year differs between countries, so when making estimates of learning losses, these differences have to be considered. The number of school days when schools were closed in each country is therefore considered in relation to the length of the academic year for the individual countries because the effect of differences in the length of school years is already reflected in the differences in student performance between countries. Therefore, time lost in each country was converted into a fraction of the academic year in each county. Column (1) of table 10.6. shows the share of the last 1.5 academic years that schools in the EEE were closed in equivalent days.

2. Individual-level student data from PISA 2018 [19] were used to measure student performance. These data reflect the heterogeneity of schooling productivity between members of the EEE and between students within the EEE. Nevertheless, for the estimations it was necessary to make assumptions concerning i) how much the learning gain would have been during 1.5 academic years if the schools had not been closed; ii) how much lower the learning gain actually achieved was on account of students not being able to learn face-to-face for certain periods.

   In the OECD countries average learning gains in PISA tests during one school year are between 0.25-0.33 standard deviation, that is between 25-33 score points [20] (Woessmann, 2016). Based on 2009 and 2012 PISA data, the OECD has published grade effects for participating countries in mathematics based on multilevel regression models in which the effect of certain individual and school-level characteristics were controlled for. In the EEE, the average learning gain in Math was 35 score points in 2009 and 36 in 2012. The results of research investigating the effectiveness of secondary education in Austria, Croatia, and Hungary Kuzmina and Carnoy (2016) found yearly grade effects of similar magnitude, about 32-33 PISA points in Reading and 30-37 points in Math in Croatia, while 26-29 in Reading and 38-39 in Math in Hungary. Another research paper on the learning gains over one school year among 15-year-olds, also using PISA data from the years 2012, 2015 and 2018, presented results for an additional 14 countries, one of them being Romania, where the grade gain was smaller, on average 15 PISA points (Avvisati & Givord, 2021). Based on the comparison of these results the average of the grade effects from the available sources was selected for use here, and this is presented in Column (2) of table 10.6. For simplicity it was assumed that within a country during the last 1.5 years the performance of all students would have improved by the average gain of the country.

   Estimates for four different scenarios were made, in each case making different assumptions about how effective remote learning was. These assumptions about the efficiency of remote learning are based on the empirical results about actual learning losses in developed economies previously presented. The results show that student performance was 0.01 - 0.03 standard deviation worse per week of closures than before the pandemic, that is, 1-3 PISA points per week. The first scenario assumed that student performance might be worse by 0.01 standard deviation for all weeks of closure, the second assumed that it would be worse by 0.03. The first two scenarios assumed that within a country, students were able to make the same use of distance learning regardless of their socio-economic status. The third and fourth scenarios assumed that students with different family backgrounds could use remote learning methods with different degrees of effectiveness. To measure students' family background, the PISA index of economic,

[19] All PISA products are published under the Creative Commons Attribution-Non-Commercial-Share Alike 3.0 IGO (CC BY-NC-SA 3.0 IGO).

[20] The PISA scores are standardized to have a mean of 500 and a standard deviation of 100 among all students in OECD countries.

social, and cultural status (ESCS) was used. This is a composite measure [21] that combines the financial, social, cultural, and human capital resources available to students into a single score. In the last two scenarios, it was assumed that students who are in the upper quartile of the distribution of the ESCS index in the particular country do not suffer any loss of learning. Students who are in the 2nd and 3rd quartile of the distribution have 0.01 standard deviation learning loss per week of school closures in Scenario 3 and 0.03 in Scenario 4. The most disadvantaged students, who are in the lower quartile according to the distribution of the ESCS index, suffer a 50 per cent greater loss than students in the 2nd and 3rd quartiles, in Scenario 3 a loss of 0.015 standard deviation weekly, in Scenario 4 a weekly loss of 0.035 standard deviation. Assumptions concerning the magnitude of these differences were made on the basis of the empirical findings of (Engzell et al., 2021), who have reported that in the Netherlands students from low-educated homes were disproportionately affected, with a 50 – 60 per cent larger drop in performance than their more advantaged peers.

Table 10.7: Estimated school closures and average learning gains without closures. Data: * own calculations
** Based on: OECD (2019); Kuzmina and Carnoy (2016); Avvisati and Givord (2021) Average of EU15 for which data were available.

	Estimated school closures from 01.01.2020 to 07.05.2021 as a share of academic years* %	Average yearly learning gains without closures PISA points**
	(1)	(2)
Bulgaria	49.9	28
Czechia	58.2	45
Croatia	38.7	27
Estonia	41.1	43
Hungary	52.1	29
Latvia	51.5	44
Lithuania	51.1	32
Poland	63.2	75
Romania	63.3	15
Slovakia	60.8	24
Slovenia	55.6	38

[21] The index is derived from several variables related to students' family background that are then grouped into three components: parents' education, parents' occupations, and an index summarising a number of home possessions that can be taken as proxies for material wealth or cultural capital.

The estimates made here consider differences in the quality of education between countries and within countries as individual level PISA results reflect these differences.

Table 10.8 summarises the results of the four scenarios. It shows how many PISA points have been lost in the last year and a half by students due to school closures in the EEE. Average learning losses are presented by country, losses in all three subjects, Reading, Math, and Science were calculated, then the results averaged.

Table 10.8: Estimated learning losses between 01.01.2020 and 07.05.2021 expressed in PISA points and the increase in the share of underperformers
Data: own estimates

Country	Estimated average learning losses in PISA points				Increase in the percentage share of underperformers in Reading Percentage points (Below level 2)	
	Scenario1	Scenario2	Scenario3	Scenario4	Scenario1	Scenario4
	(1)	(2)	(3)	(4)	(5)	(6)
Bulgaria	55	93	46	78	1.7	4.5
Czechia	64	101	42	71	12.3	21.5
Croatia	45	95	42	79	5.4	11.9
Estonia	44	84	38	61	8.9	13.4
Hungary	63	105	54	91	9.7	17.4
Latvia	66	114	56	90	15.8	22.2
Lithuania	63	105	54	88	15.5	21.2
Poland	85	146	73	117	19.8	29.2
Romania	71	107	60	100	10	12.7
Slovakia	74	121	63	99	13.1	18.2
Slovenia	78	120	66	109	22.4	28.9

The estimated results show very significant learning losses across the EEE. Even in the case of the best scenario (Scenario3), students on average have lost close to an average year's learning gains across the EEE. The worst scenario (Scenario4) shows that average learning losses might have been twice or three times as large as the average learning gains would have been in 1.5 academic years. The learning losses of countries that were already lagging (Bulgaria and Romania) seems to be even higher. Countries that had to close their schools for a longer period, like Poland, also suffer larger–than-average learning losses.

Column (5) and Column (6) show the increase in the percentage share of underperformers in Reading, those who perform below level 2 in the event of the best

(Scenario 3) and worst (Scenario 4) scenario coming to pass. These changes are quite different from the average point losses. The share of students below the minimum proficiency level will rise in all countries, but where the share of underperformers was already high (Bulgaria, Romania), a smaller impact was observable, because there a significant proportion of students had not reached the threshold before the Covid crisis, either, and were already among the underperformers, thus the share of underperformers did not increase in these countries. The impact is larger among the average countries or those performing well. It seems that even in certain countries among the previous best performers (Poland, and Slovenia), the share of students below the threshold has increased to a large degree. The EEE will find it necessary to make serious efforts to mitigate these effects.

In addition to learning losses finding expression in test scores, school closures may also lead to a jump in the number of dropouts. As discussed in Section 2, compared to 2019, in 2020 there was an increase in the share of early school leavers in Czechia, Hungary, Lithuania, Poland, and Romania (Figure 10.4), while in other countries the share decreased. It is not yet known whether the rate has changed in 2021 or whether these changes can be attributed to school closures.

10.7 Conclusions and Policy Recommendations

In this chapter, evidence has been presented demonstrating that even before the pandemic, there were large differences between the members of the EEE in the effectiveness of their public education, and accordingly, their stock of human capital. It is worth noting that, whereas in the majority of the EEE reached or even exceeded the EU15 average over the last ten years, the quality of education has not: harmonised test scores show that the basic skills of young people in emerging economies are still below those in more advanced economies.

With reference to indicators of both quantity and the quality in public education (expected school years, PISA points and top performers and underperformers ratio among students), Estonia and Poland perform best, with Slovenia also belonging to the group of countries performing well. Bulgaria and Romania are at the other end; they lag far behind the EU15 average in all aspects of the quality of public education, and although Romania did begin to catch up to a certain extent in the early 2010s, this process later came to a halt. In terms of the dynamics of changes in the average quality of education and share of top and underperformers, the performance of Hungary and Slovakia is deteriorating rapidly, and they are slipping out of the group of countries with indicators around the average. Another indicator that measures the quality of public education, the proportion of early school leavers, also shows that Bulgaria and Romania were unable to improve their public education, while Hungary's and Slovakia's results are deteriorating.

The differences found among the EEE in the effectiveness of their public education are the result of the very different paths the EEE have taken in their public education policies over the last ten years. There have been divergent developments in the public education policies of these countries, differences such as how important they consider education, how willing they are to finance it, and whether they are able to spend these sums effectively. The successful systems (Estonia, Poland, and Slovenia) have succeeded in reducing the impact of students' family backgrounds on student performance and succeeded in ensuring that an increasing share of students can reach the minimum achievement threshold, while these countries' share of top performers is also increasing.

It is possible to identify some common elements in the public education policies of the best-performing countries. One of these was their tracking policy. Avoiding the early tracking of students, as in Estonia, Latvia, and Poland seems to be one of the elements that add to a decrease in the share of underperformers and increase the average performance of students. Another public education policy with an effect on the improvement of public education is teacher policy. Teachers matter: a great deal of research has highlighted the importance of teacher quality for student achievement (OECD, 2005). Attracting and retaining talented and qualified teachers remains a major challenge for most of the EEE. It is important what kinds of incentives are available, and how effective teacher employment and pay systems are. A higher starting salary may attract talented students to teacher training, and not having to wait until the end of the career to reach the top salary reduces the danger of teacher burn-out and that they leave the teaching profession. Among the members of EEE countries for which data is available, the relative salary of teachers is the best in the Nordic countries, Estonia, Latvia, and Lithuania and in Slovenia. The average number of years necessary to reach the top of the salary scale ranges from 20 years in Poland to 42 years in Hungary. Nevertheless, raising teachers' salaries can help in the medium and long term, but even in the short-term improving working conditions for teachers might bring more immediate amelioration of the problem. A further problem is how to attract qualified teachers to the most challenging classrooms. In some of the EEE, even if more teachers are allocated to disadvantaged schools than advantaged schools, teachers in disadvantaged schools tend to be less experienced and have a lower level of qualifications. Inadequate teacher policies in many of the EEE have resulted in a less prepared, ageing workforce of teachers, and this can be an obstacle to improving student performance.

The Covid pandemic has interrupted normal teaching at primary and secondary schools to an unprecedented extent. Schools were closed, and teaching moved online and to other remote teaching methods. During the last 1.5 academic years, on average, only one-fifth of schooling took place under 'normal' conditions in the EEE. Countries were not equally prepared for digital remote teaching. So far, the effect of school closures has been to amplify pre-existing trends and to force countries to be even more adaptable. Those countries which were both digitally and pedagogically prepared for the challenges of the 21st century were also better able to respond to the challenges generated by Covid. In countries where educators do not teach in a learner-centred way and where there were already large disparities due to disadvantage, the risk of falling behind is concomitantly greater.

In terms of digital preparedness, again, it is Estonia that stands out among the EEE. People in Estonia have high levels of access to the internet and use it for a wide range of purposes. In the case of Hungary, or Romania, digital development is found primarily in asset investment, but not integrated into the system, with the result that people are not prepared for the need to collaborate effectively in a virtual network. The digital preparedness of young people is also low in countries that underperform in other areas (Bulgaria, and Romania), but the deteriorating performance of Lithuanian and Hungarian young people is also a cause for concern.

Schools and teachers in the region were also less prepared for the digital switchover than the EU15 average; even in Poland, at the forefront in many areas, the digital skills of teachers were found to be lagging to a considerable extent. With the exception, again, of Estonia, a much lower proportion of schools in the EEE had any kind of virtual learning environment up and running /in general use /already integrated. Although a higher proportion of teachers in most of the EEE had learned how to use ICT for teaching, in most of these countries (except for Slovenia) teachers used ICT less frequently in lessons than the EU15 average.

The estimates presented here give an idea of the extent to which school closures and remote learning have caused learning losses. Even in the most optimistic scenario, students on average have already lost close to the typical expected learning gains for a whole year across the EEE during the last 1.5 academic years. The learning losses of countries that were already lagging seems to be even higher. Countries that had to close their schools for longer periods also suffered larger than average learning losses. In the worst-case scenario, estimates made herein for learning losses predict even two- or three-times greater learning losses. It is worth noting that even the worst-case scenario presented here probably underestimates learning losses, as many of the assumptions in the calculations are based on the experiences of Belgium, Germany,the Netherlands, and these countries were better prepared for online education than most of the EEE. The pandemic not only heightened the pre-existing disparities but also exposed countries with previously successful public education policies to the risk that their former advantage could disappear if they fail to offset the effects of the pandemic. The most worrying prediction of the estimates presented here is that because of school closures the share of underperformers will increase greatly in most of the EEE. This means that the proportion of the future workforce whose basic skills are below the threshold of what is required for employability and is the basis of the ability to update and learn new skills will increase.

The impact of these changes may be even more severe if Covid-19 accelerates the automation of jobs as employers invest in technology to safeguard against long-lasting effects of pandemics. That seems to be exactly what is happening (Crowley, Doran & McCann, 2021). With the acceleration of the introduction of new technologies, automation and robotising disproportionately affect lower-skilled workers. The risk declines with the level of education, and with the level of measured skills.

Because of their learning losses due to the pandemic, a growing share of students in the members of EEE might face large lifetime earnings losses, if these countries fail to mitigate the impact of school closures if they fail to make up for learning losses. In addition to individual costs, there might also be costs involved in firms' lower productivity and increasing hiring and training costs. At the aggregate level, there might be efficiency losses – in terms of lower average productivity and higher unemployment or inactivity, and this may increase the risk of the EEE falling into the middle-income trap. The lifetime costs of learning losses for individuals as well as for societies could be very large, because economic growth may slow down in the medium and long term due to the deteriorating human capital stock (Hanushek & Woessmann, 2020; Psacharopoulos, Collis, Patrinos & Vegas, 2020).

To avoid this process, well-founded education policy measures would be needed in the short, medium, and long terms. In the short term, the most important issues is not to wait for students, especially the disadvantaged ones or those who are at the lower end of the performance distribution, simply to make up for lost learning. (Indeed, even better-performing students might also need help to achieve their full potential.) Extended learning time and opportunities might be necessary for students, especially for the disadvantaged ones. High-quality summer programs may also help. Large-scale tutoring programs have already been started in some advanced economies (e.g., the National Tutoring Programme in the UK); such programs might be useful too. Any plan to increase learning time would need to involve more people in teaching, who might be teachers, support staff or tutors. There are different ways this could be achieved for example by employing students in teacher training programmes or retired teachers as tutors, but each solution requires additional resources.

In the medium and long term, the effectiveness of recovery from learning losses caused by the pandemic and the improvement of the public education systems of the EEE depend to a large extent on appropriate educational policy responses. Countries that dare to make bold or innovative changes and do not rest upon the traditions of the past can emerge from the middle income trap. Late tracking means more equal and effective education. The same is true for the effective and learner-friendly application of digital technology or the modernisation of teaching content. Estonians not only value their educators, they have dared to be open to bringing modern technologies into daily practice. The Polish school structure reform in 1999, shifting toward a comprehensive public education system has also borne fruit, which would be worth preserving.

The more countries are targeted at supporting the most lagging groups with effective methods and interventions, the more effectively they will also be able to eliminate Covid losses. This requires research-based pedagogical innovations in the assessment of student performance. Where such data do not yet exist, it is worth moving in this direction, and where they do exist, they should be used both more intensively and in-depth to underpin policy interventions. Educational research is not a priority area in many countries or does not have an appropriate institutional background. Where this is lacking, emphasis should be placed on creating or strengthening it.

In some poorly performing countries, there are high proportions of Roma students, and both the EEE and the EU remain indebted to education policies that successfully support them. The benefits of the Decade of Roma Inclusion have not been reaped, with very little progress in this area. This ethnic group is almost invisible, so more attention should be paid to them, preferably with a break from the customary paternalistic approach.

Although new digital devices are a great opportunity, they do not work well or to their maximum potential in traditional teacher-centred education. Analyses of PISA databases OECD (2015) have found that if the digital space appears in the physical space without the corresponding psycho-social space assigned to it, i.e., the use of the computer is not accompanied by a learner-centred, learning-motivating playful and modern pedagogy, digitalisation will be pedagogically counterproductive. It is useless for the environment to be digital if the school itself shows the characteristics of the industrial age. This means that the appearance and faster spread of digital devices alone will not automatically improve public education in the EEE. To use them well, an open and innovative pedagogical attitude and new ways of organising learning (e.g., the project method, or blended education) are also needed. Good practice in this area can be provided by countries that are already performing well in this area, such as Estonia.

In most countries, the teacher cohort is ageing, with teacher shortages in many places. However, it is important not only to provide more competitive salaries for teachers but also to increase the prestige of the profession, which can be ensured primarily by high quality teacher training and by a broad degree of professional autonomy.

To build an efficient and effective education system, progress is needed in three areas. First, education policy needs to provide teachers of the right standard and in appropriate quantity. This can be provided by a system of quality teacher training and effective teacher employment, with appropriately wage incentives and a good workplace climate. Secondly, raising the prestige of the teaching profession requires a partner-centred approach, enhanced professional autonomy and an education policy that recognises knowledge and treats teachers as partners. Finally, a more efficient school network provision and the development of competencies capable of managing a complex system are also needed. It is important to point out that these elements mesh with each other like gears, so focusing on just one area or a few elements will not solve the problems.

