REPORT
OF THE SGH WARSAW SCHOOL OF ECONOMICS AND THE ECONOMIC FORUM 2023

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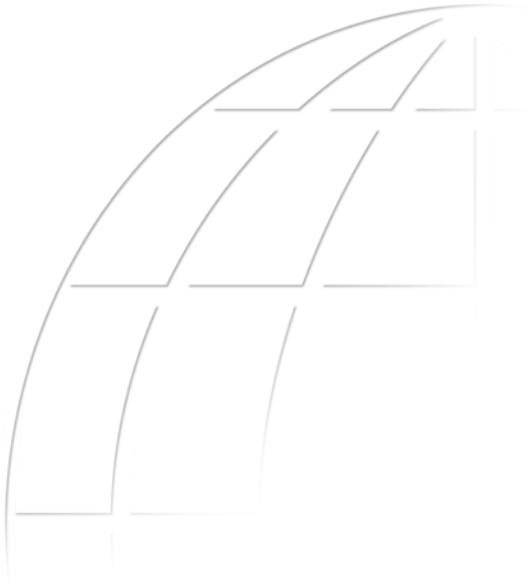

Report of SGH Warsaw School of Economics and the Economic Forum 2023

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First Edition

ISBN 978-83-8030-625-7
DOI 10.33119/978-83-8030-625-7.2023

SGH Publishing House
162 Niepodległości Ave., 02-554 Warsaw, Poland
www.wydawnictwo.sgh.waw.pl
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Cover design and production
Marcin Flis

DTP
DM Quadro

Print and binding
volumina.pl Sp. zo.o.
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Order 101/VIII/23

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PREFACE

This is already the sixth edition of the *Report of the SGH Warsaw School of Economics and the Economic Forum* – a cyclical publication that has been comprehensively summarizing the most important economic and social processes in Poland and Central and Eastern Europe (CEE) since 2018.

The report consists of 12 chapters created by experts from the Warsaw School of Economics, as well as a special addendum prepared by representatives of the European Investment Bank.

Key topics addressed in this year's *Report* include economic growth and development trajectories of countries in our region. The analysis also covers factors affecting economic development, such as worrisome decline in investments, inflation (higher in our region than in the eurozone), adoption of renewable energy sources, and pursuit of sustainable development.

According to the report, despite the recession in 2020 and the economic slowdown in 2022, all 11 CEE countries recorded a faster economic growth in the years 2020–2022 than the EU average. Among the CEE countries, Poland had the fastest economic growth throughout the analysed period. However, in terms of investments, our country significantly lags behind other countries in the region, and this trend seems to be long-term.

It should also be noted that in 2022, the CEE region experienced inflation more than twice as high as in the so-called old EU countries. The region is also struggling with an increase in the costs of servicing public debt, which poses a challenge for the fiscal policies of individual countries in times of crisis. Furthermore, extreme weather phenomena that have been intensifying since the beginning of the 21 st century, accompanied by crop failures, are raising global food security risks. Since February 2022 , the war in Ukraine, a leading global producer and exporter of wheat, barley, and corn, has further exacerbated this situation in many countries. Deliberate destruction of Ukraine's economy and critical infrastructure by Russia will have long-term negative consequences for the development of the CEE region and the world.

Obviously, it is impossible to describe and analyse all the contemporary problems and threats in just over 400 pages of the *Report*. However, we hope that the in-depth examination of selected areas by our experts will capture your interest and prove useful. We also hope that our report will reach decision-makers who will find in it specific recommendations for the future. We believe that the expert diagnosis, arising from years-long established cooperation with the Foundation Institute for Eastern Studies, is invaluable.

Piotr Wachowiak, PhD, Associate Professor of SGH
Rector of SGH Warsaw School of Economics

Zygmunt Berdychowski
Chairman of the Programme Board of the Economic Forum

INTRODUCTION

It is with great pleasure that we present to you the sixth edition of the *Report of the SGH Warsaw School of Economics and the Economic Forum*, prepared especially for this year's Economic Forum in Karpacz.

The purpose of the report is to help business leaders, government, and local government representatives, as well as non-governmental organizations, make more effective decisions in the face of significant social and economic challenges, such as the war in Ukraine, high inflation, migration, development of artificial intelligence (AI), and climate change.

This year's Report consists of 13 chapters covering inflation, influence of the war in Ukraine on the economies of Poland and other Central and Eastern European (CEE) countries, rising costs of servicing public debt, food security threats, energy security, the labour market, sustainable development (ESG), and many other issues of key significance for the CEE region.

In the first chapter, titled *Development trajectories of CEE countries – a tentative assessment of the effects of the COVID-19 pandemic and the war in Ukraine*, SGH experts prove that despite the recession in 2020 and economic growth slowdown in 2022, the CEE-11 countries achieved faster economic growth in the years 2020–2022 compared to the EU average. Countries in our region, representing a patchwork model of capitalism, fared significantly worse in handling short- and medium-term external shocks, as evidenced by data from the years 2009–2014, which covered the period of the global financial crisis. Among the CEE-11 countries, Poland recorded the fastest economic growth throughout the analysed period.

The authors of the following chapter, titled *Unleashing the power of investment: Poland's potential compared to its peers from Central and Eastern Europe* argue that Poland lags significantly behind other CEE countries, particularly the Czech Republic and even Hungary, and this trend is of a long-term nature. The value of investments relative to GDP during the period of 2008–2022 in Poland decreased from 23.1% in 2008

to 16.8% in 2022. A probable scenario for the years 2023–2025 is a continuation of the visible decline in investments in Poland to 16.4% of GDP in 2025.

The third chapter, *Central and Eastern European economies in high-inflation era*, shows that in 2022, CEE countries experienced inflation that was over twice as high as in countries of the so-called old European Union. Additionally, as a consequence of two crises, real GDP by the end of 2022 in CEE countries was only slightly higher than at the end of 2019. In Poland, a decline in consumption has also been observed since Q3 2022. In other countries of the region (except Latvia), private consumption has been steadily increasing since the moment the COVID-19 crisis began to retreat. In the Czech Republic, Poland, Romania, Slovakia, and Hungary, as well as in the EU-27, growth in investment in 2021 marked the end of a two-year period of decline phase.

In the chapter titled *Growing costs of public debt servicing: challenges for fiscal policy in crisis conditions in selected countries of Central and Eastern Europe,* the SGH team of authors assess that an increase of 1 ppt in the government bond yield translates to additional quarterly burden on the public sector ranging from around 0.11% to 0.12% of annual GDP in Czechia, Poland, and Romania, around 0.15% of annual GDP in Slovakia, around 0.18% of annual GDP in Hungary, and around 0.45% of annual GDP in Greece. In the "record-breaking" October 2022, the yield on Slovak bonds averaged 3.6%, Greek bonds – 4.4%, Czech bonds – 5.5%, Polish bonds – 7.8%, Romanian bonds – 9.1%, and Hungarian bonds – 10.3%.

Authors of the chapter titled *Threats to food security in Central and Eastern Europe and ways to overcome them* highlight that since the beginning of the 21s t century, certain phenomena have had an increasingly negative impact on food security. The biggest numbers of malnourished people in CEE in the years 2019–2021 were recorded in Ukraine, Romania, and Poland (1.4 million, 0.7 million, 0.4 million respectively). The authors claim that preventing phenomena adverse for food security will require promoting fair and transparent trade system, enhancing international cooperation on addressing food crises and upgrading food transportation and storage infrastructure.

The chapter *Digital technologies and access to healthcare services in the countries of Central Eastern Europe* proves that Poland has the second highest percentage of residents with unmet healthcare needs due to long waiting lists (25.7%). This is significantly worse than the average for the entire CEE (16.5%) and the EU (19.4%). Poland also has the lowest percentage of healthcare specialists in the region (237 specialists per 100 thousand inhabitants compared to an average of 315 specialists per 100 thousand inhabitants in CEE countries).

The chapter titled *Energy security of Central and Eastern European countries in the face of the process of decarbonisation and transformation of energy markets* provides an interesting observation that structural evolution of the energy mix in the CEE region

in 2000–2021 was consistent with changes in the global energy mix, with the difference being that the global energy mix saw a noticeable decrease in the significance of nuclear energy (from around 7% to around 4%), while in CEE the share of nuclear energy in the energy mix remained essentially unchanged (at 8%). The share of renewable energy sources (RES) in the CEE energy mix reached over 1% only in 2006. The authors therefore prove that decarbonisation and energy transformation of CEE countries in the nearest future will be influenced by a growth in fossil fuel prices and (to a lesser extent) their volatility, as well as changing prices of CO_2 emission allowances.

The article *Labour demand in the light of new and descending occupations and the structure of labour supply in the light of ageing population* forecasts that the share of CEE residents in the entire population of the EU (27 countries), which currently stands at 22.6%, will decrease to 20.7% by 2050. The authors highlight that nearly 57% of people aged 25–64 in the EU-27 have basic or higher digital skills. In Poland, this percentage is 46%.

Authors of the study titled *Transforming consumption for sustainable quality of life* observe that the share of social assistance in Poland's GDP is among the highest in CEE, but lower than in the so-called old EU Member States, except for the Netherlands and Luxembourg. Social programmes and state assistance have had a limited impact on eliminating extreme poverty, which has remained around the 2016 level. The authors suggest that it is important to support civic and social movements that counter negative socio-economic phenomena and stimulate social change, thereby contributing to more sustainable and equitable development.

In the next chapter, *A highly inflationary economy as a challenge to businesses and managers*, the authors say that the demands for lowering inflation in the short term through raising interest rates, limiting wages, compensations, and social expenditures essentially reflect the interests of the financial sector, disregarding the social costs of this policy. To be effective, efforts to combat inflation require cooperation between the central bank, the government, and other stakeholders in confrontation with external sources of inflation transmitted through channels of goods and services exchange with foreign countries. The best tool to support management in highly inflationary economy is probably flexible adaptive budgeting, adjusted to inflation, understood as an imperfect form of money.

In the study *Sustainable development and ESG – conditions, challenges, good practices,* its authors prove that publication of NFRD was a ground-breaking moment in the history of sustainable development reporting in the EU. They also stress that Poland is a regional leader in reporting on sustainable development issues (67 reports, including 11 e xternally verified).

The chapter titled *Start-up support systems in the countries of Central and Eastern Europe* analyses systems for supporting early-stage companies in 13 CEE countries. The study presented by the authors is a follow-up to studies of 2019, 2020, 2021, and 2022. In this year's edition of the *Report*, Estonia turned out to be the "leader" among CEE countries in terms of its start-up support system. Four other countries (Lithuania, Latvia, Poland, and Czechia) were found to be "rising stars", while the remaining countries (Slovenia, Slovakia, Bulgaria, Hungary, Croatia, Romania, Bulgaria, and Ukraine) are classified as "developing".

The last part, titled *Upgrading the business model: Are Central, Eastern and South-Eastern European firms investing enough?,* prepared by experts from the European Investment Bank (EIB), analyses the results of the *EIB Group Survey on Investment* (EIBIS). The study shows that European firms still face strong headwinds from high energy costs, labour market conditions (lack of skills), tightening of financial conditions and general uncertainty. Overall, the investment gaps in the CEE region remain wider than in the EU or the US, with some 77% of firms in CEE declaring broadly adequate investment levels over the recent years (compared to 80% in the EU and 81% in the US). While firms in CEE invested in intangible assets (R&D, software, business processes) less than the EU average (24% vs 37%), the share of firms intending to prioritise innovation in new products and service was larger for those operating in CEE (27%) than in the EU (24%) and in the US (21%). At the same time, around half of the firms in CEE are reporting that climate change is having some impact on their business. A "major impact" of climate change was reported by one out of ten firms, a relatively low percentage compared to the EU (57%).

Editorial Committee

DEVELOPMENT TRAJECTORIES OF CEE COUNTRIES – A TENTATIVE ASSESSMENT OF THE EFFECTS OF THE COVID-19 PANDEMIC AND THE WAR IN UKRAINE

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DOI: 10.33119/978-83-8030-625-7.2023_13_40

Abstract

In the present study, we embark on a tentative assessment of changes in the development trajectories of the 11 new European Union (EU) Member States in Central and Eastern Europe (CEE-11) between 2020 and 2022 resulting from two adverse exogenous shocks: COVID-19 pandemic and the war in Ukraine. The analysis was conducted against the background of the entire European Union in two interconnected areas: economy (growth and equilibrium) and institutions (institutional architecture of the economy). However, the consequences of the war in Ukraine and the COVID-19 pandemic cannot be properly assessed in isolation from the effects of two previous asymmetric exogenous shocks that affected the analysed countries in the 21st century. The first was the accession of the CEE-11 group to the EU, while the second was the global financial crisis triggered by the collapse of the US real estate market in 2008, the negative consequences of which essentially lasted until 2014. Hence, our study of the development trajectories of the CEE-11 countries covered a longer period, i.e., 2004–2022. An important part of our research focused on key institutional features of the patchwork model of capitalism prevalent in the CEE-11 countries. This made it possible to judge to what extent the development trajectories in the CEE-11 countries are sustainable, which is a precondition for real income convergence with more developed EU Member States, and to what extent they generate growing macroeconomic imbalances, which in the medium and long term may reverse this trend and make a negative divergence scenario come true. In the study we also attempt to assess the impact of the COVID-19 pandemic and the war in Ukraine on changes in informal institutions,

i.e., attitudes and preferences prevailing in these countries. The study also includes a classification (clustering) of the CEE-11 countries in terms of their economic growth rate and the scale of macroeconomic imbalances in two time frames: 2004–2019 and 2020–2022. This enabled a subsequent evaluation of the response of individual countries to two adverse exogenous shocks accumulated in a fairly short time. The classification tool in the latter area was based on the authors' assessment of macroeconomic imbalances designed for the present study, including inflation rate, unemployment rate, government budget balance and current account balance. In addition, in our research we examined the development trajectory and response to exogenous shocks of the entire group of countries embodying the patchwork model of capitalism against the background of other European models of capitalism. The text is concluded with policy recommendations aimed at optimizing the development trajectories of Poland and other CEE-11 countries in the future, i.e., at increasing their institutional comparative advantage and, as a result, improving international competitiveness of their economies.

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This study provides a comparative analysis of changes in the development trajectories of the 11 new European Union (EU) Member States in Central and Eastern Europe (CEE-11) between 2020 and 2022 resulting from two adverse exogenous shocks: COVID-19 pandemic and the war in Ukraine. The analysis is placed against the background of the entire European Union (EU-28)[1] and covers two basic development dimensions: economic dimension (growth and equilibrium) and institutional dimension (institutional architecture of the economy). It should be emphasized that although the wide-ranging effects of the war in Ukraine[2] and the COVID-19 pandemic strongly affected the economic condition of the CEE-11 countries during this period, they cannot be considered in isolation from previous asymmetric exogenous shocks that affected these countries in the 21s t century. The first was the accession of the CEE-11 group to the EU, while the second was the global financial crisis triggered by the collapse of the US real estate market in 2008, the negative consequences of which essentially lasted until 2014. Hence, our analysis and assessment of the development trajectories of the CEE-11 countries covered a longer period, i.e., 2004–2022. The study of economic development trajectories was conducted with regard to two key areas determining the overall economic situation: economic growth and macroeconomic equilibrium, with the most important indicators being the inflation rate, unemployment rate, government budget balance, and current account balance.

We believe that the analysis of the pace of economic growth and various dimensions of macroeconomic equilibrium allows us to assess to what extent the development trajectories in the CEE-11 countries are sustainable, which is a precondition for real income convergence with better developed Member States of the EU, and to what extent they generate growing macroeconomic imbalances, which in the medium and long term may reverse this trend and make a negative divergence scenario come true.

The response to the two aforementioned negative exogenous shocks that occurred between 2020 and 2022 posed a challenge for the governments of EU Member States, especially for the CEE-11 countries, in terms of making numerous decisions related to economic and social policies. In the short term, the most fundamental choice was between short-term protection of human life and health on the one hand, and maintaining jobs (rate of employment) and previous rate of economic activity (economic growth), on the other. Assessment of the effects of decisions made in this area in EU countries was the subject of our study in last year's *Report* [Próchniak, Lissowska,

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1 The study covers also the United Kingdom, which was an EU Member State for most of the analysed period (until 2020).

2 The uthors also take into account activities of Russia aimed at destabilising the European energy market.

Maszczyk, Rapacki, Towalski, 2022]. In the medium and long term, however, the focus of the analysis shifts towards the choice between short-term shock mitigation through expansionary monetary and fiscal policies and long-term consequences of their application, including more permanent macroeconomic imbalances and longer path to achieving the inflation target. Additionally, in Poland and, to a lesser extent, in other countries within the analysed group, the change in the geopolitical situation causes a very rapid increase in defence spending and national defence, which in the medium term has a negative impact on the balance of this sector.

Therefore, one of the main objectives of this study is to classify (divide into clusters) the CEE-11 countries in terms of the rate of economic growth and the scale of macroeconomic imbalances in two time frames: 2004–2019 and 2020–2022. The classification tool in the latter area is based on the authors' assessment of macroeconomic imbalances designed for the present study, including the inflation rate, unemployment rate, government budget balance and current account balance.

The report has the following structure. In the first part, we conduct an analysis of economic growth paths, real convergence, and equilibrium variables in Poland and the CEE-11 countries against the average values for groups of countries representing different models of capitalism in the EU. The second part contains an analysis of the most important institutional characteristics of the patchwork capitalism model present in the CEE-11 countries. In particular, we attempt to assess the impact of the COVID-19 pandemic and the war in Ukraine on changes in informal institutions, i.e., attitudes and preferences prevailing in these countries. In this part, we also try to indicate ways in which selected elements of the institutional architecture of patchwork capitalism (particularly state institutions) respond to these two exogenous shocks. Finally, in the third part, based on the previous analysis, we divide the entire group of CEE-11 countries into clusters reflecting different development trajectories in the years 2004–2019, as well as response of individual countries to the accumulated negative exogenous shocks in a relatively short period (2020–2022). In addition, we analyse the development trajectory and response to exogenous shocks of the entire group of countries embodying the patchwork model of capitalism against the background of other European models of capitalism. The whole text is concluded with a set of recommendations aimed at optimizing the development trajectories of Poland and other CEE-11 countries in the future, i.e., at increasing their institutional comparative advantage and, as a result, improving international competitiveness of their economies.

Economic development trajectories of CEE-11 countries in 2004–2022

The analysis of development trends in the CEE-11 countries was made taking into account both the pace of economic growth and progress on the path of real convergence, as well as variables describing internal and external equilibrium in these countries. To this end, we assessed the dynamics of unemployment rates and inflation, as well as the government budget balance and the current account balance. Tables 1–5 present relevant data on economic growth and the formation of equilibrium variables in the CEE-11 countries in the years 2004–2019 and sub-periods. The data were compared to averages for smaller groups of "old" EU Member States representing four Western European models of capitalism[3], as well as the EU-28 average. This also allows for a quantitative summary of the process of real income convergence of the CEE-11 countries with the EU average and with clusters corresponding to specific models of capitalism in the examined period (sub-periods). The tables also show relevant indicators for the years 2020–2022, when the first economic effects of the COVID-19 pandemic and the war in Ukraine became apparent.

Inflation rate along with government budget balance is a particularly important factor for assessing the nature of the policy mix implemented in each of the analysed countries. The impact of the war in Ukraine on the economic condition of the CEE-11 countries is primarily indirect. Russia's deliberate and politically motivated actions, destabilizing the energy market in Europe, accelerated inflation, particularly in the fourth quarter of 2021, which overlapped with the negative effects of aggressive monetary and fiscal policy easing in the analysed group of countries, as well as, in a broader context, the entire EU, during the pandemic. Additionally, depreciation of currencies in countries directly neighbouring the conflict area also contributed to faster price growth. This in turn necessitated gradual tightening of monetary policy, starting from the beginning of 2022, which had negative consequences for economic growth during the same period. It can be expected that the effects of restrictive monetary policy in the analysed group of countries will fully materialize only in 2023, resulting in a decline in real income, increase in unemployment, and further economic slowdown, which in some of the EU-28 countries may turn into a recession.

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3 The continental model of capitalism can be found in Austria, Belgium, France, the Netherlands, Luxembourg and Germany; the Mediterranean model of capitalism is typical for Greece, Spain, Portugal and Italy, the Nordic model is represented by Denmark, Finland and Sweden, while the Anglo-Saxon model is in place in Ireland and the United Kingdom. The 11 CEE countries embod the patchwork model of capitalism.

Economic growth and real convergence in 2004–2019

Analysis of data presented in Table 1 leads to the following conclusions. Firstly, economic growth in the CEE-11 countries was, on average, faster than in the "old" EU countries (EU-15) both in the entire period of 2004–2019 and in the sub-periods identified in this study. Secondly, if we assume that the CEE-11 countries represent a new, distinct model of patchwork capitalism within the EU [Rapacki, 2019; Rapacki et al., 2019; Gardawski, Rapacki, 2021], this model was characterized by the fastest economic growth compared to the four other models of capitalism coexisting in the EU: continental, Mediterranean, Nordic, and Anglo-Saxon.

Table 1. Economic growth in CEE-11 in 2004–2022 (GDP in constant prices)

Country	Average annual growth rate					PKB per capita (PPP, EU-28 = 100)		
	2004–2019	2004–2008	2009–2014	2015–2019	2020–2022	2004	2019	2022
Poland	**4.1**	**5.2**	**2.9**	**4.5**	**2.9**	**52**	**73**	**79**
Bulgaria	2.1	6.6	0.2	3.2	1.1	35	53	59
Croatia	1.5	4.0	–2.0	3.2	2.5	57	67	73
Czech Republic	2.9	5.3	0.1	3.9	0.1	81	93	91
Estonia	2.9	5.6	0.2	3.7	2.0	56	82	87
Lithuania	3.4	7.1	0.4	3.5	2.2	58	84	90
Latvia	2.8	7.4	–1.1	3.2	0.9	47	69	74
Romania	4.0	7.9	0.3	4.7	1.7	35	70	77
Slovakia	3.8	7.3	1.3	3.3	0.0	59	71	67
Slovenia	2.2	4.9	–1.1	3.6	3.1	88	89	92
Hungary	2.2	2.9	0.1	4.1	2.3	63	73	78
Capitalism models								
Patchwork	3.5	5.8	1.1	4.1	2.0	53	73	78
Continental	1.4	2.1	0.6	1.7	0.6	121	117	114
Mediterranean	0.5	1.9	–1.6	1.8	0.5	105	90	88
Nordic	1.7	2.8	0.4	1.6	1.7	127	118	121
Anglo-Saxon	1.8	2.0	0.9	2.6	1.2	125	111	112
EU-28	1.7	2.8	0.2	2.4	0.9	100	100	100

Note: population based on IMF data; for all the capitalism models population is provided as an average weighted value.
Source: self-reported data based on CEIC [2023] (for 2022), Eurostat [2023] and IMF [2022] (for 2004–2021).

Thirdly, despite the ability to achieve the highest relative GDP growth rates in the longer term, countries representing a patchwork model of capitalism fared signifi-

cantly worse in handling short- and medium-term external shocks, as evidenced by data from the years 2009–2014, which covered the period of the global financial crisis. The average economic growth rate in the CEE-11 countries during that time was lower than in economies representing other models of capitalism within the EU, with one exception (the Mediterranean model). Poland was a remarkable exception to this general pattern, as it not only avoided a recession in 2009 but also achieved the second highest average GDP growth rate in the EU during those years (after Malta).

Fourthly, among the CEE-11 countries, Poland experienced the fastest economic growth throughout the analysed period. Romania and Slovakia also achieved similar results in this regard. In the entire EU, only Ireland and Malta had higher growth rates.

Fifthly, the accession of the CEE-11 countries to the EU, with the exception of Slovenia and the Czech Republic, happened under unprecedented conditions of significant disparity in economic development compared to the countries forming its "core". In 2004, GDP per capita, PPP-based, in the CEE-11 group was only around 53% of the EU average. By comparison, during the years 1980–1986, when countries from Southern Europe were being admitted to the Community, this indicator averaged 72%, and ranged from 60% (Portugal) to 76–80% (Spain and Greece) [Rapacki, 2012]. After joining the EU, the CEE-11 countries, unlike the representatives of the Mediterranean model, experienced a rapid process of income convergence, which closed a development gap of 24 ppts with the EU after 15 years of membership. They also surpassed Greece and Portugal, on average as a group, in terms of GDP per capita (PPP-based), and narrowed the development gap (52 ppts in 2004) with the group of Mediterranean countries.

Sixthly, the process of real convergence proceeded most rapidly between 2004 and 2019 in Romania (35 ppts), followed by the Baltic countries (22–26 ppts) and Poland (21 ppts). It progressed more slowly in Slovenia (1 ppt) and in Croatia and Hungary (10 ppts each). The scale of migration in individual countries, including significant emigration and a decline in the total population in the Baltic countries and Romania, had a significant impact on the pace of this process[4]. These factors resulted in GDP per capita growth rates in those countries being significantly higher than the absolute GDP growth rate (Table 1).

4 [4] Only in 2010–2019, 2 million people left Romania, and its population fell by 800 thousand (4%). In the same period, populations of Lithuania and Latvia decreased by 8% each, as a result of emigration [Eurostat, 2023; Próchniak et al., 2021].

Macroeconomic equilibrium in the years 2004–2019

The analysis of equilibrium variables starts with the inflation rate. Both during the entire period of 2004–2019 and in its sub-periods, the average weighted rate of inflation was higher in countries with the patchwork capitalism model than in countries representing other models in the EU, and the EU as a whole (except for the Anglo-Saxon model, which had an average weighted inflation rate 0.2 ppts higher than the corresponding average for the patchwork model during 2015–2019). This may indicate a structurally higher inflation rate in the CEE-11 countries, which should not be surprising, considering the Samuelson-Balassa effect in this group of countries. Poland had a slightly lower inflation rate than the average for the entire group (2.1% compared to an annual average of 2.9% for the years 2004–2019). Romania, Latvia, Hungary, Estonia, and Bulgaria, on the other hand, had the highest levels of this variable (averaging over 3% annually for the entire period).

Table 2. Inflation rate in CEE-11 c ountries in the years 2004–2022 (%)

Country	Average annual inflation rate				
	2004–2019	2004–2008	2009–2014	2015–2019	2020–2022
Poland	**2.1**	**2.7**	**2.6**	**0.9**	**7.1**
Bulgaria	3.3	7.8	1.7	0.8	5.6
Croatia	1.9	3.5	1.8	0.4	4.4
Czech Republic	2.1	3.3	1.6	1.7	7.1
Estonia	3.4	5.8	2.6	2.0	7.4
Lithuania	2.9	4.8	2.3	1.7	7.9
Latvia	3.8	8.9	1.5	1.7	6.6
Romania	4.6	8.0	4.3	1.5	6.5
Slovakia	2.3	4.1	1.8	1.2	5.6
Slovenia	1.9	3.6	1.5	0.8	3.6
Hungary	3.6	5.6	3.3	1.8	7.8
Capitalism models					
Patchwork	2.9	4.8	2.7	1.2	6.7
Continental	1.6	2.1	1.4	1.2	3.7
Mediterranean	1.7	2.9	1.5	0.7	3.4
Nordic	1.4	1.7	1.5	1.0	3.5
Anglo-Saxon	2.2	2.3	2.6	1.4	3.7
EU-28	1.9	2.9	1.9	1.1	4.2

Note: population based on IMF data; for all the capitalism models listed in the table, population is provided as an average weighted value; all the averages were calculated as geometric means.

Source: self-reported data based on data of CEIC [2023] (for 2022), and IMF [2022] (for 2004–2021).

In contrast, the unemployment rate distinguished the CEE-11 countries favourably from the EU average throughout the analysed period. However, in the years 2004–2008, the average weighted unemployment rate in countries representing the patchwork model of capitalism was higher than the whole EU average. In the subsequent sub-periods, however, it decreased gradually, resulting in a lower average percentage of people unemployed in the CEE-11 countries than the average not only for the EU but also for countries representing the continental and Nordic models of capitalism during the 2015–2019 period. In this regard, the United Kingdom and Ireland remained unbeatable. The highest unemployment rates were found in countries with the Mediterranean model of capitalism. Poland, with an unemployment rate of 9.4% throughout the analysed period, remained above the average for the CEE-11 countries. However, in the years 2015–2019, unemployment in Poland fell below the average. The lowest unemployment rates in this group of countries were observed in the Czech Republic and Romania, while Croatia, Slovakia, and Latvia had the highest (double-digit) rates.

Table 3. Unemployment rate in CEE-11 countries in the years 2004–2022 (%)

Country	Average annual unemployment rate				
	2004–2019	2004–2008	2009–2014	2015–2019	2020–2022
Poland	**9.4**	**13.5**	**9.5**	**5.1**	**3.2**
Bulgaria	8.8	8.7	10.8	6.5	5.0
Croatia	12.3	11.2	14.2	11.1	7.4
Czech Republic	5.6	6.6	6.8	3.2	2.6
Estonia	8.2	6.8	11.4	5.8	6.4
Lithuania	9.6	7.0	13.8	7.3	7.2
Latvia	11.0	8.5	15.2	8.4	7.6
Romania	6.4	6.9	6.9	5.1	5.4
Slovakia	12.0	13.8	13.6	8.3	6.6
Slovenia	6.9	5.5	8.3	6.6	4.6
Hungary	7.5	7.1	10.2	4.6	4.0
Capitalism models					
Patchwork	8.4	9.9	9.5	5.6	4.3
Continental	7.2	8.3	7.2	6.2	5.3
Mediterranean	12.8	8.2	15.6	14.2	11.3
Nordic	7.1	6.4	7.9	6.9	7.2
Anglo-Saxon	6.1	5.2	8.0	4.7	4.4
EU-28	8.7	8.1	10.0	7.9	6.5

Note: data for 2022 cover first three quarters; population based on IMF data; for all the capitalism models listed in the table population is provided as an average weighted value.

Source: self-reported data based on data of ILO [2023] (for 2022), IMF [2022] and the World Bank [2023] (for 2004–2021).

An assessment of internal and external equilibrium would not be complete without an analysis of the government budget balance and the current account balance. Both variables, expressed as a percentage of GDP, for the entire analysed period (2004–2022) are presented in Tables 4 and 5. Just like unemployment, the average weighted value of the government budget balance does not indicate any fundamental structural difference between the CEE-11 countries and the representatives of the four European models of capitalism. The Nordic capitalism-model countries are an exception, as they managed to maintain an average annual budget surplus of 0.4% of GDP throughout the analysed period, although they also experienced deficits in the years 2009–2015. The average size of the public finance deficit in the patchwork capitalism model countries was 3% relative to GDP, the same as the EU average. This variable was slightly higher (3.5% of GDP) in Poland, which, along with Hungary and Croatia, recorded the highest relative imbalance in the public finance sector. Among the CEE-11 countries, Estonia (with an average annual surplus of 0.3% of GDP) and Bulgaria had the lowest budget deficit. However, the direction of change in this parameter in the subsequent sub-periods was different in Estonia and Bulgaria compared to the other representatives of the patchwork capitalism model. Only in Estonia and Bulgaria did the public government budget balance worsen in the period 2015–2019 compared to the average value, while in the other countries, the deficit decreased or, as in the case of the Czech Republic and Lithuania, turned into a surplus.