Development policy experts have started pointing out that there is no one-size-fits-all single recipe. Some factors may, as might be expected, help: good institutions, good governance, a differentiated approach, the active participation of actors, the accountability of service providers, though the specific combination of these must be considered and worked out by each country on their own. Mistakes are often approached with ready-made, off-the-peg solutions, such as those identified by the World Bank: Intensification, when money is thrown at the system . Instead of bringing about real change, this response may represent the simplest or most politically advantageous approach. Instead, what is called 'additional reform' is preferred. Amputation is when we de-state education and bring market elements into it, but there is a risk that important tasks will be left unattended. There is often only one narrow elite behind policy reforms . Mimicry - when a good practice is imitated slavishly, but is not adapted to local needs and possibilities, while creative deviations from the model are frowned upon (Pritchett & Woolcock, 2004).

All these measures, both those which are necessary for the short term (extended learning time, additional teaching staff etc.) and those which might be used in the medium and long term will have costs. In a post-Covid world, even in the case of a quick recovery period when GDP growth rates return to previous trends, education spending is expected to stagnate in most countries (Al-Samarrai, Gangwar & Gala, 2020). Nevertheless, if the EEE are not able to initiate and sustain the programs and reforms needed to reduce students' learning losses they will further weaken their human capital stock and through this, limit the potential for growth in the medium and long term.

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Chapter 11
Research & Development and Higher Education

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Abstract This chapter argues that the way out of the middle-income trap in which the Emerging European Economies (EEE) seem stuck is through R&D and innovation with the support of a competitive, high quality, and research intensive higher education sector. Using detailed and extensive data analysis, we show how far they lag behind the more advanced EU countries in these areas, and as contrast, how this creates significant opportunities for economic growth and structural changes that could help these economies and societies navigate out of the trap. We also provide some very specific policy recommendations.

11.1 Introduction

The Emerging European Economies (EEE) are gradually exhausting the extensive sources of their growth model and may be facing the challenge of the middle-income trap (The Economist (2019); Győrffy (2021); see also Chapter 1). In order to achieve a new dynamism, switching to an economic model built on knowledge and innovation seems inevitable. Considering the present state of R&D activities and the educational sector in these countries, transition is not impossible but looks rather

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challenging. The EEE countries must master a fast changing and highly demanding R&D environment, in which they need to acquire, develop and keep talent, must focus on high added value sectors, products and services, and compete successfully with many traditional and new universities investing heavily and modernizing their services both locally and internationally. Developed economies are adopting new technologies like automation, robotics, artificial intelligence, green energy, precision agriculture and many others. Becoming competitive in these fields needs cutting edge scientific research, fast and efficient innovation, and a new kind of workforce (see Chapter 4). The transformation needed is complex with many interlinked technical, financial, institutional and social components.

At the beginning of 2020, the EEE countries were hit by the Covid-19 crisis. This shock, which was initially thought to be temporary seems to have long-term impacts as well. It highlights local weaknesses, and detours resources but also offers opportunities for developing new strategies and initiating radical changes. While easing the immediate pain, the countries must rethink their R&D and innovation strategy together with their position in the 'talent war', and redesign their higher education (HE) sector. Fighting the virus should not overshadow the problems of long-term competitiveness and sustainability. The disappointing truth is that the European Union lags behind the United States in many aspects of scientific research, innovation and the quality of higher education, and is facing growing competition from Asia. There is a real danger that the Emerging European Economies will remain on the 'periphery of the periphery' with third tier institutions and performance, fulfilling the 'assembly shop of Europe' vision with low added value ratios and lagging productivity.

This chapter focuses on the following five most important questions related to the EEE: 1. Has the competitiveness of R&D activities improved in the last decade and can it efficiently support sustainable economic development? 2. Is higher education adapting to global development trends, such as the rise of the knowledge economy and the arrival of mass education? 3. Can it provide in sufficient numbers and quality the labour force required by a knowledge economy? 4. Are their universities' global ranking positions improving? 5. Is brain drain still a serious risk factor, or alternatively, can we observe any improvement in the retention of students and scientific personnel?

The most important trends and developments in the decade before the eruption of the Covid-19 pandemic are presented, key effects of the virus crisis are analysed, and finally conclusions and some policy recommendations are provided.

11.2 The Global R&D and HE Environment: Trends, Developments, Challenges

Empirical evidence suggests that investment in R&D and the quality of higher education have a strong positive effect on GDP growth (Guillemette & Turner, 2018). Innovation can substantially raise living standards through productivity. While R&D

and innovation play a central role in many areas of advanced economies, the global landscape of scientific research, innovation and higher education has undergone radical shifts since the beginning of the 21st century. Since the share of intangible investments is growing in many developed countries, knowledge, data and intellectual property are of especially high importance.

Governments, universities, businesses and non-profit organizations have made large investments in R&D: Since the turn of the century, global expenditures have more than tripled in current dollars (Congressional Research Service, 2020). By the second half of the 20th century, the United States had become the global leader in science and technology. Until recently scientific and innovation capabilities were located mainly in the US, Western Europe and Japan, but have now spread to some countries of the developing world, notably to China and other Southeast Asian economies that have invested heavily in their knowledge sectors. Although a market slowdown in R&D investment has been recently observed in China, if current trends continue, China is likely to soon overtake the US in R&D investments. Its share of the global R&D expenditure was a modest 5% in 2000 but had grown to 20% by 2015 (OECD, 2020b).[1]

Regarding R&D intensity (expenditure on R&D as a % of GDP) a modest recent growth in the OECD was driven by the US, Japan, Korea and Germany, offsetting the decline in some big European economies (Italy, the UK, and France) and Canada. The top achievers are Korea and Israel, while China's indicator has overtaken that of the combined EU28 area (OECD, 2020c).

After a short decline due to the financial crisis, total R&D expenditure in the OECD area has been growing again since 2010 (Figure 11.1). It has been driven by the business and higher education sectors, while total government expenditures have stagnated or declined. The total OECD business R&D and HE expenditures in 2017 were 28% and 23% higher than in 2007 respectively, while government expenditures on these sectors increased only around 9% (OECD, 2020d). The general trend has been obvious: 'less state, more business'.[2]

Keeping the original strategic objective accepted in Barcelona in 2002, the EU set itself an R&D intensity target of 3% in its 'Europe 2020' strategy (Eurostat, 2020c). However, the total real expenditure surpassed only 2% of GDP in 2013 and has practically stagnated since then. Reaching the 3% strategic target in the near future is more and more of an uphill battle. The EU as a block is increasingly lagging behind some advanced economies. In 2017, the R&D intensity of only seven EU member states (none of them EEE) surpassed that of China. National indicators were in the 0.5% to 3.4% range, indicating large differences between EU countries depending on their economic structure, the knowledge intensity of their leading sectors and their overall R&D capabilities (Eurostat, 2020b). In 2017, the United States was

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[1] The Asian giant has been rapidly closing the gap with the US in research and development investments recently, may surpass it soon, but has not done so just yet.

[2] When evaluating government R&D expenditure, it is important to note that tax-based indirect business support measures, which are not part of government budget estimates, have increased in importance in recent years, often pushing out direct support.

the largest R&D spender, and China was the second, both of whose expenditures exceeded those of the EU (National Science Board, 2020).

The 'Europe 2020' strategy emphasized the importance of smart, sustainable and inclusive growth to prepare its countries for the economic and societal challenges of the forthcoming decade, with R&D and innovation as key strategic components. Successful scientific research and product development are essential to improve the economic competitiveness of the EU, but technological development must also help in overcoming societal problems like an aging population, growing inequality, and climate change.

Scientific research is only one ingredient of innovation. The Global Innovation Index (GII)[3] measures, compares and ranks the innovation performance of more than 130 countries each year (Global Innovation Index, 2020). According to the 2020 report, the top performing countries are almost exclusively from the high-income group, with China as the only exception. Switzerland, Sweden and the US lead the list followed by the UK and the Netherlands. Measured by the progress in the ranking, the success of China, Vietnam, India and the Philippines demonstrates how the geography of innovation is continuing to shift. The first EEE country appearing on the 2020 list is Czechia (24th), followed by Estonia (25th),[4] Slovenia (32nd) and Hungary (35th), closely followed by Bulgaria, Poland, Slovakia, and Croatia, while Romania ranks 46th (Dutta, 2020). Earlier editions of the GII showed how the world economy was trying to recover from the great financial crisis. Investment and productivity growth were rather sluggish after the crisis years (Lagarde, 2017), but global innovation expenditures were growing faster than GDP.

Since the 1990s, traditional linear innovation models have been replaced with new ones emphasizing experimentation and agility (Dodgson, Gann & Phillips, 2013; Ries, 2011). Global and borderless cooperation has not been reduced, and the relevance of innovation clusters and local ecosystems has remained high: Not only countries, but regions and towns also compete for talent, creativity and investment. Governments and local public authorities try to create the right conditions to make their territory attractive for top intellectuals through new public-private relationships, joint strategy making and investment. Science and technology clusters are mostly associated with large urban agglomerations: A growing number of them cover several municipal districts and sometimes even a few countries. According to the ranking methodology of the World Intellectual Property Organization, Tokyo-Yokohama was the top performing cluster in 2020, with especially strong patenting performance, Shenzhen-Hong Kong-Guangzhou was the second, followed by Seoul, Beijing and San Jose-San Francisco. The top European performers were Paris (10th) and London (15th). The EEE have only one cluster in the Top 100: Warsaw (99th) (Dutta, 2020, pp. 44-45).

Top notch research and innovation needs top notch knowledge and skills. One of the consequences of the global war for talent is the increasing migration of scientific

[3] The GII has been developed and managed by Cornell University, INSEAD and the World Intellectual Property Organization (WIPO).

[4] Estonia's innovation performance compared to Hungary is analysed in Győrffy (2021). The country is frequently presented as a 'wunderkind of digitalisation'.

personnel and PhD graduates, which is a complex, multi-faceted and highly debated phenomenon (Florida, 2005; Scellato, Franzoni & Stephan, 2015; Van Noorden, 2012). Unfortunately, statistical data are vague and sometimes misleading because there is no consistent tracking, using the same methodology across countries. Available data on talent migration, however, consistently show a steady growth. Considering the migration of researchers, some basic geographic trends and separate 'inbound' and 'outbound' regions and countries can be identified (Han, 2017). Intra-region mobility in Europe is high, especially in the UK, Germany, France and Italy; e.g., the UK[5] is predominately an 'inbound' country while Italy is 'outbound'. Asia has more outbound movement, mostly to America and to Europe. India is massively 'outbound', while some oil-rich countries are almost entirely 'inbound'. After obtaining their PhD, many American and European researchers move to another country, while Asian and African researchers mostly continue research in the country where they received their degree.

The relationship between a well-educated population, social progress and economic development seems obvious. For many families a degree in higher education, especially from a top tier university, is a passport to prosperity. A qualification also offers good protection against unemployment (see Chapter 4). Globalisation has improved the chances for qualified people from poorer regions of getting well-paid jobs somewhere. However, the growing supply of graduates is changing employers' behaviour. In the past, when only a small elite managed to obtain a university degree, numerous attractive jobs were available to people with no more than secondary education. As having a first degree is now standard, this is no longer the case, while the postgraduate premium is growing because in some places a PhD degree is needed to stand out from the crowd. When automation depresses wages at the bottom of the job hierarchy and society is becoming more unequal, it is very risky not to have a degree at all.

Due to the above phenomena, global demand for higher education is continuously growing: the world of mass higher education has arrived.[6] Higher education has become international, with its institutions increasingly connected to the global academic world. Campus life has become multicultural. Top universities, especially American ones have opened hundreds of branch campuses abroad ranging from small recruitment and distance learning units to complex academic empires. Frequent cross-border exchanges (such as Erasmus) have given rise to cultural, political, ethical and financial challenges, for example, that of operating a liberal academic institution in an illiberal environment or vice versa.

An important symptom of internationalization is the rising number of learners studying outside of their home countries. A truly global educational marketplace has emerged (UNESCO, 2020a), where each year millions of university students attend classes abroad, guided by international university rankings. Universities in the United States, Canada, Australia, China, New Zealand, Japan, and Spain all experienced double-digit growth in international enrolment before the pandemic. Only in the

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[5] See on the effects of Brexit later on.

[6] UNESCO regularly publishes enrolment levels (UNESCO, 2020b).

United States, more than one million international students were enrolled for the academic year 2019-2020, while more than three hundred thousand US students studied abroad for academic credits (Open Doors, 2020). China has a strong desire to develop its universities into leading research and educational institutions. The country welcomes increasing numbers of international students, with more than 200,000 hosted in 2019 (UNESCO, 2020a). In the first decade of the new century Chinese universities hired approximately 900,000 new full-time faculty members (The Economist, 2015, p. 4).

The European state-centric model of university financing and control seems to be losing ground in many parts of the world, giving way to the American system, where the private sector provides for a large part of education and individuals pay for most of their tuition (The Economist, 2015). Besides reducing the burden on state budgets, this transition has ignited social problems.[7] In some countries, tuition costs in real terms have been rising fast over the last two decades, together with student debts.[8] Regarding state-level and institutional strategies, tension is growing between expensive research and academic excellence on the one side and cheap mass education, equality and social mobility on the other (The Economist, 2015).

Since the beginning of 2020, the world in general and academia in particular has had to struggle with the economic and social implications of the Covid-19 pandemic. In 2020, universities across the world were struggling to cope. The consequences are diverse and contradictory. One thing is sure: Scientific research and innovation, i.e., developing a vaccine and efficient treatments have been our best hope to overcome the crisis. The pandemic reminds decision makers that supporting medical research and healthcare innovation is a must, universal digitalization is inevitable and the general issue of sustainability must be taken seriously. At the same time, governments, businesses, and other organisations will find it harder to finance research, innovation and education because of the pandemic induced economic slowdown. It may well happen that budgets will be smaller and risk aversion will be higher in the years to come. Emerging European Economies have found themselves in a contradictory situation: Is this the right time for a 'revolution', a giant leap forward or is it more likely that dull years of financial squeeze and groping pathfinding are ahead?

11.3 R&D in EEE

R&D is ubiquitous and is more and more important for socio-economic development. R&D, human capital and innovation are the determining factors that stimulate economic growth and competitiveness. The ability to produce new knowledge and turn it into practice through innovation brings productivity gains and can thus foster growth and improve a country's competitive position and enable the way out of

[7] See e.g., Berlinger and Megyeri (2015).

[8] E.g., in 2020 in the United States 44.7 million current or former student borrowers still had an average debt of $37,500. The average public university student borrows more than $30,000 to obtain a bachelor's degree (Kurt, 2020).

the middle-income trap (Romer, 1990; Aghion & Howitt, 1998, 2008; Porter, 2008; Aghion, Akcigit & Howitt, 2014).

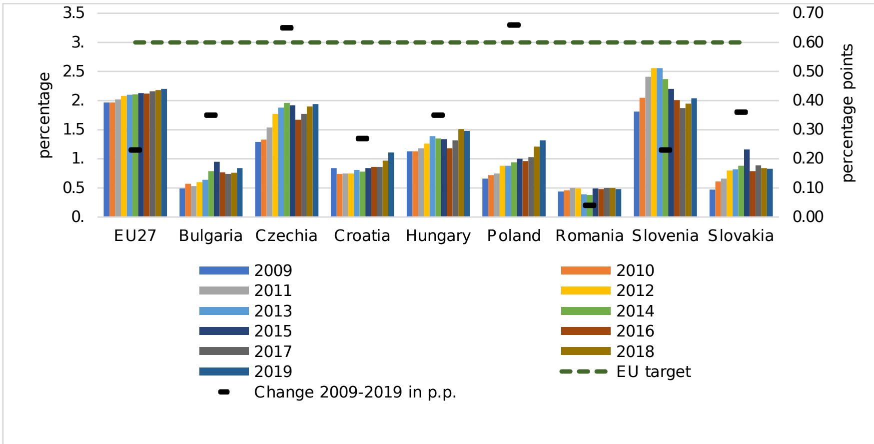
The aim of this section is to examine whether the competitiveness of R&D activities improved in the EEE in the 2009-2019 decade and to what extent it supported sustainable economic development. A reference indicator framework is used developed by the European Commission to monitor the progress of EU member states in achieving the Sustainable Development Goals (SDGs) (European Commission, 2020d). The focus is on indicators related to R&D and innovation (namely SDG 9 'Industry, Innovation and Infrastructure') connected to sustainable growth in the EU (European Commission, 2019; Eurostat, 2020). To provide a broader picture, bibliometric indicators and data on projects funded by the European Research Council are also analysed.

11.3.1 R&D Expenditures

The key questions for the EEE region in this context are how much they spend on R&D and what the outcomes of these expenditures are. The 'Europe 2020' strategy set the goal for all EU member states to increase R&D expenditures to 3% of GDP with the target year of 2030 (European Commission, 2021a). In 2019, a comparison of R&D budgets in the EEE as a percentage of GDP shows that every country spent less on R&D than the EU average (2.2%). Slovenia, with its R&D expenditure of 2.02% of its GDP was the leader in the EEE, followed by Czechia (1.94%), Hungary (1.48%), Poland (1.34%) and Croatia (1.11%). The lowest percentages were recorded in Romania (0.48%), Slovakia (0.83%) and Bulgaria (0.84%) (Figure 11.1). The highest increases were observed in Poland (by 0.66 p.p.) and Croatia (by 0.65 p.p.), while nearly no change was recorded in Romania. In all other EEE countries the pace of R&D compared to GDP growth was at least the same or slightly higher than the growth rate of the EU average, which shows that apart from Romania, all EEE countries started to catch up. However, the gap still remains, when benchmarking with the EU27 average of 2.2% as well as with the target of 3%. An important issue to be discussed later is whether the countries' human capital and their infrastructure make it possible to absorb the increases in R&D expenditures.