Table 4. Government budget balance in CEE-11 c ountries in the years 2004–2022 (% GDP)

Country	Average annual government budget balance				
	2004–2019	2004–2008	2009–2014	2015–2019	2020–2022
Poland	**–3.5**	**–3.6**	**–5.2**	**–1.5**	**–4.3**
Bulgaria	0.0	2.6	–2.0	–0.2	–3.0
Croatia	–3.5	–3.3	–6.1	–0.7	–4.3
Czech Republic	–1.7	–2.0	–3.3	0.6	–5.2
Estonia	0.3	1.3	–0.1	–0.3	–3.5
Lithuania	–2.3	–1.4	–5.3	0.3	–3.4
Latvia	–1.7	–1.0	–3.1	–0.8	–5.1
Romania	–3.3	–2.6	–4.2	–3.0	–7.7
Slovakia	–3.3	–2.7	–5.1	–1.7	–5.2
Slovenia	–3.2	–1.2	–7.0	–0.7	–5.4
Hungary	–4.1	–6.5	–3.7	–2.1	–6.5
Capitalism models					
Patchwork	–3.0	–2.8	–4.4	–1.4	–5.2
Continental	–2.0	–2.0	–3.2	–0.5	–4.9

Country	Average annual government budget balance				
	2004–2019	2004–2008	2009–2014	2015–2019	2020–2022
Mediterranean	–4.0	–2.4	–6.5	–2.6	–7.1
Nordic	0.4	2.9	–1.5	0.3	–1.0
Anglo-Saxon	–4.8	–3.1	–7.9	–2.7	–7.9
EU-28	–3.0	–2.2	–4.9	–1.5	–5.8

Note: for all the capitalism models population is provided as an average weighted value.

Source: self-reported data based on IMF [2022].

Table 5. Current account balance in CEE-11 c ountries in the years 2004–2022 (% GDP)

Country	Average annual current account balance				
	2004–2019	2004–2008	2009–2014	2015–2019	2020–2022
Poland	**–3.3**	**–5.3**	**–3.9**	**–0.6**	**–0.3**
Bulgaria	–4.6	–15.0	–1.3	1.8	–0.3
Croatia	–2.4	–7.8	–2.1	2.8	0.2
Czech Republic	–1.2	–2.9	–1.6	0.9	–1.6
Estonia	–2.9	–11.8	0.8	1.7	–0.3
Lithuania	–3.5	–11.0	–0.3	0.1	1.3
Latvia	–4.9	–15.5	–0.4	0.3	–1.8
Romania	–5.5	–10.4	–3.5	–3.0	–7.1
Slovakia	–3.3	–6.3	–1.5	–2.5	–3.0
Slovenia	1.1	–3.2	1.2	5.3	3.5
Hungary	–1.5	–7.6	1.0	1.7	–4.1
Capitalism models					
Patchwork	–3.4	–7.6	–2.4	–0.3	–2.1
Continental	3.8	3.4	3.5	4.4	2.9
Mediterranean	–1.7	–5.3	–1.7	1.9	0.3
Nordic	4.2	5.2	4.1	3.4	4.7
Anglo-Saxon	–3.5	–3.0	–3.4	–4.0	–3.0
EU-28	–0.1	–1.9	0.0	1.6	0.5

Note: data for 2022 cover fir t three quarters; population based on IMF data; for all the capitalism models listed in the table population is provided as an average weighted value.

Source: self-reported data based on data of CEIC [2023] (for 2022), and IMF [2022] (for 2004–2021).

The last component determining macroeconomic (non) equilibrium is the current account balance. The average value of this parameter in the years 2004–2019 (–3.4% of GDP) significantly distinguished the CEE-11 countries not only from the entire EU (–0.1% of GDP) but also from countries representing the Nordic model (+4.2%

of GDP), continental model (+3.8% of GDP), and Mediterranean model (–1.7% of GDP). Only the average result for Ireland and the United Kingdom (–3.5% of GDP) was similar. In the subsequent sub-periods after 2004, the current account deficit gradually decreased both in the entire EU and on average in the patchwork model countries. In the 2015–2019 period, only Poland, Slovakia, and Romania recorded a deficit, while in the period 2009–2014, only Slovenia, Hungary, and Estonia had a surplus. However, in the years 2004–2008, all CEE-11 countries showed a deficit. The current account balance of Poland distinguished our country from the other CEE-11 countries in a negative way. Although the average current account balance throughout the analysed period, including the years 2004–2008, was slightly lower in Poland than the weighted average for the entire group, the pace of deficit reduction in individual sub-periods was significantly slower.

Impact of the COVID-19 pandemic and the war in Ukraine on the economic development trajectory of CEE-11 countries

In 2020, the previous favourable trends in economic growth in CEE-11 countries were reversed. Due to the COVID-19 pandemic and sharp reduction in economic activity, primarily as a result of administrative restrictions (lockdowns) and a collapse in aggregate demand, all countries in this group entered into a recession. However, the volume of the GDP decline varied, with Croatia experiencing the largest decline (due to the significant role of the tourism sector in its economy) and Lithuania, Estonia, and Poland recording the smallest declines.

In contrast, year 2021 saw a rapid improvement in economic conditions, although the base effect was also significant. The percentage change in GDP in 2021 was calculated relative to the reduced, pandemic rate. Nevertheless, in most CEE-11 countries, GDP at the end of 2021 was higher than in December 2019. Particularly high economic growth rate was observed in Croatia, Slovenia, Estonia, and Hungary.

In 2022, on the one hand, positive trends initiated in the previous period were maintained, as all countries in the analysed group, except for Estonia, maintained positive economic growth rates. On the other hand, when analysing the growth pace, a significant slowdown can be observed, which was a consequence of the Russian invasion of Ukraine and the rapid tightening of monetary policy in response to rising inflation rates in all countries of the region, partly due to the conflict.

As a result, all the analysed economies (except for Estonia, which experienced a 1.1% decline in GDP) faced a slowdown in economic growth dynamics ranging from 3.8 ppts in Croatia and 3.1 ppts in Lithuania to 0.4 ppts in Bulgaria and 0.6 ppts in Poland. The war in Ukraine particularly affected economic growth in the Baltic

countries (in Latvia, the economic growth rate in 2022 decreased by 2.5 ppts compared to the previous period), where the political risk associated with the expansion of the conflict was the highest.

It should be emphasized that despite the recession in 2020 and the economic slowdown in 2022, in the 2020–2022 period CEE-11 countries achieved, on average, a faster pace of economic growth compared to the EU average. As a result, they managed to reduce the development gap with the EU-28. Two exceptions were Czechia and Slovakia, where the development gap increased by 2 and 4 ppts, respectively, compared to the EU-28 a verage. The relevant data is presented in Table 1.

Both the direct consequences of the pandemic and the indirect impact of the armed conflict in Ukraine destabilized the economic situation in CEE-11 countries. Russia's deliberate and politically motivated actions, destabilizing the energy market in Europe, led to an acceleration of inflation, particularly in the fourth quarter of 2021, which overlapped with the negative effects of rapid monetary and fiscal policy easing during the pandemic. Additionally, depreciation of currencies in countries directly neighbouring the war zone also contributed to faster price growth. This, in turn, necessitated a gradual tightening of monetary policy, starting in early 2022, which adversely affected economic growth during this period.

In some CEE-11 economies with low unemployment rates in 2021, inflation was on average higher. Conversely, countries where price growth was not so rapid struggled with worse situation on the labour market. This seems to confirm a relationship described by the classical Phillips curve. In countries where fiscal and monetary policies were particularly expansionary and cushioned the pandemic shock (by an accommodative economic policy), unemployment was lower, but at the cost of higher inflation. On the other hand, economies with slightly more restrained fiscal and monetary expansion experienced higher unemployment rates but lower inflation rates.

In 2022, inflation rate increased sharply (Table 2). In all the analysed countries, inflation rate surged compared to 2021, with most of them reaching double-digit levels. Estonia's inflation exceeded 20% in 2022. In Lithuania, Latvia, and the Czech Republic, it ranged from 16% to 18%. While in 2021, none of the countries surveyed had reached double-digit inflation levels, only Slovenia and Croatia recorded single-digit inflation in the following year (8.9% and 9.8%, respectively).

Inflation in CEE-11 countries in 2022 was both supply- and demand-driven. The major factors stimulating quick price growth during the analysed period were:

1) Deferred demand due to the pandemic.
2) Sharp loosening of fiscal and monetary policies aimed at taming the recession in 2020 and early 2021.

3) Disruptions in global supply chains as a consequence of China's restrictive policy to mitigate the effects of the pandemic.
4) Rapid and cumulative increase in energy prices within a relatively short period.

Initially, this was caused by Russia's destabilizing policies in the European market, but later became a direct consequence of sanctions imposed on Russia, the most important supplier of energy to many post-socialist countries. The first two factors were demand-driven, while the latter two were strictly supply-driven. Moreover, in countries that retained their own currency (e.g., Poland, Czech Republic, and Hungary), the Russian invasion of Ukraine led to a sharp depreciation of exchange rates, fuelling inflation even further. According to the established economic theory, it is very difficult to combat inflation resulting from negative supply shocks without incurring significant social costs in the short term. What remains crucial is the priorities of economic policy and preferences regarding the path of disinflation. Fortunately, the probability of further inflationary growth or even the emergence of hyperinflation in some countries is considered to be very low. Nevertheless, even considering the decline in gas and oil prices that occurred in the global markets in the first and second quarters of 2023, the energy crisis may still deepen.

In contrast, the level of unemployment in CEE-11 hardly changed. In the years 2020–2022, the best results in this area were achieved by three Visegrad Group countries: Czech Republic, Poland, and Hungary, with an average unemployment rate below 4%. Among the new EU members, Estonia, Croatia, Lithuania, Slovakia, and Latvia struggled the most with unemployment rates ranging from 6.4% to 7.6%. Naturally, it must be remembered that low unemployment rates are just one of many elements of the labour market picture. In Poland, the low labour force participation rate remains a problem, while the entire CEE group faces declining real incomes, which will limit consumption growth and have a negative impact on economic growth rates. Unfortunately, in conditions of declining but still high inflation and very moderate wage growth, the standard of living in the CEE-11 countries is expected to continue to decline in the coming year.

The war in Ukraine, combined with the previously implemented protective measures by most countries in the form of various "inflation shields" and fiscal policy loosening during the pandemic, significantly worsened the state of public finances in CEE-11 countries. This was also largely due to increased defence spending. Fearing an escalation of hostilities by the Russian Federation, the CEE-11 countries began to rapidly increase their spending on modern military equipment, raising their costs significantly.[5] Public finances were also negatively affected by the influx of refugees

5 Let us also note military equipment and munitions sent to Ukraine, which also have to be replenished.

from Ukraine, leading to an increase in social benefits, especially in countries that accepted a large number of refugees, such as Poland and Czechia.

In the years 2020–2022, all countries in the analysed group recorded an average annual budget deficit exceeding the Maastricht convergence criteria threshold of 3% of GDP. Romania had particularly high public sector deficit (7.7%), followed by Hungary (6.5%). In Poland, the average annual deficit reached 4.3%, an increase of nearly 3 ppts compared to the average level in the years 2015–2019.

Furthermore, in most CEE-11 countries (except for Poland and Lithuania), there was also a deterioration in the current account balance between 2000 and 2022. The average deficit in the entire group of economies was around 2.1% of GDP, compared to only 0.3% of GDP in the previous sub-period.

The increasing negative current account balance in the vast majority of CEE-11 countries caused by two external negative shocks was partly due to the structure of their trade exchange (both goods and services), particularly a significant share of expensive imported energy.

Paths of institutional development of CEE-11 countries in 2004–2022

Emergence and evolution of the patchwork model of capitalism in CEE-11 countries from 2004 to 2019

After the fall of socialism in 1989, a new socio-economic order emerged in CEE-11 countries, known as post-communist capitalism, which is referred to as the **patchwork capitalism**. Theoretical considerations conducted in terms of Weberian ideal types and the latest empirical research by the authors of this study demonstrate that patchwork capitalism constitutes a distinct type of capitalism compared to Western capitalist models found in the EU [Gardawski, Rapacki, 2021; Rapacki, Czerniak, 2019; Rapacki et al., 2019]. [6]

Despite a shared history after World War II, the patchwork model in CEE-11 countries differs significantly from the varieties of capitalism that emerged in other former socialist countries, especially Russia and former Soviet republics. Furthermore, despite certain similarities ((semi) peripheral status), patchwork capitalism in CEE-11 countries represents a fundamentally different type of capitalism than the hybrid (mixed)

[6] It should be noted that patchwork capitalism, for example in Poland, differs considerably, also in respect of its institutional architecture, from the model stipulated in Polish Constitution (Article 20) presenting an ordoliberal form of social market economy. More information can be found in the work of Mączyńska and Pysz [2016].

socio-economic models present in peripheral countries on other continents (e.g., Latin America).

The concept of patchwork capitalism allows us to uncover the dimensions and institutional peculiarities of the socio-economic system that emerged in CEE-11 countries after 1989, which have been overlooked or unnoticed in the literature so far. These include institutional heterogeneity, i.e., the inconsistency and lack of complementarity in the institutional architecture of these countries resulting from the weakness, or even lack of its foundation. These characteristics make patchwork capitalism an "open access order" because the barriers and transaction costs of entry are very low, facilitating the inclusion of new organizations and institutions representing different and often divergent logics of action. This makes patchwork susceptible to developmental drift, and countries embodying it tend to import entropies from central countries [Gardawski, Rapacki, 2021].

The key distinctive features of patchwork capitalism, which contribute to its uniqueness, can be summarized as follows:

1) **Genesis.** Patchwork capitalism in CEE-11 countries is the result of a long historical process (path dependence) dating back to the Middle Ages. Institutional architecture of a patchwork model consists of loosely connected components inherited and/or adopted from various socio-economic orders, chronologically arranged into three time layers:
   a) institutions inherited from pre-capitalist times,
   b) legacy of the real socialism period,
   c) institutions imported during the post-1989 transformation period, transplanted from various capitalist models coexisting in Western Europe today.

   One unique feature of patchwork capitalism in CEE-11 countries is that one generation during their lifetime experienced two collapses in the developmental trajectory of institutions, reversing their direction by 180 degrees – first (1945–1948) transitioning from capitalism to socialism, and then (after 1989) through systemic transformation from socialism to capitalism [Gardawski, Rapacki, 2021].
2) **Capitalism without capitalists.** Both system transformations resulted, among other things, in the destruction of the previous institutional frameworks (or "cages of norms") [see Acemoglu, Robinson, 2022], i.e., the set of basic institutions defining the rules of the game within existing socio-economic orders. Simultaneously, these transformations led to profound changes in the class structure of society, including taking away capital goods (and, consequently, economic and political significance) from previously privileged classes. The most important implication of implosion of socialism in CEE-11 in 1989 was that a new system – capitalism – was initiated without domestic capitalists, i.e., a class with economic interests in estab-

lishing the institutions that form the backbone of this system, ensure its stability and protect it. Protection can be ensured, for example, by creating barriers (and transaction costs) to entry into the emerging socio-economic order for new players and enforcing compliance with applicable rules [Gardawski, Rapacki, 2021].

3) **Insiders – outsiders.** One peculiarity resulting from the unique developmental trajectories of CEE-11 countries was their accession to the EU (the only such case in its history) as former socialist economies, i.e., outsiders in the world of capitalism, who were just building the institutional foundations of the new system.
4) **EU membership.** On the one hand, this factor contributed to a certain degree of institutional convergence and "standardization" of socio-economic orders in CEE-11 countries, but on the other hand, at least in the short and medium term, it also entailed a specific exogenous shock, increasing their institutional heterogeneity.
5) **Formal institutions poorly embedded in the society.** Strong dependence on previous developmental paths in CEE-11 countries (persistence of historically inherited informal institutions, cultural patterns and social attitudes) on the one hand, and on the other hand, massive importation of formal institutions automatically transferred from different models of Western European capitalism after 1989, caused a significant mismatch between formal and informal institutions, with poor social internalization of the former.
6) **Axiological patchwork**. A peculiarity of patchwork capitalism, constituting another dimension of its institutional heterogeneity, is the internal inconsistency of values embraced by the society. This is evidenced, among others, by research conducted by Lissowska [2020], based on the results of the *World Values Surveys* [Inglehart, Welzel, 2010], *European Social Survey* [2018], and other previous works by this author [Lissowska, Kopestyńska, 2008].

In recent years, in some countries of Central and Eastern Europe (Hungary after 2010, Poland after 2015), new phenomena have emerged. They have not changed the essence of the existing patchwork capitalism in these countries, but they have led to a change in its form and characteristics. The most significant developments include:

- Drastic divergence from the formally established rules of the game and methods (directions) of their enforcement.
- Significant increase in the symptoms of the state institutions' unreliability and their transformation from a *Tamed Leviathan* to a *Paper Leviathan*, indicating (along with the weakening of civil society) that the countries are leaving the "narrow corridor" defining the optimal path of socio-economic and political development of a country [Acemoglu, Robinson, 2022]. Despite the expansion of state intervention (re-nationalization, increased oppressiveness of the state apparatus, control over public media, partial subordination of judicial power), efficiency of these

institutions and their ability to respond quickly to unexpected threats and exogenous shocks has significantly decreased. This was a result of the state's actual non-performance of its basic functions, particularly provision of certain essential public and socially desirable goods (education and healthcare).

- Sharp increase in the phenomenon of appropriation of the state and key areas of the economy by politicians, and intensification of a model driven by rent-seeking.

These phenomena have also affected the way the existing institutional architecture in Poland (in its formal layer), especially the institution of the state, responded to two external shocks in the years 2020–2022 caused by the pandemic and the war in Ukraine. Four reactions deserve special attention:

1) A very high number of excess deaths caused by the COVID-19 pandemic and a high healthcare sacrifice ratio (similar to other CEE-11 countries), indicating a gradual collapse of the healthcare system, growing unreliability of the state, and, in general, lower institutional efficiency in the patchwork capitalism model compared to other models in the EU, except for the Mediterranean ones.[7]
2) Redefinition of functions of the National Bank of Poland (NBP) by the Law and Justice Party (PiS) contradictory to the Central Bank Act (fighting imaginary unemployment instead of real inflation). This resulted in poor and ineffective monetary policy, and consequently one of the highest inflation rates in the EU in 2022, only partially caused by negative external shocks ('putinflation').
3) Little state activity and delayed actions of state institutions in response the refugee crisis triggered by the war in Ukraine.
4) Effects of the Polish state's incompetence in resolving the transit problem of Ukrainian grain through Poland, revealed in the spring of 2023, which is against the interests of Polish farmers.

Changes in selected informal institutions of patchwork capitalism in CEE-11 countries after the outbreak of the COVID-19 pandemic and the war in Ukraine in light of results of the European Social Survey

Results of two consecutive editions of the European Social Survey (ESS9 from 2018, conducted before the COVID-19 pandemic, and ESS10 from 2020–2022, conducted partially after the outbreak of the war in Ukraine) confirm significant, in our opinion, features of the patchwork capitalism model in CEE-11 countries as indicated above. However, one should be cautious when interpreting ESS results, due to vary-

7 More on this topic can be found in the last year's *Report* [Próchniak et al., 2022].

ing size of groups of countries representing different models of capitalism in the EU (Tables 1–5).

Looking at ESS9 results, CEE-11 countries differ significantly from continental European countries in terms of socio-political characteristics (based on average ratings for all countries in these groups). They are characterized by significantly lower levels of trust in the legal system, lower trust in politicians, lower satisfaction with democracy, and less common belief that justice always prevails over injustice.

The experience of the pandemic and war in Ukraine among countries representing the patchwork and continental models did not invalidate the fundamental differences between them. These differences also extend to social characteristics, primarily including significantly lower levels of trust in other people in CEE-11 countries, lower preference for loyalty towards friends, lower preference for helping others, lower subjective happiness levels, higher preference for being wealthy, and lower preference for generating new ideas or treating people equally.

The belief that the political system allows citizens to express their opinions is less prevalent in CEE-11 countries compared to continental European countries (with the exception of the Czech Republic). Representatives of these countries also rate their own government lower, although citizens of Czechia, Estonia, Hungary, and Poland perceive their governments slightly better than the average in the entire group. Even in Mediterranean countries, perception of their own governments is higher than among representatives of the patchwork model. Overall, societies in CEE-11 countries are less satisfied with democracy (except for the Czechia, Estonia, and Poland). Some discrepancies can also be observed in individual assessments. For example, citizens of Czechia, Estonia, and Hungary rate their domestic legal systems highly, but perceive the advantage of justice over injustice worse even than in Bulgaria, where citizens have no trust in their legal system.

Significant differences between CEE-11 countries and other country groups also pertain to the assessment of sociological factors. Among citizens of the former (except for Estonia) trust in other people is significantly lower. Surprisingly, they also declare lower preference for making their own decisions (which seems contradictory to the assumptions of a market economy, chosen by these societies, but perhaps they have never fully adapted to it). This may be some kind of escape from responsibility and a manifestation of the learned helplessness syndrome inherited from socialism.

Thus, the ESS9 survey (conducted before the two shocks mentioned earlier), portrays CEE-11 societies as traditional, reliant on welfare, distrustful, and uninterested in change. The survey results from ESS10, covering the period between September 2020 and May 2022, show social perception and preferences during the pandemic and partially after Russia's armed aggression in Ukraine. After calculating average

characteristics (including political ones such as trust in the legal system and politicians, satisfaction with democracy, and a belief that justice prevails over injustice), previously observed differences emerge[8:] in the group of Nordic countries, all political characteristics received the highest ratings, followed by slightly lower ratings in the continental European group, and then by the Mediterranean countries, which rated most political characteristics third highest (below the level of continental Europe but above CEE-11). Regarding some characteristics (evaluation of the ability to voice opinions in the political system, trust in politicians), the ratings in the latter group were even lower than in CEE-11 countries (likely due to the influence of Italy). In this context, Poland stands out within the patchwork model with significantly lower ratings for the legal system, politicians, its own government, and satisfaction with democracy.

The pandemic period brought about some changes in the assessment of political factors, albeit to a lesser extent than expected. Trust in politicians and satisfaction with democracy decreased in continental European countries. In the CEE-11 country group, satisfaction with the government and trust in the legal system also declined. In several countries within this group (Bulgaria, the Czech Republic, Estonia, Hungary), trust in the legal system and satisfaction with democracy increased, as it did in Mediterranean countries (satisfaction with democracy). Changes in the assessment of political factors in Poland during the pandemic are quite specific. Trust in the legal system and politicians decreased significantly, as did satisfaction with the government and democracy.

Changes in social characteristics during the pandemic were less common and smaller than changes in political conditions, which indicates that they may be more embedded in the societies' mentality. There was a slight decrease in preference for wealth accumulation in continental European countries. In this group, as well as in CEE-11 countries, the tendency to treat people equally intensified. Within the latter group, the ability to understand other people also increased, alongside a decrease in Mediterranean countries. Both in continental European countries and CEE-11 countries the tendency to preserve traditions weakened.

Regarding social characteristics, trust in other people increased in Czechia, Estonia, and Slovenia (in the other CEE-11 countries this attitude remained largely unchanged). Conversely, in Poland, which stood out negatively within the reference group, trust in other people decreased significantly. A complement to this characteristic was the preference for loyalty towards friends, which is significant in this group of countries, where trust mainly concerns individuals in close proximity (so-called bonding social capital). This preference became more important in Bulgaria and Estonia. In some CEE-

8 The a alysis does not cover the UK because of its exit from the EU.

11 countries (Bulgaria, Estonia, Hungary, Slovenia), the belief in the need to help people rose. The same countries also experienced an increase in self-perceived happiness (despite a deep decline in Poland). In Czechia, Hungary, and Slovenia, the tendency towards treating people equally became more common, while for the other countries there were either no survey results available, or this characteristic did not change. In some countries (Bulgaria, Estonia, Slovenia) declared willingness to seek new ideas (a characteristic feature of a modern society according to Inglehart) grew, while in others (Czechia and Hungary), the tendency to accumulate wealth accumulation intensified, indicating that the societies of these countries remain at the materialism stage.

The aforementioned data characterizing the informal institutions existing in CEE-11 countries are interpreted as a strong tendency to seek comprehensive security. This is primarily expressed in the pursuit of wealth accumulation, which is perceived as the most crucial factor of ensuring security. At the same time, in some countries (Bulgaria, Czechia, Poland, Slovenia, Estonia), citizens opt for a strong central authority (government), which may indicate that they recognise, more or less consciously, shortcomings of the patchwork capitalism model and that they search for an entity that would limit the growing entropy. While in Bulgaria, Estonia, and Czechia, the yearning for a strong authority correlates with increased satisfaction with democracy (a strong government should operate within unambiguously democratic rules, with a conscious and developed civil society), this relationship was not observed in Poland. In our opinion, this means that Poles are more inclined to accept stronger authority of the state and ruling party or coalition, if it has considerable authoritarian (undemocratic) features.

An attempt to classify CEE-11 countries

The analysis of macroeconomic results in terms of economic growth and macroeconomic balance in the period 2004–2019, during the direct impact of the COVID-19 pandemic, and during the war in Ukraine, i.e. in the years 2020–2022, allows for a comparative assessment of the developmental trajectories at the level of the entire CEE-11 country group representing the patchwork capitalism model, in comparison to other models in place in the EU (Tables 6 and 8). Based on this assessment, we divided the CEE-11 countries into clusters (Tables 7 and 9), considering both the pace of GDP changes and the results of our own assessment of macroeconomic imbalance, including inflation rate, unemployment rate, government budget balance, and current account balance. The construction of our assessment of imbalances is relatively simple. We examined the distribution of the four equilibrium variables in each of the

analysed countries (or capitalism models) in relation to the weighted average of every variable for the entire CEE-11 group (average for the entire EU-28). If the value of at most one variable deviated negatively from the average, we considered that the economy was in relative equilibrium; otherwise, we assumed that an imbalance persisted. Similarly, we examined the distribution of average annual economic growth dynamics in each country (capitalism model) in relation to the average for the entire group (EU-28) and divided them into two subgroups: the first includes countries (models) where the growth rate was higher than the average, and the second includes those where it was below average.

Paths of economic development in the years 2004–2019

In this part, we made a comparative assessment of the economic growth rate and the formation of equilibrium variables in the years 2004–2019 among the group of countries representing the patchwork capitalism model compared to other models in the EU-28. The relevant data is presented in Table 6.

Table 6. Economic growth rate and macroeconomic equilibrium in various capitalism models in the EU-28 in the years 2004–2019

		Scale of macroeconomic imbalance	
		small	big
GDP growth rate	above average	Nordic	patchwork, Anglo-Saxon
	below average	continental	Mediterranean

Source: self-reported data

The data show that countries representing the Nordic model of capitalism achieved the best economic performance in the years 2004–2019, with rapid economic growth accompanying a small scale of macroeconomic imbalances. Countries embodying the patchwork and Anglo-Saxon models also experienced comparatively high GDP growth rates during this period, but it was accompanied by significant imbalances. Mediterranean countries fared relatively worse in this regard, as their economic growth rates were below the EU-28 average, and additionally, three out of four equilibrium variables were below the overall EU average.

Next, we divided the CEE-11 countries into clusters, taking into account the internal diversity of economic growth rates and the scale of macroeconomic imbalances within this group. This time, the distribution pertained to average growth rates and equilibrium variables exclusively within the CEE-11 gr oup.

Table 7. Economic growth rate and macroeconomic equilibrium in CEE-11 c ountries in the years 2004–2019

		Scale of macroeconomic imbalance	
		small	big
GDP growth rate	above average		**Poland**, Romania, Slovakia
	below average	Czechia, Estonia, Slovenia	Bulgaria, Croatia, Lithuania, Latvia, Hungary

Source: self-reported data

None of the countries in the analysed group had a GDP growth rate higher than the average for the CEE-11 while maintaining a relative economic equilibrium. Only Poland, Romania, and Slovakia exhibited higher economic growth rates than the weighted average for the entire group, while the scale of macroeconomic imbalance was small only in the Czech Republic, Estonia, and Slovenia. The remaining five countries recorded growth rates lower than the weighted average for the entire group in the analysed period, and the values of two or more equilibrium variables deviated negatively from the corresponding average.

Response of CEE-11 countries to the COVID-19 and the war in Ukraine

The data presented in the first part of the study also served to evaluate the macroeconomic responses of CEE-11 countries to the two recent negative exogenous shocks: the COVID-19 pandemic and the outbreak of war in Ukraine. It should be noted that both of these shocks had unequivocally negative impacts on both the rate of economic growth and macroeconomic equilibrium in the CEE-11 and EU-28 countries in the years 2020–2022. Therefore, the distribution of the variable values in relation to the average for the entire group, presented in the two tables below, make it possible to assess the relative strength and depth of the economic response to these shocks in the economies of CEE-11 countries, pursuing the patchwork capitalism model. This assessment is made, first, in comparison to the averaged response of countries representing the other four European capitalism models (Table 8), and second, in comparison to the CEE-11 average only (Table 9).

The location of each model in the table depicting the situation in 2020–2022 has not changed compared to the previous period. It would be incorrect, however, to conclude that the fact that Poland shifted from the group of countries with above-average economic growth but lacking macroeconomic balance in the years 2004–2019 to a cluster with a relatively balanced economy compared to the other CEE-11 countries

means an improvement in the macroeconomic situation. A correct interpretation of the data presented in Tables 7 and 9 merely indicates that Poland fared relatively well compared to the overall decline in economic growth and the increased scale of imbalance in the entire CEE-11 gr oup in the years 2020–2022.

Table 8. Economic growth rate and macroeconomic equilibrium in various capitalism models in the EU-28 in the years 2020–2022

		Scale of macroeconomic imbalance	
		relative balance	relative imbalance
GDP growth rate	above average	Nordic	patchwork, Anglo-Saxon
	below average	continental	Mediterranean

Source: self-reported data

Table 9. Economic growth rate and macroeconomic equilibrium in CEE-11 c ountries in the years 2020–2022

		Scale of macroeconomic imbalance	
		relative balance	relative imbalance
GDP growth rate	above average	Poland, Croatia	Estonia, Lithuania, Slovenia, Hungary
	below average	Bulgaria, Czechia, Latvia	Romania, Slovakia

Source: self-reported data

Summary and recommendations

The above assessment of Poland's and other CEE countries' trajectories of economic and institutional development have helped us formulate recommendations regarding desired directions of change for these trajectories in the future. The aim of the recommendations is to permanently improve Poland's institutional comparative advantage and enhance its international competitiveness, thereby enabling it to keep following a path of real income convergence and, in the near future, join the ranks of highly developed countries. These recommendations are divided into long-term, medium-term, and short-term measures, taking into account the nature of their development trajectories and the corresponding time horizon for their implementation. Thus, long-term recommendations refer primarily to changes in the institutions (especially informal ones) of patchwork capitalism which are permanent; medium-term recommendations refer to changes in formal institutions and structural transformation

in the economy whose time horizon is shorter; while short-term recommendations refer to economic policy in place.

Thus, in the long term the major goal of our recommendation is to change the prevailing attitudes and values within the Polish society, specifically the core of informal institutions. The path to this goal includes:

1) A comprehensive reform of the current education system in Poland, which is a precondition (though not always sufficient) to change social attitudes and beliefs. This change is a prerequisite for addressing one of the fundamental weaknesses of patchwork capitalism, namely the significant inconsistency between formal and informal institutions, which should enable a deeper embedding of the former in the society.
2) Development of civil society, which will serve as a counterbalance to a stronger state authority and create an opportunity for transforming the state into a *Tamed Leviathan* (a form of state activity that promotes sustainable and balanced economic development) while mitigating the risk of it turning into a *Despotic Leviathan* (a state with strong authoritarian features) [Acemoglu, Robinson, 2022].
3) Designing a long-term educational campaign (beyond the formal education system) aimed at explaining and preparing the society for new challenges and living in conditions of recurring negative external shocks, including overlapping crises at both local and global levels (multi-crisis).

In the medium term, the priority should be to minimize the patchwork characteristics of the existing socio-economic order in Poland through appropriate transformation of formal institutions and their architecture. A long-term strategy for economic development should be simultaneously developed, in order to change the profile of Poland's international competitiveness towards innovation and specialization in high-value-added production. The following measures/changes should serve these purposes:

a) Institutions:
   - Reviewing the existing institutional architecture in terms of coherence and complementarity of formal institutions that comprise it.
   - Developing and implementing a program for the reconstruction of formal institutions to ensure greater coherence and complementarity of the entire institutional architecture and strengthen its foundation.
   - Establishing a mechanism to ensure unconditional enforcement of existing formal institutions (rules of the game).
   - Designing and implementing a system of constitutional safeguards that prevent arbitrary interpretation of legal norms by politicians and eliminate "institutional voluntarism".

- Introducing institutional barriers to limit the scale of rent-seeking and appropriation of the state by politicians.
- Comprehensive reform of the healthcare system to significantly increase healthcare accessibility and quality of medical services while enhancing the system's resilience to unforeseen shocks such as pandemics.
- Introducing institutional solutions that "civilize" the inflow of foreign capital and subject its activities to an assessment based on strategic development goals of the domestic economy (thus eliminating another weakness of patchwork capitalism as an "open access order").
- Introducing control (previously unregulated) over the inflow of entropy from abroad.

b) Strategy for economic development:
   - Developing and implementing a plan to gradually shift the direction of Polish economic development and change its structure towards an increased share of highly processed products and services with high technological progress and value-added.
   - Enhancing the development-stimulating function of the state, especially in the field of R&D.
   - Limiting the phenomenon of state unreliability, especially in its role as a provider of public goods and socially desirable services (such as healthcare and education).
   - Introducing tax measures to permanently increase the historically low savings propensity in Poland and to boost investment rate that would create conditions for accelerated economic growth.

In terms of short-term measures, our recommendations focus on the most desirable directions for changes in Poland's economic policy. In this regard, we particularly recommend:

1) Employing a well-balanced combination of fiscal and monetary policies to limit inflation to a single-digit level (ideally 2.5% in the first-best scenario) and at the same time avoid a recession caused by excessively restrictive policies.
2) As part of anti-inflationary policy, reducing market concentration in various sectors of the economy, for example, by eliminating or reducing licenses, permits, and other barriers to market entry.

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UNLEASHING THE POWER OF INVESTMENT – POLAND'S POTENTIAL COMPARED TO ITS PEERS FROM CENTRAL AND EASTERN EUROPE

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DOI: 10.33119/978-83-8030-625-7.2023_41_60

Abstract

The purpose of the study, the results of which are presented in this paper, was to identify the reasons for the poor state of investments in the Polish economy and to propose measures of improving it. The study identifies areas where actions can be taken to increase investment in Poland, both by taking action at the level of public policy and by entrepreneurial initiatives. The introductory part of the study presents the context of the problem, pointing out that Poland has been facing declining investments for years, and that they are significantly lower compared to other CEE countries. Authors outline the development challenges facing Poland, such as the middle-income trap or the exhaustion of the model of an economy based on foreign investment and simple copying of technology by domestic companies. In this regard, the authors consider the strengthening of investment by Polish enterprises and the development of investment based on advanced technologies and human capital as a key task.

The study used various research methods, such as data analysis, statistical modelling and interviews with experts, to diagnose the level of investment and identify barriers to its growth. Based on these analyses, they made recommendations for public policies and entrepreneurs that have the potential to increase investment levels.

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The purpose we had set for the study, the findings of which have been presented in this paper, was to conduct a diagnosis of the level and structure of investments in Poland and other Central and Eastern European (CEE) countries in a long and short term perspective, as well as to assess the reasons for a low number of investments in the Polish economy and to recommend potential measures which could increase investment activity. Overview of the investment level and barriers hampering the development of investments in Poland was a starting point for formulating specific recommendations on how to boost such ventures.

The fact that for many years now Poland has been struggling with diminishing investments was our key motivation while preparing the study. The value of investments in Poland in relation to GDP in the years 2008–2022 fell from 23.1% of GDP in 2008 to 16.8% in 2022. What is more, Poland lags significantly behind other CEE countries in this respect, in particular in comparison to the Czech Republic, or even Hungary, and this trend seems to be long-standing. These sustained trends are high-

ly negative, if viewed in the context of challenges facing Poland which, just like most CEE countries, has reached a middle development level and may soon fall into the middle-income trap. Also the model of a dependent economy, relying heavily on foreign investments, is slowly becoming unable to generate further economic growth. In this situation, it is a key challenge to enhance investments of Polish companies and to develop investments based on advanced technologies and human capital.

In this paper, several research methods have been applied, including desk research of the existing studies, a quantitative data analysis of the size and structure of investments in CEE countries, also in Poland, statistical modelling of the future value of the studied investments, as well as individual in-depth interviews[1] with experts in economic policy, entrepreneurial organisations and entrepreneurs, concerning reasons for a low level of investments in Poland and recommendations on how to stimulate such ventures.

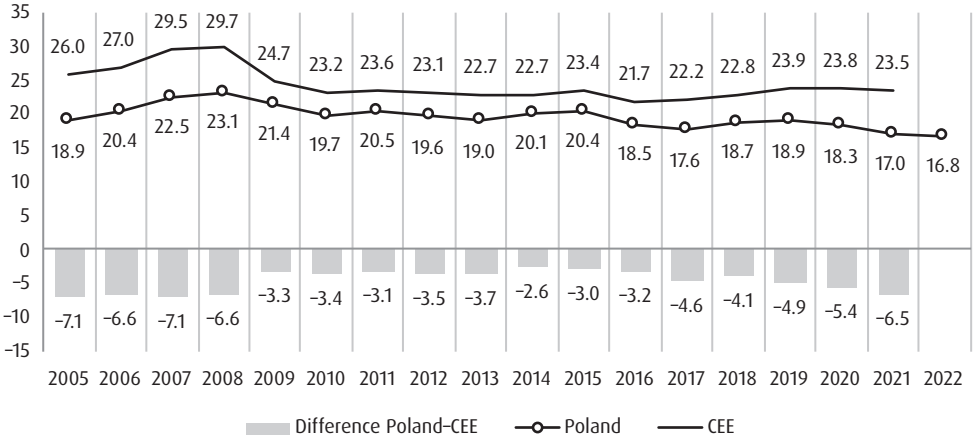
Investments in Poland and other CEE countries

Analysis of the data on the level of investments in Poland and other CEE countries in the years 2005–2021 allows to identify three sub-periods characterised by diverse trends (Figure 1). The first one comprises the time from 2005 until the global crisis of 2007–2009, with its peak in 2009. In this time period investments in Poland and CEE countries kept growing and reached their highest in relation to GDP. In Poland investments of that time accounted for 23.1% of GDP in 2008. In other CEE countries the result was even higher, hitting the level of 29.7% of GDP. The end of the global crisis was marked by investments in the studied economies levelling out at significantly lower levels. Consequently, in the next sub-period (2010–2015) in CEE countries the value of investments fluctuated around 22.7–23.6%, whereas in Poland it stabilised at the level of 19.0–20.5% of GDP. A characteristic feature of this period, apart from fairly stable levels of investments, was a relatively small difference between the results of Poland and the other CEE countries average. The last sub-period (2016–2021) brought about a deepening of these disproportions in Poland. In this time, CEE countries recorded a slight increase in investments – from 21.7% to 23.5% of GDP, when in Poland investments did not exceed 19% of GDP, and in 2021 hit a bottom of 17% of GDP. It should be noted that according to the initial data of the Central Statistical

[1] In total, some eight interviews were conducted in the time period of 4–30 April 2023. Our respondents were the representatives of such institutions as investment agencies, companies, special economic zones (SSE Mielec, Sub-zone Lublin), institutions of the business environment (including the Polish Institute of Directors), universities (SGH) and investment funds (European Regional Development Fund).

Office of Poland (GUS) [2023], the level of investments in the Polish economy in 2022 went down to 16.8% of GDP.

Figure 1. Gross outlays on fixed assets in Poland and in other CEE countries in the years 2005–2021 (% GDP)



Note: data concerning CEE – excluding Poland – refer to: Bulgaria, Croatia, the Czech Republic, Lithuania, Latvia, Estonia, Romania, Slovenia and Slovakia; data for Poland are based on initial GUS data.

Source: self-reported data based on AMECO [2023] and GUS [2023].

The above picture of the situation in Poland clashes with the investment situation in other CEE countries, particularly in the Czech Republic and Hungary. Data describing investments in CEE countries were presented in Table 1. The comparison of average investment values in relation to GDP in particular countries in the entire period studied (2005–2021) allows to conclude that the leader, both in terms of the level and stability of investments, is the Czech Republic which invested in this period 26.9% of GDP on average, with a standard deviation of 1.4 p.p. The second country with a high investment stability in the years 2005–2021 was Poland (standard deviation: 1.6 p.p.) which at the same time occupied the last position in terms of an average investment value. A relatively stable level of investments was observable in Hungary and Slovakia, with a much higher value of investments than in Poland – the average value of investments reached in those countries 22.8% and 22.1% of GDP, accordingly. It should be noted that the above mentioned Hungary in 2016 recorded a systematic rise in investments – from the level of 19.5% to 27.2% of GDP in 2021. The Baltic countries, as well as Croatia, Bulgaria, Romania and Slovenia, saw a relatively high fluctuation in investments, with Croatia, Lithuania, Slovenia and Bulgaria observing significantly lower average values than those in Estonia, Latvia or Romania.

Table 1. Investments in Poland versus other CEE countries in the years 2005–2021 (% o f GDP)

	Bulgaria	Czech Republic	Croatia	Estonia	Latvia	Lithuania	Hungary	Romania	Slovenia	Slovakia	**Poland**
2005	25.7	28.8	25.2	32.9	31.0	23.4	23.8	23.4	26.6	26.2	**18.9**
2006	27.4	28.4	26.3	36.8	33.9	26.0	23.5	26.6	27.7	25.6	**20.4**
2007	28.3	29.9	26.6	36.4	36.2	28.6	23.7	35.3	28.7	25.4	**22.5**
2008	33.0	29.2	27.9	31.1	31.9	26.1	23.3	37.3	29.4	24.8	**23.1**
2009	27.8	27.6	24.9	22.7	22.2	17.9	22.6	26.0	24.1	20.8	**21.4**
2010	22.2	27.1	20.9	21.2	19.1	16.9	20.1	25.7	21.1	21.0	**19.7**
2011	20.8	26.8	19.9	26.5	23.0	18.5	19.5	26.8	19.9	23.2	**20.5**
2012	21.1	26.2	19.3	28.7	26.0	17.3	19.1	27.0	19.0	20.4	**19.6**
2013	21.2	25.4	19.4	27.9	24.3	18.4	20.8	24.4	19.6	20.5	**19.0**
2014	21.1	25.4	19.0	25.7	22.8	18.9	22.0	24.4	19.1	20.5	**20.1**
2015	20.9	26.5	19.3	24.5	21.9	19.6	22.2	24.9	18.7	23.7	**20.4**
2016	18.4	24.9	19.8	24.4	19.3	19.9	19.5	23.1	17.4	21.0	**18.5**
2017	18.3	24.9	19.7	25.9	20.6	20.1	22.1	22.8	18.3	21.1	**17.6**
2018	18.8	26.3	20.1	27.1	22.1	20.9	24.7	21.4	19.3	20.9	**18.7**
2019	18.6	27.1	21.3	25.4	23.1	21.4	27.0	23.0	19.6	21.5	**18.9**
2020	19.1	26.5	22.2	31.2	23.1	21.3	26.5	23.5	18.9	19.5	**18.3**
2021	16.3	26.0	20.7	28.9	22.3	21.4	27.2	24.1	20.3	18.9	**17.0**
Standard deviation (p.p.)	4.4	1.4	2.9	4.3	5.0	3.2	2.5	4.1	3.9	2.2	**1.6**
Average value	22.3	26.9	21.9	28.1	24.9	21.0	22.8	25.9	21.6	22.1	**19.7**

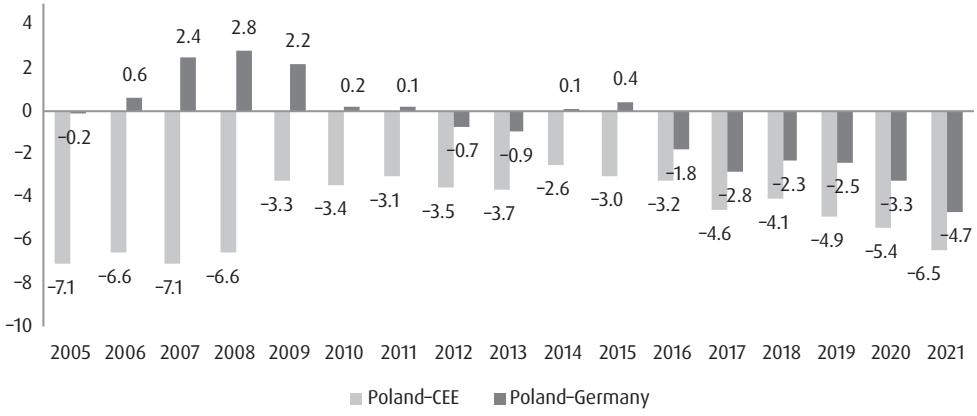
Note: CEE – unweighted average for: Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Romania, Slovakia, Slovenia.

Source: self-reported data based on AMECO [2023].

The above reported trends, indicating a stagnation and a consecutive fall in investments in the Polish economy, imply that the Polish economic growth is to an insufficient degree driven by a long term domestic growth engine which are investments. It is worth comparing the value of investments made in Poland with investments recorded not only in CEE countries, but also in a large economy, such as Germany. As shown by the data presented in Figure 2, the level of investments in the Polish economy was on average lower than in CEE in the entire period studied (2005–2021), but the investments in Poland only in the sub-period around the time of the global financial crisis were growing and were higher in relation to GDP than in Germany. Already in the first years after the crisis had subsided, this difference changed to Poland's disadvantage. As a result, in some years of the period of 2010–2015 investments in the

Polish economy were lower in relation to GDP than in Germany. Regrettably, in the last sub-period (2015–2021) this trend declined even more and in 2016 investments in the Polish economy in relation to GDP were visibly lower – not only in comparison with CEE countries, but also with Germany. Moreover, these negative disproportions have intensified in recent years.

Figure 2. The difference between the level of investments in Poland and their level in CEE and Germany in the years 2005–2021 (p.p.)



Source: self-reported data based on AMECO [2023].

Indirectly, the causes of lower investments in Poland as compared to other CEE countries and Germany are explained by the data on the structure of these investments by institutional sectors presented in Table 2. Their analysis indicates that corporate investments in the years 2016–2021 accounted for almost 10.2% of GDP which was the lowest value among all countries studied – CEE and Germany. In the CEE region the Czech Republic, Estonia and Hungary stood out with their corporate investments reaching 16.9%, 16.6% and 14.9% of GDP accordingly. In terms of the public investments level in relation to GDP, Poland was in the 4th position among 12 countries studied, with its average result of 4.1% of GDP in the years 2016–2021. Ahead of Poland were Hungary, Estonia and Latvia which allocated to public investments 5.4%, 5.3% and 4.9% of GDP accordingly. Public investments in Germany were among the lowest in this list and on average reached merely 2.4% of GDP in the period studied. In terms of investments made by households, Poland ranked in the 8th place among 12 countries with its average result of 3.9% of GDP in the years 2016–2021. The highest positions in the ranking were these of Romania, Germany and Estonia, where on average household investments accounted for 7.2%, 6.3% and 5.2% of GDP accordingly.

Table 2. The structure of investments by institutional sectors in Poland in comparison to other CEE countries and Germany in the years 2016–2021 (% of GDP)

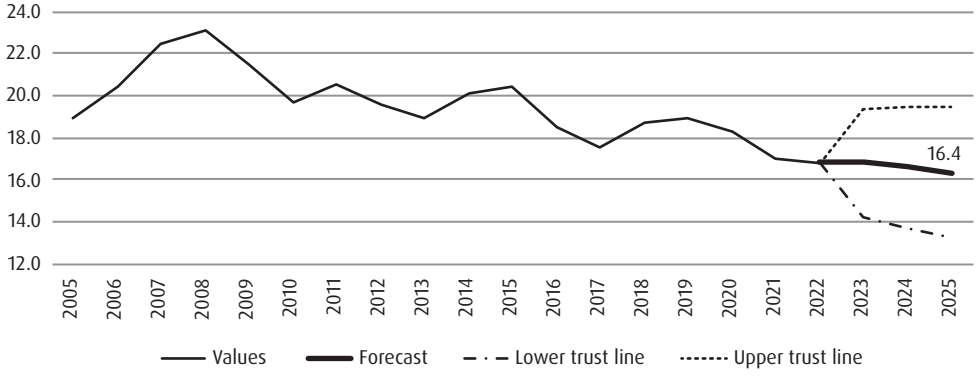
	Corporate investments							Public investments							Household investments						
	2016	2017	2018	2019	2020	2021	aver.	2016	2017	2018	2019	2020	2021	aver.	2016	2017	2018	2019	2020	2021	aver.
Bulgaria	12.8	14.0	n/a	n/a	n/a	n/a	13.4	2.6	2.3	n/a	n/a	n/a	n/a	2.4	3.2	2.3	n/a	n/a	n/a	n/a	2.8
Czech Republic	16.8	17.4	17.3	17.6	16.5	16.1	16.9	3.2	3.4	4.2	4.4	4.9	4.7	4.1	4.9	4.2	4.9	5.1	5.2	5.2	4.9
Estonia	14.9	15.1	16.8	15.2	19.7	17.9	16.6	4.6	5.7	5.3	5.0	5.7	5.6	5.3	4.9	5.1	5.0	5.3	5.8	5.4	5.2
Croatia	13.4	13.8	13.2	12.9	12.3	11.8	12.9	3.2	2.7	3.5	4.3	5.6	4.7	4.0	3.2	3.2	3.4	4.0	4.4	4.2	3.7
Latvia	12.6	12.9	12.9	14.3	14.0	14.0	13.4	3.6	4.6	5.6	5.1	5.7	5.2	4.9	3.1	3.1	3.6	3.8	3.5	3.1	3.4
Lithuania	12.4	12.8	13.6	13.9	12.2	13.7	13.1	3.0	3.2	3.2	3.1	4.4	3.1	3.3	4.5	4.1	4.2	4.4	4.7	4.6	4.4
Hungary	13.0	13.9	14.8	16.4	14.9	16.2	14.9	3.2	4.5	5.8	6.3	6.5	6.3	5.4	3.3	3.7	4.2	4.3	5.2	4.9	4.3
Romania	13.6	11.7	11.4	12.6	10.7	n/a	12.0	3.7	2.6	2.7	3.5	4.6	n/a	3.4	5.7	8.1	7.0	6.5	8.6	n/a	7.2
Slovenia	10.7	11.5	11.8	11.9	11.1	11.8	11.4	3.2	3.1	3.7	3.8	4.1	4.7	3.7	3.6	3.8	3.9	3.8	3.7	3.9	3.8
Slovakia	13.6	13.7	12.9	13.7	11.6	11.4	12.8	3.4	3.4	3.8	3.6	3.4	3.1	3.4	4.1	4.1	4.2	4.2	4.5	4.7	4.3
Poland	**10.4**	**9.5**	**10.5**	**11.0**	**10.6**	**9.1**	**10.2**	**3.3**	**3.8**	**4.7**	**4.3**	**4.5**	**4.1**	**4.1**	**4.8**	**4.3**	**3.6**	**3.6**	**3.3**	**3.8**	**3.9**
Germany	12.0	12.2	12.5	12.8	12.4	12.4	12.4	2.2	2.2	2.4	2.4	2.7	2.6	2.4	6.2	6.0	6.2	6.2	6.6	6.7	6.3

Source: self-reported data based on Eurostat.

Summing up, it should be stated that the level of investments in the Polish economy is much lower than in most CEE countries and in Germany. In particular, corporate investments which remain continuously lower than in other countries of the region may hamper the Polish economy. Sadly, as shown by the data of BGK and PIE [2023], the number of companies in Poland which do not invest at all has also been on the rise. In January 2021, as many as 49% of the surveyed companies declared not to have incurred any investment expenditure on tangible or intangible assets, and in March 2023 their number reached already 62%. At the same time, the number of companies which in the last three months, as compared against the previous three months, have incurred the same or higher investment expenditure has decreased – from 43% in January 2021 to 33% in March 2023. Recovery in corporate investment levels in Poland is not encouraged by short term factors. According to the research by EIB and Ipsos [2022], companies in the entire CEE region expect the economic and political climate to worsen and the development prospects in their industries to deteriorate.

It has been reflected in the investment forecast for Poland until 2025 presented in Figure 3. The forecast is based on the analysis of the existing trends of the years 2005–2022, including seasonal factors and the trust range of 95%. Due to the long term downward trend in Polish investments, a highly likely scenario for 2023–2025 is a further slump in investments down to 16.4% of GDP in 2025. Some of the reasons which make this scenario probable are: high inflation and interest rates, sluggish GDP growth, uncertainty about when the military conflict in Ukraine will end, no effect of the falling energy prices on lower retail prices and lack of factors boosting private investments.

Figure 3. Forecast for the level of investments in the Polish economy for the years 2023–2025 (% of GDP)



Note: the forecast prepared based on the trend line with the trust level of 95%, including seasonality.
Source: self-reported data based on AMECO [2023].

Barriers to investments in Poland in the light of the studies to date.

There are many factors affecting the investment rate in the economy. They include: the economic structure, savings rate, public debt level, cost of labour and other costs of business operations, cost of capital, condition of non-financial companies, fiscal policy, taxation and tax policy predictability, levels of long term interest rates, corporate sentiment, general economic situation, investor sentiment, human capital or external shocks. Many studies to date have proved the above factors to cause low corporate investments in the Polish economy.

Hagemejer, Poniatowski, Pechcińska, Turgut and Śmietanka [2021] or Łaszek, Trzeciakowski and Zieliński [2021] stress the significance of the economic structure, including a high proportion of less capital-intensive industries. Many studies (also Dobrowolski [2021], Hagemejer et al. [2021], Kawalec and Błażuk [2021], Łaszek et al. [2021] or PAIH [2022]) point out to a high institutional risk as a factor discouraging companies from investments. The sources of this risk are a complicated and volatile tax system, frequent and unpredictable changes in law, problems with tax law interpretation and tax authorities behaviour, troubled system of justice, time-consuming administrative procedures in the construction and investment process or obstruction of contacts between investors and administration. The investment rate is also negatively affected by the factors which impede general productivity, such as stifling competitiveness, tax preferences for selected industries or insufficient supply of qualified workers [Łaszek et al., 2021; PAIH, 2022]. Institutional risk may rise as a result of external shocks like the recent pandemic. This is being brought up by Kawalec and Błażuk [2021] who claim that negative effects of the pandemic on public finance will exacerbate unfavourable trends in the tax policy and affect the conduct of tax authorities. It is confirmed by Chmielecka and Szulc [2020], Czechowicz [2023] or Łagowski [2022] – according to them these expectations had come true when in 2022 several versions of the tax reform were implemented, which confused the already opaque tax system even more. Worsening of the investment sentiment in Poland is also caused by uncertainty in international relations, particularly in relations with the European Commission (e.g. concerning the financing of the National Reconstruction Plan projects). Polish Investment and Trade Agency [PAIH, 2022] indicates specific barriers hampering the development of investments in Poland. In its opinion, the key issue is a lack of suitably prepared and equipped large investment areas (the infrastructure network, transportation, conducive environment, access to renewable energy sources, convenient terrain geometry) which could in a short time be made up-and-pending for project launches. In the existing investment areas there are frequent constraints in the access to utilities, particularly to high voltage power lines and vast amounts of

water, which makes them unsuitable for potential investor needs. Local government units simply lack finance to properly equip investment areas. Moreover, planned extensions of the road infrastructure, still a scarce facility, rarely account for its accessibility to potential investment areas. An important factor which in recent years has affected investments in Poland and in other CEE countries are external shocks, including the COVID-19 pandemic and the related lockdown policy, as well as the war in Ukraine which spurred a lot of unrest among investors.

Factors limiting investments in Poland which were diagnosed in literature have been also confirmed in the research run by EIB and Ipsos [2023] among entrepreneurs. Polish entrepreneurs believe the key impediments in this respect to be: uncertainty about the future (93%), energy costs (91%), access to qualified labour (85%), business activity regulations (76%), labour market regulations (69%), access to financing (65%) and demand for goods and services (64%). Importantly, each of these barriers in Poland is perceived as more harmful than generally in the EU.

EIB and Ipsos [2022] have presented a slightly wider study – referring to the entire region – of barriers to developing the investment activity of companies. These study findings show that companies in CEE most frequently name the following obstacles to investing: uncertainty about the future (87%), energy costs (87%) and access to qualified workers (82%). It should be noted that the significance of energy costs as a barrier to investment has grown considerably in recent years. These studies also point out that large companies in the region, more often than SME, encounter hurdles in developing investments, including energy costs, access to the digital infrastructure, labour market regulations and inadequate transport infrastructure.

Barriers to investments in Poland in the light of the conducted in-depth interviews

Taking into account the above mentioned literature survey, in our study we have performed, based on the findings from individual in-depth interviews, a qualitative verification of the previously presented barriers hampering the development of corporate investment activity in Poland. The conducted interviews allowed us to divide the factors into groups:

- consequences of external shocks – the COVID-19 pandemic and war in Ukraine;
- demographic structure of companies in Poland and their structural imperfections;
- regulatory environment, public institutions and instability;
- resources and human capital as well as their cost;
- physical infrastructure and limitations in the availability of investment areas;

- rising energy prices and their instability, changing preferences of investors concerning the energy mix;
- market institutions and infrastructure, including financial markets.

Below we have presented a detailed discussion of these factors. At this point we would like to emphasise the cumulative character of many components, due to the fact that long term and short term factors tend to interweave, the regional and national ones occur simultaneously. Interestingly, expert opinions frequently point out to different aspects, effects and interdependencies between determinants of investments than these previously presented.

Consequences of external shocks – COVID-19 pandemic and war in Ukraine

Consequences of the lockdown policy during the COVID-19 pandemic are factors which are today largely a thing of the past, yet it may be worthwhile to note their versatile results. Key conclusions from the conducted in-depth interviews may be summarised in three points:

1) **winning industries** – lockdowns and the COVID-19 pandemic had a short term diverse effect on particular industries, accelerating the development of investments in modern business service sectors, biotechnology, medicine, medical chemistry or hygiene products;
2) **losing industries** – many industries, such as the auto-motive industry, tourism or HORECA felt the pinch of the pandemic, which caused many investment projects to be frozen;
3) **higher relevance of other factors** – the pandemic had a rather negligible effect on the slump in investments in the entire economy, as this was caused by numerous other factors.

The war in Ukraine has sent an external shock wave which started in February 2022, and its effects will still be felt in a long time perspective. It is almost impossible to determine the real time horizon for this factor because at the time the study was conducted, the conflict had not been resolved yet. The data gathered during in-depth interviews allow to formulate the following conclusions:

1) **suspending investment projects** – the war in Ukraine caused a suspension of numerous investment projects and postponing of investment decisions by Polish and foreign entrepreneurs, particularly in the East of the country;
2) **relocation of some companies from Ukraine to Poland** – some Ukrainian companies moved part of their production to Poland, which generated an investment impulse in selected regions of the country (e.g. in Lublin Voivodeship);

3) **military industry** – some foreign companies, including those in the military industry, continue their projects and investments in Poland, despite the war in Ukraine;
4) **reconstruction of Ukraine** – investments related to the reconstruction of Ukraine may appear after the conflict ends, which will be highly appealing to many Polish and foreign investors; yet currently we may see:
   a) increased interest of the foreign capital in investing in Poland related to the foreseen reconstruction of Ukraine;
   b) expected rise in military investments in Eastern Poland, including NATO investments in the military infrastructure and additional investments of the Polish army;
   c) influx of foreign investments in the context of Ukraine, dependent on the improvement of the road and border infrastructure, as well as the availability of locations with good cost arbitrage;
   d) the fact that Poland will only be one of the intermediaries in the reconstruction of Ukraine which will happen through various channels and countries.

Demographic structure of companies in Poland and their structural imperfections

A separate factor, not widely discussed in the source literature, is the significance of the demographic structure of companies in Poland and their structural qualities. Based on in-depth interviews, six problems with a strong impact on investments and related to the specifics of domestic companies, particularly those from the SME sector, may be singled out. These involve:

1) **microscale trap** – most Polish companies are small and micro-companies with no sufficient resources, know-how and managerial qualifications, which makes it difficult for them to scale their business, take on bigger risks, also the investment risk; due to the microscale trap and lower investment propensity Polish companies are unable to resist unfavourable external circumstances, which negatively affects their investment decisions; the trap results also from the financial gap in which many micro-companies find themselves having no credit history or collateral, which makes the financial sector unresponsive to their needs; also the procyclical behaviour of financial intermediaries opens the financial gap even wider;
2) **middle-scale trap** – medium-sized companies have a more limited access to public help and larger sources of finance than micro-companies, but are too small to tap into the help options offered to large companies; preference of small and micro-businesses in access to public help may stimulate tiny investments and at the same time discourage from increasing them in the fear of losing access to financial assistance;

3) **investment awareness** – it concerns small and medium-sized businesses as well as micro-companies, the smaller the company, the lower its awareness of the investment importance; entrepreneurs from smaller companies often prefer to repair old machines instead of investing in new technologies, which drives down new investments; additionally these companies usually are quite averse towards investment risks, as they do not possess sufficient capital reserves and are put off by a high risk of losing their capital;
4) **succession problems** (handing over management) – this problem affects increasingly more Polish family companies founded in the '90 s, in which the time of their founders is coming to an end; it causes problems of handing over management duties to the next generations or professional managers;
5) **low corporate investments, low innovativeness and developing less capital-intensive industries** – before the pandemic high margins did not encourage Polish companies to invest in higher efficiency, and Poland as a recipient of innovations did not invest too much in innovations; up to now the source of Poland's development was a large consumer market and less capital-intensive industries;
6) **regional specifics** – the structure of companies in Poland is not uniform: it refers both to the level of entrepreneurship, and to various sizes of companies, which also affects the volume of investments; the scope of investments in a given region is also determined by the availability of various assistance programmes and public financing.

Other structural problems related to the Polish economy development model include two additional factors, which are:

1) **foreign investments** – in Poland it is the foreign corporations, not Polish companies that invest in the most advanced technologies and the biggest technological projects; this generates another problem for the Polish economy in the form of dualism between a fast development of modern and innovative foreign companies and a simultaneous limited transfer of know-how and technology to Polish entrepreneurs; the situation can be additionally exacerbated by a lack of collaboration ties between foreign investors and Polish suppliers;
2) **state capitalism** – it is a process observable not only in Poland but also worldwide – next to the rising power of international corporations, we can see a growing role of state authorities as company owners and market makers; as a result the state and international corporations are more engaged in developing the Polish business than Polish family companies which have no ownership of the state treasury.

Regulatory environment, public institutions and instability

Studying company behaviour we should understand the role played by public institutions and regulations which determine the "rules of the game". Entrepreneurs can accommodate the existing solutions, but lack of stability and uncertainty about regulations pose a challenge many are unable to meet. In this field we can find not only some factors which constrain investments, but also those that encourage them. This applies particularly to such aspects as:

1) **legal uncertainty and political instability** – legal volatility, complexity of the tax system and inconsistency of regulations translate into increased operational risks; complicated regulations impede the implementation of non-standard and innovative projects. What entrepreneurs find difficult is also excessive duration of court proceedings; there are some obstacles in strategic planning at the public level, which means that immediate political decisions trigger new problems that need to be tackled;
2) **unequal distribution of administrative burdens** – regulatory problems and administrative burdens are more harmful to SME; large domestic companies or international corporations do not experience any particular hardships; regulatory system in Poland does not differentiate companies according to their administrative burdens;
3) **conflict with the European Commission** – is another factor which discourages EU investors from implementing projects in Poland, particularly in the sectors in which there are many state-run companies; high risk of a potential unfair competition may hamper business operations and prevent investing in Poland;
4) **significance of regional help** – regional help is of high significance both to the attractiveness of particular regions and Poland as a whole; access to EU funds for companies is a key tool of supporting the Polish economy and investments in Poland.