The structure of R&D expenditure varies considerably in the EEE and has changed over the last decade. In 2009, in most of the EEE the government was the main source of R&D funds with the share in total R&D expenditures ranging from over 60% in Bulgaria and Poland to about 50% in the remaining EEE, except in Slovenia, and Hungary, which had the highest business sector share. Ten years later, the business enterprise sector dominated in R&D expenditures in all EEE, with its share over 60% in Slovenia, over 50% in Romania, Poland and Hungary, over 40% in Slovakia and Bulgaria, and over 30% in Czechia and Croatia. It should also be pointed out that over the last decade the share of foreign funds in EEE expenditures on R&D increased significantly reaching one third of the total in Bulgaria and Czechia and one fifth in Croatia. In the remaining EEE, the role of foreign resources was relatively smaller, in 2018 their share was slightly above the EU27 average of 9.1%. Domestic sources

Fig. 11.1: Gross domestic expenditure on R&D as % of the GDP and change in percentage points: 2009-2019
Data: Eurostat (2021a)



of R&D funds also include the higher education sector and the private non-profit sector, however in the EEE only a small part of R&D expenditures originates from these two groups. Higher education's share in total R&D expenditures was around 1% in most of the EEE, except in Poland and Croatia, where it stood at around 4%. Private non-profit sources were even less important: between 2009-2018 they constituted less than 1% in the EEE region (Eurostat, 2021a).

In the ten years between 2009-2018, there were significant changes in the structure of R&D expenditures broken down by fields of science. In most of the EEE, the share of engineering and technology sciences increased, e.g., to 40% in Croatia and 70% in Romania while in only two countries (Czechia and Croatia) it remained unchanged over the period analysed. Medical and health sciences absorbed quite a high and increasing percentage of the total R&D budget in Croatia (11% in 2009 versus 25% in 2018) and Slovenia (from 3% in 2009 to 17% in 2018). Bulgaria also recorded a modest increase (from 15% to 17%), while this percentage remained stable in Poland (around 11%) and decreased in Czechia, Hungary, Romania and Slovakia. In nearly all EEE countries the share of agricultural sciences, humanities and social sciences decreased (the share of the latter remained stable in Bulgaria, Croatia, Czechia and Slovakia) (Eurostat, 2021a).

Looking at the R&D structure from the perspective of being prepared for the Covid-19 pandemic, during the 2009-2018 decade, as seen above, in some of the EEE there was a decrease in the share of R&D funds spent on medical and health sciences. Although these expenditures had been growing in absolute terms in all of the EEE except in Romania, their decreasing share in the total R&D budget reduced the relative capacity of these EEE countries not only to conduct research in this field, but also to absorb knowledge coming from elsewhere, which has wide-ranging implications.

During the ten years between 2009-2018 in all the EEE there was significant fluctuation in R&D expenditures in medical and health sciences when measured in euro per inhabitant (Table 11.1). Nevertheless, in all EEE countries, except Romania, the values of R&D in medical and health sciences have grown since 2009. The highest over six-fold increase was observed in Slovenia. This country is also the leader in the EEE in terms of the value of R&D per capita in medical and health expenditure, followed by Croatia and Czechia.

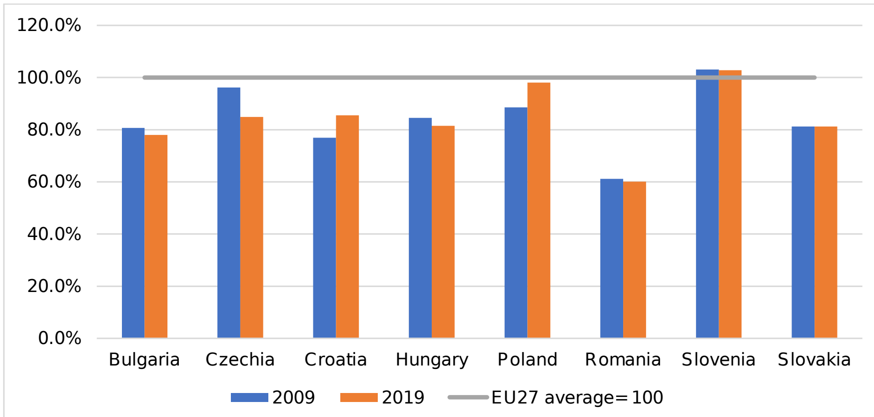
Table 11.1: Intramural R&D expenditure (GERD) in medical and health sciences in the EEE (euro per inhabitant)
Data: Eurostat (2021b)

	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
BG	3.6	11.1	13.0	15.1	15.9	17.0	19.1	10.0	9.3	10.4	:
CZ	18.1	18.0	19.4	22.2	22.4	23.7	22.5	18.3	20.4	25.0	25.4
HR	9.9	5.7	10.6	12.4	13.3	15.3	20.2	24.5	26.2	30.6	:
HU	7.2	8.4	9.0	10.7	10.4	8.7	10.0	7.1	13.1	12.7	:
PL	5.8	7.1	8.4	11.7	9.5	10.7	13.1	10.5	15.0	17.4	:
RO	2.9	2.4	:	3.1	3.4	3.0	4.5	2.9	2.7	2.8	:
SI	10.8	11.3	11.2	11.9	12.6	13.1	58.1	60.3	12.2	66.4	:
SK	4.3	5.5	6.9	9.2	10.1	12.3	12.8	7.9	7.0	6.6	7.4

11.3.2 Human Resources for Science and Technology

Human capital is one of the most important determinants of economic growth (Romer, 1990; Mankiw, Romer & Weil, 1992; Bernanke & Gürkaynak, 2001; Fischer, 2018). The indicator of human resources in science and technology (HRST) is used to monitor the EU's progress (European Commission, 2020d, 2021a). It is defined as the share of people in the 25-64 age group who have successfully completed tertiary level education (or have not done so formally but are employed in science and technology jobs where such qualifications are required) (Eurostat, 2020c). This indicates the percentage of the active population that constitutes a highly qualified work force in the economy. Figure 11.2 illustrates the human resource gap between the EEE and the EU27 average. The results show that in 2009-2019 the gap widened in Bulgaria, Czechia, Hungary and Romania. In Slovakia it remained stable, and only two EEE countries, namely Poland and Croatia, managed to narrow it.

Fig. 11.2: Human resource gap: HRST in the EEE relative to the EU27 average, 2009 and 2019
Data: Eurostat (2021c)



Perhaps the R&D personnel measured as a percentage of the active population is a more precise indicator of human resources for R&D than HRST. Between 2009-2019, this percentage increased in the EEE, with the largest improvement in Poland, followed by Hungary, Czechia and Bulgaria. Nevertheless, in 2019 only in two countries (i.e., Slovenia and Czechia) was this percentage higher than the EU27 average, mostly thanks to relatively high levels of R&D staff in business enterprises in 2009 in both countries as well as their huge increases in the following decade. The most substantial change in the R&D personnel of business enterprises in the decade studied happened in Poland and Bulgaria, but this was partly because their base was very low.

The role of two key types of publicly-funded research organisations, namely research institutes and universities was quite different in Czechia, Hungary and Romania, where the institute-based system was dominant, from the system in Poland, Croatia or Slovenia where universities were of relatively higher importance (OECD, 2000; Weresa, 2014). The reforms of research systems undertaken in the EEE changed the structure of the R&D personnel. For example, over the last decade research personnel in higher education has nearly doubled in Poland and has increased significantly in Hungary, Croatia and Czechia, while in Bulgaria and Romania it started at a low level and decreased even further. It should also be pointed out that in 5 out of the 8 analysed countries (Bulgaria, Croatia, Czechia, Hungary and Slovenia) R&D personnel in the government sector was higher than the EU average. Furthermore, in Czechia and Hungary the ratio of R&D personnel employed in the government sector relative to the active population also rose between 2009-2019. The most remarkable growth of R&D personnel in the government R&D sector was noted in Romania, although it still remained below the EU average (Eurostat, 2021c).

The EEE are heterogeneous in terms of human resources for R&D, their sectoral structure and their development trends. Slovenia is the leader in terms of both its human capital for R&D and their R&D personnel performing better than the EU average. Poland is catching up nearly reaching the EU average in human capital development, but despite speeding up the pace of R&D personnel increase it still lags behind the European average. The trend of the latter indicator looks promising in Czechia as it has grown significantly in the past decade surpassing the EU27 average. In the period 2009-2019, an important structural change in the R&D division by sector occurred in all EEE countries, with continuous increases in the R&D personnel in the business enterprise sector relative to the active population.

11.3.3 Results of R&D Efforts

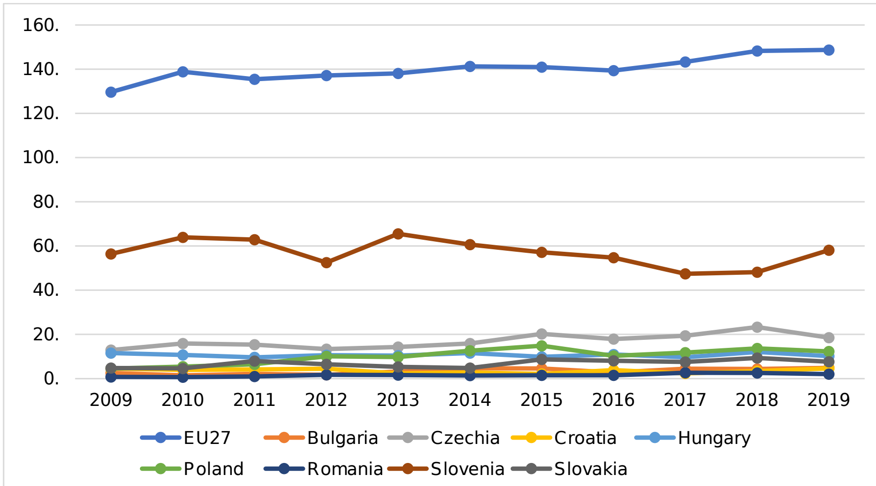
The results of R&D can be measured, amongst others, by the number of patent applications submitted to the European Patent Office (EPO) relative to the size of a country. The number of applications include direct European applications as well as international (PCT) applications to protect invention in Europe (European Commission, 2020d, 2021a). The entire EEE group has a very weak position in terms of patent application to the EPO, and unfortunately little progress has been made over the past decade (Figure 11.3).

Slovenia is the leader in the EEE in the number of patent applications to the EPO per million inhabitants, however, even this is well below the EU27 average. During the decade, the average number of patent applications per million inhabitants in the EU27 was more than twice as high as in Slovenia, nearly ten times as high as in Czechia, Poland and Hungary, twenty to fifty times as high as in Slovakia, Bulgaria and Croatia, and over seventy times as high as in Romania. However, it must be added that research activity and patent applications are often detached, e.g., a multinational company conducting innovative research may well submit the patent application in another (usually its home) country. Consequently, these figures should be taken with a pinch of salt.

In order to identify the technological profiles of the individual EEE countries the Revealed Technological Advantage (RTA) indices[9] were calculated. It is worth taking a closer look at those areas which seem to be crucial in the times of the Covid-

[9] $RTA = P_{ij}/\sum_i P_{ij} : \sum_j P_{ij}/\sum_i \sum_j P_{ij}$, where:
P_{ij} = number of patent applications to the EPO by inventor from a country i in the field j
$\sum_i P_{ij}$ = total number of patent applications to the EPO in the field j
$\sum_j P_{ij}$ = total number of patent applications to the EPO by inventor of country i
$\sum_i \sum_j P_{ij}$ = total number of patent applications to the EPO i all technology fields.
An $RTA < 1$ indicates that a country does not have comparative advantages in technology relative to the whole group of countries analysed, while $RTA > 1$ indicates the existence of such relative advantages.

Fig. 11.3: Patent applications to the European Patent Office in the EEE per million inhabitants in 2009-2019
Data: Eurostat (2021d)

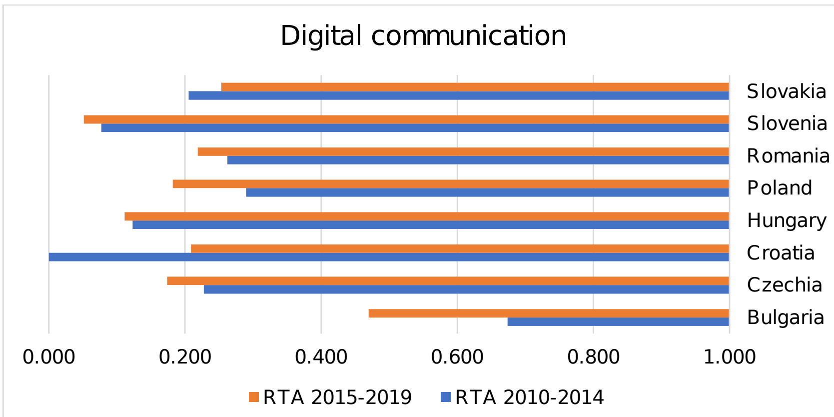


19 pandemic: medical technology, pharmaceuticals, digital communication and IT methods for management. The RTA index measures the technological advantages of a country relative to other countries in these technology groups. As the patent data in this paper cover patent applications filed in the European Patent Office by applicants from any country, the index shows how proactive EEE were in protecting their inventions in the four selected fields of technology compared to other countries that applied for patents in the EPO in these technologies. Figures 11.4 and 11.5 illustrate the main findings comparing RTA indices between 2010-2014 with those between 2015-2019.

In medical technologies, in the EEE group it was only Czechia that enjoyed technological comparative advantages, gaining them in the 2015-2019 period. In pharmaceuticals the EEE were relatively stronger as these technologies belong to the relative technological specialisation of Croatia, Czechia, Hungary, Poland and Slovenia. However, when comparing the periods 2010-2014 and 2015-2019, it should be noted that RTA indices decreased in all these countries, except in Czechia and Poland (Figure 11.4).

In the area of digitalisation, the EEE group's performance was generally poor. None of these countries had any relative specialisation in digital communication technologies in the entire 2010-2019 period. However, a few of them, namely Bulgaria, Croatia, Romania and Slovakia established relative specialisation in technologies for IT methods for management. These technologies were among Poland's specialisation between 2010-2014, but from 2015-2019 they became relatively disadvantageous for it (Figure 11.5).

Fig. 11.4: Specialization in technologies of digital communication and IT methods for management as measured by the RTA index: 2010-2014 and 2015-2019
Notes:
(1) European patent applications include direct European applications and international (PCT) applications.
(2) The origin of applications is based on the country of residence of the first applicant listed on the application form.
(3) RTA > 1 indicates relative specialization in a given technological field.
Data: European Patent Office (2020)



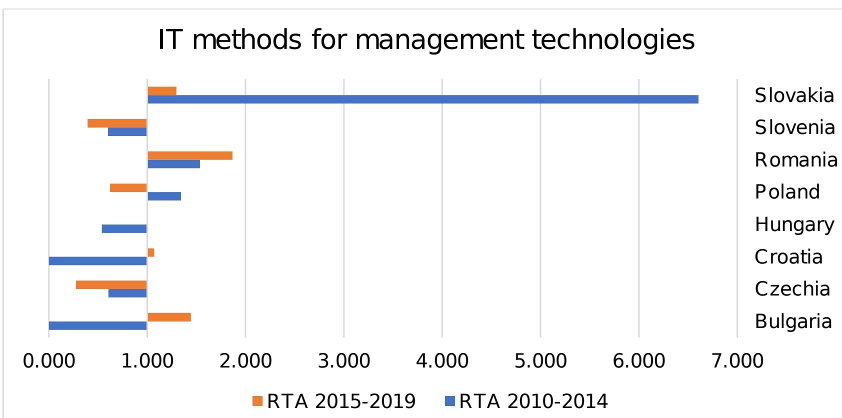
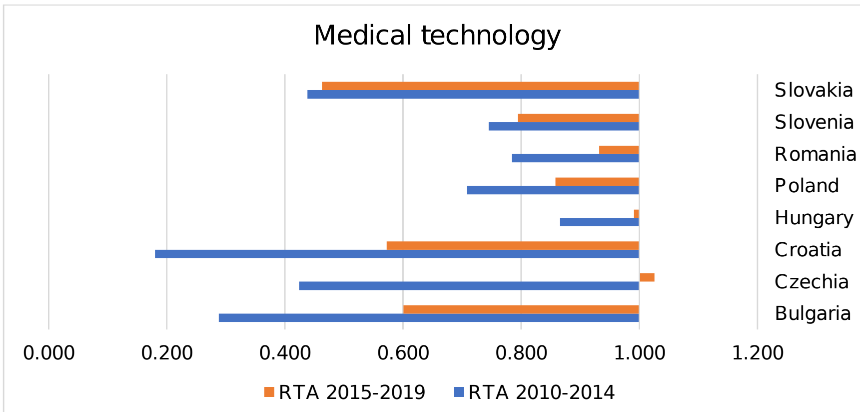
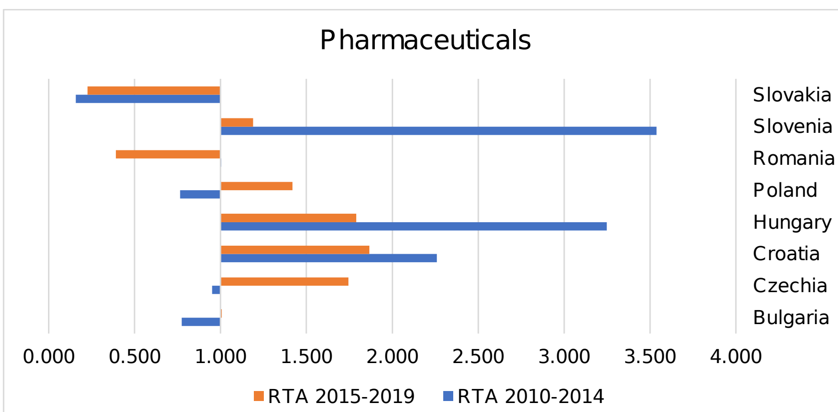


Fig. 11.5: Specialization in medical and pharmaceutical technologies as measured by the RTA index: 2010-2014 and 2015-2019
Notes:
(1) European patent applications include direct European applications and international (PCT) applications.
(2) The origin of applications is based on the country of residence of the first applicant listed on the application form.
(3) RTA > 1 indicates relative specialization in a given technological field.
Data: European Patent Office (2020)





The scientific output of individual countries can also be assessed by using publications data available on the SCImago portal using the Scopus database. The data is drawn from over 34,100 scientific journals and covers more than 5,000 international publishers. In 2019, the number of papers published by authors from the EEE was significantly higher compared to that in 2009. (Table 11.2). The same tendencies regarding the growing number of publications were observed in all EU member states, however, EEE publications and citations grew at a slightly higher pace than in the whole EU. As a result, the share of the EEE in the total number of publications of the EU27 increased between 2009-2019 from 12.3% to 13.7% and their share in citations also went from 7% to over 10%. These changes indicate that during 2009-2019 the impact of knowledge produced in the EEE on the whole knowledge base of the EU was strengthened, although modestly. Poland is the leader in the EEE group in terms of scientific productivity and scientific impact measured by the H index.[10] Czechia and Hungary come next followed by Slovenia and Romania. Slovakia, Croatia and Bulgaria have the lowest H-indices and are at the end of the ranking list (Table 11.2).