Dwindling access to human resources and human capital and their costs

Access to human resources and human capital in the context of shrinking production age populations and rising wages has an increasingly stronger impact on investment decisions. Opinions of our participants of in-depth interviews in this area may be summarised in two points:

1) **human resources and capital** – lack of employees with suitable qualifications is a serious problem for the Polish economy because many companies in the sector of modern business services need qualified workforce; simultaneously development of the technological sector and IT translates into high requirements in terms

of employee knowledge and skills, which makes the recruitment of appropriate candidates difficult;

2) **the end of competitiveness based on costs** – as labour costs rise and the standard of living improves, Poland ceases to be a competitive location for investments based on low wages; it is necessary to attract investors who can use human capital and technologies to create high value added with higher level of wages.

Physical infrastructure and limitations in availability of investment areas

Physical infrastructure – roads, railways, airports, investment areas, etc. – has significantly improved in recent years. Regions vary on the quality of their infrastructure, which is both a challenge and an opportunity. During in-depth interviews the following factors have been identified:

1) **(un)equal infrastructural accessibility of regions** – originally, western, southwestern and northern regions of Poland were more infrastructurally accessible; currently, along with the development of the road infrastructure and airports in eastern Poland, interest of investors in this region is growing; the choice of locations to make investments is determined by the time of delivery – both to customers and from subcontractors; if this time can get shorter due to infrastructural investments, the prominence of a given location increases;
2) **access to regional job markets** – in the context of availability of labour force the regional aspect and how it is connected to infrastructural accessibility is vital; in Poland there is a discrepancy between regional wages; it presents an opportunity for some regions in Poland which are still in possession of relatively cheaper labour force and until now have had a low infrastructural accessibility; as there are more investments in road, rail and air infrastructure, their accessibility can improve and make these regions more attractive;
3) **significance of the reconstruction of Ukraine** – foreign investments in eastern Poland in the context of the reconstruction of Ukraine will depend on the construction of road and rail connections, improvement of the border infrastructure, building terminals, etc.;
4) **accessibility of investment areas** – improved infrastructure itself results in increased accessibility of investment areas; in highly industrialised regions (like Lower Silesia) accessibility of investment areas as well as human resources is fairly limited due to a high number of investors; it is necessary to expand infrastructure and make more investment areas available in less industrialised regions;
5) **large infrastructural projects** – large infrastructural projects like the Solidarity Transport Hub (CPK) are very important for long term investments; if the CPK

project gets over the preparation phase and is ready for the launch, it will become a stimulus boosting corporate investments, causing an influx of foreign investments.

Unstable and rising energy prices and changing investor preferences in reference to the energy mix

Energy production is increasingly more important for developing corporate investment activity in Poland. Participants of in-depth interviews pointed out to some crucial barriers related not only to rising and unstable energy prices, but also to the energy policy and energy mix. These observations may be put into four points:

1) **availability of energy at a stable price** – is a key factor of long term company development, particularly in energy-intensive industries; low and stable energy price and low emissivity affect the investment attractiveness of a country, which in turn affects investment decisions and company development;
2) **energy policy** – is a factor which decides how Poland is being perceived by foreign investors; stability and predictability of regulations, including those on the direct line or RES is crucial to investments made in the energy industry;
3) **changes to the energy mix** – companies, particularly foreign companies, increasingly more often will condition their investments on the characteristics of the energy mix; investors want to know whether energy comes from RES or if at the very least it is non-emissive (e.g. nuclear energy); the other important concerns will be using appropriate technologies and construction materials, as well as applying circularity in the production process which presents a special challenge to businesses;
4) **climate neutrality** – it relates to the factors described above because it is becoming a common expectation to use 100% of energy coming from renewable sources and achieving climate neutrality; companies must be ready to implement adequate technological solutions and investments to reach this goal, which may affect their competitiveness on the market.

Institutions and market infrastructure, including financial markets

Areas which are not very well covered in source literature are market institutions, also financial markets. Our participants of in-depth interviews indicated the following problems:

1) **weakness of the Polish capital market** – it limits Polish companies' access to capital raised from stock exchange investors, which hampers financing investments and development;

2) **introduction of more burdens for Polish banks** – credit holidays or probable bond write-offs may constrain companies' access to credit and disturb obtaining finance from the banking sector;
3) **restrictive collaterals for loans** – create a hurdle in raising finance by companies because banks require ever more security and guarantees making it very difficult for businesses to take out loans and find other sources of finance;
4) **growing role of ESG** – means that access to capital will depend on meeting some additional requirements in this respect; companies will have to comply with specific standards and have an appropriate ESG history to be able to receive financing from banks and investors; it already makes the energy mix a vital factor of investments;
5) **attrition of EU funds** – EU help in the perspective until 2030 is the last such a generous portion of support for Poland; this financing will keep shrinking, which poses a challenge to the Polish economy and companies which must already now accumulate capital or seek new sources of financing for investment projects; it may be also viewed as a premise for the development of public financial institutions – also regional – employing funds returned from the projects co-financed by the EU.

Summary and recommendations

Taking into account the previously identified barriers to investment activity in Poland, including the results of in-depth interviews, in the summary we have presented recommendations for the public policy and entrepreneurs on the possibilities of boosting the level of investments. Some guidelines are general in nature, others involve more detailed remarks. In order to maintain the clarity of arguments, recommendations have been paired off with particular thematic segments corresponding to various barriers previously identified in this paper. Interestingly, this set of recommendations provided by experts has spread rather unevenly over the above mentioned segments. The biggest number of recommendations have been made in reference to 4 groups of barriers:

1) demographic structure of companies in Poland and their structural imperfections;
2) regulatory environment, public institutions and instability;
3) market institutions and infrastructure, including financial markets;
4) physical infrastructure and accessibility of investment areas.

Fewer recommendations were given about:

1) consequences of external shocks – only in the context of the war in Ukraine;
2) human resources and capital and their costs;
3) building a stable and sustainable energy industry.

A diverse number of recommended changes or actions in particular fields may indirectly be a proof of their significance for boosting corporate investments in Poland, this hypothesis though has not been verified in any way. The final selection of recommendations presented below includes both expert advice as well as some tips derived from the analysis of the identified barriers to corporate investment activity.

Key recommendations in the context of the current demographic structure of companies in Poland and their structural imperfections involve the following: improving the quality of corporate supervision and management in Polish companies, employing instruments which support development of smaller companies by creating new supply chains and strengthening their position in these chains, supporting succession in family companies by adequate legislature, supporting foreign expansion of Polish companies (including the development of e-commerce, corporate education, proactive state actions and simplifying support programmes for SME investments), expanding public help programmes for medium-sized Polish companies or changing the role of business environment institutions so that they can provide entrepreneurs with proper help in terms of planning and running investments.

Key recommendations in the context of the regulatory environment, public institutions and instability comprise before all: streamlining the judiciary, active participation of Poland in EU institutions, simplified tax system, higher transparency and stability of law, simpler investment process, differentiation of regulations and administrative obligations according to the company size, proactive measures in public policies, simplified investment support programmes for SME as well as faster and more efficient administrative decision-making by local governments.

Key recommendations in the context of market institutions and infrastructure, including financial markets refer to the optimisation of the financial market as an intermediary between suppliers and recipients of capital and focus on developing the financial sector so that it can provide companies with an access to the sources of finance. These recommendations comprise taking care of a healthy banking sector and developing capital markets through developing the market of corporate bonds and tax incentives for buyers. An important aspect of such an activity is developing the system of credit guarantees for small companies as well as promoting ESG as a facilitation, not a barrier in the investment activity of companies. Currently, what matters most for Polish companies are grant instruments financed from EU funds and distributed by the administration and public agencies. For many companies it is still a vital source of finance which will run out by 2030. Due to that, domestic and regional financial institutions which accumulate return funds from the EU and the private financial sector should be strengthened.

Key recommendations in the context of physical infrastructure and accessibility of investment areas concern developing the public infrastructure, including the construction of a well-integrated transport infrastructure and developing the digital infrastructure, also of e-government and digitalised administration. Access to adequate infrastructure is vital for the previously underprivileged regions – particularly in Eastern Poland – and in the context of potential benefits offered by the reconstruction of Ukraine. It is necessary to ensure coherence between the transport and digital infrastructures, investment areas and access to labour markets, which will allow to attract investors and boost competitiveness of individual regions. Not only should we create new investment areas, but also reconstruct old industrial areas for brownfield investments.

Key recommendations in the context of the war in Ukraine include creating attractive conditions for companies which relocate their production from Ukraine to Poland, by facilitating the relocation process and ensuring relevant infrastructure. Increasing investments in eastern Poland, also these enhancing the road and border infrastructure, can encourage the flow of investments related to the reconstruction of Ukraine and boost attractiveness of the region to foreign investors. Moreover, it is necessary to establish a support system for Polish companies interested in investments in Ukraine, as providing reliable information on the investment prospects in this country can help Polish entrepreneurs tap into the opportunity presented by the reconstruction of Ukraine.

Key recommendations in the context of dwindling accessibility of human resources and human capital as well as their costs are a basis for formulating advice on increasing focus on investments in people and technologies, which in particular refers to investments using highly qualified workforce and innovative technologies, and taking measures geared towards growing labour efficiency and creating high-income job places. It requires an adequate access to qualified workforce and providing investment-conducive conditions such as good infrastructure and access to financing and assistance programmes. It is very important to properly manage the process of raising wages, also the minimum wage, so that on one hand it can stimulate the creation of highly efficient work places, but on the other, will not undermine company competitiveness.

Key recommendations in the context of stable and sustainable energy production involve three areas of activity. Firstly, it is necessary to ensure the stability and predictability of energy regulations, also these on RES. Secondly, implementation of the energy policy should lead to obtaining access to energy at a low and stable price and working out such an energy mix which will account for two fundamental climate goals – using RES and non-emissive energy (nuclear power). Thirdly, it is necessary to encourage companies to invest in technologies and construction materials allowing

to obtain energy from renewable energy sources and to achieve climate neutrality. Introducing financial incentives, such as tax reliefs or subsidies for RES investments may encourage companies to make more sustainable and innovative investments, which as a result will enhance the development of the energy sector in Poland.

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CENTRAL AND EASTERN EUROPEAN COUNTRIES IN A HIGH-INFLATION ERA

DOI: 10.33119/978-83-8030-625-7.2023_61_124

Abstract

The study focuses on the situation of Central and Eastern European economies (Bulgaria, Czech Republic, Estonia, Lithuania, Latvia, Poland, Romania, Slovakia and Hungary) in 2022. The overlapping of unfavourable events in external and internal business environment, mainly an outbreak of the war in Ukraine, effected in an economic slowdown, manifested in quantitative (GDP, consumption, investment, industrial production, construction production, retail trade) and qualitative (business confidence, consumer sentiment) data. In Estonia the slowdown even turned into a technical recession. At the end of the year, there appeared some signs of a recovery in the manufacturing industry, and later, in construction and trade industries. They may foreshadow an upturn coming soon and an acceleration in the economic growth of the region.

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The beginning of the '20s of the 21s t century is marked by a very high intensity of cyclical changes in the world economy. It has come as a result of overlapping unfavourable developments in the external and internal economic environment. The COVID-19 pandemic was followed by the war in Ukraine. Economies of the Central and Eastern Europe (CEE) have been experiencing tough consequences of the painful war drama playing out in the region. Next to the challenges unleashed during the pandemic, including disruptions in commodity supplies, there are more problems to come. Sanctions imposed on Russia and Belarus have had negative repercussions for

the economic processes, both on the supply and demand side. Diminishing income purchasing power has severely limited consumption, which for countries that rely on consumption as a key growth driver means a drop in GDP growth. The costs of fighting the pandemic, just like the costs of helping Ukraine, have negatively affected investments, putting a swift economic recovery at risk. Although the learning from running the economy in tough conditions during the pandemic bears some fruit, it does not seem enough to face up to all present threats. After a speedy rebound following the COVID-19 crisis, since the beginning of 2022 we have observed another downturn. The greatest threat to the economies of the region is constituted by a repeated economic slowdown and rising inflation. A growing intensity of these occurrences creates a risk of stagflation.

The invasion of Russia on Ukraine in February 2022 had considerably transformed the economic situation in CEE which in the years 2020–2022 was seriously disturbed by the consequences of the COVID-19 pandemic. Outbreak of the war brought about an influx of refugees from Ukraine to CEE countries, mainly to Poland, which drove up demand for consumer goods and labour supply. As a result of the war and the imposed sanctions, many supply chains were disrupted and energy prices rocketed, which gave rise to a dramatic surge in inflation across the entire EU. That caused a dwindling consumer sentiment, a rise in precautionary savings and a slump in the purchasing power of households.

The climax of the complex situation of recent years seems to be the economic crisis visible in the data and forecasts of numerous institutions and independent economists. This part of the report is devoted to the assessment of this crisis prospects.

The purpose of the paper is to study the economic situation on nine CEE economies: Bulgaria, Czechia, Estonia, Lithuania, Latvia, Poland, Romania, Slovakia and Hungary in 2022, focusing particularly on the situation in the processing industry, construction and trade. The study has employed quantitative variables describing the macroeconomic situation of the economies: GDP, investments, private consumption, retail sales, sold production of the processing industry and construction, and indices obtained from the findings of the study of the economic situation using a test method. They reflect the opinions and sentiment of the market players.

The study of the economic situation focuses on an assessment of cyclical fluctuations understood as trend divergences. The reference variable for changes in the economic situation of the region will be the relevant macroeconomic indices, defining the situation in the EU as a whole (EU-27).

General economic situation

A swift recovery of CEE economies after the COVID-19 crisis was short-lived [Adamowicz et al., 2022]. At the start of 2022 , both in EU-27 and in CEE countries another economic slump could be observed. The cyclical changes in particular countries were to a large degree synchronised. Just like the anti-pandemic restrictions, the war sanctions which stifled economic activity affected the economies of the region both at the same time. The main macroeconomic variable, GDP (adjusted seasonally), reached the highest level after the pandemic at the turn of 2021 and 2022, except for Romania, where an upward trend initiated in Q4 of 2020 persisted. Since the first months of 2022 the real GDP growth rate has been decreasing, and in the growth cycle a contraction phase has been developing.

The pace of change varies among countries. In Romania, a positive growth rate of the real GDP continued for the entire 2022, it was relatively stable, fluctuating between 4.0% in Q2 and 4.8% in Q4. In the other countries of the region and EU-27, GDP growth rate kept falling quarter to quarter. In EU-27, Bulgaria, Czechia, Latvia, Poland, Slovakia and Hungary for the entire year the real GDP growth rate was positive – the highest in Poland, from 10.7% in Q1 to 0.6% in Q4, and the lowest in Slovakia from 2.9% in Q1 to 1.2% in Q4. In Estonia and Lithuania a negative real GDP growth rate was recorded: already in Q2 in Estonia (–0.6%, a classic recession), and later in Lithuania (–0.4% in Q4).

The crisis caused by the war in Ukraine is to a large extent a crisis of the falling confidence of all market players. Both in all studied countries of CEE and in EU-27 the value of the Economic Sentiment Indicator (ESI) (adjusted seasonally), which is an indicator of confidence, kept rising until Q1 of 2022. The earliest it reached its highest value in Slovakia (September 2021), then in Czechia and Latvia (February 2022). Changes in sentiment took place with diverse intensity in different countries. The earliest signals of improvement were observed in mid-2022 in Bulgaria and Latvia, and the latest in December 2022 in Estonia and Lithuania. In these couple of final months ESI lost from almost 3.0 pts (in Romania) to over 26 pts (in Estonia); in EU-27 it stood at 24.9 pts, so it accounted for a 0.6-fold (in Bulgaria) to a 2.6 -fold standard deviation (ESI values in 1996–2022). Currently, at the beginning of 2023, economic confidence in the region stands at about the level of the post-pandemic recovery, so above the historical minimum on one hand, and below the long term average, on the other. Low, negative values of the ESI indicator confirm the persisting uncertainty and pessimism of market players.

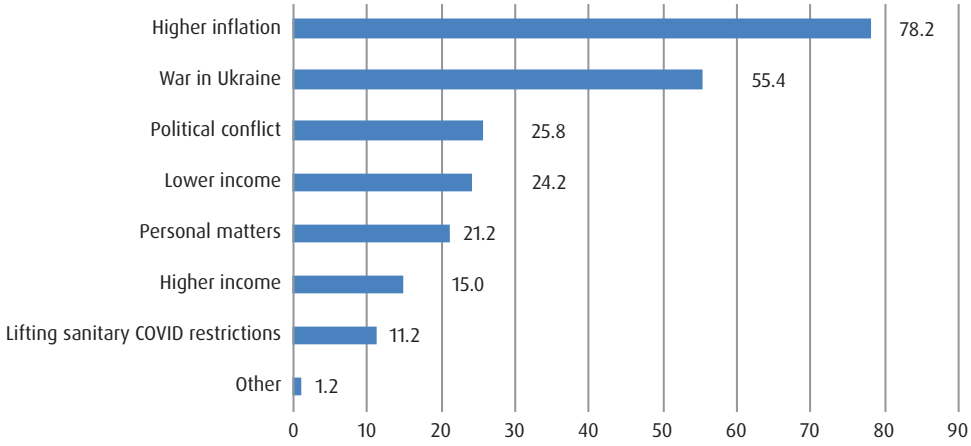
The war in Ukraine, just like the COVID-19 crisis, has disrupted the growth paths of all analysed economies. In consequence of these two crises, at the end of 2022 the

real GDP was only slightly higher than at the end of 2019, i.e. by: 1.08% in Slovakia, 2.95% in Estonia, 4.47% in Latvia, 4.98% in Hungary, 6.26% in Lithuania, 6.37% in Bulgaria, 7.14% in Poland and 7.91% in Romania. In Czechia the real GDP in Q4 of 2022 fell below the level of Q4 of 2019, by 1.0%. By comparison, in EU-27 the real GDP at the end of 2022 was by 2.84% higher than before the COVID-19 pandemic. Sluggish economic activity and high inflation put the European economies at the risk of a looming stagflation. However, economic sentiment fluctuations show certain signs of an economic upturn, and we expect the quantitative data for Q1 of 2023 to confirm the trends anticipated by the leading economic indicators.

Private consumption

The situation of households in recent years has been determined originally by the economic crisis of the COVID-19 pandemic and then by the energy crisis resulting from the war in Ukraine. Some countries of Europe in this period conducted unconventional monetary and budget policies – in the EU a fiscal rules abolition clause was implemented, and the monetary policies of many member states, including some CEE countries, were based on quantitative easing (QE). They resulted in dramatically surging inflation. In 2022 inflation in CEE countries was two times higher than in the "old" EU countries. At the end of 2022 the highest CPI rate was observed in Hungary (25% y/y), and the lowest in Romania and Bulgaria (14.1% and 14.3% accordingly). In the eurozone the inflation rate accounted for 9.2% y/y, and in EU-27 10.4% – y/y. Increased inflation encouraged central banks to tighten their monetary policies, which led to significant rises in interest rates. High inflation combined with increased interest rates has exerted a strong impact on the economic situation of households and has affected their economic decisions. In mid-2022 in its quarterly survey of the condition of households, the Institute for Economic Development (IRG) of SGH asked Poles 1000 questions about the factors which had had the most effect on their perception of life quality. The most frequently repeated answer in the survey was "rising inflation" (72.8% of respondents). The other answers respondents provided were: "war in Ukraine" (55.4%), "political conflict" (25.8%), "falling income" (24.2%). One in five respondents mentioned "personal problems" as important factors of life quality, and "lifting covid restrictions" was indicated by a mere 11.2% of respondents (Figure 1).

Figure 1. Proportion of answers provided to the question: *What had the biggest impact on your general perception of life quality?* (%)



Note: $n = 1000$ Polish households.
Source: ZPF and IRG SGH.

The falling purchasing power of incomes as a result of rising inflation caused the consumption of households to shrink in some countries: in Czechia real consumption (adjusted seasonally) has been shrinking since Q4 of 2021, in Estonia and Lithuania the downward trend has continued since Q2 of 2022, in Poland consumption has been falling since Q3 of 2022. In the other countries of the region private consumption has been increasing steadily since the moment the COVID-19 crisis was overcome (only in Latvia in Q2 of 2022 a one-off instance of a fall in consumption of 0.9% q/q was observed). It should be noted that during the COVID-19 crisis, changes in the volume of consumption (in a classic cycle) in CEE countries stayed at similar levels. Currently, fluctuations in consumption among particular countries of the region vary substantially. Similar conclusions may be drawn from the study of the cyclical component of private consumption. In Czechia, Poland, Estonia and Lithuania the contraction phase is still in progress. In the remaining countries the growth phase is continued.

Synchronicity of cyclical fluctuations in household sentiment is much greater than the synchronicity of cyclical variations in consumption. In particular countries these values stay at similar levels. Since the end of 2021 consumer sentiment has been on a downward trend. At the end of 2022 the value of the Consumer Sentiment Index (CSI) was lower than a year before by: 22.3 pts in EU-27, 37.5 pts in Hungary and 3.2 pts in Bulgaria. In Estonia and Latvia these falls exceeded 20 pts, just like in Czechia. In Poland the fall accounted for about 10 pts, and in Lithuania for 11.8 pts. At the end of

2022 the sentiment of households measured with the CSI index was more pessimistic than during the pandemic crisis. Although at the end of 2021 household sentiment in EU-27 and in all countries of CEE deteriorated, private consumption in some of them is still on an upward trend. It is partly due to the fact that negative fallout from inflation becomes apparent with a certain delay.

Corporate investments

Corporate investments usually react relatively fast and strongly to the changing business environment and confidence in the economy [Radzikowski, 2023]. A slowdown in the investment rate across the region was seen already in 2019, but a real downturn started after the COVID-19 pandemic had broken out. All throughout 2020 corporate investments kept shrinking, both in EU-27 (by 5.4% in real terms), and in most CEE countries (the highest falls in Slovakia – of 10.8%). As soon as the pandemic restrictions were lifted and a recovery in the European economy started, companies began rebuilding their investments. In 2021 they increased in all countries of the region, except for Bulgaria – with the greatest growth in Lithuania (of 7.8% in fixed prices), and the lowest in Slovakia (of 0.2%); by comparison in EU-27 these rises reached 3.8%. In Czechia, Poland, Romania, Slovakia and Hungary, as well as in EU-27, the rises of 2021 ended over two years of the contraction phase in the investments cycle. In three countries: Bulgaria, Lithuania and Latvia the rebound in investments was too subdued to break the downward trend. In Estonia, contrary to all other countries, investments reached a peak of the cycle only in Q1 of 2021, and have been in the contraction stage ever since.

In 2022, following the outbreak of the war in Ukraine, and as a consequence of high inflation and significant rises in interest rates, the investment momentum visibly slowed down. In two countries, i.e. in Bulgaria and Estonia investments even shrank by 4.3% and 10.9% on 2021 (in real terms), accordingly. The biggest rise was observed in Romania (of 8.0%), followed by: Slovakia (of 6.5%), Czechia (of 6.2%), Poland (5.0%), Lithuania (2.6%), Hungary (1.2%) and Latvia (0.7%). In EU-27 as a whole the rise in real investments amounted to 4.0% y/y. At the end of 2022, most economies of the region, despite sluggish growth rates, at least managed to regain the level of investments from before the COVID-19 pandemic. The highest real increases in corporate investments (versus Q4 of 2019) were recorded in Estonia (a rise of 14.2%), Romania (of 11.3%) and Lithu ania (of 10.4%).

Processing industry situation

COVID-19 crisis in the processing industry in CEE was deep but short-lived. After a slump in Q2 of 2020, the situation in the processing industry improved swiftly. The growth phase lasted till the end of 2021. In the processing industry the symptoms of the upcoming slowdown had appeared before all other economic sectors reacted, i.e. at the start of 2022. In EU-27 the peak was reached in February, the same situation was in Estonia, Poland, Romania and Slovakia; Lithuania reacted one month earlier, Czechia, Latvia and Hungary reached the highest point in March, followed by the latest Bulgaria in April. Worsening of the economic situation took place across the entire economic area of Europe, although its intensity varied.

In EU-27 monthly rises in the sold production indices of the processing industry (2015=100, seasonally adjusted and smoothed) in subsequent months of the year were alternately positive and negative, and they did not exceed, except August – 2.0 pts (within the limits of a standard deviation). Two times, in April and July, the index fell below the level of a year before. At the end of the year the index reached the level 0.6 pts higher than in December 2021. Among all economies of the region, the highest slumps were observed in Estonia and Slovakia. In both countries, for most of the year, the sold production index was losing value month to month, negative increases kept gradually deepening, particularly in the second half of the year, and in December 2022 the index reached a value lower than a year before by: 9.8 and 15.1 pts (in both cases these falls exceeded a standard deviation). In three countries: Lithuania, Latvia and Romania annual decreases in the index were noted too, accordingly by: 15.5, 3.8 and 4.1 pts. In Bulgaria, Czechia and in Hungary the cyclical slowdown in the processing industry output was much more superficial – fluctuations in the index in subsequent months did not exceed 5.0 pts. (m/m) and, despite the slowdown, towards the end of the year the index reached a level higher than in December 2021, accordingly by: 15, 5.9 and 7.6 pts. In Poland a deceleration of the processing industry activity was short-term. All throughout the year annual increases in the production index were positive and double-digit (like in Bulgaria), and the downward trend was reversed in September. In December 2022 the index reached the value higher by 12.5 pts. than a year before.

The contraction in the processing industry in 2022 should be viewed as resulting from the war in Ukraine, imposition of economic sanctions on Russia and Belarus and its direct consequences, i.e. a slump in the supply of some raw materials on the markets, increased prices and disrupted trade relations as well as trade directions in international relations. This has brought about changes in the structure of industrial production and disruptions in its continuity. Uncertainty about future economic

conditions has surged, as is commonly believed [Niedziński, 2023], war changes the existing geopolitical order, which has a lot of bearing on the economies. This high uncertainty was reflected in a collapsing producer sentiment which coincided with the Russian aggression on Ukraine. The highest value of prosperity in the processing industry (seasonally adjusted) for EU-27 was recorded in December 2021 (13 pts) when speculations about the war appeared. Still in February 2022 this index stood at 12.2 pts. It should be noted, though, that most opinions on the economic situation in the processing industry come in the second and third week of the month, thus in the February edition, the consequences of the war outbreak (24 February) could not be accounted for in full. In subsequent months of the year the value of the index kept gradually falling, in November it hit negative values, only to reach –1.5 pts at the end of the year. The trend of the cyclical component of the index showed a fall earlier than the corresponding quantitative variable, i.e. the sold production index of the processing industry, as already in August 2021 in CEE countries the values of this index were lower on average than in EU-27, and stayed negative almost for the entire year. Signals of a weakening confidence appeared already towards the end of 2021 – first in Estonia (in October), then in Czechia and Latvia (in March 2022). In most countries of the region it lasted until the end of 2022. The lowest values of the economic situation index were observed: in October in Bulgaria, in December in Slovakia, in February 2023 in Estonia, Lithuania and Hungary, and in March this year in other countries. In the contraction phase, mostly taking place in 2022, the economic situation index lost in value from 3.3 pts in Romania to 35.2 pts in Estonia (15.1 pts in EU-27), i.e. from 0.6-fold in Romania to 3.3 -fold in Czechia of the standard deviation, generally much more than the corresponding production index. Processing industry sentiment in the discussed period fluctuated more than the key quantitative indicator – the volume of output.

Generally speaking, despite many adverse factors overlapping, the slump of the early 2022 in the processing industry had been quite swiftly overcome. It is hard to decide, though, whether the recovery signals observed at the turn of 2022 and 2023 will persist. In Poland, cyclical components of both analysed indices point out to the end of the downturn. In the remaining countries, (in Slovakia, Baltic countries and in Hungary) signals of an improved situation are either ambiguous or imply the recovery may be fragile (in Bulgaria, Czechia and Romania).

Economic situation in the construction industry

In mid-2020, across the entire region (also in EU-27 generally, in Romania at the end of 2020) we could see the end of the downturn in the construction business cycle which was initiated in 2019 and accelerated by the pandemic crisis. In subsequent quarters a fairly dynamic recovery was observed. Rapid increases in the prices of raw materials, commodities and energy in the second half of 2021, and particularly the war in Ukraine which broke out in February 2022, drove up the costs of production and prices of construction services. In the study of the economic situation of the Polish construction industry, conducted by IRG SGH in Q1 of 2023, A rise in the prices of construction materials was acknowledged as the main barrier to business development by as many as 72.5% of the surveyed construction companies. By comparison, slightly below a half (49.2%) of respondents pointed out to tax burdens as a barrier to development. Unpredictable prices on the construction market, slumping real incomes of households and a worsening credit crunch drove many investment projects to a halt and hampered individual clients' decisions to buy property. In most CEE countries and in EU-27, Q1 of 2022 sa w a collapse in the construction business (in Romania towards the end of 2022). The value of the sold construction production index (2015=100, seasonally adjusted) in Q4 of 2022 was lower than three years earlier by: 2.3 pts in Bulgaria, 2.7 pts in Czechia, 10.1 pts in Estonia, 20.4 pts in Latvia and 9.4 pts in Slovakia. Only in four countries of the region it exceeded the level from before the pandemic, i.e. it grew by: 11.5 pts in Lithuania, 9.8 pts in Poland, 44.8 pts in Romania and 11.6 pts in Hungary (in EU-27 b y 3.0 pts).

Similar to the processing industry and trade, the construction business slump of 2022 was largely driven by a worsening of the corporate sentiment. After the COVID-19 crisis had ended in mid-2020, for the next several quarters a growth phase developed. At the peak of the cycle the economic situation index amounted to: –6.7 pts in Bulgaria (in August 2021), 7.1 pts in Czechia (in January 2022), 23.8 pts in Estonia (in October 2021), –8.5 pts in Lithuania (in January 2022), –8.7 pts in Latvia (in July 2021), 8.0 pts in Hungary (in September 2021), –16.5 pts in Poland (in November 2021), –7.2 pts in Romania (in January 2021) and –12.6 pts in Slovakia (in September 2021). In EU-27 CCI reached a high point in December 2021 of 8.4 pts. The outbreak of the war in Ukraine in 2022 caused a slump in the construction business. In most countries of the region already before the end of 2022 some symptoms of a revival could be noticed. Towards the end of 2022 the value of the CCI index was lower than a year before in most CEE countries and EU-27. It was also lower than three years before (i.e. before the COVID-19 pandemic) by: in Poland 12.6 pts, in Czechia 9.4 pts, in Hungary 21.8 pts, in Latvia 5.6 pts, in Romania 6.2 pts, in Bulgaria 10.1 pts, and in Esto-

nia 0.5 pts. In the EU-27 the difference amounted to –4.1 pts. Only in Slovakia and Lithuania the value of the index grew between December 2019 and December 2022 by 4.5 and 6.0 pts accordingly.

The turn of 2022 and 2023 brought about improved confidence of the construction companies and consequently, more prosperity in the construction industry. At the time of preparing this paper there are not enough data to claim that this recovery will turn out resilient and lasting, yet some revival signals, both in terms of qualitative data (leading signals) and quantitative data are quite apparent.