Table 11.2: Bibliometrics of scientific output of the EEE countries
Data: SCImago (2020)

Country	Number of published papers		H index
	2009	**2019**	
Poland	30,473	50,338	562
Czechia	15,220	25,620	471
Romania	11,492	16,326	304
Hungary	9,136	11,787	459
Slovakia	4,653	8,838	283
Croatia	5,689	7,406	282
Slovenia	4,937	6,601	310
Bulgaria	4,057	6,022	261

The impact of publications is also reflected in their citations. The EEE performance with regard to the top 10% most cited publications worldwide measured as % of total scientific publications of the country is far below the EU average of 10.03%. Slovenia with the indicator reaching 7.67% in 2017 was the best performer in EEE in this respect, followed by Hungary (5.5%) and Czechia (5.19%), but since 2009 all three countries have widened their distance from the EU average. Only two members of the EEE group, namely Poland and Romania, have improved their position since

[10] This is a country's number of articles (h) that have received at least h number citations (SCImago definition see: https://www.scimagojr.com/help.php). As it is a non-normalized measure it is affected by size, and as such should be interpreted with caution.

2009. Despite these improvements, their scientific publications that belong to the top 10% most cited publications worldwide constituted less than a half of the EU average (in 2017 4.82% and 4.38% respectively) (Table 11.3).

Table 11.3: Scientific publications by authors from EEE
Data: European Commission (2020c)

Country	International scientific co-publications per million population		Scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country	
	2009	**2019**	**2009**	**2017**
EU27	315.2	1,092.5	10.10	10.03
Bulgaria	172.6	319.4	4.10	3.02
Czechia	381.7	1,084.7	6.00	5.19
Croatia	253.1	778.9	4.10	3.55
Hungary	298.3	608.4	7.00	5.50
Poland	168.7	436.3	4.40	4.82
Romania	103.8	283.6	4.20	4.38
Slovenia	660.8	1,580.1	7.80	7.67
Slovakia	279.6	719.8	5.30	4.56

In the EEE, international scientific co-publications per million inhabitants doubled and in some countries tripled since 2009. Two countries among the EEE, Czechia and Slovenia, exceeded the EU average as early as 2009 and maintained their high performance since. Other EEE countries are trying to catch up with the EU average, however the pace is disappointing (Table 11.3).

Apart from publications, the scientific excellence of the EEE can also be measured by the number of research projects funded by European Research Council (ERC) grants. These grants support top researchers in EU member states and associate countries. There are five types of grants available, each of them with considerable funding: starting grants for early-career researchers, consolidator grants for researchers with 7 to 12 years' experience since completion of their PhD, advanced grants for established research leaders, proof of concept grants supporting commercialisation of research results and synergy grants offered to small groups of principal investigators for solving ambitious research problems (European Research Council, 2021). Between 2009-2020, researchers from the EEE countries received 184 grants. The top three EEE countries with the highest numbers of ERC projects between 2009-

2020 were Hungary[11] (59 grants), Czechia (44 grants) and Poland (43 grants) (Table 11.4). However, the absolute number of ERC projects only partially reflects a country's strength in gaining research funding as the countries in the EEE group differ significantly by size, population, number of researchers, R&D expenditures etc. The success rate understood as a ratio of projects granted to total number of evaluated projects may give a more accurate picture of excellence in science. Again, Hungary and Czechia were the leaders in this respect with higher success rates (9.1% and 6.4% respectively) than the average for the whole EEE region (4.8%). Croatia, Poland and Slovenia had also relatively high success rates, but lower than the average for the whole group. It should be pointed out, however, that on average the success rate of the EEE in obtaining ERC grants (i.e., 4.8%) was less than half of the rate in the EU27 (11.9%, Table 11.4).

Table 11.4: Number of ERC funded projects by category and success rate in 2009-2020
Data: European Research Council (2020)

Country	**Starting**	**Consol.**	**Advanced**	**Proof of Concept**	**Synergy**	**Total grants since 2009**	**Success rate (2009-2020, %)**
Bulgaria	0	0	1	1	0	2	1.3%
Croatia	2	2	1	1	1	7	4.2%
Czechia	20	17	6	1	0	44	6.4%
Hungary	23	13	17	5	1	59	9.1%
Poland	26	9	4	3	1	43	3.9%
Romania	6	2	1	2	0	11	1.9%
Slovakia	1	0	0	1	0	2	1.5%
Slovenia	5	1	8	2	0	16	3.9%
EEE Total	83	44	38	16	3	184	4.8%
EU27 Total	3,218	1,733	1,771	838	88	7,648	11.9%
Share of EEE grants	2.6%	2.6%	2.1%	1.9%	3.4%	2.4%	-

The structure of grants by category was similar in the EEE to that of the EU as a whole. Starting grants for young researchers constituted the majority of projects both

[11] Most of the Hungarian ERC grants were obtained by Central European University, Budapest, and some research institutes of the Hungarian Academy of Sciences (HAS). In 2020, CEU was forced to move to Vienna, and the research institutes were separated from the HAS.

in the EEE and the EU27 (45% and 42% respectively). Consolidator and advanced grants had similar shares of over 20% each in the EEE countries as well as in the EU27. Proofs of concept projects aimed at commercialisation of research results constituted 9% in the EEE and 10% in the EU27, and synergy grants were the least popular with their share in the total number of projects amounting to 2% in the EEE and 1% in the EU27 (European Research Council, 2020).

To sum up the analysis of the competitiveness of R&D activities in the EEE and its changes during the 2009-2019 period, the following observations can be made:

1. The levels of R&D expenditures in the EEE remain far below the EU27 average despite some improvements in the period analysed. Members of the EEE vary in this respect: Slovenia is the leader in the EEE region in terms of the percentage of GDP spent on R&D, while the highest advance is observed in Poland.
2. There were some shifts in the structure of R&D expenditures by source of fundings in the EEE. The boost in the business sector's share in R&D spending has been noted in most of the EEE, except in Czechia and Croatia, where the decreasing share of governmental expenditures was offset by the growing share of funds coming from abroad.
3. The EEE are heterogeneous in terms of human resources available for R&D, their structure by sector and their development trends. Slovenia was the only EEE that performed better than the EU average in terms of both human capital for R&D and R&D personnel. Thanks to a significant growth of R&D personnel, Czechia managed to surpass the EU27 average and Poland was close to the average level of human capital for R&D. In all EEE countries the growing shares of R&D personnel employed in the business sector has been noted.
4. Patenting activity is not among the strengths of the EEEs. There are some similarities in the technological profiles of these countries when measured by RTA indices, with the predominant role of traditional technology fields (e.g., metallurgy, food chemistry, and furniture production).
5. The impact of knowledge produced in the EEE on the knowledge base of the EU measured by the EEE share in the total number of publications and citations of the EU27 has increased slightly. In terms of scientific productivity and scientific impact measured by the H index, Poland is at the head of the EEE group (which is understandable as it is the largest country in the group).
6. The EEE performance with regard to the top 10% most cited publications worldwide measured as % of the total number of scientific publications of a country is far below the EU average.
7. From 2009-2019 EEE scientists increased their international outreach, which is reflected in the growing number of international scientific co-publications per million inhabitants, as well as in the growing number of ERC-funded projects. All the EEE have been catching up with the EU27 average with regard to both indicators. Nevertheless, the success rate of the EEE in getting ERC grants was still more than two times lower than that in the EU27.

Overall, it can be observed that there are some improvements in all indicators characterising R&D in the EEE. Thus, the gap between the EEE and the EU27 average has narrowed, but is still tangible and is only shrinking at a slow pace. It is also safe to say that Slovenia, Czechia and Hungary are the leaders in the EEE region in terms of most of the relevant indicators.

11.4 Innovation in EEE

Formal R&D and patenting activities do not necessarily present a true picture of the innovation process, as they do not always require R&D. Half of the EU enterprises conducted some form of innovative activity, while only 45% of these enterprises showed any R&D activity. Yet, economists often represent R&D activity as a linear sequence of functional activities that begins with basic research and ends with diffusion. Alternatively, the evolutionary approach emphasises innovative activities as an outcome of a dynamic non-linear process that usually involves some form of complexity. Models based on Schumpeter (1934) suggest that innovation comes from within the economic system by displacing old equilibria and creating radically new conditions. By carrying out new combinations of existing knowledge that result in new products, new methods of production, new markets, new materials and sources, and new forms of business organization (including new business models and new networks) the entrepreneur and innovating firms become the main agents of change. Schumpeter (1934) argued that creative destruction brings novel ideas and new business, but often destroying jobs in older industries.

A firm's ability to introduce higher-quality products, and cost-saving organisational and managerial processes reflects the country's competencies and capabilities (von Tunzelmann, 2009). These strategies and knowledge flows represent a firm's competitive behaviour and its ability to learn and assimilate new technical knowledge from both home and abroad (Cohen & Levinthal, 1989). When firms apply knowledge transferred through knowledge spillovers, they must enter a time-consuming and costly process of investing in their absorptive capacity. The idea of absorptive capacity thus becomes a connecting device between what Abramovitz (1989) described as the potential for catching up (technological opportunities) and its realisation (appropriability conditions). The main challenge for the EEE is to build the competencies and capabilities needed to carry out specific strategies and assimilate new knowledge.

One way to measure these kinds of innovative activities is to use data collected from the Community Innovation Survey (Eurostat, 2018). Through the national statistical agencies Eurostat collects data from these surveys on a biennial basis. The survey collects comparable information on sources of knowledge going into the innovation process, including R&D expenditures within a firm, collaboration with other firms and organisations, and R&D obtained outside the firm, all of which are relevant for analysing R&D internationalisation. It also surveys individual enterprises on the sources, output, and impact of innovation, along with the obstacles to innovation, technological diffusion, public funding, and corporate strategy. Eurostat has conducted 11 surveys, with the most recent one in 2018, covering the period

2016 to 2018. Aggregated data from the CIS survey appear in the Eurostat science and technology statistics and original survey data are available at the Eurostat Safe Centre.

The four editions since 1992 of the *Oslo Manual* (OECD, 2018) lays out guidelines for 'collecting and interpreting innovation data'. The 2018 edition delineates the duality of innovation as a process and innovation as an outcome: 1) Innovation activities are the "developmental, financial and commercial activities undertaken by a firm that are intended to result in an innovation for the firm", and 2) the outcome of business innovation is "a new or improved product or business process (or combination thereof)". This innovation must differ from "previous products or business processes and that has been introduced on the market or brought into use by the firm". Data from the Community Innovation Survey presented here (CIS-2018) carried out in 2018 (Eurostat, 2018), are unfortunately not directly comparable with results of earlier surveys.

Table 11.5: Ratio (%) of enterprises with R&D activities in 2018 by number of employees
Data: Community Innovation Survey, citeeurostatcis2018

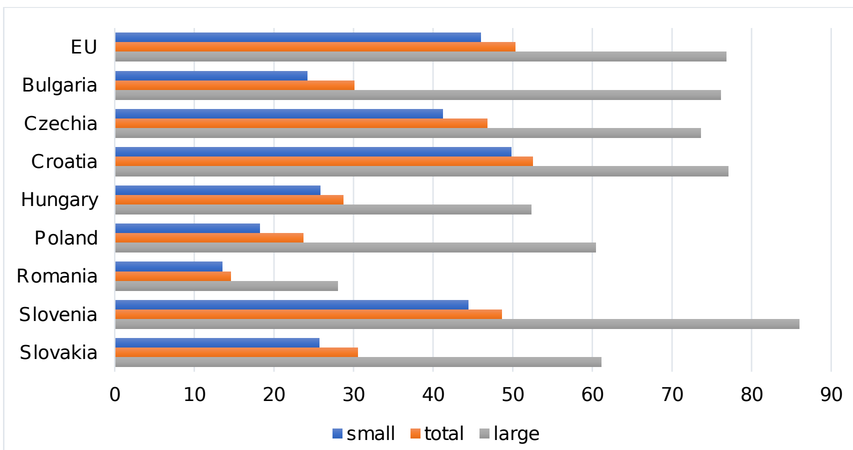
	10-49	**50-249**	**250+**	**10-49**	**50-249**	**250+**
		Industry			Services	
EU27	20.4	43.2	63.3	...	...	...
Bulgaria	5.8	13.3	28.6	...	...	...
Czechia	20.1	36.4	57.3	20.0	32.2	39.4
Croatia	8.6	22.4	38.1	12.1	19.5	25.4
Hungary	7.9	19.2	33.7	11.3	12.0	21.4
Poland	5.9	17.0	37.0	4.0	8.4	18.9
Romania	0.5	1.9	7.1	2.8	2.3	5.1
Slovenia	14.9	40.1	71.6	...	...	...
Slovakia	8.6	19.8	41.2	8.9	14.6	23.7

Table 11.5 reports the percentage share of enterprises with either in-house or contracted-out R&D activity in 2018. With the exception of large manufacturing firms in Slovenia, R&D activity in EEE enterprises was notably lower than the average percentage share in the 27 EU member states. Czechia was close the average, while few enterprises in Romania reported any R&D activity. The table also reveals that there are significant differences in terms of employment depending on the relative size of enterprises. In general, larger firms innovate more frequently than small ones as they can spread the risk more easily. The table also distinguishes between industry and industrial services. Because not all countries cover industrial services in their innovation survey, some, such as Bulgaria and Slovenia do not report

statistics. Nevertheless, in countries that do report data smaller service firms seem to be more likely to conduct R&D activity than industrial ones in the same size group, and larger service firms seem to do more R&D.

Figure 11.6 shows half of all EU enterprises in the survey sample have introduced either a product or process innovation. As expected, the larger enterprises (with more than 250 employees) are more innovative than small businesses (with 10-49 employees), as most small businesses are single-product enterprises. Only 4% of European enterprises have more than 250 employees. The figure also illustrates the low rate of innovation in many countries of the EEE group. For example, the rate of innovation is below 15% in Romania. Other countries among the EEE also show alarmingly low rates of innovation, which makes catching-up with Western Europe rather difficult. According to Eurostat, little catching-up (in terms of real GDP per capita) has taken place since the 2007-2008 financial crisis.

Fig. 11.6: Ratio (%) of enterprises doing innovation by size
Data: Eurostat (2018)



The distribution of innovative activity across industries and the frequency of product and process innovation are also important determinants of structural change. Table 11.6 gives a breakdown of innovative activities by industry in the EEE countries. As expected, firms in science-based industries tend to be more innovative. The manufacturing of basic pharmaceutical products and preparations, computer, electronic and optical goods, along with the manufacturing of electrical equipment, and machinery are above average. The manufacturing of motor vehicles and other transport equipment is at a high level in most countries because Western European manufacturers often locate their production in the EEE. Some industries were exceptional in certain countries. The manufacturing of food and beverage products stood out in Czechia, as did that of textiles, clothes, and related products in Croatia

Table 11.6: Ratio (%) of innovative firms (that reported some kind of innovation) in EEE by industry
Data: (Eurostat, 2018)

NACE	**BG**	**HR**	**CZ**	**HU**	**PO**	**RO**	**SI**	**SK**
Food and beverages etc.	28.9	53.0	42.6	28.1	22.3	20.9	48.2	41.3
Textiles, wearing apparel, etc.	24.2	35.0	53.1	18.0	15.3	11.4	49.4	25.1
Wood, paper, printing etc.	32.4	37.9	50.5	15.4	19.5	15.1	42.4	28.4
Petroleum and chemical products	58.8	75.1	79.2	48.4	47.3	15.1	88.3	50.7
Pharmaceutical products	66.7	79.9	90.1	67.4	58.4	43.7	85.7	35.8
Rubber and plastic products, etc.	39.2	53.1	54.0	36.1	29.1	18.0	...	42.5
Fabricated metal products	42.5	49.1	52.5	25.8	26.2	13.2	...	28.7
Computer and electronic products	64.6	70.1	70.8	47.9	53.6	21.4	63.8	59.7
Electrical equipment	63.0	49.9	68.0	34.4	49.3	21.5	72.9	54.5
Machinery and equipment	63.1	65.3	71.6	38.3	43.4	22.2	68.2	49.1
Motor and transport equip.	59.0	56.7	61.7	40.4	42.4	14.8	74.9	48.5
Other manufacturing	34.6	45.8	55.3	27.0	20.0	21.9	51.8	28.3

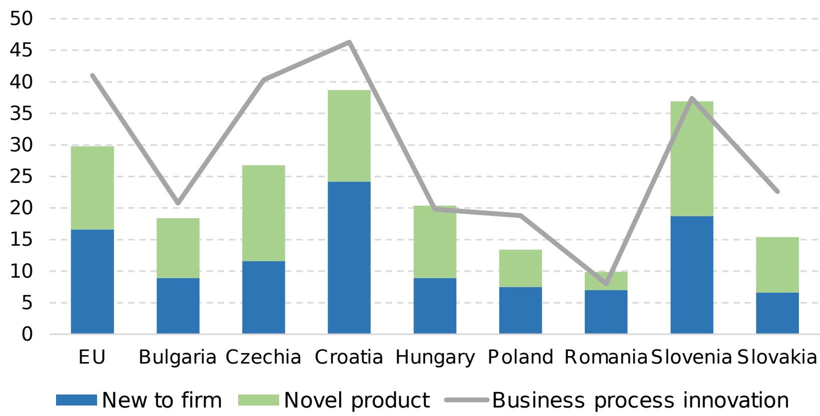
and Slovenia. These three countries also had innovative petroleum and chemical industries.

A product innovation is a new or improved good or service that differs significantly from earlier goods or services implemented within a firm or on the market. Every commercial innovation displays a degree of novelty and involves risk. Novelty may appear as 'new for the market', or 'new for the firm. Figure 11.7 shows innovative goods and services already offered by competitors and available on the market, but new to the enterprise. Novel goods are not previously offered by any competitor and are new to the market. Slightly over 44% of product innovation in Europe is novel.

The scores for Bulgaria, Czechia, Hungary, Slovenia, and Slovakia were higher than the EU average.

A business process innovation is a new or improved business process for one or more business functions that differs significantly from the firm's earlier business processes. Figure 11.7 also reveals the share of process innovations above the share of product innovation. Croatia and Slovenia appear strong compared to the EU average.

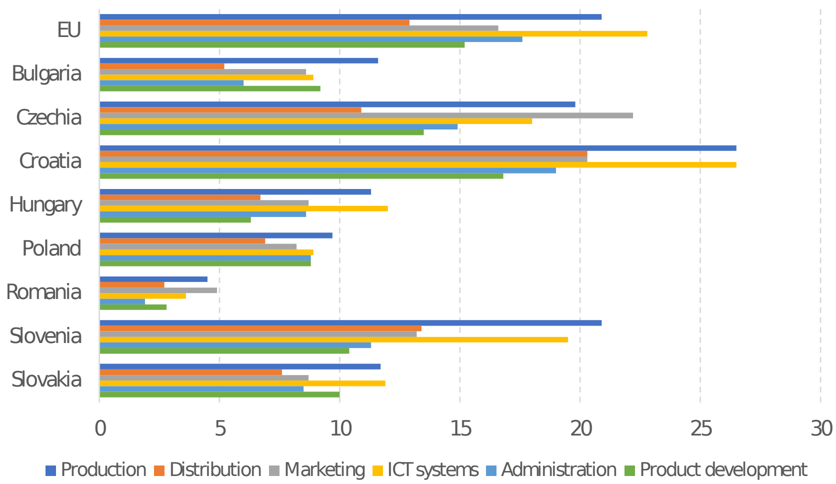
Fig. 11.7: Ratio (%) of firms doing product innovation and business process innovation in the EEE
Data: Eurostat (2018)



The Oslo Manual names seven distinct functions of a firm, recognised in the business management literature. Figure 11.8 shows process innovation related to these functions. While there are differences between the distinct functions, there is a similar pattern across the EEE countries, with Croatia appearing above the EU average, Czechia and Slovenia at a similar level, and Romania well below the EU average.

Innovation collaboration between enterprises and other organisations is essential for the creation, transfer and absorption of new knowledge and economic growth. It does all this by reducing the risk and complexity involved in the development of new products and processes by spreading it among several partners with agreed complementary aims. Collaboration is a strategic choice for local and global partners, and firms may seek membership in innovation networks. They tend to cooperate with partners in their geographic vicinity if they have complementary resources; if local partners are not available, enterprises may collaborate with foreign ones. Foreign-owned subsidiaries have the advantage of being able to tap foreign sources of technological knowledge through other subsidiaries in the group and parents abroad.

Fig. 11.8: Ratio (%) of firms doing business process innovation by type in the EEE
Data: Eurostat (2021d)



Freeman (1991), Powell and Grodal (2010) and others have shown that own R&D activity is positively correlated with the intensity of networking and that it positively affects a company's ability to exploit the opportunities arising from innovation cooperation. There are several reasons for the globalisation of R&D and innovative activities. Companies tend to internationalise certain activities at earlier stages of their life cycle due to global competition and specialisation as well as the increasing costs of R&D and other innovative activities. The trend towards innovation globalisation is also part of a general tendency of companies sourcing technology externally and collaborating with other companies, universities, and public research organisations, in addition to investing internally in R&D and innovation (Powell & Ginnaella, 2010). Data also suggest that companies that collaborate internationally also collaborate with domestic and European partners (Knell & Srholec, 2008).

The Oslo Manual has guidelines for measuring collaboration between companies located in different regions or countries. Figure 11.9 shows the collaborative activities of innovating enterprises in the EEE and Germany. These data only include enterprises that engage in R&D and innovative activities. They clearly show that most collaborations are between local partners within the same country. Next, there are the countries within Europe, which include EU member states and EFTA, and finally all other countries. Hungary had the largest ratio of innovative enterprises engaged in collaborative R&D or innovation activity and Romania had the lowest.[12]

Table 11.7 summarizes the diverse types of collaborative activities that innovative firms engage in. They include various partners outside the enterprise group, including consultants, commercial labs and private research groups, suppliers of equipment, materials, components and software, clients or customers, and competitors. Others

[12] Germany is included in the figure for comparative purposes.

Fig. 11.9: Ratio (%) of enterprises that co-operated on business activities with other enterprises or organisations, 2016-1918
Data: Eurostat (2018)

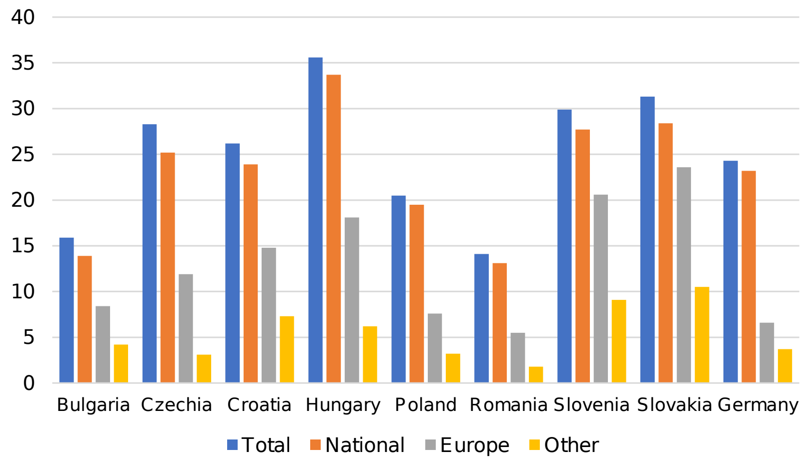
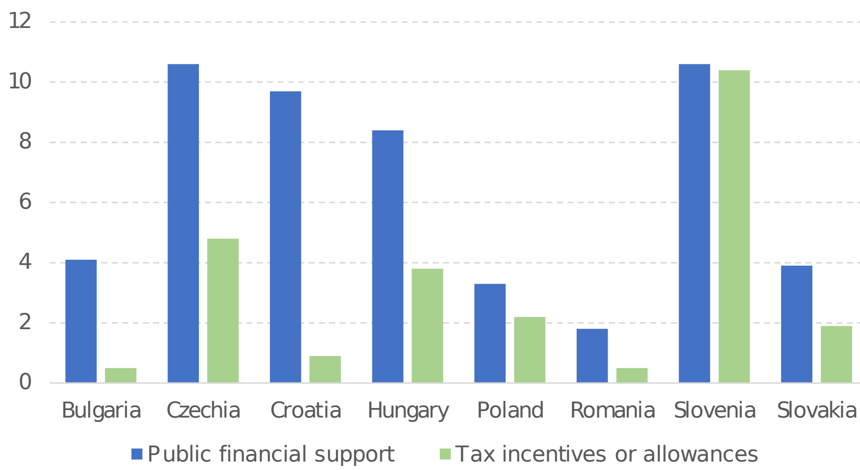


Fig. 11.10: Share (%) of innovative enterprises that have received some form of public support.
Data: Eurostat (2018)



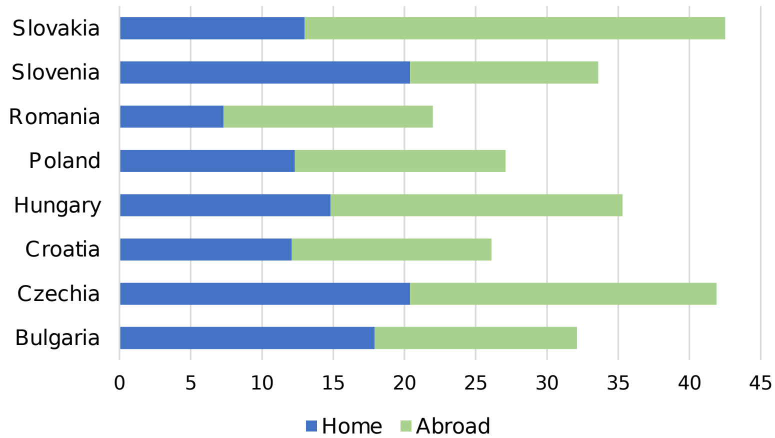
include business units within the enterprise group, universities, government and public research institutes, clients or customers from the public sector and non-profit organizations. A vast majority of the innovation collaborations come from outside the enterprise group. The pattern of cooperation activity across different countries also suggests that their size matters.

Table 11.7: Type of co-operation partner in the EEE countries, percentage share Data: Eurostat (2018)

	BG	**HR**	**CZ**	**HU**	**PO**	**RO**	**SI**	**SK**
All types of co-operation	15.9	28.3	26.2	35.6	20.5	14.1	29.9	31.3
Within enterprise group	3.8	10.2	9.8	9.8	8.9	2.8	14.0	13.4
Outside the enterprise group	14.0	23.0	24.1	33.9	15.2	12.8	28.8	27.6
Consultants or commercial labs	6.0	8.4	14.3	16.9	9.4	3.7	18.5	11.7
Suppliers	10.5	15.7	20.0	25.5	10.2	11.0	24.3	23.6
Clients or customers	7.4	9.1	13.8	18.3	7.5	5.7	19.1	18.2
Competitors	2.6	1.3	4.9	6.8	2.9	2.3	..	8.0
Other enterprises	3.0	3.0	7.7	14.2	5.6	2.4	17.8	6.8
Universities	4.6	11.0	8.9	10.6	9.9	3.5	16.0	10.3
Government	2.5	4.0	4.9	3.6	6.1	1.9	11.5	3.1
Clients from public sector	1.5	1.6	3.5	3.6	2.4	1.7	7.0	5.0
Non-profit organisations	0.9	0.3	1.7	3.2	1.3	1.5	..	3.1

Public financial support and/or tax credits and allowances may be important for stimulating innovation. Most public financial support comes through national sources, followed by local and regional authorities, then followed by EU Horizon projects. Figure 11.10 shows the ratio of innovative enterprises that have received some form of public support. There is considerable diversity across the EEE. For example, Slovenia and Croatia receive more national public support than others within the EEE. There are also various national schemes or allowances for R&D and other innovation activities. Apart from Slovenia, enterprises in the EEE used tax credits or allowances less often than direct financial support.

Fig. 11.11: Share (%) of innovative enterprises by location of headquarters
Data: Eurostat (2018)



Finally, figure 11.11 shows the share of innovative enterprises by the location of company headquarters. Here the blue bar displays innovative enterprises with their head office located within the country and the green bar shows those with their head office abroad. In contrast to Western Europe, most innovative enterprises within the EEE have their head offices abroad and could be considered foreign rather than domestic.

Regarding innovation performance, statistics from the CIS-2018 show the EEE countries as consistently below the EU average, with Romania, Bulgaria, and Poland well below. This points to the need for the EEE to increase innovation investment and promote product and process upgrading. The EEE should also adopt a mission-oriented approach to innovation policy (Mazzucato, 2021). Policies of this kind highlight problem-specific societal challenges. Emerging technologies, such as biotechnology, nanotechnology, robotics, and artificial intelligence as well as green technologies require risk-taking and bold entrepreneurial action by public organisations. The EEE countries should encourage new product innovation and business process innovation, encourage business collaborations, and provide public financial support and tax incentives to industry.

Many large incumbent firms like to stay in the fields where they have already acquired a competitive advantage (Aghion, Antonin & Bunel, 2021). On the other hand, young and ambitious ventures are frequently looking for new markets and technical solutions. Supporting small and medium sized enterprises in general, and innovative young ventures with international ambitions (startups) in particular is central to the EU's development policy. The EU's SME Strategy for a Sustainable and Digital Europe sets the highly ambitious goal of making Europe the most attractive place to start a small business. The strategy is built on three pillars: (1) capacity-building and support for the transition to sustainability, (2) reducing regulatory burdens and improving market access, and (3) improving access to financing (European Commission, 2021b).

As seen in Table 11.5, it is clear that the general innovativeness of small companies in the EEE group is well below the EU average, however, the development of startups is encouraging. Although data on startups is scarce and frequently unreliable (e.g., 'star' ventures and products may be overhyped, failure rate is high, etc.), one can conclude that the general trend seems to be positive. In May 2021, the EU's Innovation Radar identified 118 SME innovators with EU-funded research and innovation projects in the EEE group. Startup tracking Crunchbase provides information on thousands of ventures from the EEE, picturing a growing ecosystem.

Venture capital is the lifeblood of innovative startups. In 2020, the Vestbee fundraising and deal platform registered 734 investment rounds in Central and Eastern Europe, covering only the disclosed ones; therefore, we may suppose that the level of financing was much higher (Vestbee, 2021). Regarding the number of investments, Poland, Estonia and Hungary are at the top. Poland has the largest startup ecosystem in the EEE group, digitalisation pioneer Estonia has developed a very favourable legal and market environment for launching companies, and, for Vestbee, Hungary is an 'eye opener', putting much emphasis on developing startups. The most appreciated industries are among the most innovative ones: artificial intelligence, Big Data and analytics, e-commerce, advertising, healthcare, blockchain, and fintech. Just a few examples of prominent startup innovators from the EEE group: the Polish-Finnish 'Iceye' is a SpaceTech venture developing satellite imagery, the Polish-Singaporean 'Silent Eight' uses artificial intelligence for detecting financial crime, the Hungarian 'Rendi' is an online platform for providing household services, 'Aeromobil' located in Slovakia builds flying cars, and the Czech 'Cyrkl' specialises in circular waste management enabled by advanced technological solutions. One of the main challenges for the global startup and venture capital scene was the outbreak of the Covid-19 epidemic in 2020, causing shifts in innovation, entrepreneurship, and investor behaviour. Following a stagnation in the first half of the year, actors started to realise the new opportunities, especially the growing need for digitalisation and automation.

Case study

The recent IPO of 'UiPath' on the New York Stock Exchange (NYSE) in 2021 is one of the startup success stories from the EEE. After working as an obscure software company for a few years, UiPath, founded by two Romanian entrepreneurs in Bucharest in 2005, was relaunched by its founder Daniel Dines in 2012 as a Robotic Process Automation vendor, and started to invest heavily in global distribution. The Romanian market was so small that the company had little choice but to expand internationally. In 2013, UiPath released its desktop automation product line. The need for process automation is growing, and the Covid-19 pandemic has boosted it further. Growing demand and cutting-edge artificial intelligence, especially computer-vision algorithms scanning documents enabled UiPath and its competitors to grab a rapidly developing high-tech market. They focus on building automation platforms ('hyperautomation'). UiPath reported 590 employees in 2017 when it moved its headquarters from Bucharest to New York. When Covid struck and employees were forced to work from home all over the world, revenues nearly doubled, pushing the company close to profitability. With an estimated thirty percent market share in April 2021 UiPath managed to raise $1.3bn in its IPO. That valued it at around $30bn, higher than what Spotify achieved when it was listed in 2018 (The Economist, 2021a). Keeping its market lead will be difficult, as IT giants like SAP and Microsoft are also pushing into process automation, but the expanding market is big enough for multiple vendors. Regardless, the Romanian company managed to demonstrate that there may be life even when coming from the EEE.

11.5 Higher Education

Although the ratio of university graduates in the population of the Emerging European Economies is growing, it still lags behind the more developed part of Europe. Additionally, the EEE countries should find a solution to the problems of negative demographics and the outbound migration of students. Falling local student numbers are often compensated by international recruitment. However, in order to be efficient the international reputation of the region's top universities should be improved, enabling them to climb much higher in global rankings. Depending on historic, financial, political, strategic and other factors, EEE countries are not at the same level of readiness to face these challenges. Consequently, their chances to succeed are also different.

11.5.1 Students and Educational Attainment

To provide more graduates with tertiary degrees is a key issue of economic competitiveness because the European labour market needs more well-educated people. Higher educational attainment (ratio of population aged 30-34 holding a tertiary degree) is associated with more efficient innovation, better health, lower unemployment risk, higher earnings, and a more active social life. In 2019 (the last year before the Covid crisis), 40.3% of people aged 30-34 held a tertiary degree in the EU. This means that the 40% attainment target set in 2009 (European Commission, 2020b, p. 4) as an important element of the 'Europe 2020' strategy for promoting social development, employment and economic growth has been met. Over the past decade, tertiary educational attainment has grown continuously in each EU member state, but EU averages hide significant geographic and social differences. In a small group of member countries,[13] including Lithuania, the ratio was more than 50% in

[13] Country-specific attainment data: European Commission (2020a).

2019, while Romania (like in Italy for example) did not reach 30%. The countries, where the attainment rate was below the EU target in 2009, seem to have raised their performance substantially. Slovakia's improvement, an increase from 17.6% up to 40.1% over 10 years is especially impressive (Table 11.8). In 2019, the countries scoring the lowest were Romania (25.8%), Italy (27.6%), Croatia (33.1%), Bulgaria (32.5%) and Hungary (33.4%).