Economic situation in trade

Countries of the Visegrad Group experienced a severe slump in trade in 2020 which was followed by fluctuations dependent on the scale and scope of the pandemic restrictions tightening and relaxing. In 2022 we could see a gradual deterioration of the situation in trade, most visible in Slovakia and Hungary. In Poland in Q1 of 2022 still a positive value of the economic situation index in trade was observed, according to IRG SGH (0.3 pts), subsequent quarters brought about a drop in the index. Although retail sales data did not reveal a slump (in the first three quarters the average real retail sales dynamics reached 4.3%), overall economic sentiment fell considerably after the war in Ukraine had broken out. The same worsening sentiment was observed in EU-27. Between December 2021 and March 2022 the value of the trade situation index (RCI) in EU-27 fell by 5.1 pts (seasonally adjusted). Worsening of confidence in the analogical period was also observed in: Czechia (–2.2 pts), Poland (–2.9 pts), Romania (–3.2 pts), Estonia (–6.0 pts) and in Lithuania (–9.2 pts), some improvement was seen in: Bulgaria (5.8 pts), Latvia, Hungary (5.1 pts) and Slovakia (3.7 pts).

The second and third quarter of 2022 revealed further slumps in Poland, CEE countries and the entire EU-27. In Q2 of 2022 the value of the economic situation index according to IRG SGH, in comparison with the previous quarter fell by 5.2 pts, and in the next quarter declined by a further 6.3 pts. Between March and September the value of RCI deteriorated across the entire EU-27 (by 4.9 pts) and in seven out of nine CEE countries, most significantly in Estonia and Hungary. The only countries which showed growth were Romania (3.6 pts) and Slovakia (4.8 pts), which most probably was caused by an extraordinary rise in private consumption (average rise of 5.5% y/y, in fixed prices), higher than in the other CEE countries (3.5% y/y, in fixed prices). Average retail sales growth rates (in fixed prices, seasonally adjusted) were also lower than in Q1 of 2022 – in Q2 and Q3 in EU-27 and CEE countries they amounted to 0–2%, except Estonia (–0,1%). In Poland the retail sales growth rate reached 0.4% (compared

to the analogical period a year before). These falls across Europe were mostly owed to deteriorating consumer confidence after the war had broken out and the shrinking purchasing power of income when inflation was driven up by the energy crisis.

In Q4 of 2022 the situation in trade improved, although it still did not return to the level of Q1. In Poland the value of the trade situation index according to IRG SGH increased as compared against the previous quarter by 9.3 pts (to –3.6 pts), in EU-27 by 3.4 pts, and in six out of nine CEE countries by an average of 1.5 pts (in the other three it diminished). Average dynamics of retail sales in CEE countries in Q4 stayed at a slightly higher level than previously, and tiny slips y/y were recorded only in Czechia (of 0.3%) and Latvia (of 0.2%). In Poland retail sales in Q4 of 2022 seasonally adjusted in fixed prices grew by about 1.0% y/y. Despite gradual increases in the last months of 2022, the volume of retail sales in fixed prices (index 2015=100), in comparison to December 2021, in EU-27 at the end of 2022 was lower by 2.5% (also in Czechia and the Baltic states); only in five out of nine CEE countries in December 2022 a rise in the volume of retail sales was seen (including Poland with a rise of 3.7%).

Summary

2022 was a year of an economic downturn in CEE countries, caused mostly by the outbreak of the war in Ukraine, which only exacerbated the problems triggered by fighting the COVID-19 pandemic (procurement, inflation, budget, credit issues) and generated new risks in the economic environment (first of all political and military). A slowdown in the economy of the region is observable at the level of quantitative data (product, consumption, investments, industrial and construction output, retail sales) and qualitative data (producer and consumer sentiment). The scale of deteriorating sentiment exceeds the scale of the shrinking economic activity. The current recession is also a crisis of confidence, reflecting increasing uncertainty and pessimism of the market players.

In these turbulent circumstances, it is the processing industry that has emerged relatively unscathed. The slump in industrial output was rather superficial and short-lived, almost unnoticeable in Czechia for that matter. Towards the end of the year, most countries of the region experienced some signs of a revival in the manufacturing industry. At the turn of 2022/2023 subtle signals of recovery were also observable in the construction industry and retail.

The picture of how the economic situation fluctuates in different CEE countries is not uniform. In Estonia the slowdown has turned into a recession, despite quite a substantial increase in investments. The situation in other Baltic countries is not much

better. The most negligible drop in the economic activity took place in Romania. Despite a general contraction in the Romanian economy, much higher investment and consumption growth rates were maintained than in other countries of the region. A low level of consumption and investments constitutes a major threat to the economic growth of CEE countries. The economic slowdown of 2022 has severely hit both groups of private expenditure. In most countries of the region the current level of investments is lower than before the COVID-19 pandemic, and the level of household consumption is only slightly higher.

The above mentioned signals of recovery may indicate that we have just witnessed an accelerated restructuring of European economies, which was largely forced by the sanctions imposed on Russia and Belarus and geopolitical changes. Although uncertainty about the future of the war in Ukraine is still stifling a more dynamic upturn, it may be expected that as the restructuring continues, sources of high inflation will cease, real household incomes will start rising, and in consequence, the consumption slump will be overcome, making consumer spending again a key driving force of the economic growth.

ANNEX

Attachment 1. Variable description

The following quantitative macroeconomic indicators were used for analysis:

- Gross Domestic Product (GDP), fixed prices 2015 = 100 1995 – Q4 2022;
- household consumption (CONS), fixed prices 2015 = 100, Q1 1995 – Q4 2022;
- gross outlays on fixed assets (INV), fixed prices 2015 = 100, Q1 1995 – Q3 2022;
- sold industrial production (IP), fixed prices 2015 = 100, January 2000 – December 2022;
- sold construction production (BLD), fixed prices 2015 =100, January 2000 – December 2022, excluding Estonia, Lithuania and Latvia, due to no data available;
- retail sales (TRD), fixed prices 2015 = 100, January 2000 – December 2022;

and qualitative data from the studies conducted using the business cycle test method:

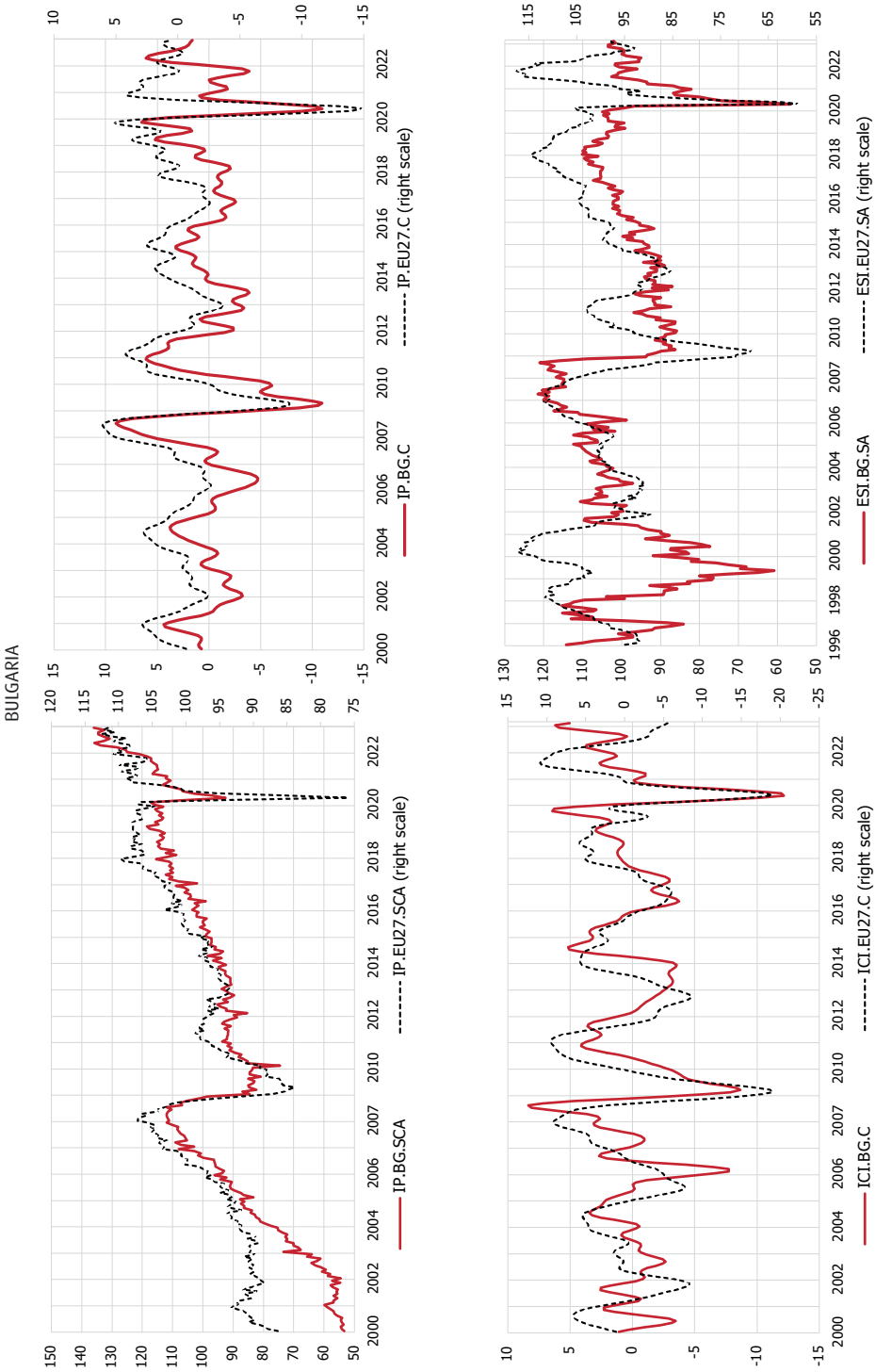
- economic situation index (ESI), January 1996 – February 2023;
- index of the household situation (CSI), May 2001 – February 2023, except Romania due to no data available;
- index of the processing industry situation (ICI), January 2000 – April 2023;
- index of the construction business situation (CCI), January 1998 – February 2023;
- index of the situation in retail (RCI), January 2000 – February 2023.

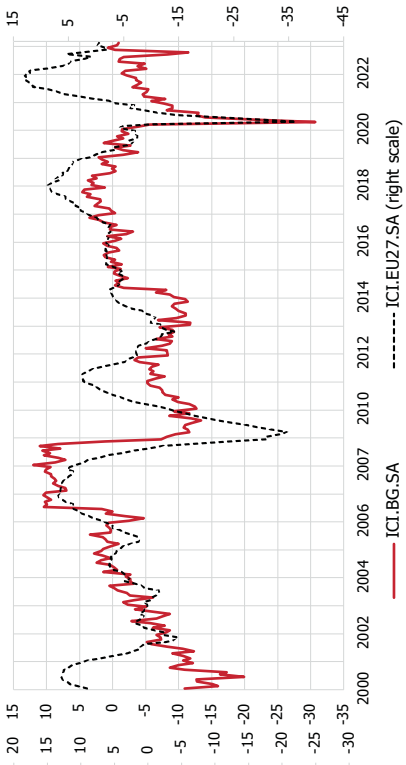
Time series of qualitative economic situation indices in Poland come from the research conducted by IRG SGH[1]. The other data have been sourced from the Eurostat base (https://ec.europa.eu/eurostat/data/database) in the form of clean data without seasonal fluctuations (SA) and calendar effects (SCA). Cyclical components (C) have been identified using the Christiano-Fitzgerald filter. IRG SGH data have been detrendised and deseasonalised using the X-13ARIMA -SEATS method.

In the graphs included in Attachment 1, two aligned series and their components have been described as follows: [index_code]. [country_code]. [series_transformation_code]. For instance, GDP.BG.C stands for a component of the single-base GDP index of Bulgaria at average prices of 2015, ICI.PL.C, in turn, signifies a cyclical economic situation component of the processing industry (from IRG research).

[1] More information on the economic situation research run by IRG SGH may be found on: http://kolegia.sgh.waw.pl/pl/KAE/struktura/IRG/ koniunktura/Strony/default.aspx (access: 17.04.2023).

Attachment 2. Graphic documentation

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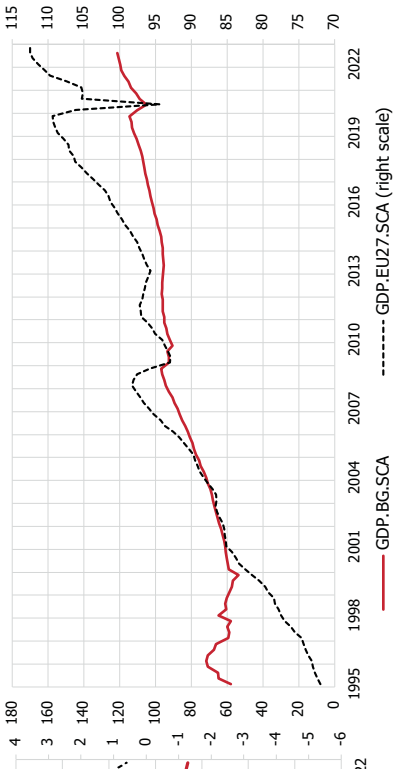
ICI.BG.SA
ICI.EU27.SA (right scale)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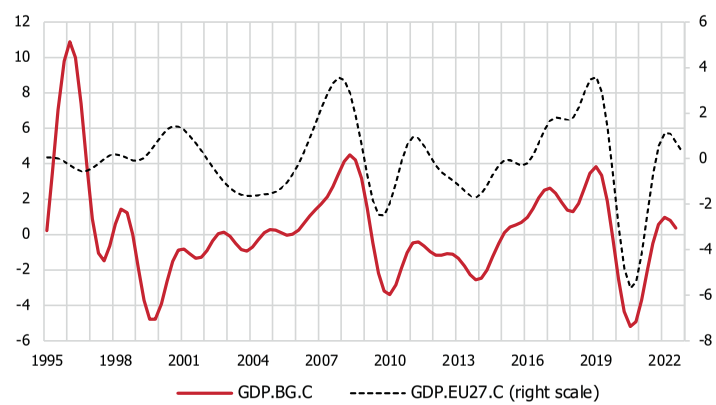
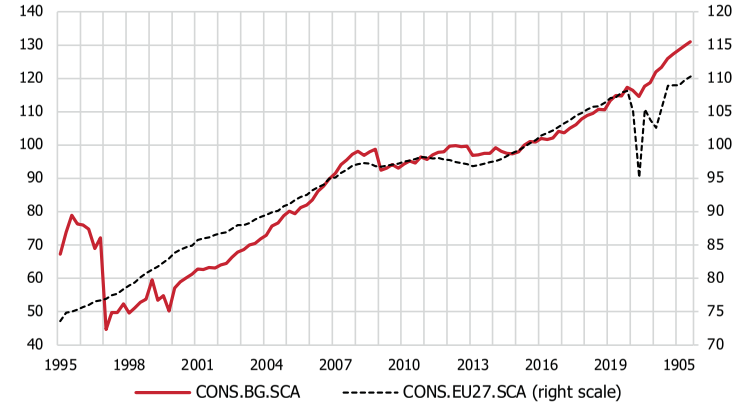
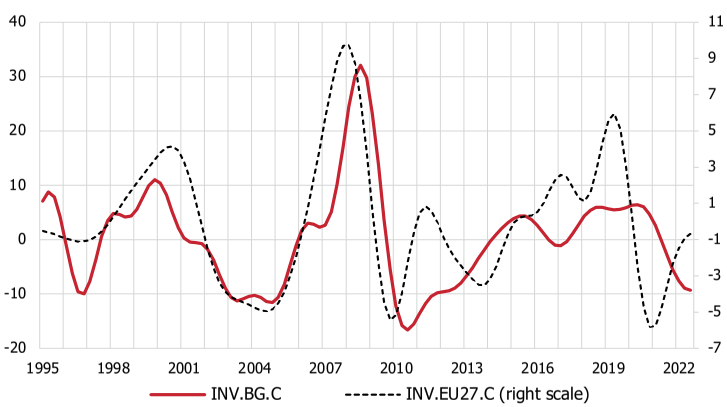
CONS.EU27.C (right scale)

GDP.BG.SCA
GDP.EU27.SCA (right scale)


GDP.BG.C
GDP.EU27.C (right scale)


CONS.BG.SCA
CONS.EU27.SCA (right scale)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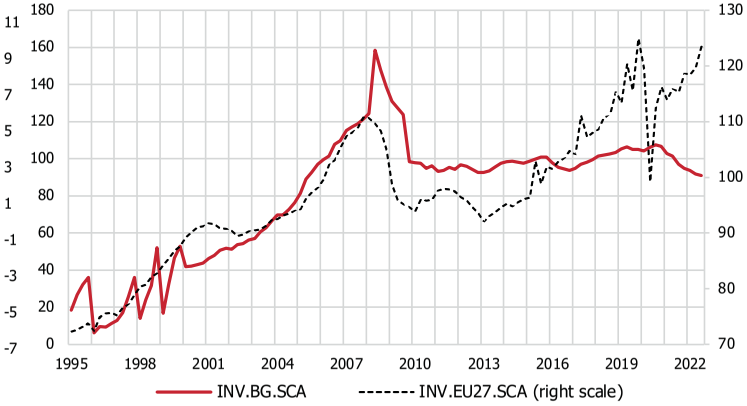
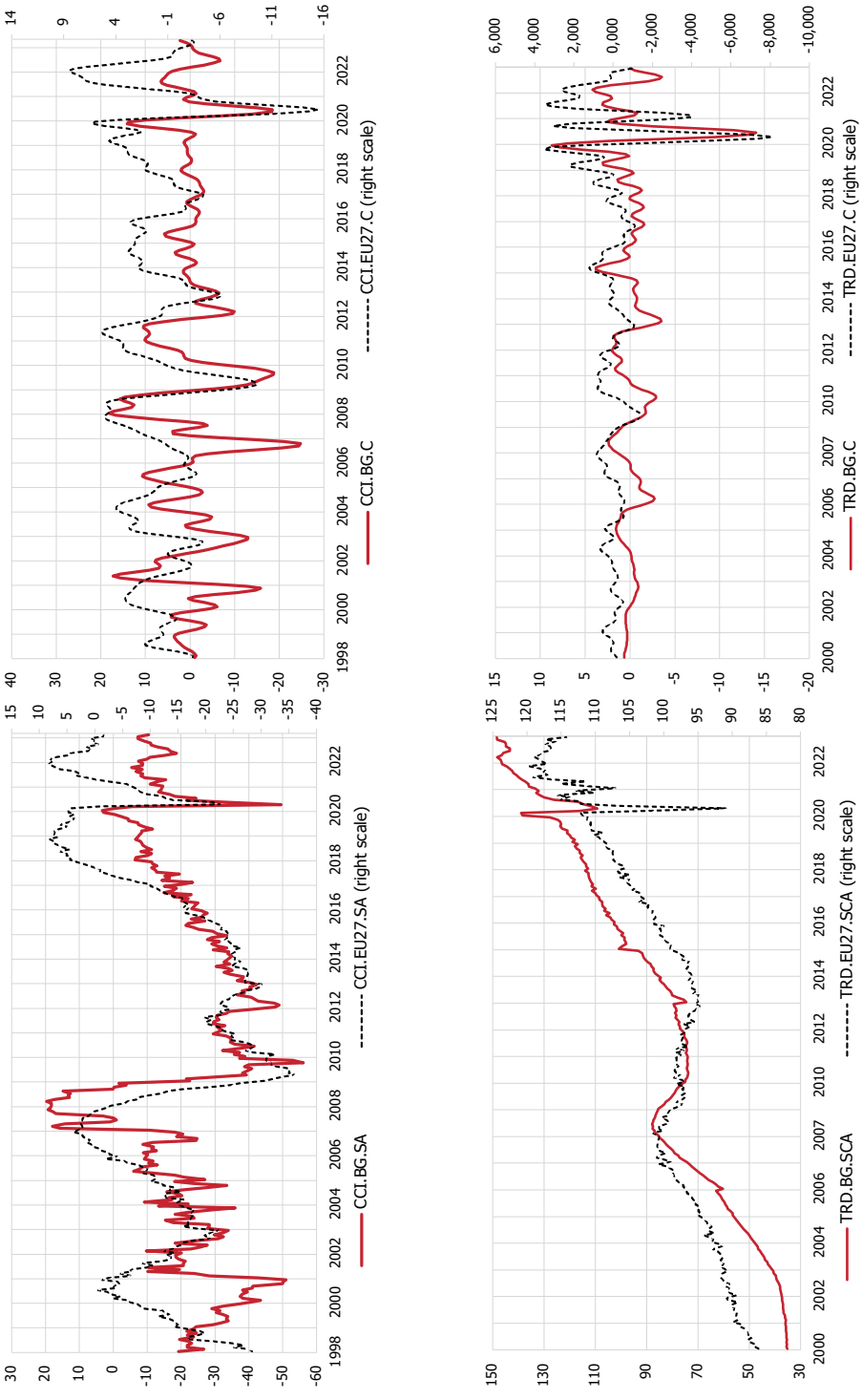
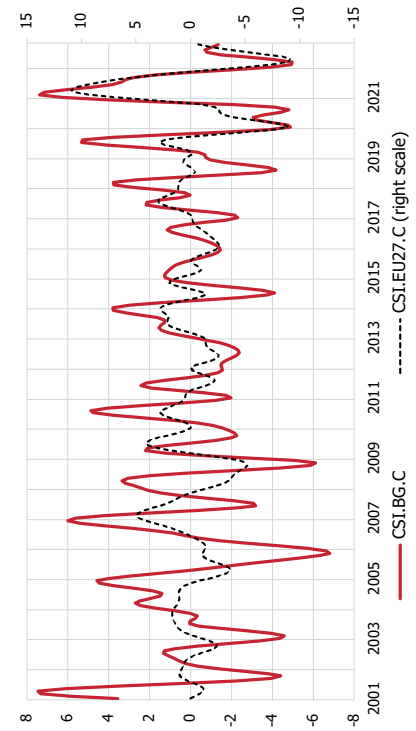
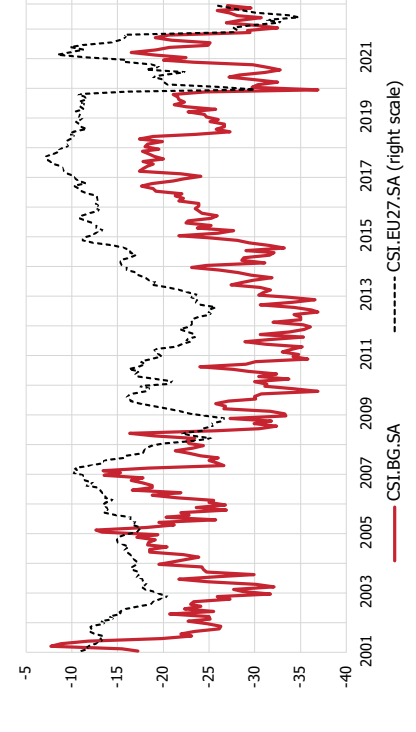
INV.EU27.C (right scale)


INV.BG.SCA
INV.EU27.SCA (right scale)


CCI.BG.C
CCI.EU27.C (right scale)
CCI.BG.SA
CCI.EU27.SA (right scale)
TRD.BG.C
TRD.EU27.C (right scale)
TRD.BG.SCA
TRD.EU27.SCA (right scale)


CSI.BG.C
CSI.EU27.C (right scale)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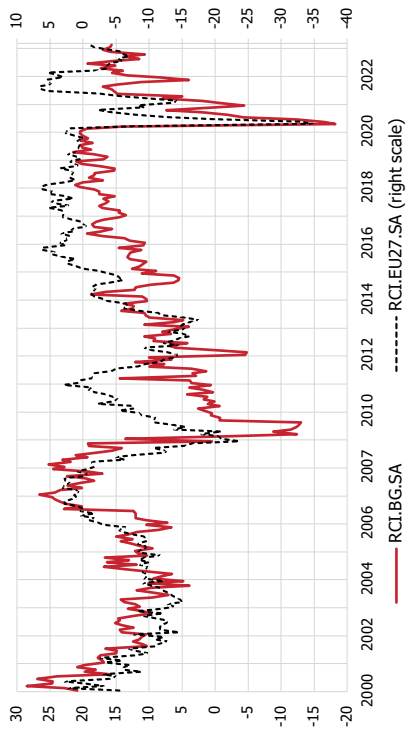
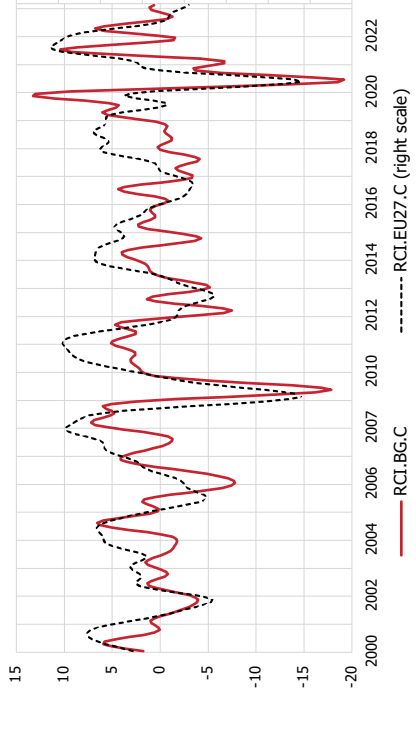
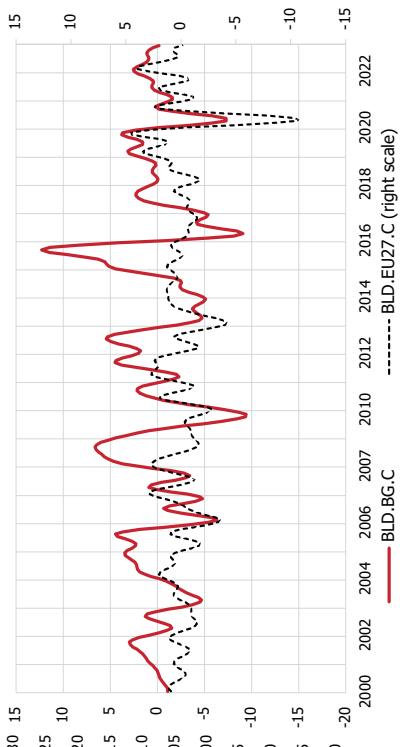
CSI.EU27.SA (right scale)


RCI.BG.SA
RCI.EU27.SA (right scale)


RCI.BG.C
RCI.EU27.C (right scale)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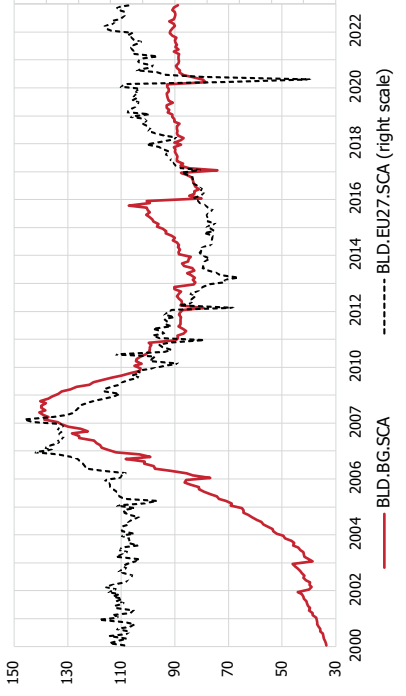
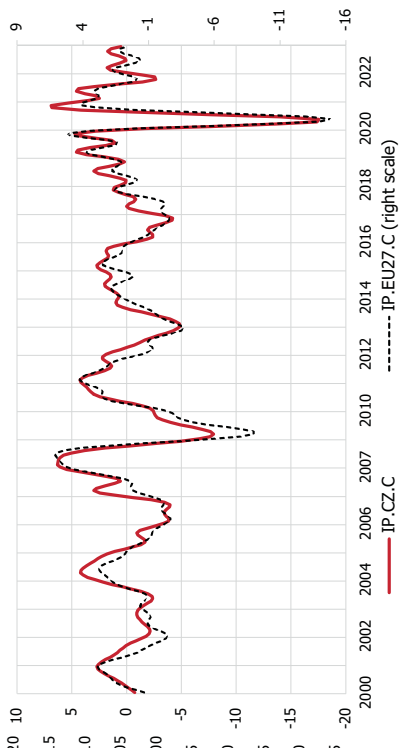
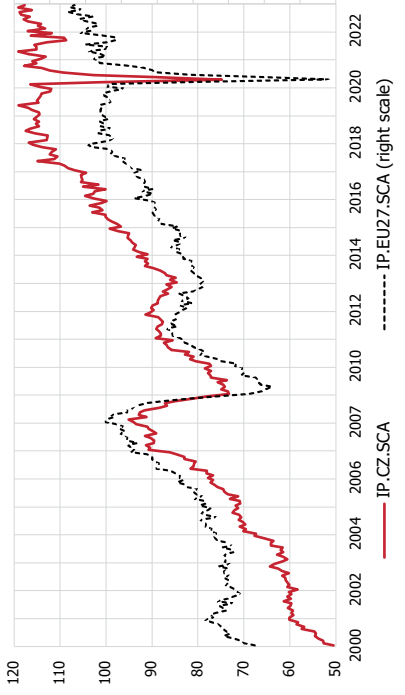
BLD.EU27.C (right scale)


BLD.BG.SCA
BLD.EU27.SCA (right scale)