Between 2014 and 2018, in most EU countries the total number of students increased. However, this growth came mostly from pre-primary and primary levels (see Chapter 10 on public education), while many countries, including the EEE, did not witness an increase at the tertiary level (Figure 11.12). The two main reasons behind this are changing demographics and migration. Compared with the EU average, birth rates are generally lower in Central and Southern Europe and there has been a net emigration from these countries to Western and Northern Europe, affecting mainly the younger generations. In the EEE group, Poland has the highest total number of tertiary education students (Table 11.9) and the country's student/population ratio is also high, above the EU27 average. Relative to its size, in 2018 Czechia awarded the most degrees to students coming from other countries (Table 11.9). Regarding the ratio of doctoral students in the total student population, Czechia's performance is the most impressive in the EEE group, together with that of Slovakia (Figure 11.13).

Table 11.8: Tertiary educational attainment, as a % of the population aged 30-34
Data: European Commission (2020a)

	2009	2019
Bulgaria	27.9	32.5
Croatia	21.3	33.1
Czechia	17.5	35.1
Hungary	24	33.4
Poland	32.8	46.6
Romania	16.8	25.8
Slovakia	17.6	40.1
Slovenia	31.6	44.9
EU27	31.1	40.3

International student mobility[14] is high in the EU:[15] In 2018, a total of some 1.3 million students came to the individual countries from abroad (from countries inside

[14] Data on student mobility usually involves long and short term, degree and non-degree movements. The trends and general inference of these data are still, however, very much indicative.

[15] See e.g., for the mobility trends the 2019 Annual Report of the Erasmus+ program (Erasmus+, 2020, from p. 31). EU's Erasmus+ program provides opportunities for millions of Europeans to study and gain experience abroad.

Fig. 11.12: Number of enrolled students in tertiary education, all programs
Data: UNESCO (2020b)

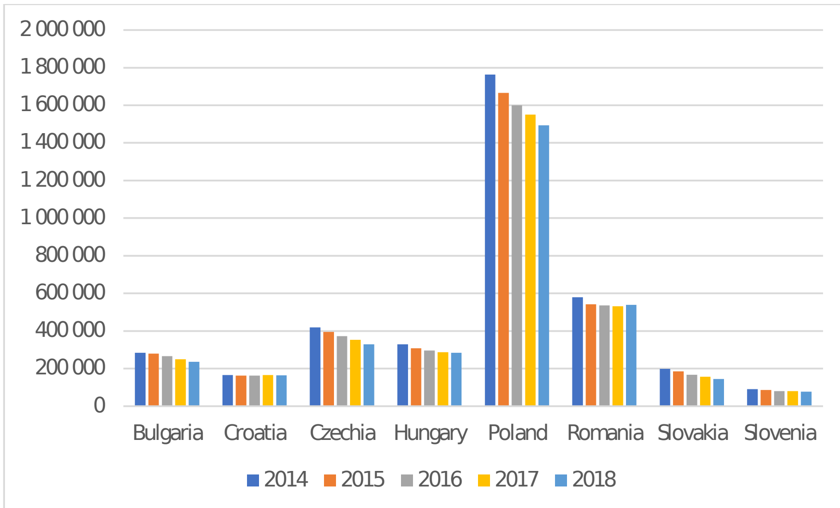
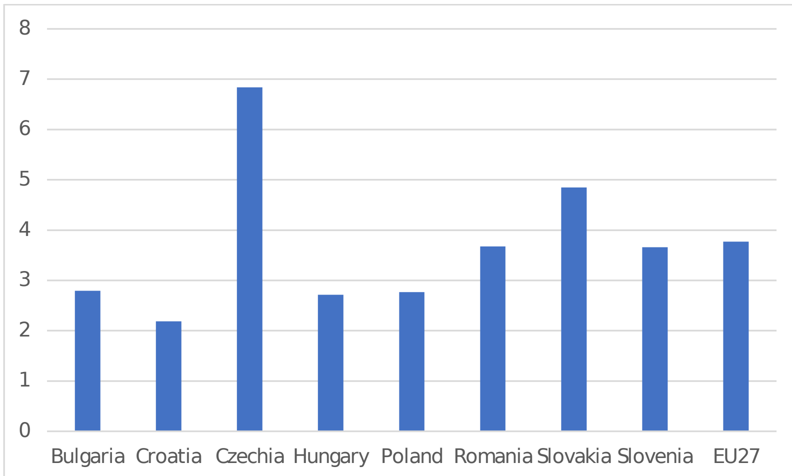


Table 11.9: Number of students in tertiary education, 2018
Data: (Eurostat, 2020g, 2020f, 2020e)

	Population	Tertiary education	Doctoral students	Graduates from abroad		
	thousands	thousands	thousands	BA	MA	PhD
Bulgaria	7,050	236.3	6.6	687	1,059	96
Croatia	4,105.5	164.8	3.6	342	414	68
Czechia	10,610.1	329	22.5	4,250	4,130	410
Hungary	9,778.4	283.4	7.7	1,802	2,703	145
Poland	37,976.7	1,492.9	41.3	5,983	4,658	72
Romania	19,530.6	538.9	19.8	1,914	3,233	124
Slovakia	5,443.1	144.4	7	1,143	1,238	109
Slovenia	2,066.9	76.5	2.8	200	299	39
EU27	44,6824.6	17,502	660.3	99,886	170,705	20,498

Fig. 11.13: Ratio of doctoral students in the total tertiary student population %, 2018
Data: Same as Table 11.9



and outside the EU) in 2018. Most were studying for either a bachelor or a master degree, while 9.2% were doctoral students. The most preferred destinations among the EU 27 countries were Germany and France. There were ten member states where at least one tenth of the tertiary student population came from abroad, including Czechia and Hungary in the EEE group. In Slovenia, Poland and Croatia, foreign students constituted a relatively small proportion of the student body: below 5% in each (Eurostat, 2020e).

According to national reports, the growth of internationally mobile tertiary students[16] is quite impressive in the EEE. To give only one example: Compared to the previous year, Poland's inbound student number grew by 10% in the 2017/2018 academic year (Study in Poland, 2018). Governments and universities try to do their best in order to compensate for the effects of the negative demographic trends and the local enrolment losses due to the growing number of students studying abroad. National recruitment programs and campaigns are launched, many universities participate in international exchange programs and job fairs, design websites to inform potential foreign students, and build cross-border partnerships. Some countries and universities have managed to implement a 'niche strategy' based on geography or study domain in international recruitment. For example, in Poland there has been a strong upward trend of students coming from India; Prague and Brno, the two big university towns in Czechia are successful in attracting American students for short-term studies. In Czechia and Hungary, the most popular fields for incoming foreign students are medicine, health and veterinary science. In 2019, there were

[16] Students who cross the border for a reasons related to their tertiary studies.

1,200 foreign students studying in English at the Medical Faculty of Semmelweis University (Budapest), and 1,050 in German (Szabó, 2018), representing about one third of the student population in the field. Students can complete their studies in Hungary or, after the first years, when the clinical courses start and language proficiency becomes more important, they can go home having their credits completed in Hungary recognised.

Stakeholders continuously discuss and debate the effects of increasing inbound student numbers on the quality of teaching, and the outbound growth on the individual countries' intellectual pool. One of the most frequent criticisms is that although many EEE institutions have managed to raise their inbound numbers, they mostly enrol students who failed (or are afraid of failing) the entrance exams in their home countries, or are not wealthy enough to pay the fees of the top tier institutions. Consequently, considering how many of the EEE group's top talents these institutions lose due to outbound migration, the bottom line of the 'brain exchange' is likely to be negative. This seems to be crucial: The EEE countries should have a positive 'brain exchange' balance in order to be able to break out of the middle-income trap.

According to the yearly data on international student mobility of the the Unesco's Institute for Statistics in the 2018/2019 academic year, for the EEE students who studied aboard (Table 11.10) the main destination countries were Germany and the United Kingdom[17] in addition to the countries with some kind of geographic and/or cultural affinity. Regarding inbound mobility, the most developed countries of the world rarely appear among the top three countries of origin, and inbound figures have a 'long tail' pattern in some countries, meaning that a high ratio of students is recruited from one or only a few countries, usually ones in the neighbourhood.

Regarding the employment rate of secondary and tertiary graduates, the 2019 EU score was the highest since the financial crisis, very close to the strategic target of 82%. The earnings premium for tertiary graduates was visible everywhere. However, in some EU countries supply and demand for graduates did not meet in the labour market, e.g., there were labour shortages of STEM graduates in Belgium, Denmark and The Netherlands.

One of the preconditions of expansive innovation is lifelong learning and regular retraining. Although many higher education institutions provide training services for adults, over the past decade progress in adult participation in learning (European Commission, 2020a) has been slow in the EU and continued to be uneven across member countries. The average EU participation rate[18] of 10.8% (2019) is far from the 15% target. National rates were the lowest (less than 5%) in Romania, Bulgaria, Croatia and Slovakia, scoring very far from the best-performing Denmark, Finland and Sweden, where it was above 25%. Understanding the drawbacks of the gap in adult learning, some EU countries, including Czechia and Slovakia, have initiated concrete actions to support upskilling and retraining.

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[17] Brexit though is likely to change this dramatically due to the increase in student fees and the lack of access to friendly student loans.

[18] The share of 25 to 64 year olds who received formal or non-formal education or training in the four weeks preceding the survey prepared for theEuropean Commission (2020b) report.

Table 11.10: Flow of tertiary level students school year ending in 2019
Notes:
(1) The inbound mobility rate is the total number of tertiary students from abroad, expressed as a % of the total tertiary enrolment in that country
(2) The outbound mobility rate is total number of tertiary students from the country studying abroad, expressed as a % of total tertiary enrolment in that country
Data: UNESCO (2020a)

	Total number of mobile students abroad	Top 3 destinations	Outbound mobility rate	Total number of mobile students hosted	Top 3 countries of origin	Inbound mobility rate
Bulgaria	25093	Germany (26%) United Kingdom (24%) The Netherlands (10%)	10.6	15155	Greece (15%) United Kingdom (8%) Turkey (6%)	6.4
Croatia	9754	Bosnia/Herz. (28%) Austria (11%) United Kingdom (10%)	5.9	5014	Bosia/Herz. (50%) Germany (7%) Slovenia (5%)	3
Czechia	12334	Slovakia (28%) United Kingdom (20%) Germany (12%)	3.8	44767	Slovakia (49%) Russian Fed. (13%) Ukraine (7%)	13.6
Hungary	12865	Austria (17%) United Kingdom (17%) Germany (17%)	4.5	32332	Germany (10%) Romania (7%) China (6%)	11.4

Table 11.10 Cont.: Flow of tertiary level students school year ending in 2019
Data: UNESCO (2020a)

	Total number of mobile students abroad	Top 3 destinations	Outbound mobility rate	Total number of mobile students hosted	Top 3 countries of origin	Inbound mobility rate
Poland	26351	United Kingdom (29%) Germany (20%) The Netherlands(6%)	1.8	54354	Ukraine (49%) Belarus (10%) India (5%)	3.6
Romania	37534	Italy (26%) United Kingdom (23%) Germany (7%)	7	29112	Moldova (32%) Israel (11%) France (8%)	5.4
Slovakia	31472	Czechia (70%) United Kingdom (6%) Hungary (5%)	21.8	11597	Czechia (30%) Ukraine (17%) Serbia (6%)	8
Slovenia	3195	Austria (21%) Germany (13%) United Kingdom (12%)	4.2	3420	North Macedonia (22%) Croatia (20%) Bosnia/Herz. (19%)	4.5

The effect of university education on social mobility and equality is limited all over the EU. Regarding tertiary attainment, the urban-rural divide[19] was especially high (above 30 percentage points) in Luxembourg, Denmark, Romania, Slovakia, Bulgaria, Hungary, Lithuania and Poland, while the EU average is about 20 percentage points (European Commission, 2020b). In this respect, Slovenia is one of the best performers with an indicator less than 15 percentage points. The gap is growing in the EU: tertiary attainment levels are rising faster in the cities, causing social and political tensions that influence political programs and elections. The gender gap in attainment in Estonia, Lithuania, Slovenia, Latvia, Cyprus, Poland and Finland is

[19] Difference in tertiary education attainment between large urban and rural areas.

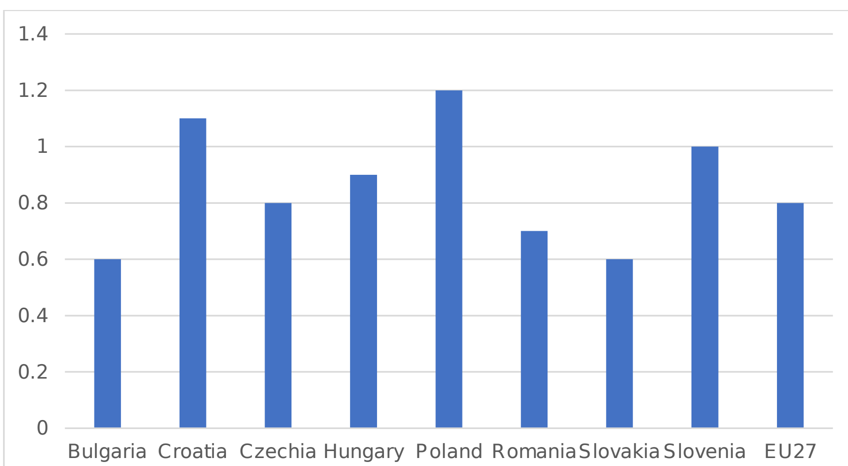
at least 18 percentage points, but gender differences unfortunately persist across the whole EU (European Commission, 2020b).

11.5.2 Public Spending on Tertiary Education

During the 2015-18 period, public spending on education measured as a share of the total public expenditure was fairly steady in the EU as a whole, with high differences though between countries reflecting historical, economic and social conditions, services provided by schools, and policy decisions. Variations are also high within each educational category. Most EU countries have a private and semi-independent education sector as well, its size varies between countries, just as public subsidies for the private sector do. Data on spending must be evaluated with caution, For example, in some countries employee compensation includes payments to non-teaching staff, while in others it does not.

Figure 11.14 shows government expenditure on tertiary education as a % of GDP in the EEE and the EU27 together. In the OECD, tertiary educational institutions are mainly publicly founded. However, the role of private funding is growing. According to the OECD's educational database (OECD, 2020f), the share of private funding varies significantly with countries. In Finland it was only 3.4% in 2015, in Slovenia, Poland, Slovakia, Czechia, Latvia, Estonia and Lithuania it was in the range of 13.0 % to 25.0 %, while in Hungary it was as high as 37.1% (European Commission, 2020b, p. 102).

Fig. 11.14: Government expenditure on tertiary education 2019, as a % of the GDP
Data: Eurostat (2020d)



In the EU public spending on tertiary education decreased by 2.1% between 2015 and 2018.[20] Differences between countries are striking and reflect educational policy choices, falling student numbers and the growing share of private funding. Lithuania witnessed an extreme decrease of 31.4%, while in Latvia, Bulgaria, Poland and Romania the decrease was less striking but also larger than the EU average. In Croatia and Slovakia there was a decrease below the EU average, while Estonia, Czechia, Slovenia and Hungary produced positive growth. The highest score in the EU was that of Ireland with an almost 26% increase (European Commission, 2020b, p. 102).[21]

According to the OECD's 2020 Education at a Glance report (Schleicher, 2020), between 2012 and 2017 member states recorded a 0.4% average increase in expenditure per tertiary student, again with stark differences across countries. Czechia and Lithuania, together with Canada, Finland, and the Netherlands, among others, recorded a drop mainly due to the rapid increase in the number of tertiary students. In the same period, expenditure per student rose by more than 4% in Estonia, Hungary and Slovakia as a result of the combined effects of higher expenditure and lower student numbers (OECD, 2020a, p. 276).

The student to academic staff ratio (i.e., the number of students per member of academic staff) is an important quality indicator in the education sector. In 2018, within the EU, the ratio was the highest in Cyprus (22.0) and the lowest in Luxembourg (4.4). Romania's data were the highest (19.8) in the EEE group (Figure 11.15), while the other countries were in the 10 to 16 range (Eurostat, 2020i).

Overall, it seems safe to say that the resources allocated to the formation of a knowledge society in the EEE are inadequate, especially if a knowledge society is considered the means of breaking out of the middle-income trap.

11.5.3 University Rankings

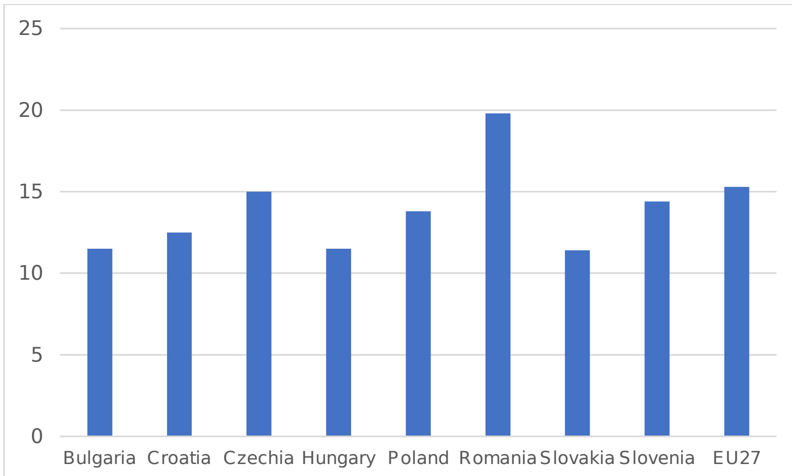
Quality higher education seems to be struggling in the whole EEE group, a problem highlighted by the countries' positions in the global university rankings. Although international university rankings have their methodological problems,[22] they matter because of their strong signalling value. As such, they have a significant impact on students' orientation and on their subsequent job market perspectives. In addition, they also signal a country's or region's competitiveness and development. Knowledge-producing and talent-catching capabilities are vital indicators of a country's ability to successfully participate in global economic competition, technological progress and innovation.

[20] Real change adjusted for inflation.

[21] Sometimes lines between public and private spending are blurred, see e.g., the Hungarian country study below.

[22] See, e.g., Fábri (2016), Garfield (2007), Hazelkorn (2015) and Stack (2016) on rankings and Abbott et al. (2010), Hirsch (2005) and Jurajda, Kozubek, Münich and Škoda (2017) on some key metrics.

Fig. 11.15: Student / academic staff ratio in tertiary education 2018
Data: Eurostat (2020i)



Countries and institutions are eager to climb higher on the lists. Governments want top-tier universities. As leading high-tech companies know that a modern economy is driven by knowledge, they establish centres where it is available. In addition, an internationally competitive educational sector may make a significant contribution to GDP and high added value trade. Governments and educational decision makers use various strategies for moving upwards in the rankings.[23] Some countries, especially the wealthy ones, try to build universities from scratch or persuade top institutions to set up campuses on their soil. Others work with their legacy institutions and try to boost their quality. Since top universities need excellent faculty, competition for the best professors and researchers has increased, together with a fight for the most talented students.

The two most frequently cited rankings these days are the *Shanghai Jiao Tong Academic Ranking of World Universities (ARWU),* which mostly focuses on research, while the *Times Higher Education World University Rankings (THE)* also looks at other factors such as reputation or staff-to-student ratio.

According to the ARWU (2020) ranking, the EEE group has altogether 25 universities in the Top 1000 (Table 11.11) While most of them (21 institutions) are above 500, there is only one in the 201-300 range; there are three in the 301-500 range but not a single one in the Top 200. On ARWU's 2019[24] list the most successful

[23] See, e.g., the recommendations in Salmi (2009). According to this frequently referenced study, a top university needs the following: (a) a high concentration of talent (faculty and students), (b) abundant resources to offer a rich learning environment and to conduct advanced research, and (c) favourable governance structures that encourage strategic vision, innovation, and flexibility (pp. 19-20).

[24] The latest data for some countries is for 2019.

university in the EEE was Charles University in Prague (in the 201-300 range, but on a negative trend since 2016). Charles is one of the oldest universities in the world, has a reputation as a modern and cosmopolitan institution, providing home to about fifty thousand students including more than seven thousand in doctoral programs (Charles University, 2020). More typical is the case of Hungary's top research university, the University of Szeged, which has seen a continuously declining ranking since the financial crisis or even earlier: between 2003 and 2020 it fell from the 201-300 to the 601-700 range. These negative ARWU trends in the EEE can be explained with keener international competition, local developments and funding problems. Talent is enticed away because there are few hurdles in the way of student, faculty and researcher migration. By way off comparison, Austria had three universities in the 151-300 bracket and 14 institutions altogether in the ARWU 2020 Top 1000. The Netherlands had four universities in the Top 100 and a further five in the 101-200 range, while the University of Helsinki ranked 74th in the world.

Table 11.11: Number of EEE universities in the ARWU 2020 ranking ranges
Note: Bulgaria and Czechia 2019 data
Data: ARWU (2020)

Ranking range	1-200	201-300	301-500	501-1000
Bulgaria				1
Croatia			1	
Czechia		1		6
Hungary				5
Poland			2	6
Romania				1
Slovakia				1
Slovenia				1

The Times Higher Education 2021 rankings (THE, 2021) does not significantly change the picture (Table 11.12). There are no EEE universities ranked better than 400. There are only two in the 401-500 bracket: Prague's Charles University and Budapest's Semmelweis University of Medicine. All others in the region are above the 500 range. It is important to note that besides the overall global ranking there are others that focus on special fields of studies, where we can find some EEE university units and/or programs with better rankings, indicating that despite the general competitiveness problems there are certain 'islands of excellence' in the region.

Table 11.12: Number of EEE universities in the THE 2021 rankings
Data: THE (2021)

Ranking range	1-400	401-500	501-600	601-800	801-1000
Bulgaria					
Croatia					1
Czechia		1		2	1
Hungary		1		2	2
Poland			1		2
Romania				1	1
Slovakia					
Slovenia					1

11.5.4 Country Profiles

Bulgaria: [25] Almost all its tertiary education indicators[26] are well below the EU27 benchmarks. Tertiary education attainment has improved in the last decade but is still quite low. Government spending on tertiary education as a % of GDP is among the lowest in the EEE, while adult participation in learning is only 2%. Spending on tertiary education fell by 11% in the last decade. Only the employment rate of recent graduates is close to the EU target. Underachievement in mathematics and science is extremely high,[27] indicating that many young Bulgarians lack basic skills in these fields (see Chapter 10 for data on the efficiency of public education). The drop in the number of Bulgarian tertiary education students is offset by foreign students who, according to the National Statistical Institute of Bulgaria accounted for 7.7% of the total student body in 2019/2020, including universities and specialist high schools (Sofia Globe, 2020). Authorities have made efforts to improve the population's digital skills, but the lack of equipment and teachers' insufficient competences hamper the use of modern educational technology. The ambitions of the country are summarized in the 'Digital Bulgaria 2025' national program (Digital Bulgaria, 2020). Offering higher scholarships and using other support measures, the government tries to orient students towards qualifications in mainly STEM professions.

Croatia: Compared to EU targets and benchmarks, Croatia is also one of the underachievers in education. Tertiary attainment is low, as well as graduates' em-

[25] In this section, besides some other sources referenced separately, the main reference is the European Commission (2020a), structured by countries.

[26] The most recent EU report on education (European Commission, 2020a) uses a group of indicators for each member country. National data are presented together with EU27 benchmarks, for the last decade (2009-2019). Here we rely on data from that report.

[27] The European Commission (2020a) report uses PISA 2018 statistics for indicating underachievement.

ployment rate, which is among the lowest in the EU. In 2019, the adult education participation rate was only one third of the EU average. The number of tertiary students is falling, while the number of study places offered is increasing. Consequently thousands of tertiary study places were left vacant in the 2018/2019 academic year. Fortunately, there are also some noticeable improvements. For example, thanks to a major national e-school project, digital education is developing fats. The funding of higher education institutions has recently increased through performance contracts, although the new system generated some resistance (European Commission, 2020e). The internationalisation of the tertiary student body is low but growing; recognition challenges and administrative obstacles are high, even though many local institutions have internationalisation strategies with dedicated personnel, and a growing number of courses are offered in English.[28] According to the 2020 report of the Croatian Agency for Science and Higher Education, 53 study programmes were delivered in English in 2020, with plans for 74 more by 2025/2026 (Croatian Agency for Science and Higher Education, 2020).

Czechia: By EU standards the overall educational performance is good. In 2018, the education expenditure as a % of GDP roughly equalled the EU27 average. The country dedicated 11.4% of its budget to education, which is above the EU average. Spending increased the most for higher education. Education financing has been reformed, and a new system entered into force in 2020: Funding is based on hours taught and pedagogical work rather than the number of students. PISA results in 2018 (see Chapter 10) were slightly above the EU average in all fields, while the ratio of low-achievers was below it. Nevertheless, compared to the EU level of 40.3% in 2019, tertiary educational attainment was only 35.1%. Czechia's economy is attractive for qualified foreign workers, and it is noteworthy that the attainment of foreign-borns is significantly higher than that of native-borns. Regional differences are high, favouring the capital region. Although project-based learning is still uncommon, many students start to work during their university years, and the employability of recent graduates is high. Digital skills seem to be a weak point: Graduates from Czechia are not satisfied with their ICT knowledge and experience, feeling that in many fields fast digital transformation requires more advanced knowledge. Aware of the gap, the country has launched digital upskilling programs and adopted a national strategy for artificial intelligence (Ministry of Industry and Trade of the Czech Republic, 2019).

Hungary: In 2018, government spending on education was higher than the EU average and the increase in 2017-2018 was mainly allocated to tertiary education. The employment rate of new tertiary graduates is high, reflecting a strong demand for a well-educated labour force, which is difficult to satisfy, however, because of the demographic decline and high outward mobility. Moreover, in 2020 tertiary admission requirements were further tightened resulting in a massive drop in application numbers (20,000 fewer than in 2019, (Eduline, 2020)). This requirement policy was introduced to reduce the dropout rate which was around 30% in 2017 (Demcsákné, 2020, p. 11). Participation in adult learning is well below the EU average. In 2020,

[28] See e.g., the course portfolio of the University of Zagreb (University of Zagreb, 2020).

the Hungarian government launched a radical reform program in the university sector that affects governance, financing and several other aspects of tertiary education. Below is a short case study highlighting these changes.

Case study

With the explicit goal of boosting the performance of higher education and improving its quality, in 2019 a new financing and governance model was introduced in the Hungarian higher education sector. In this new model, specially dedicated foundations are established that operate each university separately. These are entirely responsible for the governance of the institutions concerned. Board members are initially appointed by the government, afterwards by the board itself. This system creates conditions that are rather difficult to change at a later stage (The Economist, 2021b). The foundations will exercise the founders' rights, will be responsible for the institutions' development and asset management, and their boards of trustees will approve the budget, the annual report, and the organizational and operational regulations. The government is to sign a long-term agreement with the universities, undertaking to pay tuition fees for a given number of students, thereby to provide them with scholarships; otherwise the universities are free to charge tuition fees. With this new setup, employees lose their civil servant status, making hiring and firing simpler, and salary scales more flexible. The government also promised to give about a quarter of the funds Hungary is expected to receive from the EU Recovery and Resilience Facility (around four billion Euros) to the higher education sector. In the government's view, the 'foundation model' allows greater independence to the institutions since the government would no longer be involved in their management.

Corvinus University Budapest, one of the most popular institutions in the country, was the first to implement the new model. The university's real estate and material assets were placed into the Maecenas Universitatis Corvini Foundation. All the operations of the university have been brought under the full control of the foundation, where the members of the board of trustees were appointed by the government. The foundation, beyond the ownership of its real estates, received 10% stakes in two Hungarian blue chip companies, namely the oil and gas company MOL, and the pharmaceutical company Richter.

This new model was never widely discussed with the main stakeholders (students, faculty, etc.) and the self-governing senates were arm-wrestled to speedily introduce it. Due to its 'forced' introduction and extension, however, there was considerable backlash among the stakeholders and the wider public. For example, the complete leadership of the Budapest-based University of Theatre and Film Arts resigned in protest in 2020, maintaining that the changes resulted in a 'total loss of autonomy'. The students organized demonstrations and for several weeks barricaded themselves inside their building. The same year, due to heavy political pressure, the Central European University, a research-oriented American institution was forced to move from Budapest to Vienna, opening its new academic year in the Austrian capital. Early that year, it was also announced that with the financial support of the Hungarian government, the Chinese Fudan University of Shanghai (top 100 in both the ARWU and the THE rankings) will open its first European campus in Budapest in 2024. Double degree programs are also expected to be launched jointly with some leading Hungarian universities.

Taking advantage of its two thirds majority in parliament, in 2020 and 2021 the government rolled out the new model very fast. As a result, from the 2021-2022 academic year, about 70% of higher education students are expected to pursue their studies under the new model. The radical transformation induced hot debates among politicians and education experts alike. Critics said the universities had been forced into adopting the system and had not received any guarantees ensuring academic autonomy and freedom, and that it was a tool for strengthening political control over the institutions. The government and its present parliamentary majority were accused of a mass transfer of public wealth into the hands of political loyalists just before the 2022 elections. The government, on the other hand, insisted that universities were given the choice of whether to adopt the new model, and insisted that the reforms were necessary to modernize higher education and to rethink the role of the state.

Overall, the control and structure of higher education is changing radically in Hungary, and only in a few years' time will the effects be clearly visible. It is questionable though whether it will bring the desired quality improvement, as it is unlikely to stop the talent bleeding that the sector is experiencing.

Poland: The country's tertiary attainment was 6 percentage points higher than the EU27 benchmark. Students' performance in reading, maths and science is strong according to a recent PISA report (see Chapter 10) are mixed: Compared to other EU members, total investment in education is high and growing, while spending per student is low. The country spends 1.2% of its GDP on tertiary education, which is the highest in the EEE. There are ongoing discussions between central and local governments about financing education. Reflecting the high demand for skilled labour, the employment rate of recent graduates is above the EU's 85% target. The number of foreign students is growing, with their proportion reaching 6.3% in 2019. With the aim of improving quality, the government initiated university reforms (Usher, 2019) and started their implementation in 2019/2020. Institutes of higher education have changed their statutes, reorganized their staff and created academic councils. The first cycle of the new academic evaluation system is planned for 2022. There are debates whether teaching is undervalued by the new law. Adult learning certainly continues to be a weak point.

Romania: The country is a low educational performer within the EEE and the EU. The level of educational spending is one of the lowest, well below the EU average. Compared to 2010, in 2018 spending on education was stagnant, real growth was close to zero, with significant structural changes favouring secondary education (+28%) at the expense of tertiary (-19%) and primary (-16%) education. The tertiary attainment rate has improved significantly but is still well behind target, causing problems on the labour market. In 2018, the country spent only 0.7% of its GDP on tertiary education, which is only slightly higher than Bulgaria's 0.6%. The number of Romanian undergraduate students has declined continuously in recent years, reaching

377,000 in 2018, while the figure had been 761,000 in 2010 (Romania-Insider, 2019). This dramatic shrinking can be explained by a combination of the downward demographic trend, the emigration of the younger generation, high early school-leaving rates, a preference for studying abroad, and a demanding baccalaureate exam. Additionally, only a very small number of people participate in adult learning. The country is facing the challenge of raising quality and providing market-relevant education.

Slovakia: Tertiary educational attainment reached the EU average in 2019, which is an impressive achievement compared with 2009, when the country was 14 percentage points below. Investment in education, however, has remained relatively low, indicators are below the EU average, and annual public spending per student is among the lowest in the EU. A national action plan for the development of education has started to be implemented for the 2018-2027 period, including actions like continuing professional development of teachers coupled with salary increases, introducing measures for quality assurance in higher education, and the creation of an independent Slovak Accreditation Agency for tertiary institutions. Market demand is especially high for STEM graduates, but their proportion has been essentially unchanged since 2013. The national reform programme aims to increase the number of bachelor programmes that better match market demand. The country's tertiary institutions' international rank is low, mainly due to the problematic quality of teaching, institutional fragmentation, limited internationalisation, and job market mismatches. Participation in adult learning is also low, well below the EU average.

Slovenia: In 2018, the country spent 5.4% of its GDP on education, which is above the EU average, but is still lower than the 6.5% before the financial crisis. Investment in higher education has grown since 2017, reaching 1.0% of the GDP in 2018, and growth is also planned for the forthcoming years. Tertiary attainment is impressively above the EU average, while the gap between men and women is growing and is one of the widest in the EU. The share of STEM students is high in tertiary education. There is a long-term downward trend in total university enrolment (Republic of Slovenia Statistical Office, 2019), the total number of students fell by 21.7% between 2013 and 2018, which is only partially explained by the country's population decline: The total number of tertiary graduates in 2019 is the worst in the last decade. The employment rate of recent graduates is high and growing. The participation rate of adults in education fell slightly in 2019 but is still higher than the EU average.

Based on the country profiles, one may conclude that history is an important determinant (Nolke & Vliegenthart, 2009; Polónyi, 2020; Szűcs, 1983) of educational trends and achievements. With a few exceptions, most of the EEE countries, or at least parts of them belonged to the Austro-Hungarian Monarchy before the end of World War I. The structure, location and working language of universities was not only a cultural, but also a hot political issue in the Empire. Austria was the most developed part of it. For the sake of comparison, and because the country is a frequently mentioned strategic benchmark for Central and Eastern European countries, it is worth providing a snapshot of its recent achievements in tertiary education.

In *Austria*, government spending on education as a % of GDP and as a share of government expenditure is stable and close to the EU average. Since 2017, real expenditure has slightly increased on all educational levels. Government expenditure on tertiary education was 0.7% of GDP in 2018, below the EU27 average of 0.8% and close to the percentage of Croatia or Romania, but naturally, of a larger GDP. University studies for all EU students are free of charge up to a time limit set by the expected duration of the study, with some tolerance built in. The employment rate of recent graduates was much above the EU average in 2018, and graduates enjoy a significant earnings premium. Governments have initiated many projects to improve adult learning. The number of foreign university students has been growing continuously, and in 2018, the ratio of mobile students in total tertiary education (26.5%) was among the highest in the OECD (OECD, 2020e).

As seen from the country studies, the higher education sector in the EEE faces huge challenges, which are mostly due to inadequate financing, uneven (or even a lack of) quality, the sector's detachment from R&D, and governance and institutional problems. Last but not least, the EU's open border environment causes heavy brain drain and the emigration of young people, which has a serious negative impact on the sector and the EEE overall. We can start to talk, at least for some EEE countries, of a 'lost generation', lost for the country and 'gone to the West'. This may have serious long-term economic and political implications.

11.5.5 Higher Education in the Time of Covid-19

Growing labour market demand for university graduates, a demographic downturn, significant international student mobility, persistent brain drain, intensive international competition for talent, weak, or at best, middle level positions in global rankings, continuous problems with students' basic skills affecting the quality of tertiary intake, several reform initiatives in progress, and budget constraints: These were the challenges the sector was facing in the EEE when the Covid-19 pandemic hit at the beginning of 2020.

Many of the consequences and reactions were global, rather than country or region specific. The pandemic put huge pressure on universities all over the world. From an epidemiological perspective, campuses, school buildings and dormitories are excellent breeding grounds for the virus, and millions of students travelling across countries and continents every semester are the perfect vehicle to spread it globally. In addition, socially active young people may be expected to ignore unpleasant restrictions. Therefore, unsurprisingly, from the very beginning of the pandemic, a large number of Covid-19 cases were linked to colleges and universities.

Campuses were closed in many countries and teaching moved mainly online. Traditional face-to-face teaching came to a halt abruptly, with only a few, and decreasing number of institutions deciding to continue teaching fully or mostly in person. It became obvious that even if professors turned up in person, many students, especially foreign ones, would not: Aware of the health risks, entry restrictions and the collapse of air travel, many cancelled or deferred their plans to study abroad.