CZECHIA


IP.CZ.C
IP.EU27.C (right scale)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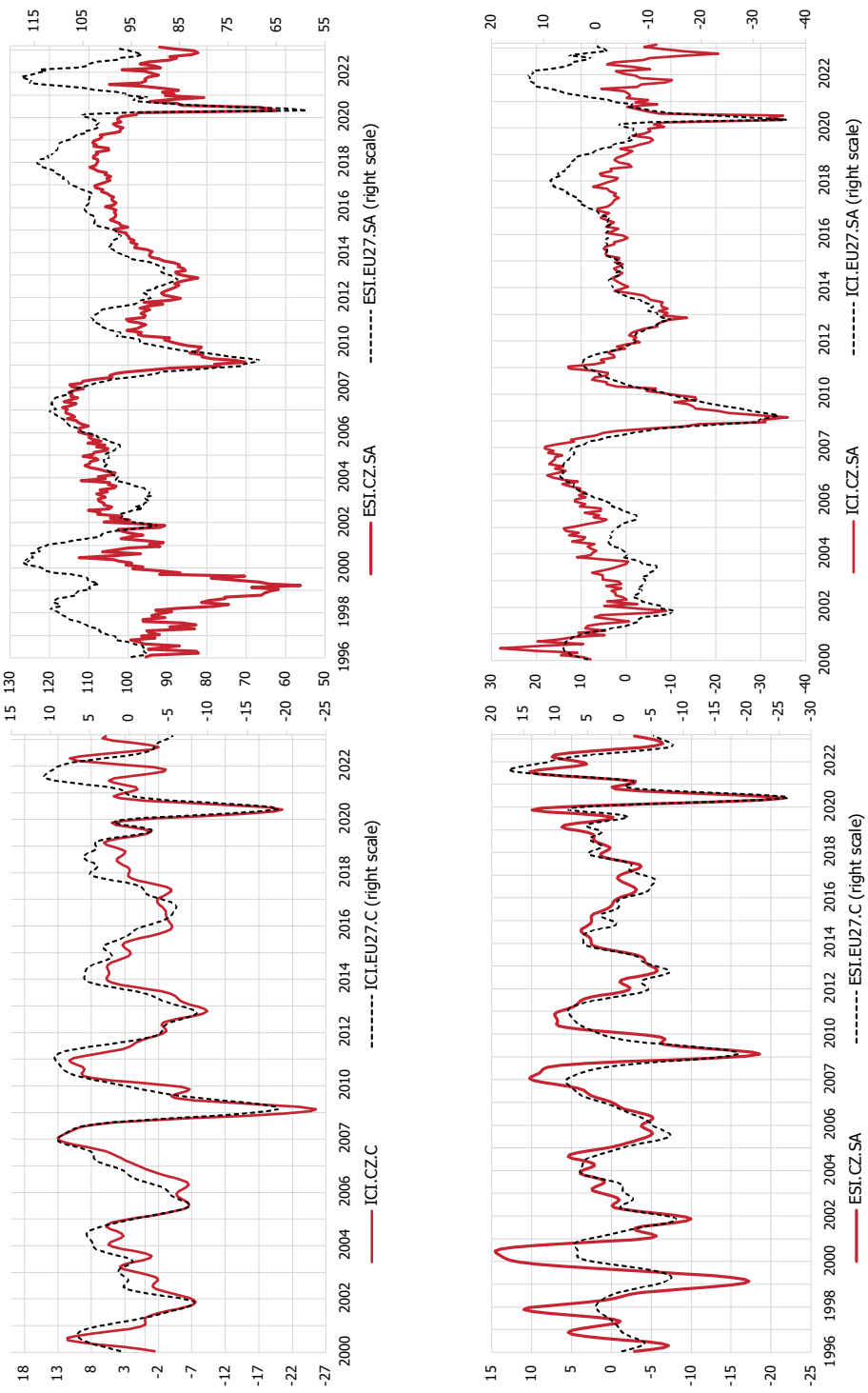
IP.EU27.SCA (right scale)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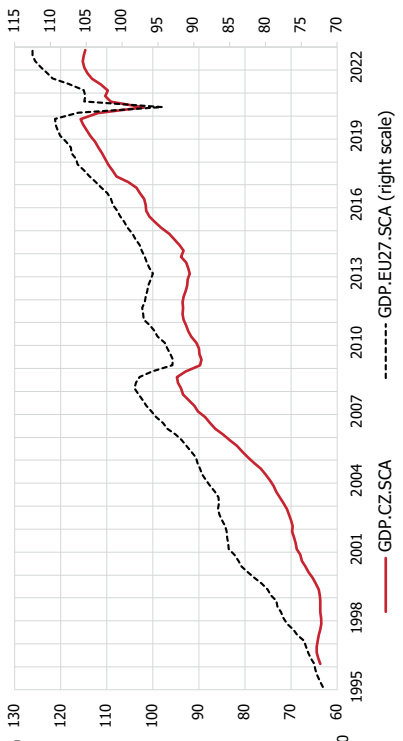
ESI.EU27.SA (right scale)
ICI.CZ.SA
ICI.EU27.SA (right scale)
ICI.CZ.C
ICI.EU27.C (right scale)
ESI.CZ.SA
ESI.EU27.C (right scale)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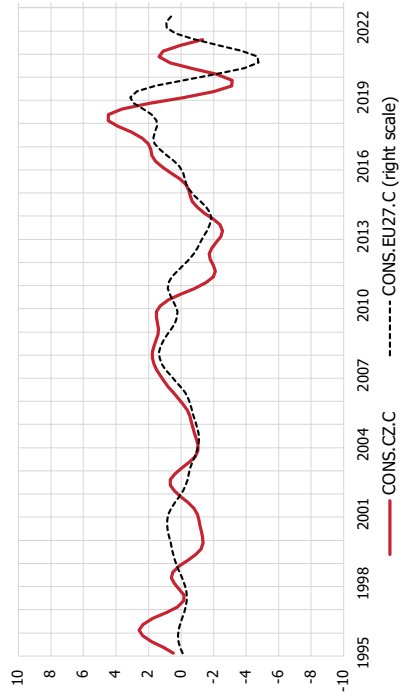
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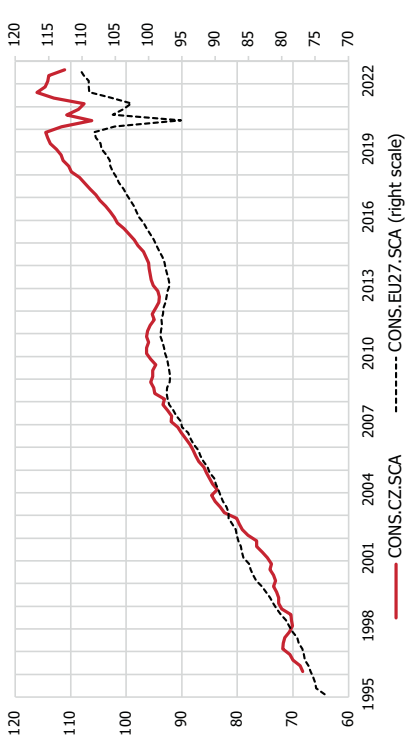
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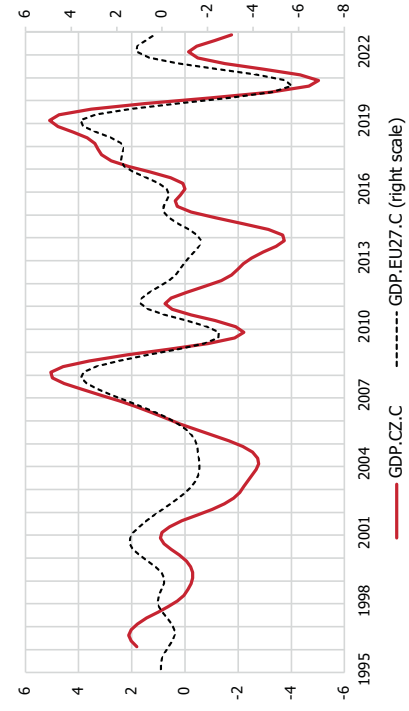
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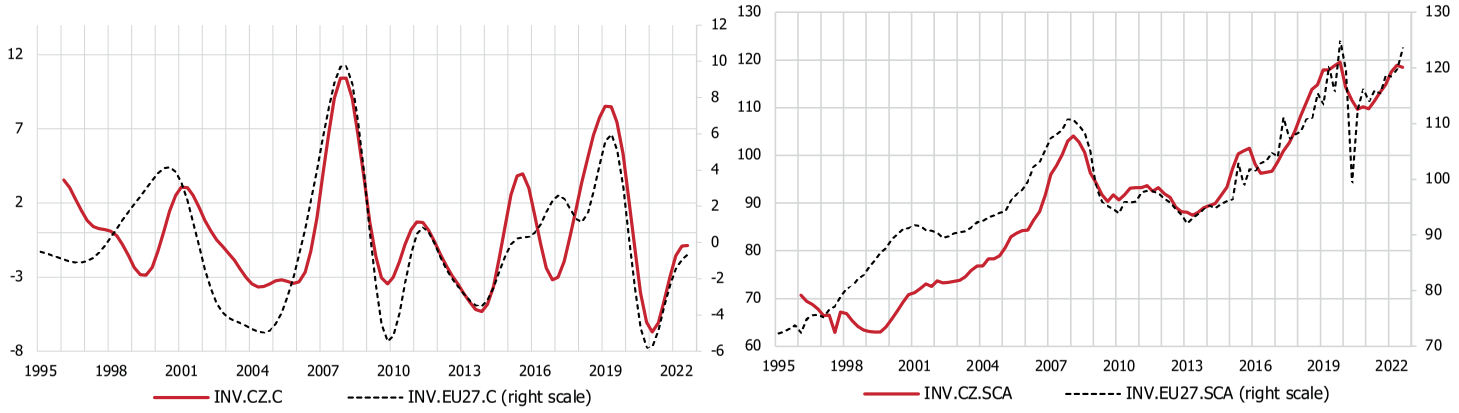
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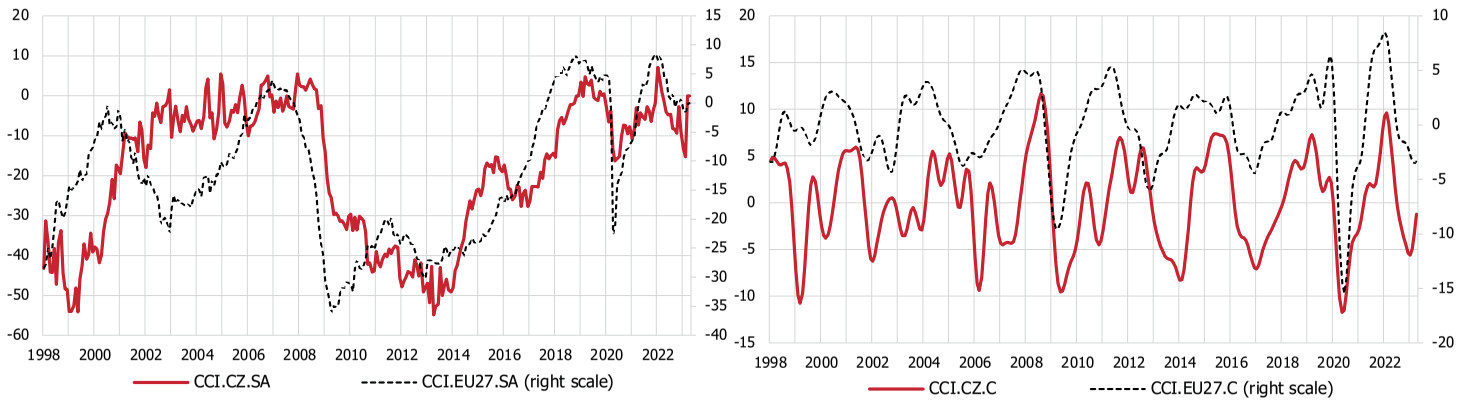
INV.EU27.C (right scale)
INV.CZ.SCA
INV.EU27.SCA (right scale)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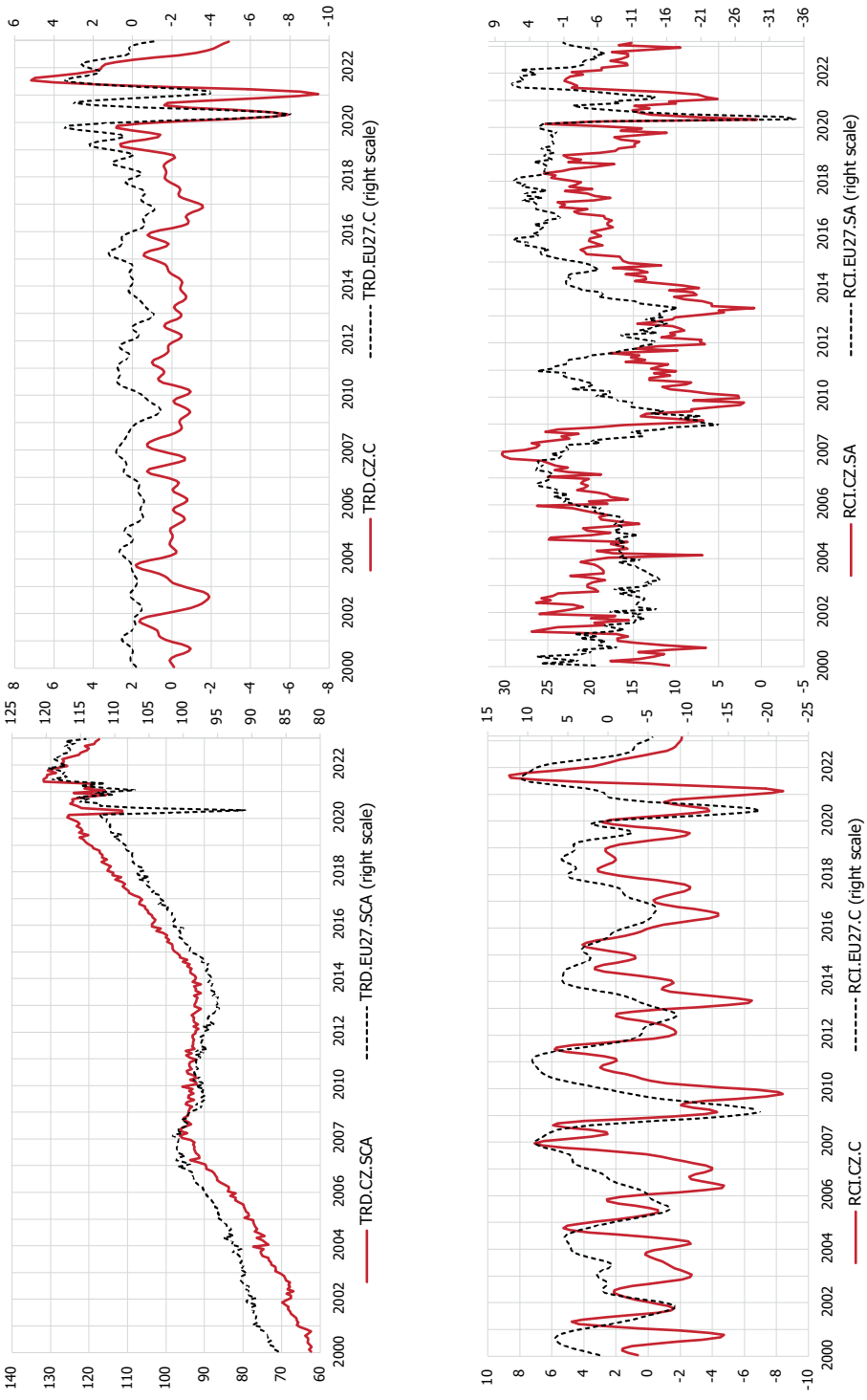
CCI.CZ.C
CCI.EU27.C (right scale)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TRD.EU27.SCA (right scale)
TRD.CZ.C
TRD.EU27.C (right scale)
RCI.CZ.C
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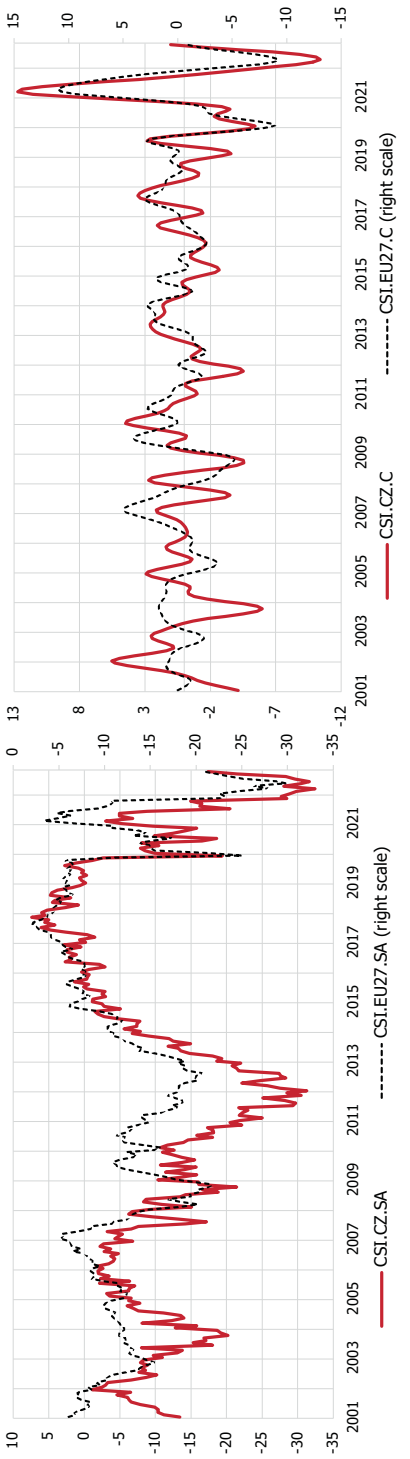
RCI.CZ.SA
RCI.EU27.SA (right scale)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CSI.CZ.C
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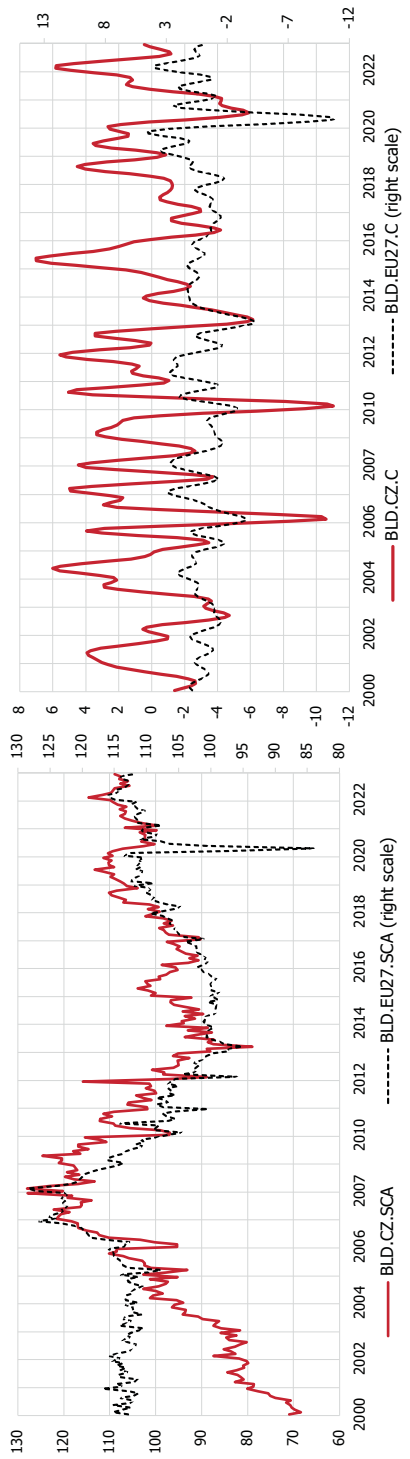
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BLD.EU27.SCA (right scale)

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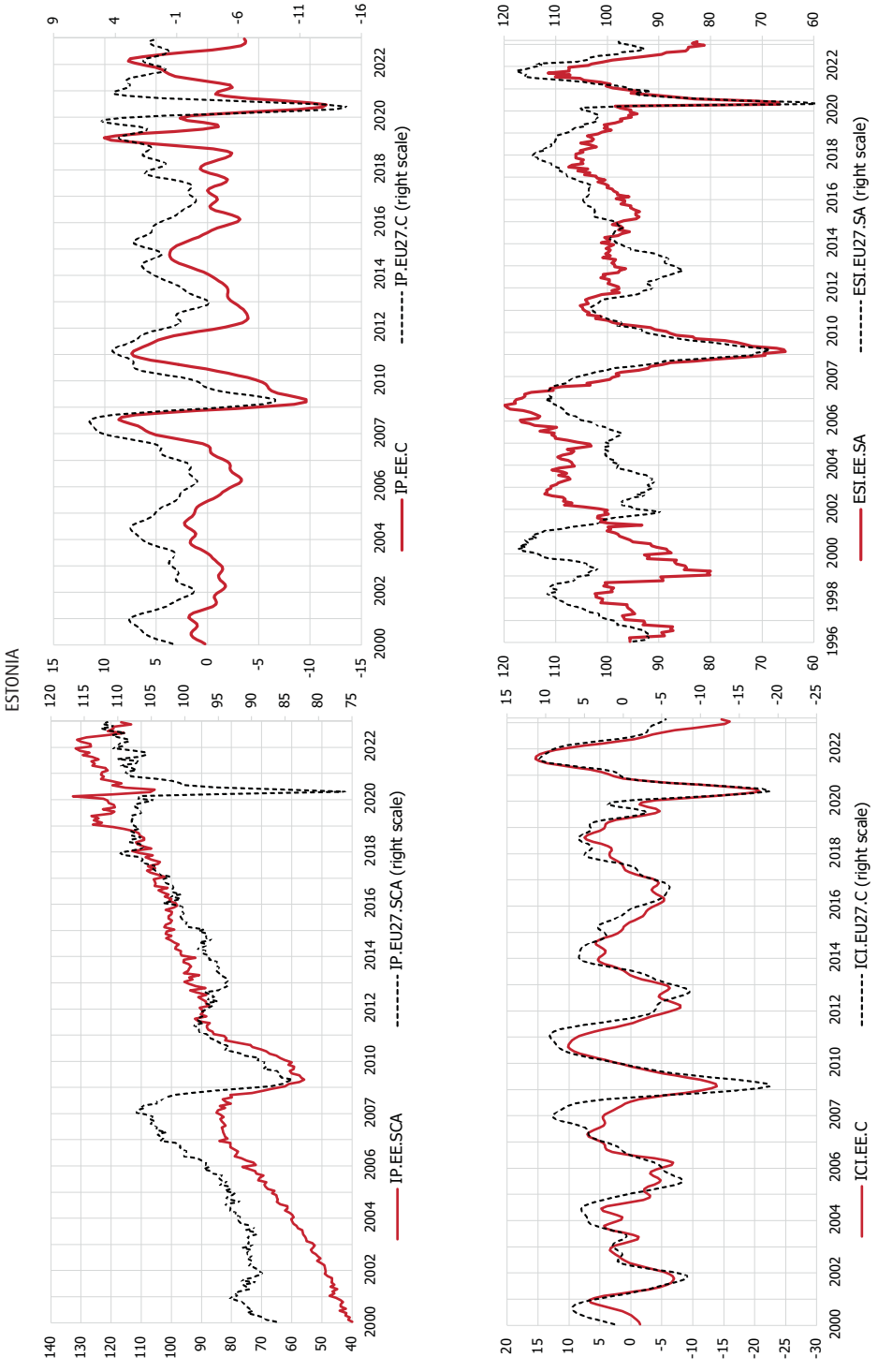
BLD.EU27.C (right scale)


ESTONIA
IP.EE.C
IP.EU27.C (right scale)
IP.EE.SCA
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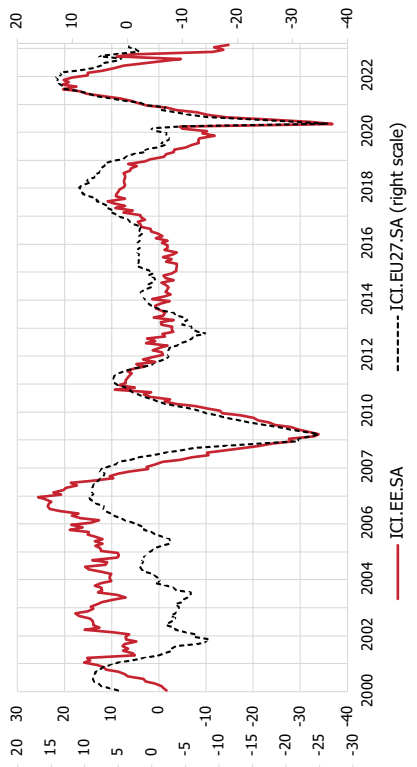
ICI.EE.C
ICI.EU27.C (right scale)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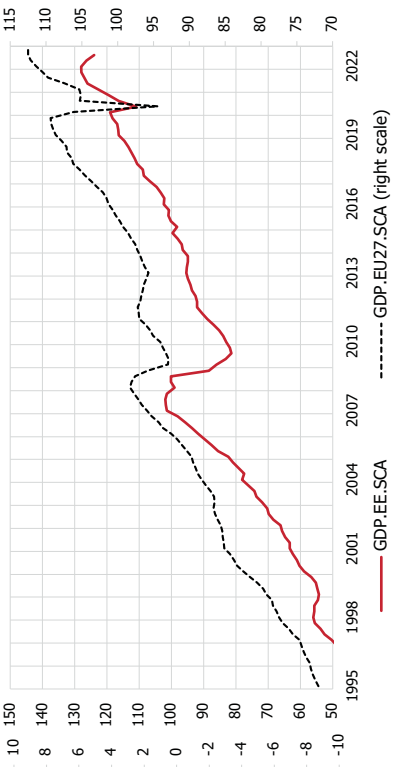
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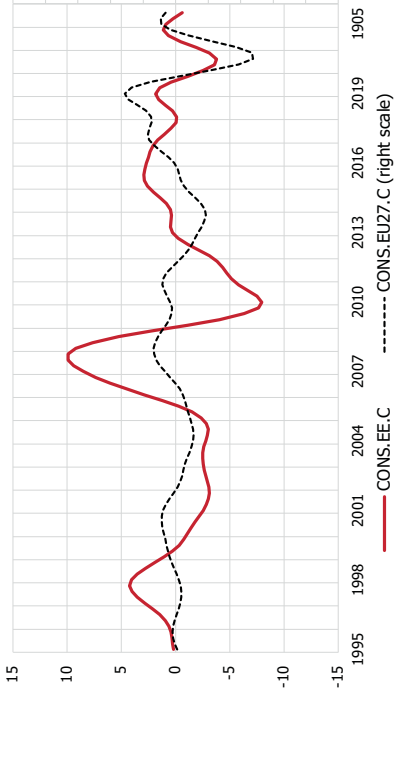
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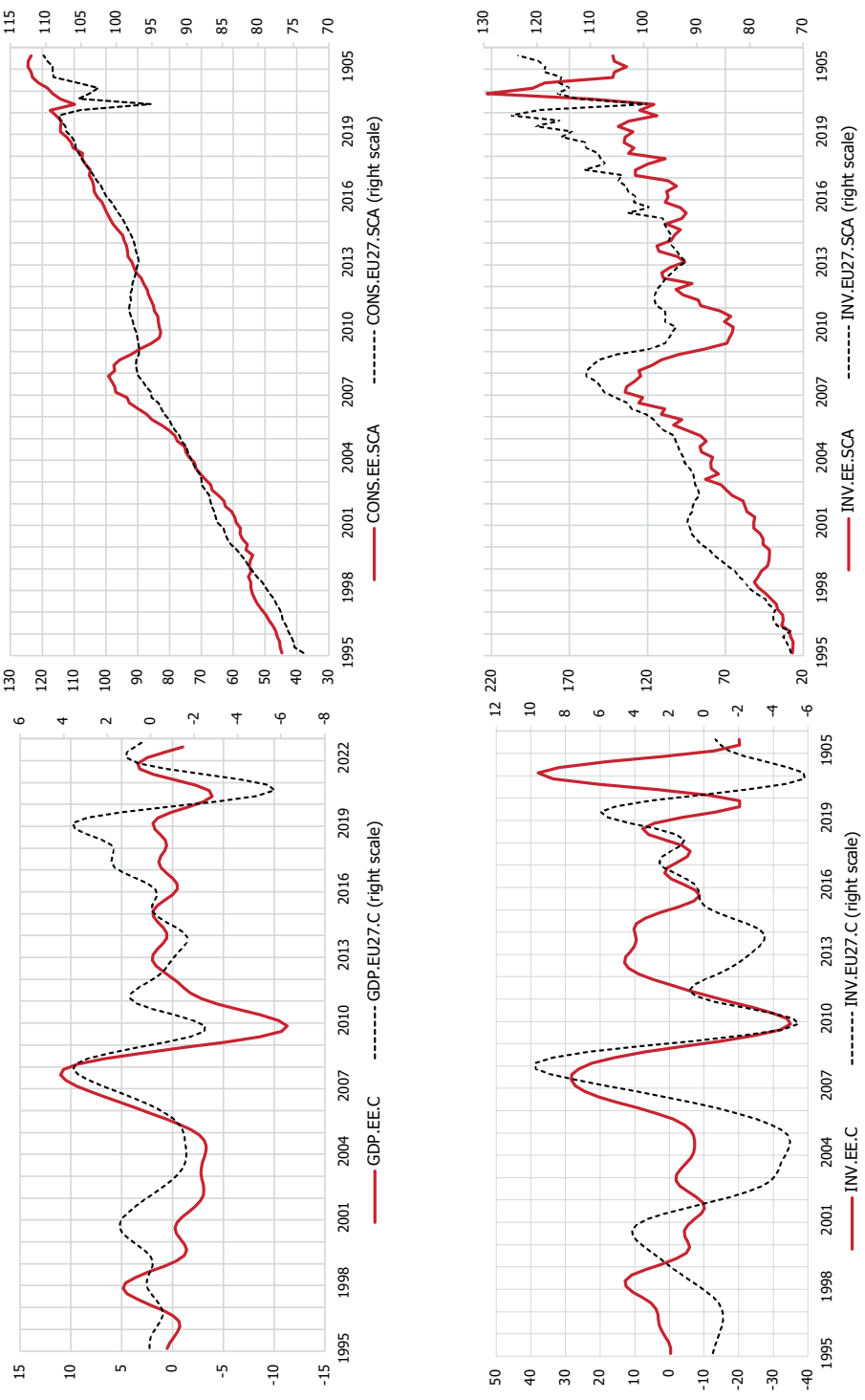
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CONS.EU27.SCA (right scale)
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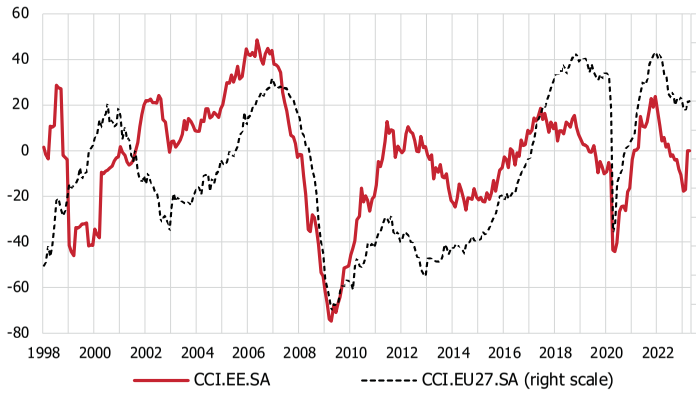
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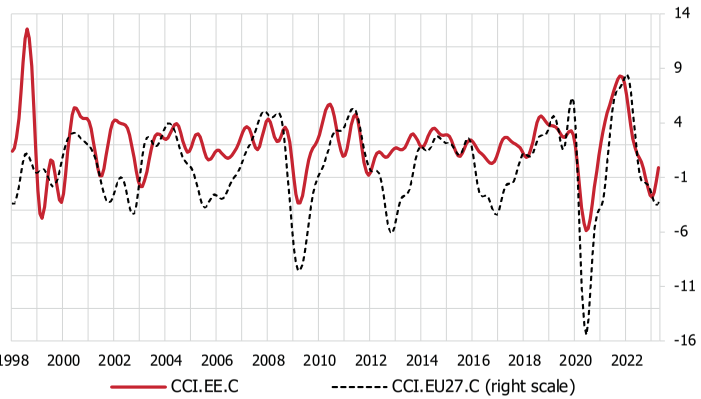
CCI.EU27.SA (right scale)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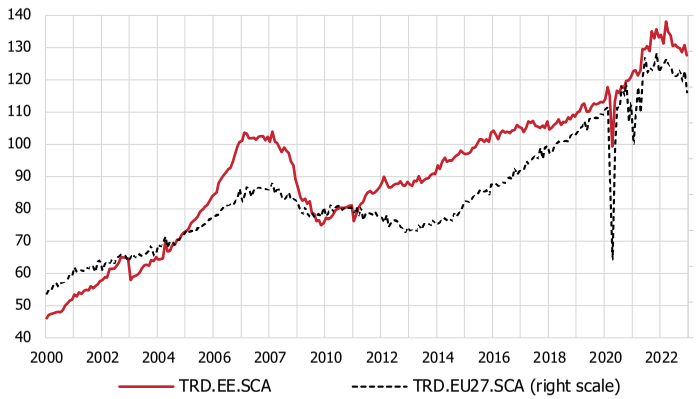
CCI.EU27.C (right scale)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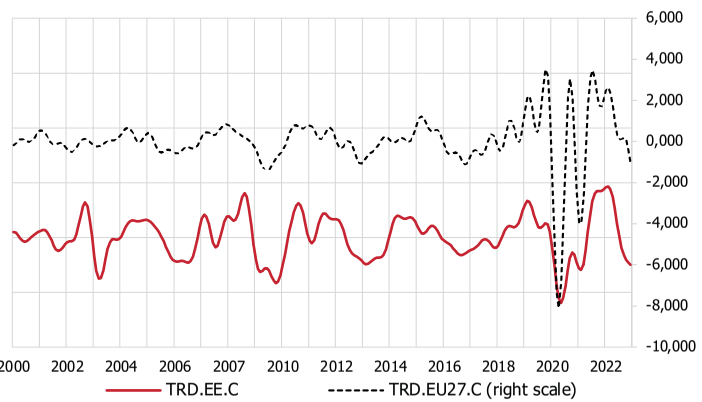
TRD.EU27.SCA (right scale)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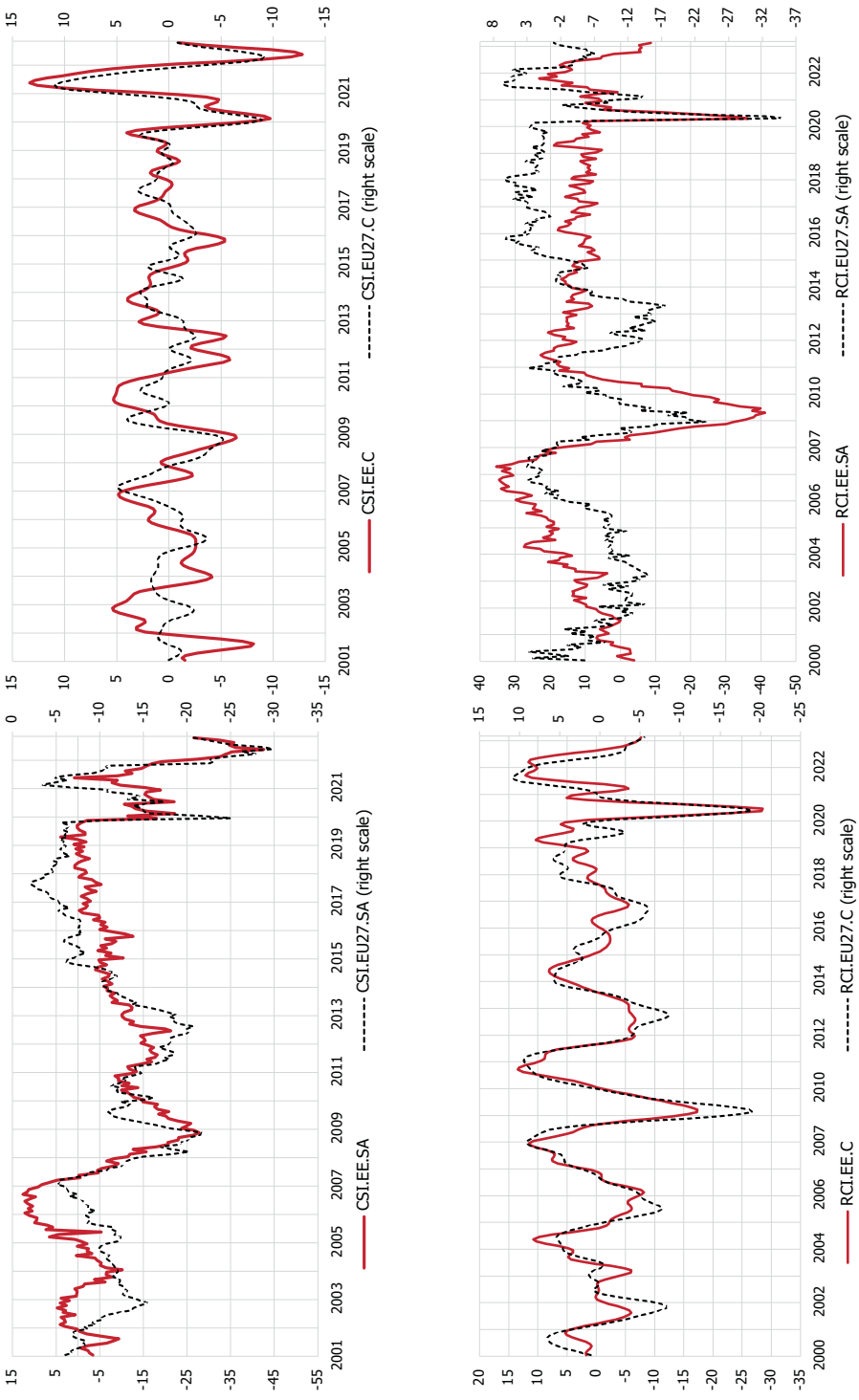
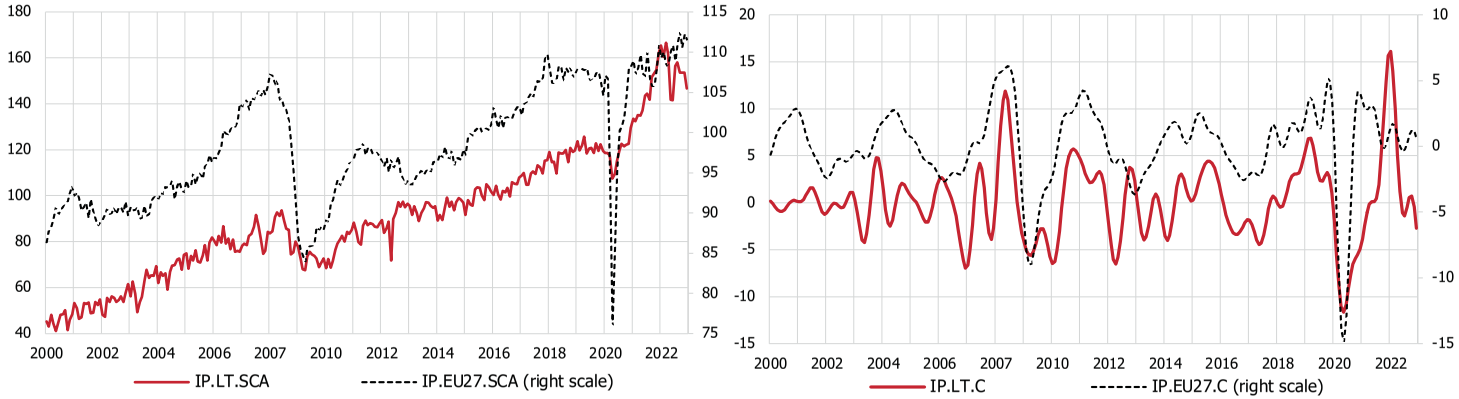
TRD.EU27.C (right scale)