The only real option for many institutions was to move online as fast as possible. The success of the radical digital transformation depended on their preparedness: The availability of modern infrastructure at school and at home, earlier digitalization of course materials, experience in online teaching, students' motivation and level of digital literacy. The digital transformation of university education already had its champions: Over the past few years, a growing number of institutions have started to offer online courses (including MOOCs, that is 'massive online open courses' attracting many thousands internationally) and/or complete degrees, teaming up with 'professional online program managers' (Christensen & Horn, 2008). Early market entry proved to be an advantage in the pandemic.

Member states of the European Union, including the EEE, made tremendous efforts to ensure the continuity of university education by shifting fast to distance learning, often within a few days. After the summer break, most countries relaunched traditional classroom teaching, but the second Covid-19 wave forced the closure of schools again. Access to distance learning proved to be hard not only in some EEE countries, but also e.g., in Italy. It seems that due to the differences in digital literacy and the availability of modern infrastructure, the pandemic will have an inequality enhancing effect in society. Infrastructural and digital literacy conditions were better at the university level than in primary or secondary schools, but it is difficult to predict the long-term consequences of the 'Covid holiday' at secondary schools where contact with many learners was lost because of weak access. This may impact heavily on the quality of the universities' student intake. Currently, researchers are trying to measure and monitor the 'skill gap' of the Covid generation (see Chapter 10).

In the EEE, several universities launched digital distance learning quickly. Professors' willingness to use digital technologies has improved as experience has been accumulating, but the transformation also highlights some existing gaps. The adaptation to the crisis was easier for countries with more advanced digitalization and digital education. Estonia is one of the positive examples. Croatia has also proved to be effective thanks to the e-School project supported by the European Social Fund. Due to the availability of digital infrastructure and multimedia services, most Bulgarian higher educational institutions quickly managed to launch digital courses, the 2019-2020 academic year was completed online, including exams with the exception of such special fields as medicine and arts; admissions were organized electronically and were based mainly on state exams. In Czechia, digital education is a declared strategic focus, and adaptation to Covid conditions was fast and efficient at the university level.

As far as university enrolments are concerned, national reactions to the emergency conditions varied both in the EU and the EEE. Some countries did not change their national tertiary entry exam system and pressed ahead, while a few others cancelled them altogether (The Economist, 2020a). Slovakia postponed upper secondary school-leaving exams at the end of the 2019-2020 school year, Hungary, like Austria, called off oral examinations but allowed written tests to proceed. Although many universities have had problems recruiting students for studies in 'hard' sciences like biology or chemistry, we may hope that as science has demonstrated its power, relevance and impact during the pandemic, this will help to raise enrolment numbers in the long run.

2020 and 2021 were rather turbulent years for university students. Those already enrolled found themselves locked up or sent home. New graduates were pushed out into a European job market that was cooling down: After a long boom in employment between 2013 and 2019, in 2020 youth unemployment started to rise (Eurostat, 2020a).

According to the OECD, just before the pandemic 6% of tertiary students were international or foreign across the OECD, and that share was as high as 22% in doctoral programmes (Schleicher, 2020, p. 9). In 2019, the EU27 issued almost 400,000 first time residency permits for education(Eurostat, 2020h). Poland issued 20,760, Czechia 14,446, while Croatia only 332. Although there are studies finding that the Covid confinement had a positive effect on students' learning performance (see e.g., Gonzalez et al. (2020)), one consequence seems unquestionable: Online university courses are weak substitutes for the experience students are looking for, that is, meeting interesting people in person, participating in lively classroom discussions, engaging in the multicultural social life of campuses, networking, and face-to-face communication in general. From a study published recently in Poland, despite positive opinions about distance learning, students would like to return to traditional education when it becomes possible (Rizun & Strzelecki, 2020). Nevertheless, we may expect that the days of traditional lectures for very large audiences are numbered, personal presence will be substituted by place elasticity and global access. This may induce more standardisation of courses and a reduction of curriculum segmentation, especially at the undergraduate level where student numbers are high.

The public health crisis has seriously disrupted international student mobility. According to a survey done in the United States after the outbreak of the pandemic in the spring of 2020, 96% of higher education institutions reported that they had closed campus buildings and offices, 82% that they had cancelled international travel for students, and 54% that they had closed dormitories and student housing (Martel, 2020, p. 3).

The European higher education area and Erasmus mobilities were also hard hit. A survey by the Erasmus Student Network in spring 2020 (Erasmus Student Network, 2020) found that a quarter of student mobility periods had been cancelled, the percentage of students staying at their exchange destination was continuously falling during the time the survey was open, more than a third of the students were facing at least one major obstacle related to their exchange e.g., loss of transportation, and many students coming from countries that the Covid-19 pandemic hit early experienced discrimination based on their nationality. The Erasmus mobility program is affected also by Brexit as the UK is establishing its own Alan Turing scheme [29] rather than participating in it.

[29] In the United Kingdom, home student numbers have remained static in recent years, the only growth has been generated by international students (Bolton & Hubble, 2021, p. 3).

To inform and orient students, the European University Foundation launched a website (European University Foundation, 2020) where students could find useful information about their host institutions for the autumn semester of the 2020-2021 academic year. Many universities (e.g., among others Mendel and Masaryk in Czechia, Pazmany and Obudai in Hungary, Jagiellonian in Poland, University of Medicine in Tirgu Mures, Romania) declared that they were ready to accept foreign exchange students and offer online courses, but many others (e.g., most of the Bulgarian institutions) indicated a 'no' or 'unknown' status, reflecting the ambiguity caused by the pandemic.

The disruption of international student mobility induced serious financial problems in the university sector. In July 2020, the British Institute for Fiscal Studies analysed the financial resilience of local universities and concluded that although the sector's losses were highly uncertain, long-term losses might amount to between 7.5% and nearly half of the sector's overall annual income (British Institute for Fiscal Studies, 2020), and most of the losses were likely to be caused by the fall in international student enrolment. Everywhere in the world, including the EEE, the heaviest losses are suffered by institutions where the ratio of paying international students is high.[30] Top-tier universities are more likely to be protected by their brand and reputation. Their strong balance sheets with high levels of reserves may help, but many universities face serious financial problems because of decreasing market revenues. Thus they will be more dependent on state aid and may need rescue packages. Institutions in countries where political tensions are growing, and where democracy is in retreat, may experience growing political pressure and more state intervention due to this dependency, as for example in Hungary (see the case study in 11.5.4).

Some universities managed to grab special research and contact-building opportunities in the pandemic, e.g., Czechia's Masaryk University offered free priority access to its laboratories and expertise for research that may lead to the development of a Covid-19 vaccine or drug; Mendel University researchers in Brno conducted an early survey on the psychological and behavioural consequences of the pandemic. Researchers of Petrodsani University in Romania, who studied their own institution's preparedness for e-learning, concluded that students had been fast to adapt to digital education, and that smartphones were their most frequently used equipment for participating in online courses (Edelhauser & Lupu-Dima, 2020). Unusual times may need unusual steps: The chemical laboratories of the Faculty of Nuclear Sciences and Physical Engineering of the Czech Technical University in Prague started to produce thousands of litres of anti-Covid disinfectant to meet the needs of the university and other institutions.

[30] One of the most affected countries is Australia. The number of student visas issued to students from China started to fall in September 2019. Selling university programs to foreigners generates large export revenues for the country, and the Chinese market is the largest. Students from China make up approx. one third of total foreign enrolments (Maslen, 2019). As a rough estimate, compared to 2019 the Australian university sector lost about AUD 1.8 billion in revenue in 2020, and more than 17,300 jobs since the 'sudden-stop' of student migration to the country (Skantzos, 2021).

There are other potential Covid-19 consequences to consider. In August 2020, discussing the effects of the pandemic on tertiary education, the British weekly, The Economist, wrote: “The first two decades of the 21st century were ones of extraordinary growth for universities in many countries. That golden age is over.” (The Economist, 2020b, p. 16). Thanks mainly to the booming demand and government subsidies, global growth was truly impressive: The number of young people enrolling in higher education in the world more than doubled since 1995, and the EEE were among the engines of that development.[31] But will governments come to the rescue again, will growth continue? Politicians’ and governments’ opinion and attitudes towards the academic world are changing and may continue to change even more in the future. Some governments may even turn against universities, maybe not in manifest strategies and political declarations, but in operative decisions and deeds.

In our age, society and politics are divided along educational differences, social status and ways of life related to educational background and experience acquired in cosmopolitan, multicultural and open academic environments (Goodhart, 2017). A high proportion of voters have a negative view of college and tertiary education in general, and some politicians may seize that opportunity. Many think that universities do not provide the right knowledge, produce more graduates than the labour market needs, and may not deserve society’s support and investment because productivity growth and innovation are slow. Public opinion and attitudes towards academia in general and university life in particular are divergent: Many believe that the growth and development of university education, and a growing number of graduates and PhDs are key to future prosperity and sustainability, but others are convinced that we live in an inflating education bubble which should soon burst.[32] Both sides have their advocates in EEE countries as well.

The criticism is not groundless, not even in the most developed countries.[33] The Covid-pandemic highlighted the weaknesses of higher education, made criticism sharper and louder, forcing governments and institutions to reconsider their strategies and innovate. Universities must understand that leaving the academic ivory tower and demonstrating the power of science to the public is essential, and it can only be done through intensive, interactive and multi-channel communication with the public at large.

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[31] Tertiary attainment data are available in European Commission (2020a).

[32] One of the most prominent long-term critics of higher education is the extremely rich venture investor (Facebook, PayPal etc.) Peter Thiel. See e.g., Lacy (2011).

[33] See e.g., the debate on overeducation. According to the British Office for National Statistics, 31% of graduates had more education than was required for the job they were doing in 2017 (Office for National Statistics, UK, 2019). Intensive international labour migration raises the ratio in ‘inbound’ countries like the United Kingdom, but the ratio for locals per se is also high.

11.6 Long Term Prospects and Recommendations

As shown in the chapters of this volume, despite relatively successful convergence in the past 30 years, the bulk of economic improvement in the EEE has mostly been driven by external, FDI-led technology transfer from more developed EU countries. The time is ripe for a completely new growth model, based on domestic research and innovation. To put it differently, the EEE countries should move from simply copying existing technologies towards creating new ones in key industries. The bad news is that preconditions for such a change are relatively weak. The tertiary education sector is uncompetitive and investment in R&D is low compared to international best practices.

There is a real danger for EEE countries to be stuck in the middle-income trap. We emphasize that this should not only be viewed through the lens of lost output or welfare loss. Lack of further catch-up with the more developed parts of the EU may have serious political and social implications. It may strengthen anti-EU populist forces, alienate these countries as they may start feeling second class citizens inside a successful European club. It is therefore of paramount importance for 'club members' to promote the transition of the EEE to a developed, and high added-value economic path.

Managing the paradigm shift to a more knowledge-based growth model is difficult and requires much more complex policies than international companies subsidizing investments. Policymakers should shift gears from industry/firm protection, demand stimulation and cost competitiveness towards quality creation, higher productivity, and better institutions. The Schumpeterian creative destruction, which is at the heart of every successful innovation process, may require more democracy, trust, and less direct state interference.

Governments should not block resource reallocation from less promising sectors into new ones, erect barriers in the flow of new technologies or neglect the quality of human capital necessary for the transition. Instead, policymakers should help to build the infrastructure for the innovation process (public-private clusters) and ensure adequate funding for the different phases of the innovation process: from the birth of the idea to the scaling of a functional prototype for mass production. This is impossible without adequate R&D investments and quality higher education, which has been the focus of this chapter.

Our more specific recommendations are the following. Based on the evidence presented in this chapter, it seems clear that more financial resources should be injected into higher education, research and development. This is true not only for EEE countries, but for the EU in general. EEE countries should support every initiative which changes the structure of the European budget in favour of more investment in technology and innovation. So far the focus has been mainly on agricultural spending and infrastructure investments (brick and mortar); or to put it differently, building the economy of the 20th century. With the help of better targeted EU funds (including the most recent Recovery and Resilience Fund) and beefed-up national initiatives, the goal to reach at least the EU average in R&D and higher education spending seems attainable. The European Research Council may also think of a vehicle to support R&D in the EEE.

However, throwing more money at the problem is unlikely to solve the problem in itself. Substantial differentiation based on transparent and outcome-based incentive schemes is also badly needed. The starting point seems obvious. There are already a few centres of excellence in Central and Eastern Europe which produce high quality internationally recognized research. For small countries, there is no point in trying to be successful in every area. Instead, putting together in one ecosystem the most successful researchers and firms seems a much better strategy. Besides supporting the bright spots, we need a completely new incentive scheme to raise the effectiveness of public grants in general. First of all, financing should be less institution-based and more project-oriented. Second, international cooperation and public-private research initiatives should receive higher funding. Third, projects with high quality output (based on internationally developed criteria) should qualify for more support. On the other hand, locally relevant projects of dubious quality should receive significantly less public money. Fourth, the quality of proposals should be evaluated with the help of external experts.

However, admittedly, the current practice of cross-evaluation inside a small group of local elites is a hard Gordian knot to untie. Selecting research based on global recognition does not necessarily mean supporting only applied research in technology-related areas. It would be a mistake, in our view, to neglect, for example, basic research or social sciences. Let us take the example of the internet, the poster child of the recent technological revolution. It was not created by some global private corporate giant, but is a direct outcome of a government financed basic research program. And then why not exclusively technology projects?

There are at least two good reasons to consider other areas as well. First, with the development of machine learning and AI, more and more human skills can be automated. It is well known that soft skills are much less prone to robotization and less likely to be substituted by technologies. From the perspective of economic success, income distribution or the labour market, social or more human-like skills will continue to be assets in the near future. Moreover, policymakers should also consider these broader trends when managing their economies. Research areas are not isolated compartments as there are a large number of scientific advances happening at the borderline and intersection of natural and social sciences.

Governments should also recognize their role in creating a supportive environment for innovation. In the recent past, the private sector has been gradually increasing its R&D expenditures, but clearly more is needed to approach the global technology frontier. Scientific talent likes 'smart' places (countries, towns, and organizations) where money, facilities and the community of other prominent scientists are available. Therefore, successful research centres are concentrated in geographic clusters. Unfortunately, none of the CEE countries has any innovation cluster in the Top100 centres of inventive activity on the list compiled by the World Intellectual Property Organization WIPO (2017), while Austria and Finland each have one, and the Netherlands has three.

Top clusters with leading universities, research institutions, world-class companies, a lively entrepreneurial community, modern infrastructure and attractive living conditions are especially strong magnets for talent. Facilitating the creation of such clusters is seen as an important role for governments. Here we can think of three avenues to pursue. First, from a national perspective, the strategy should be broad-based, covering most aspects of scientists' lives. A good salary, the proximity of talented students and researchers, high quality health services, green cities, and a rich cultural life are all important ingredients for a happy life. Second, from a regional perspective, cooperation between the EEE countries might also be considered. Geographical distances are relatively short, and the group might benefit from economies of scale in research. Third, in the 21st century we should not exclude the possibility of pan-European virtual clusters.

Turning to the recommendations for the tertiary education sector, moving from quantity towards quality cannot be overemphasized. Periphery countries cannot afford to finance universities or faculties disconnected from global standards. There is no point in having colleges in every larger city; it is much more important to have at least one or two high quality research universities. Therefore, scoring higher in international university rankings should be one of the main objectives of every reform. This can be achieved only via a comprehensive reform package covering finances, human resources, teaching, and incentive schemes.

Building a globally recognized university is impossible without adequate human resources. Faculties and students should be international. Selection criteria should follow international good practices. Professorships should be awarded based on research output rather than obscure formal requirements, as is current practice in many places. Salaries should be competitive enough to attract high quality foreign researchers. Policymakers should understand that the tertiary education market is truly global. In our view, English should be the primary language of teaching and research at most universities (with some exceptions like teaching colleges, etc.). At the beginning of the reform process, it makes sense to create joint PhD programs with the participation of foreign professors (like in Finland or Switzerland).

Financing should be based mainly on the quality of research output: journal rankings, citations, and participation in international projects. Governments might also consider creating special programs in areas with clear links to the supply side of their economies (for example, the automotive sector in Hungary and Slovakia, etc.). In some cases, regulatory exemptions or fiscal benefits might attract foreign research and innovation, for example, providing a 'real' testing site for autonomous vehicles or drone research, a program Hungary has already embraced.

No country can build a successful university without good students. Currently, student mobility in EEE countries mostly seems to be a one-way street. Therefore, we propose establishing student loan programs, with friendly repayment conditions (somewhat similar to the current UK student loans) to cover reasonable tuition fees and living expenses:

- For students from the EU periphery to study in the EU's top universities, attached to a 'go back' requirement string,

- For students from developed EU countries to study in some selected periphery universities and/or degree programs (which satisfy some pre-set conditions),
- For students from non-member states (e.g., developing countries) to study in these selected periphery universities and/or degree programs.

Similarly to student mobility, the mobility of researchers needs to be promoted, thus helping to build research excellence. A fellowship scheme should be created to incentivize established researchers with a proven track record to move (temporarily, e.g., for sabbatical) from research institutions and universities in the centre to the periphery, and vice-versa.

The move towards a more knowledge-based society would benefit also from the broad support of citizens. Politicians and policy makers should clearly communicate the change in the growth model. The public recognition of teachers and researchers should be raised together with their salaries. Good examples or substantial achievements should be more widely communicated also on official forums.

Lastly, we list four important policy questions which beg exploration. First, we need to better understand the evolution of research clusters. What factors contribute to the attraction of 'smart' places and what kind of policies can accelerate such a process? Second, the mechanics of creative destruction should also be high on our agenda. How are successful ideas 'flowing' through the economy? What determines the speed and penetration of innovations? How are international innovation chains created? Third, brain drain is the Achilles heel of the EEE countries. Is it really only about wage differentials? What kind of policies can help to keep the brains at home or attract talents from Eastern Europe? And fourth, as policy makers have only limited knowledge about the innovation needs in the private sector, what are the determinants and preconditions for successful public-private cooperation?

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