CSI.EE.SA
CSI.EU27.SA (right scale)
CSI.EE.C
CSI.EU27.C (right scale)
RCI.EE.C
RCI.EU27.C (right scale)
RCI.EE.SA
RCI.EU27.SA (right scale)

LITHUANIA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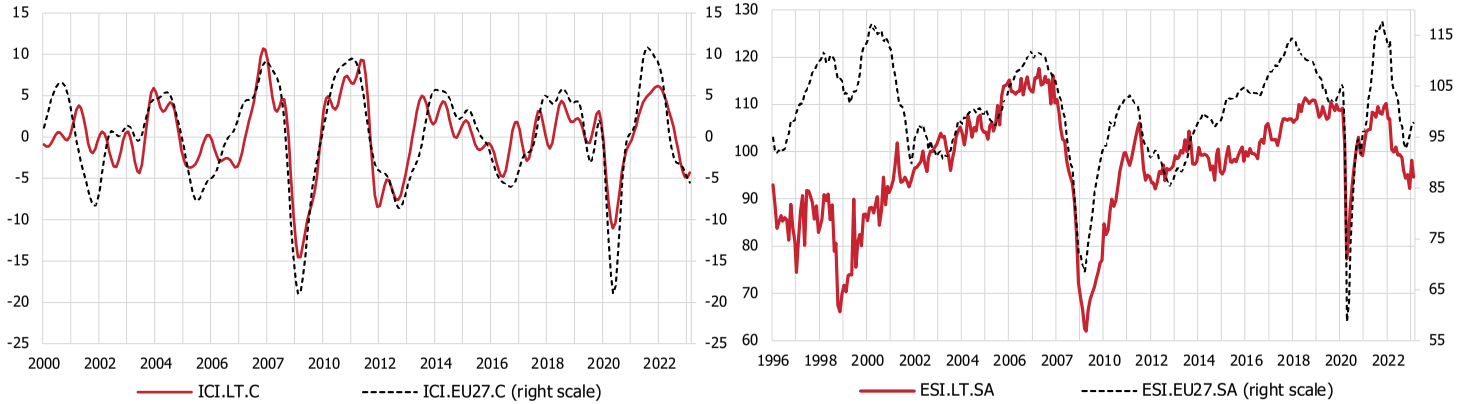
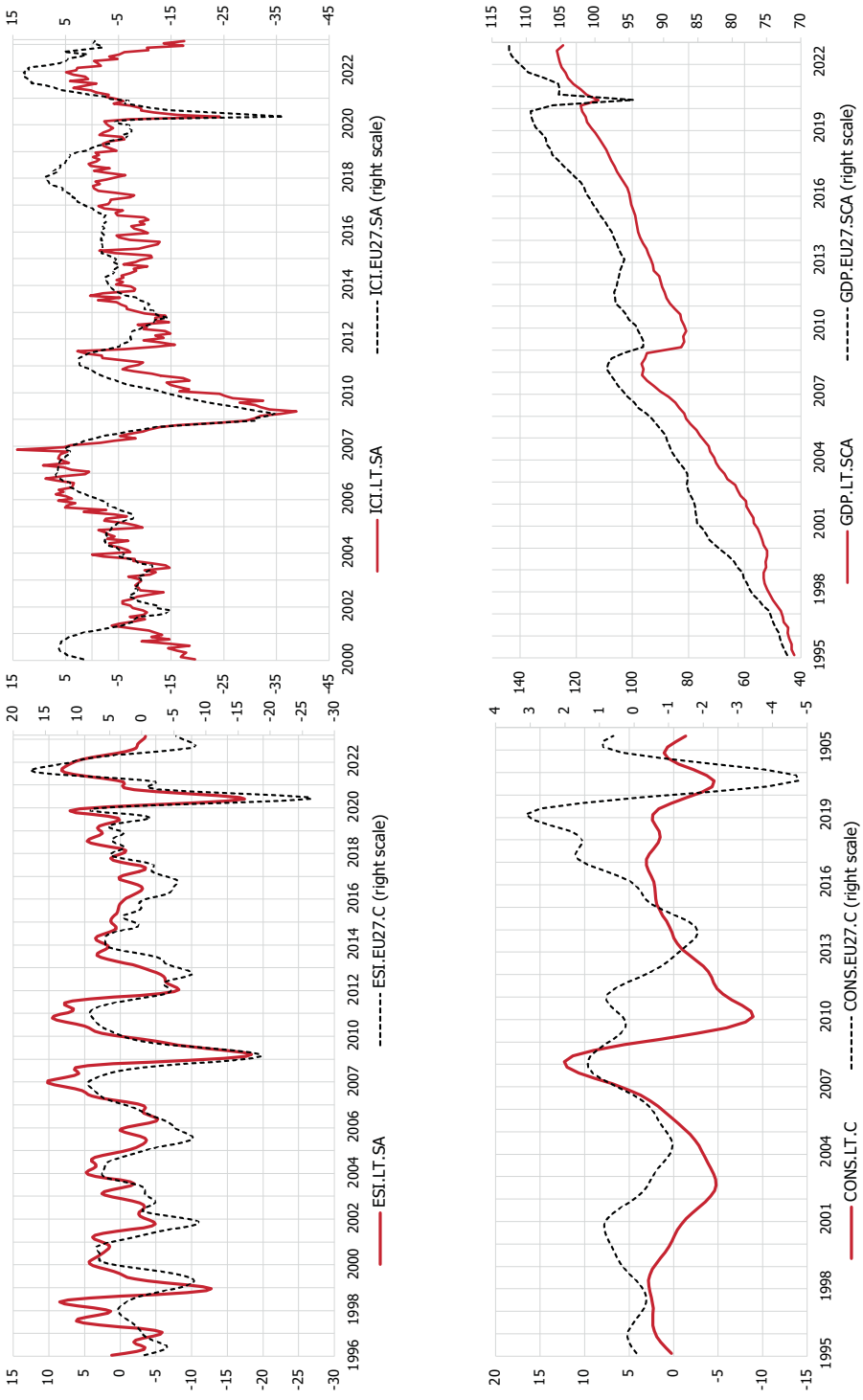
IP.LT.C
IP.EU27.C (right scale)


ICI.LT.C
ICI.EU27.C (right scale)
ESI.LT.SA
ESI.EU27.SA (right scale)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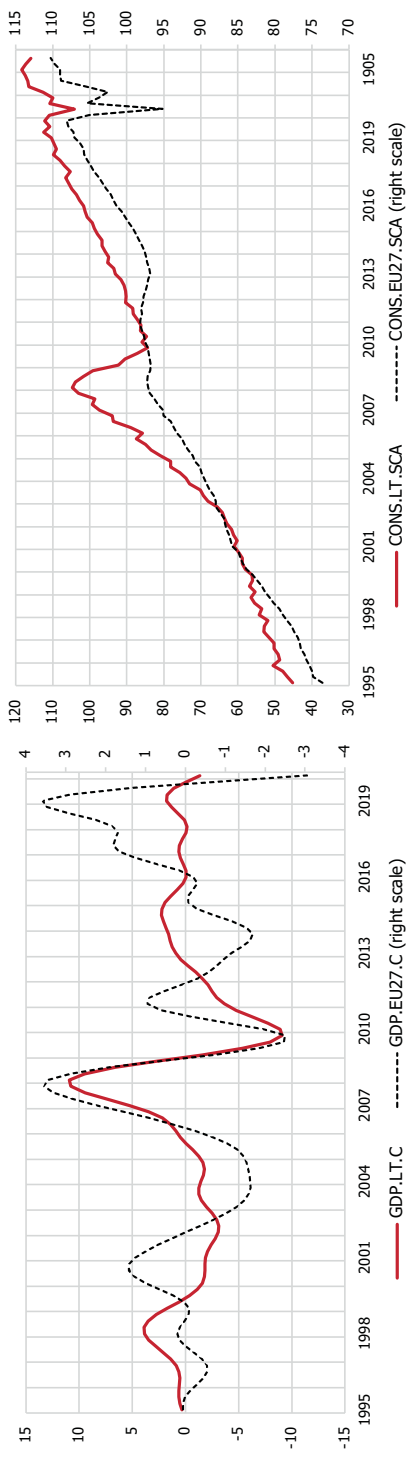
ESI.EU27.C (right scale)
ICI.LT.SA
ICI.EU27.SA (right scale)
CONS.LT.C
CONS.EU27.C (right scale)
GDP.LT.SCA
GDP.EU27.SCA (right scale)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GDP.EU27.C (right scale)

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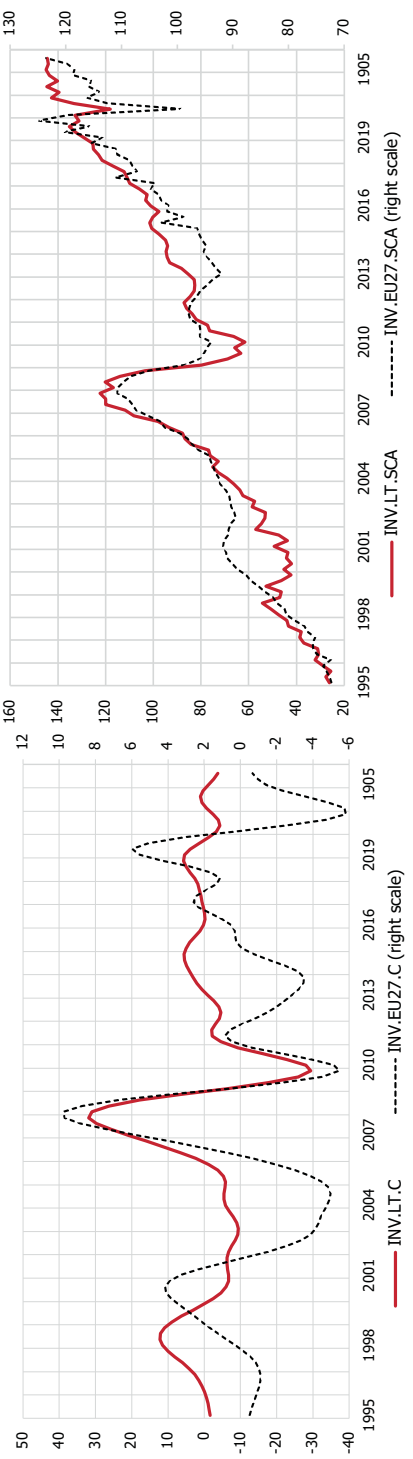
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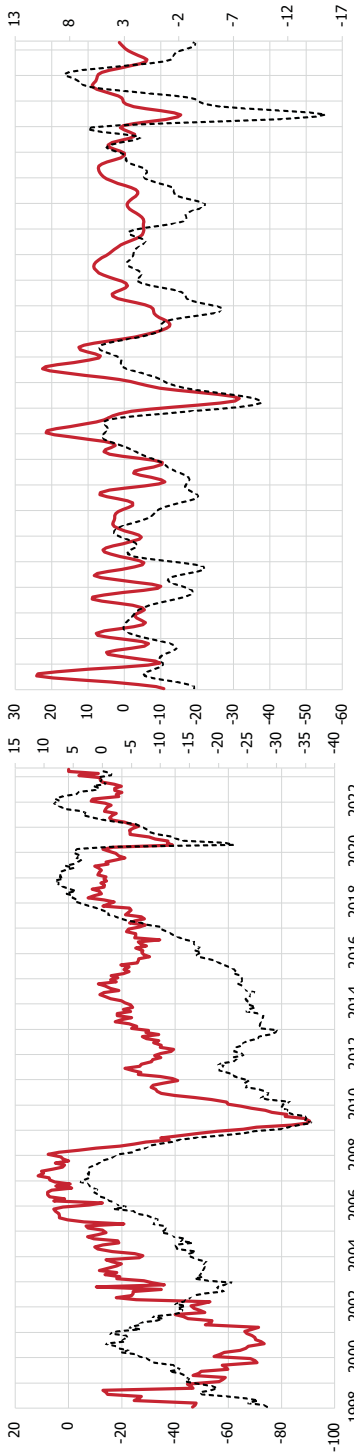
INV.EU27.C (right scale)

INV.LT.SCA
INV.EU27.SCA (right scale)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CCI.LT.SA
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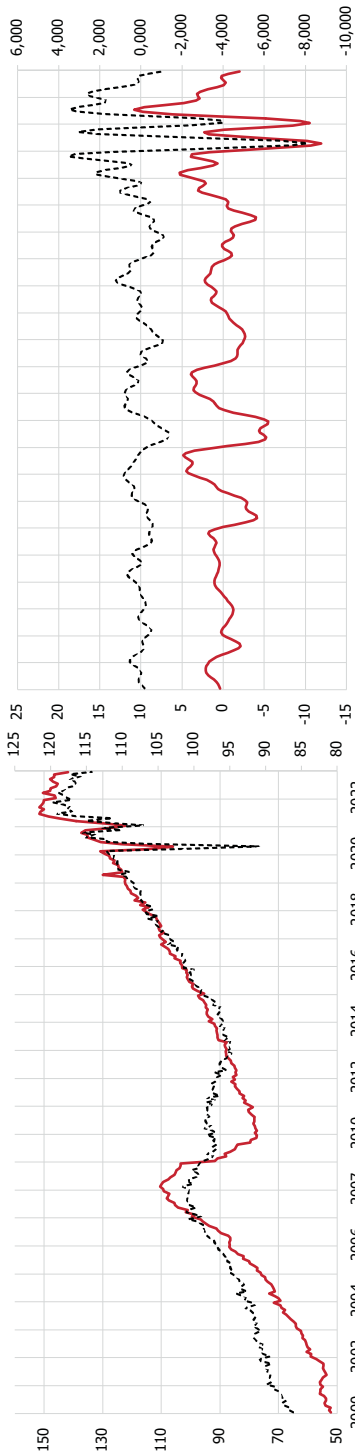
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TRD.LT.SCA
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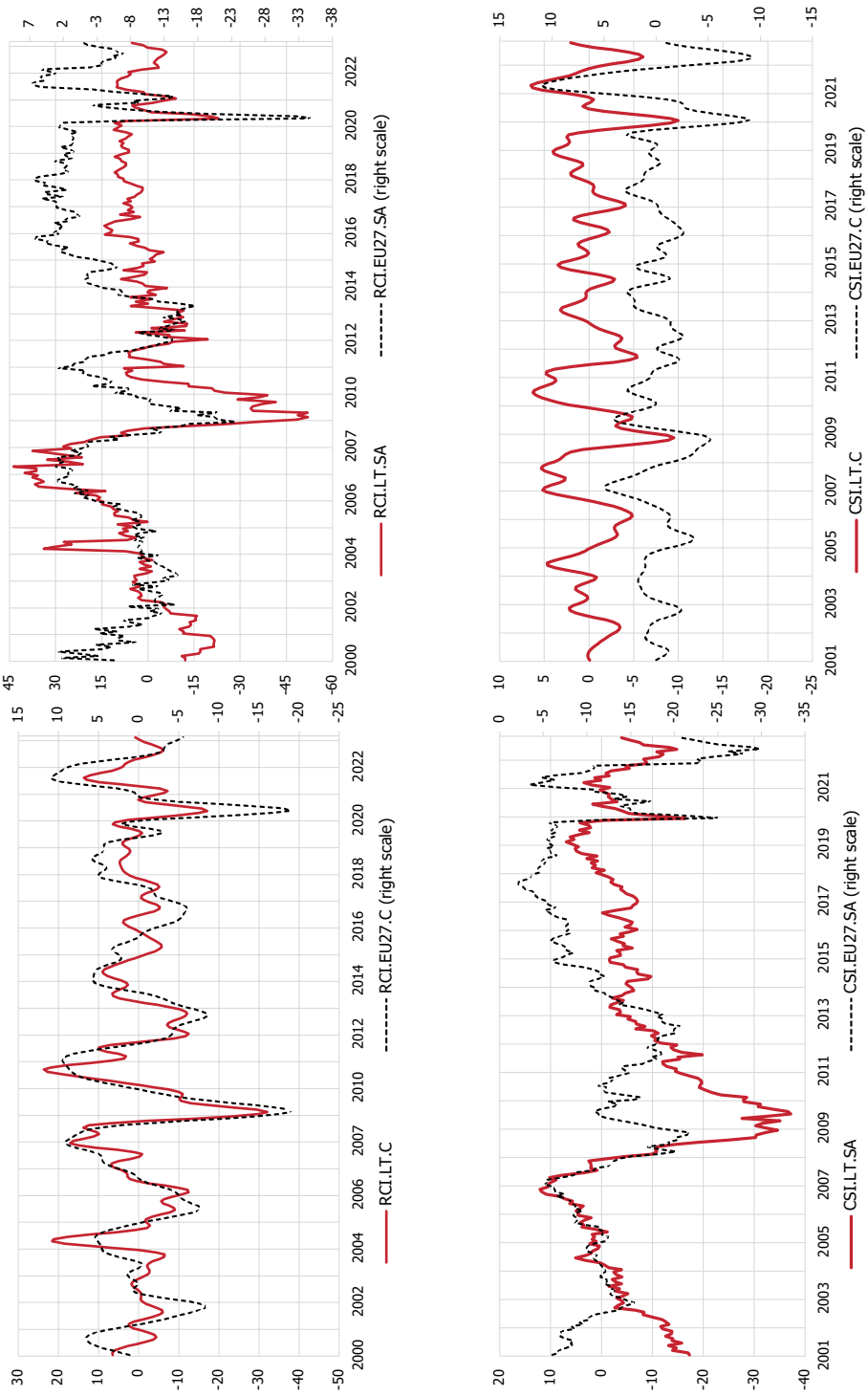
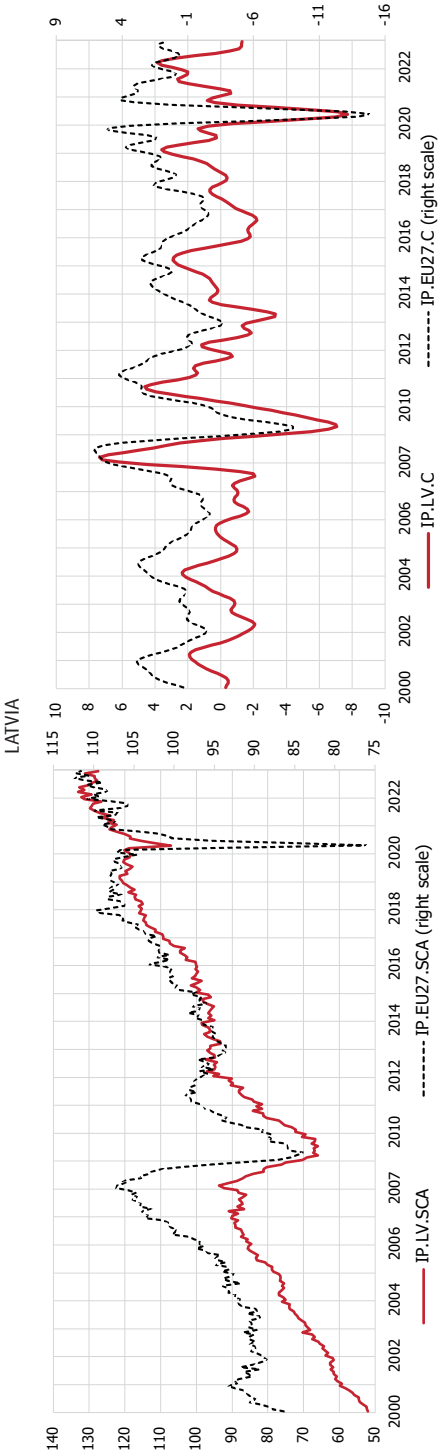

RCI.LT.C
RCI.EU27.C (right scale)
RCI.LT.SA
RCI.EU27.SA (right scale)
CSI.LT.C
CSI.EU27.C (right scale)
CSI.LT.SA
CSI.EU27.SA (right scale)

LATVIA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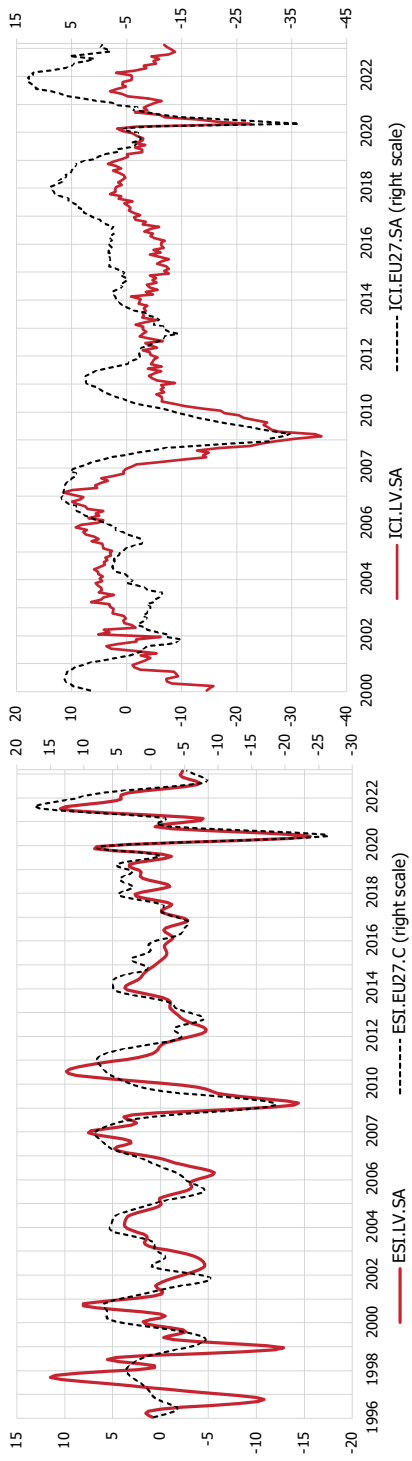
ESI.EU27.SA (right scale)
ICI.LV.C
ICI.EU27.C (right scale)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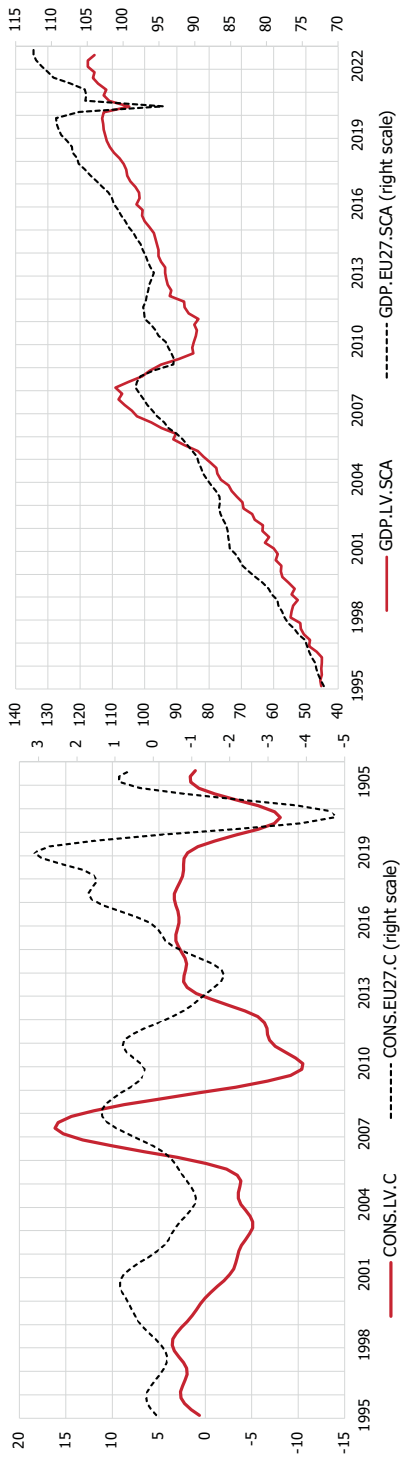
ICI.LV.SA
ICI.EU27.SA (right scale)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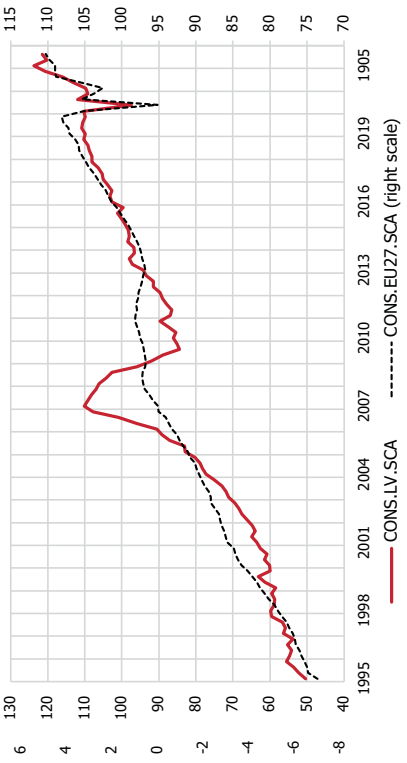
GDP.EU27.SCA (right scale)

CONS.LV.C
CONS.EU27.C (right scale)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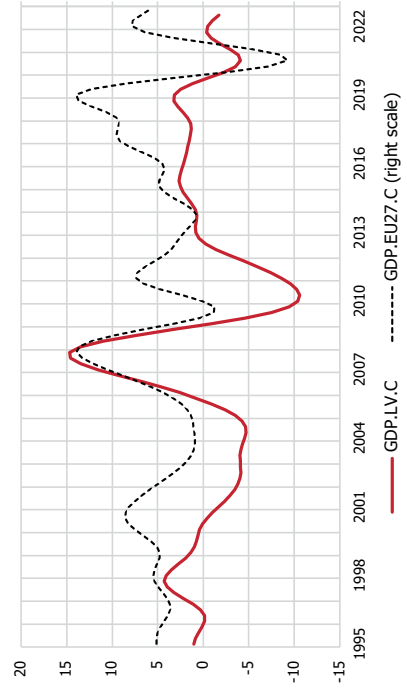
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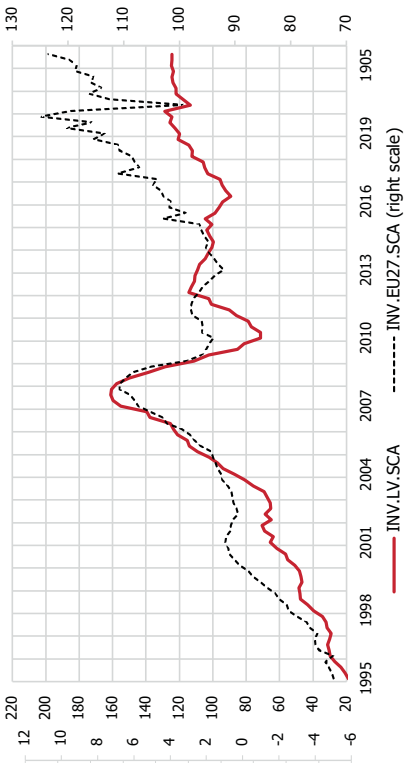
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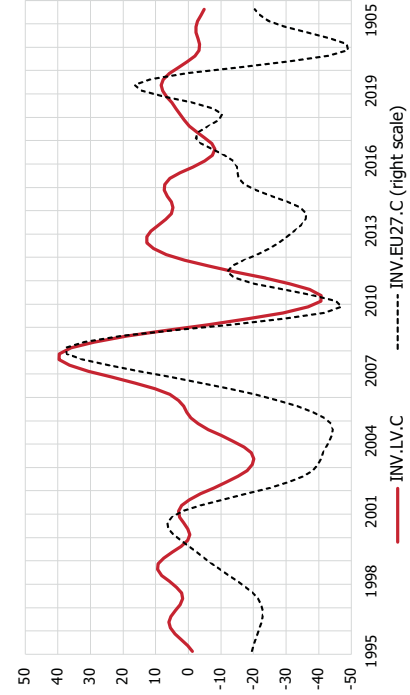
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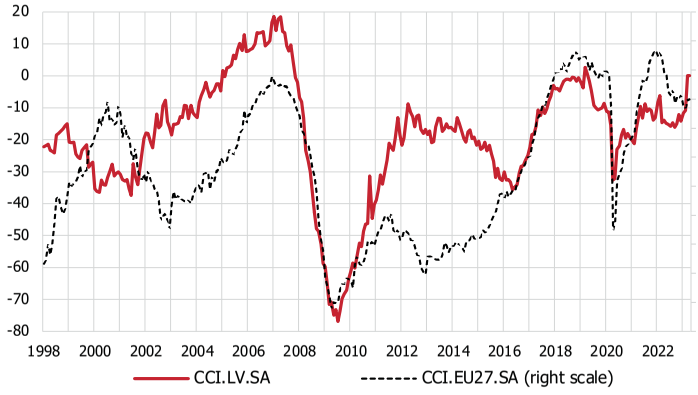
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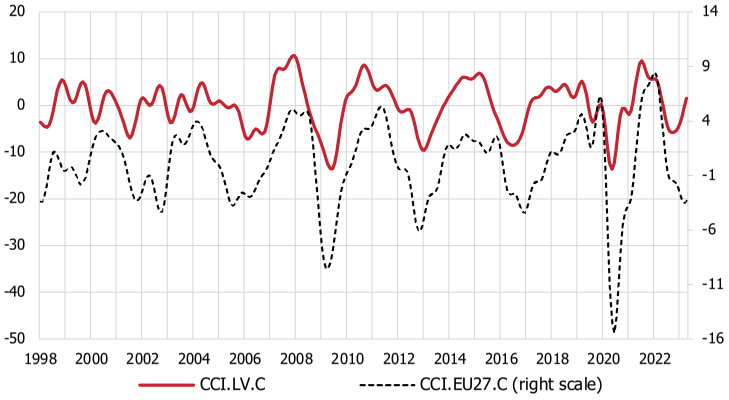
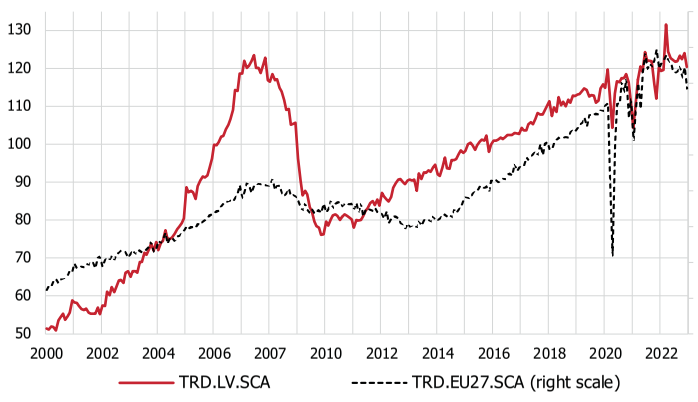

CCI.LV.C
CCI.EU27.C (right scale)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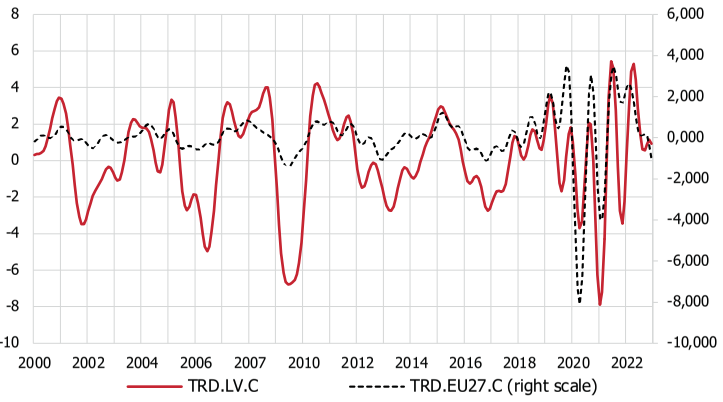
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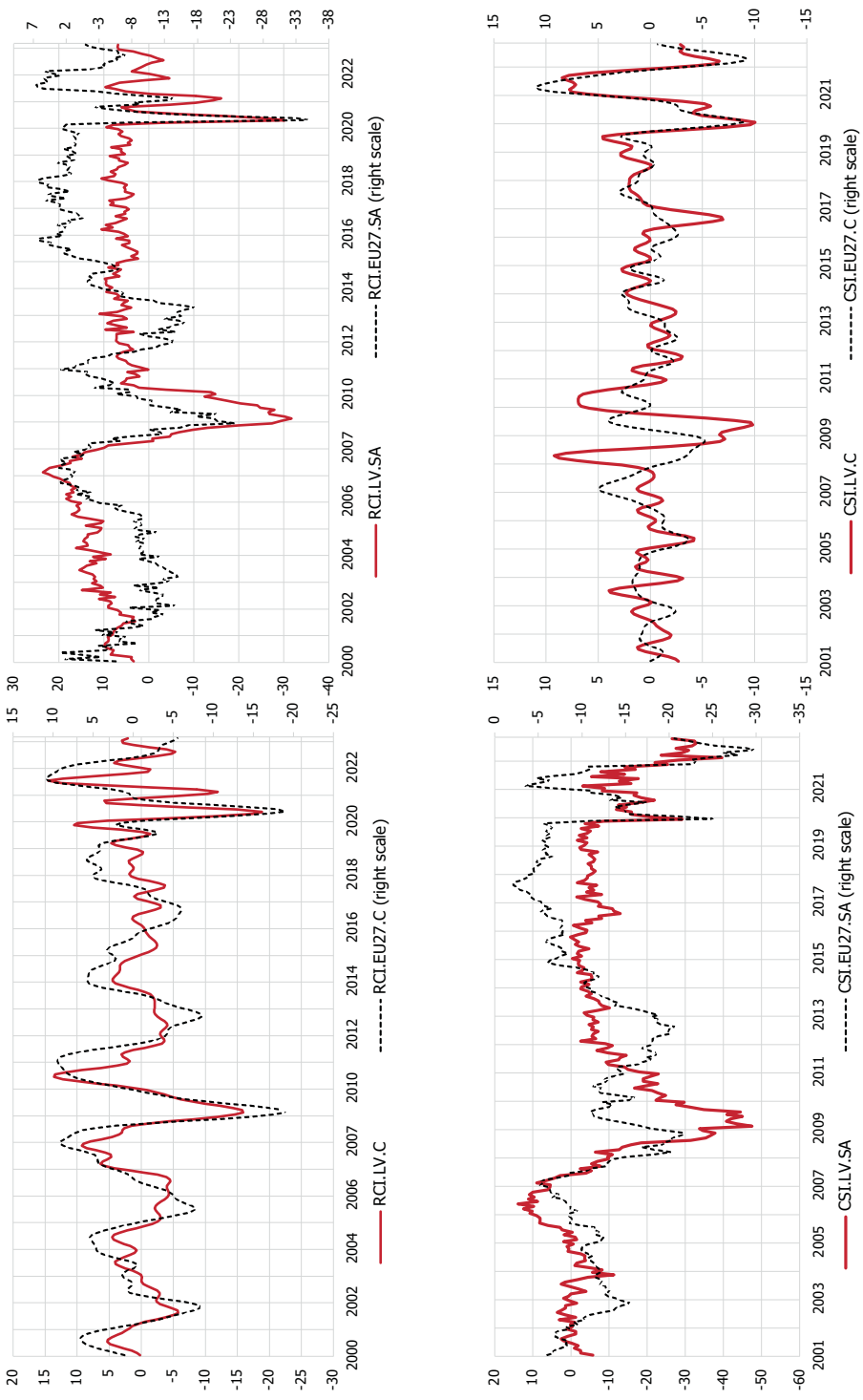
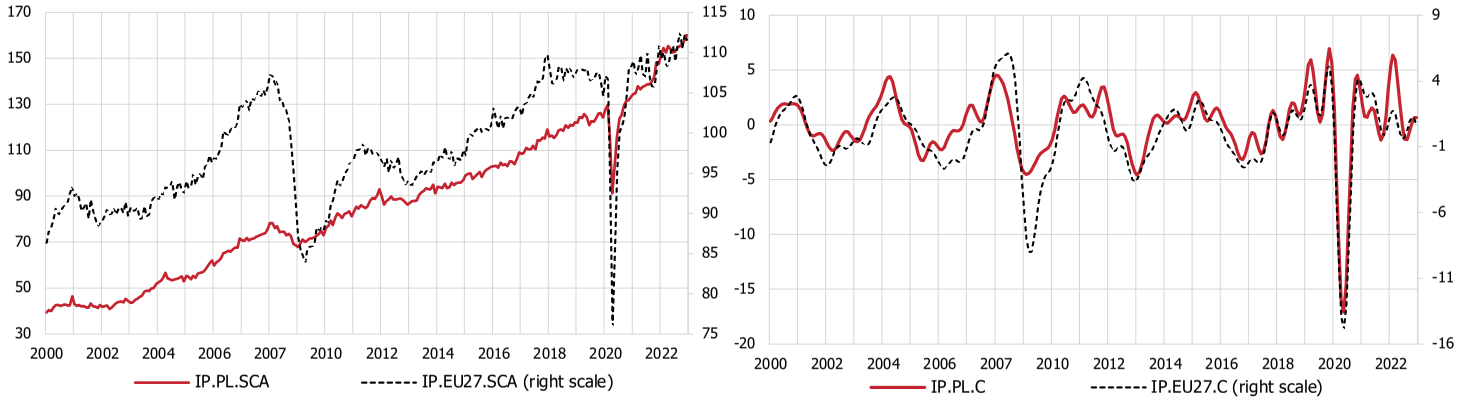

RCI.LV.C
RCI.EU27.C (right scale)
RCI.LV.SA
RCI.EU27.SA (right scale)
CSI.LV.SA
CSI.EU27.SA (right scale)
CSI.LV.C
CSI.EU27.C (right scale)

POLAND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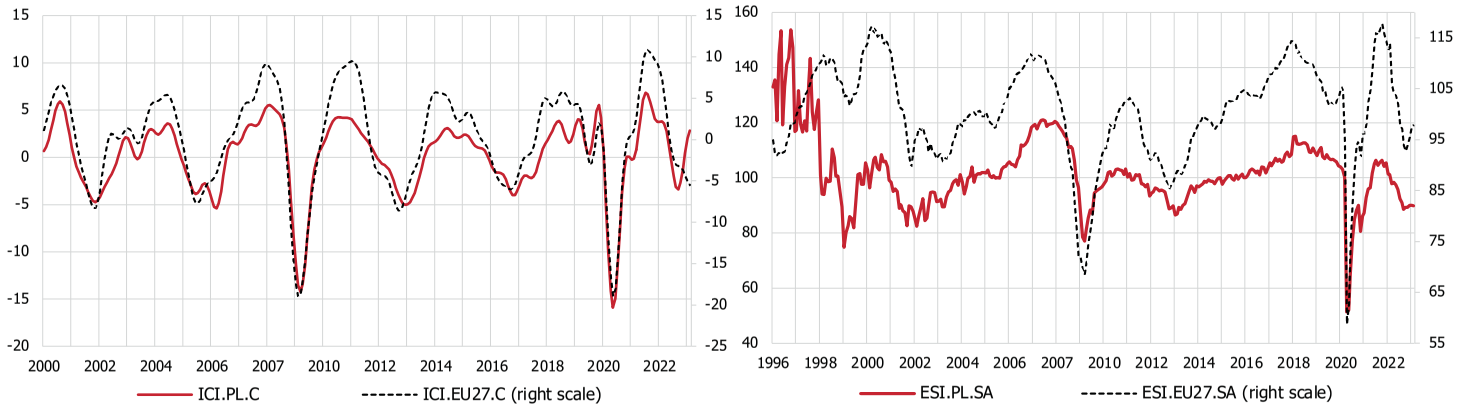
IP.EU27.SCA (right scale)
IP.PL.C
IP.EU27.C (right scale)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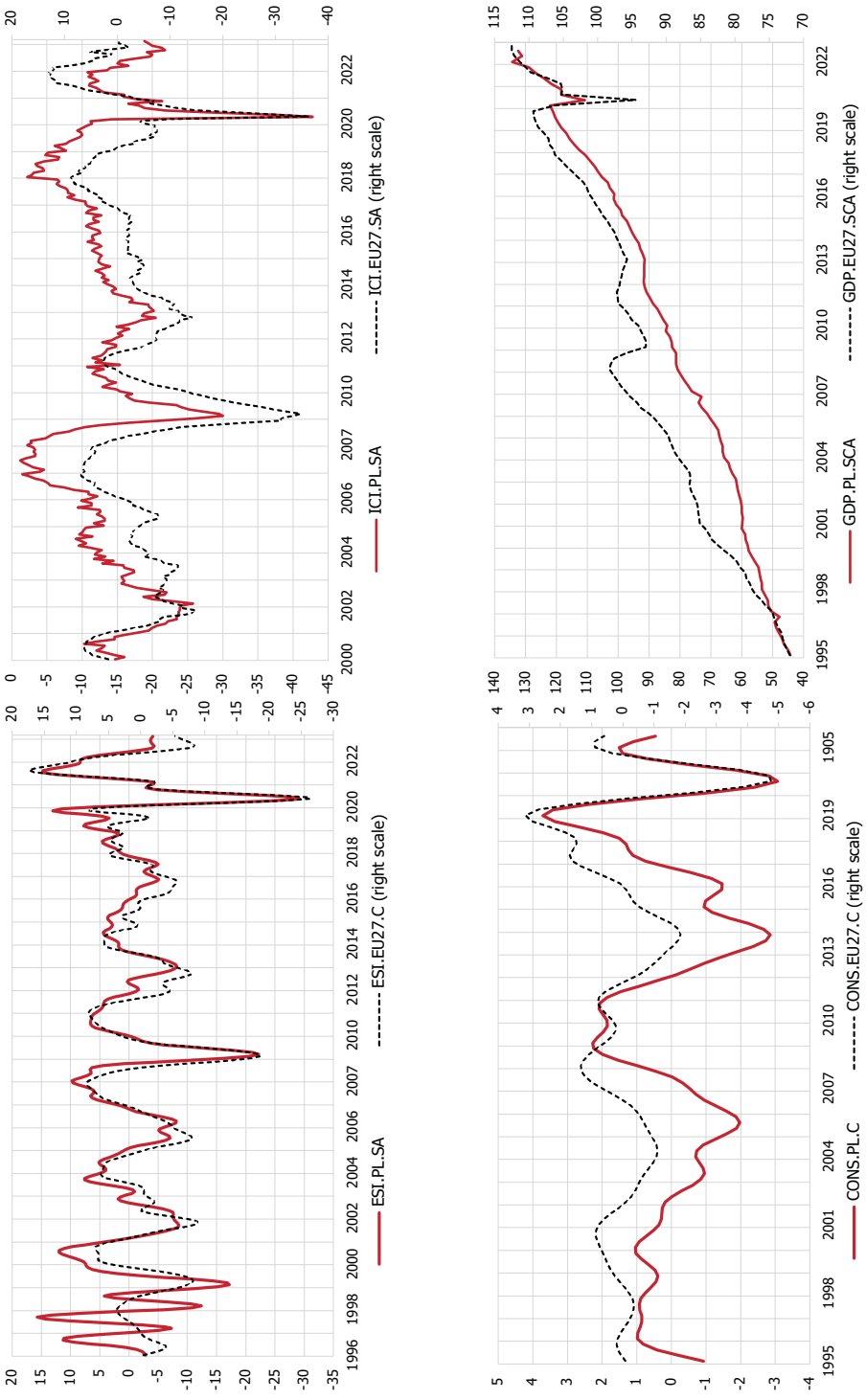
ICI.EU27.C (right scale)
ESI.PL.SA
ESI.EU27.SA (right scale)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ESI.EU27.C (right scale)
ICI.PL.SA
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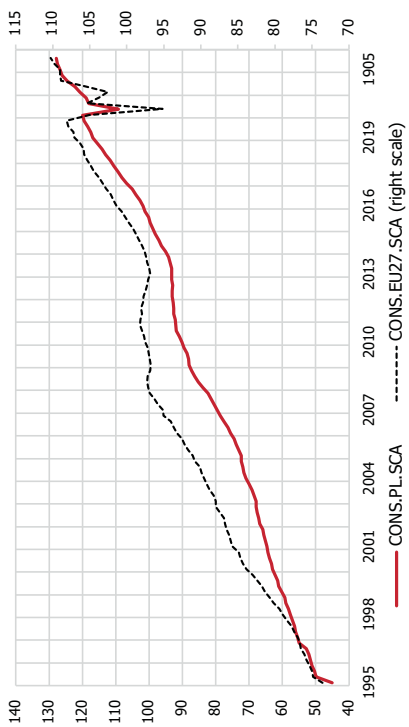
CONS.EU27.C (right scale)
GDP.PL.SCA
GDP.EU27.SCA (right scale)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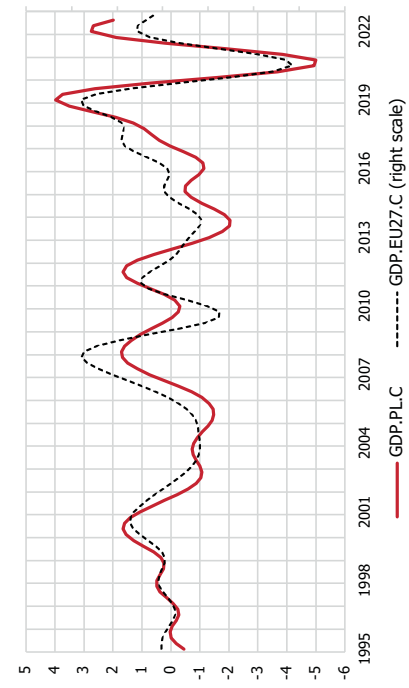
CONS.PL.SCA
CONS.EU27.SCA (right scale)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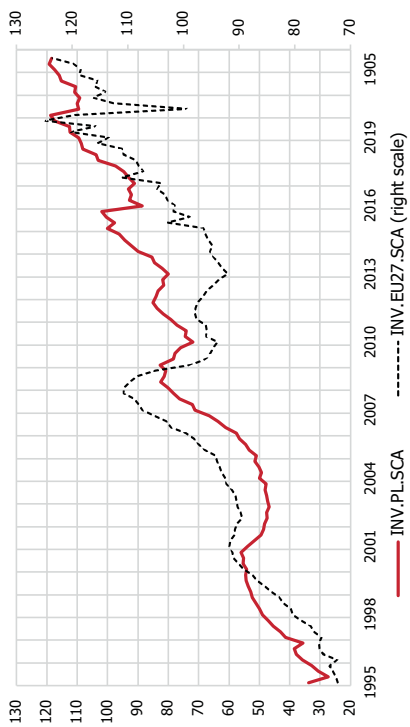
2022
GDP.PL.C
GDP.EU27.C (right scale)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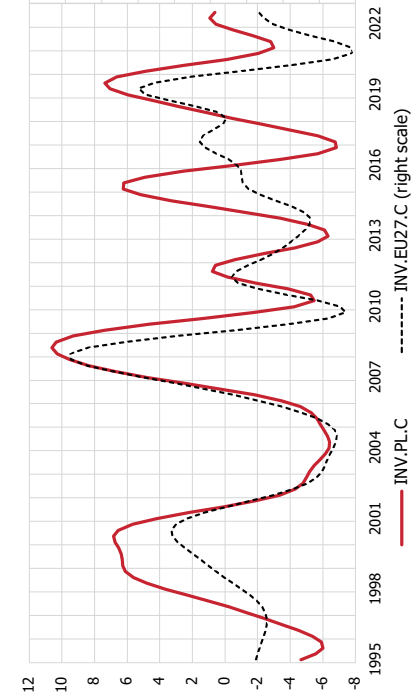
INV.PL.SCA
INV.EU27.SCA (right scale)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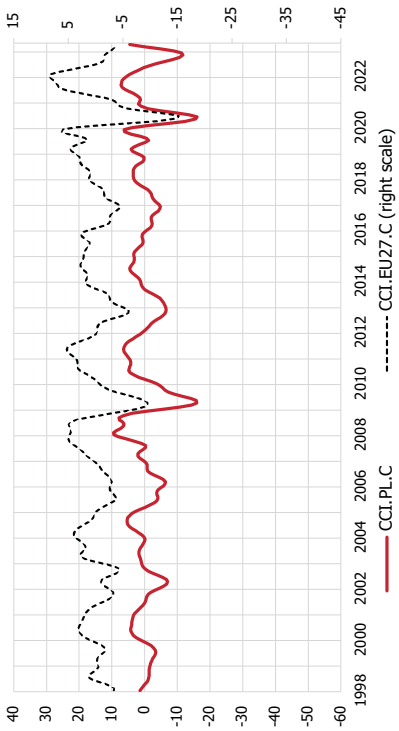
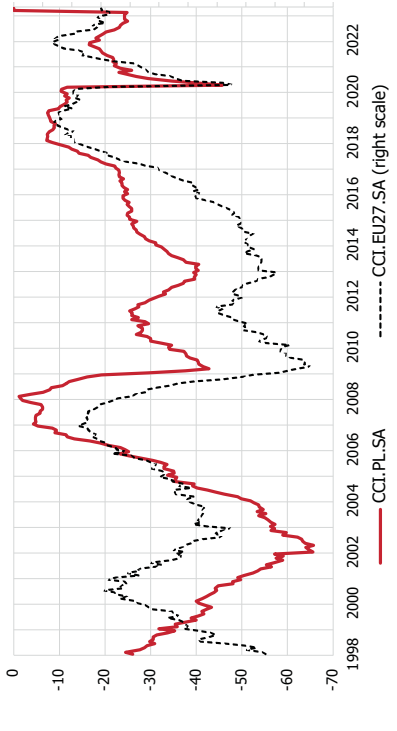
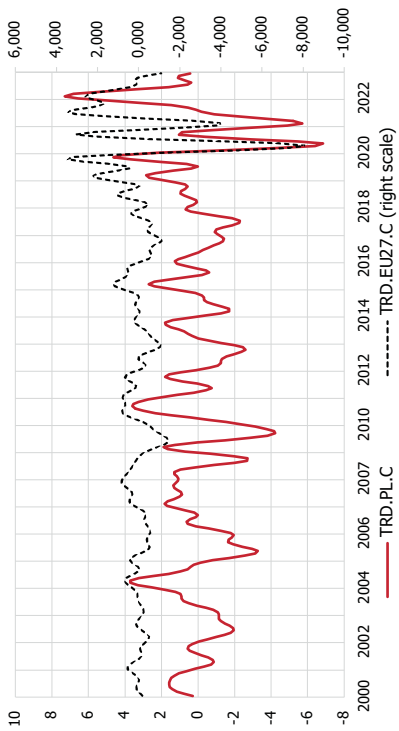
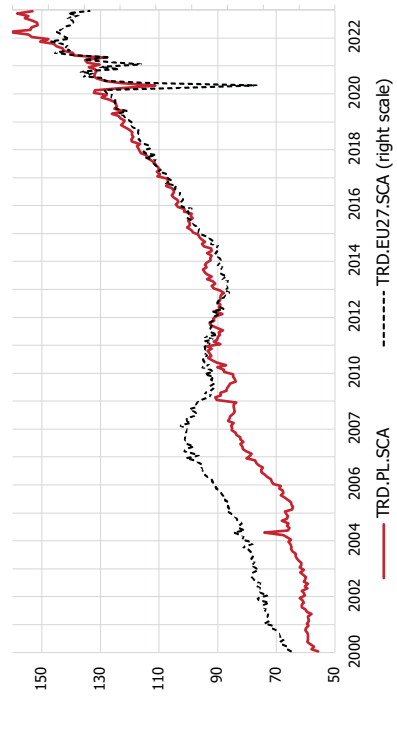
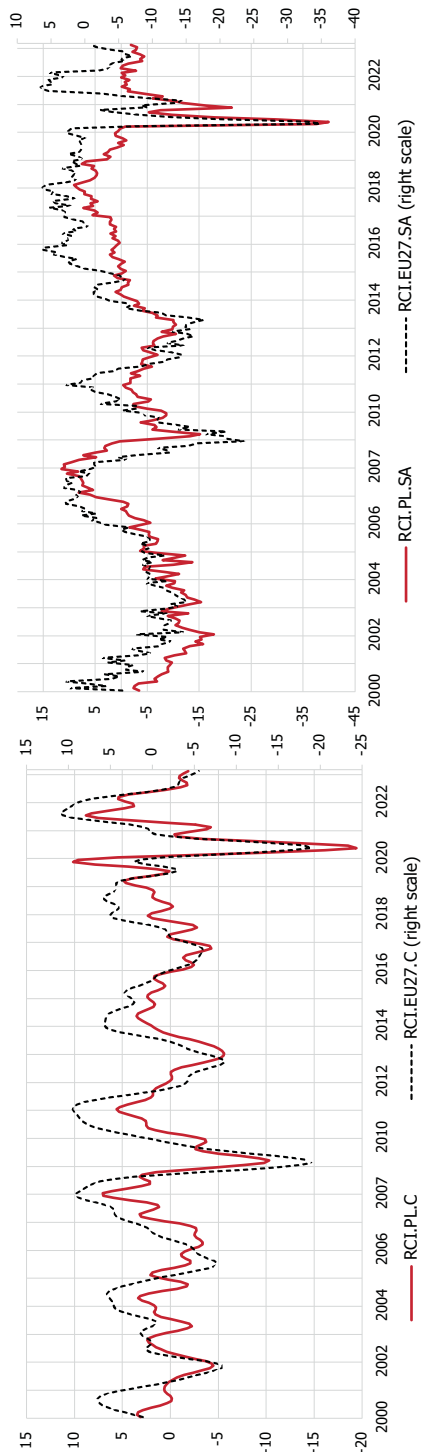
2022
INV.PL.C
INV.EU27.C (right scale)


CCI.PL.C
CCI.EU27.C (right scale)


CCI.PL.SA
CCI.EU27.SA (right scale)


TRD.PL.C
TRD.EU27.C (right scale)


TRD.PL.SCA
TRD.EU27.SCA (right scale)


RCI.PL.C
RCI.EU27.C (right scale)
RCI.PL.SA
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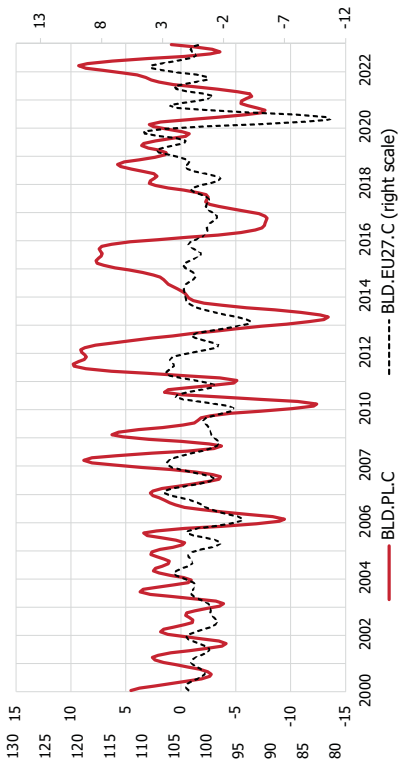
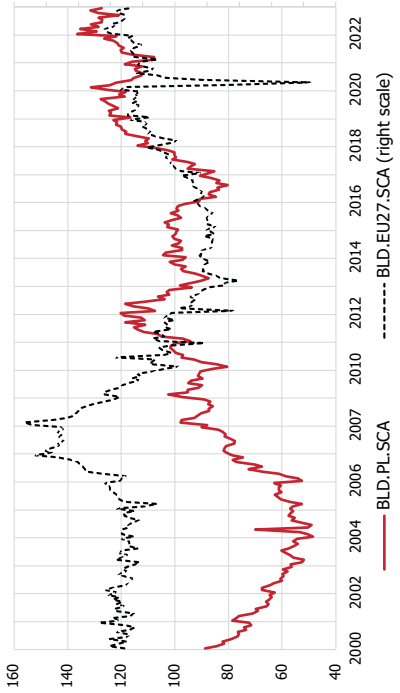
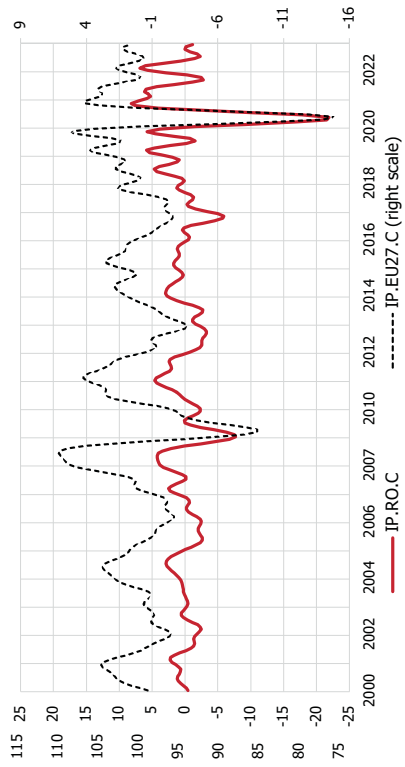
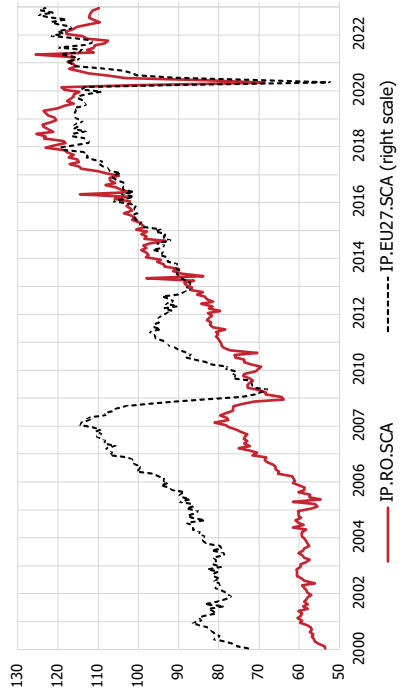
CSI.PL.SA
CSI.EU27.SA (right scale)
CSI.PL.C
CSI.EU27.C (right scale)

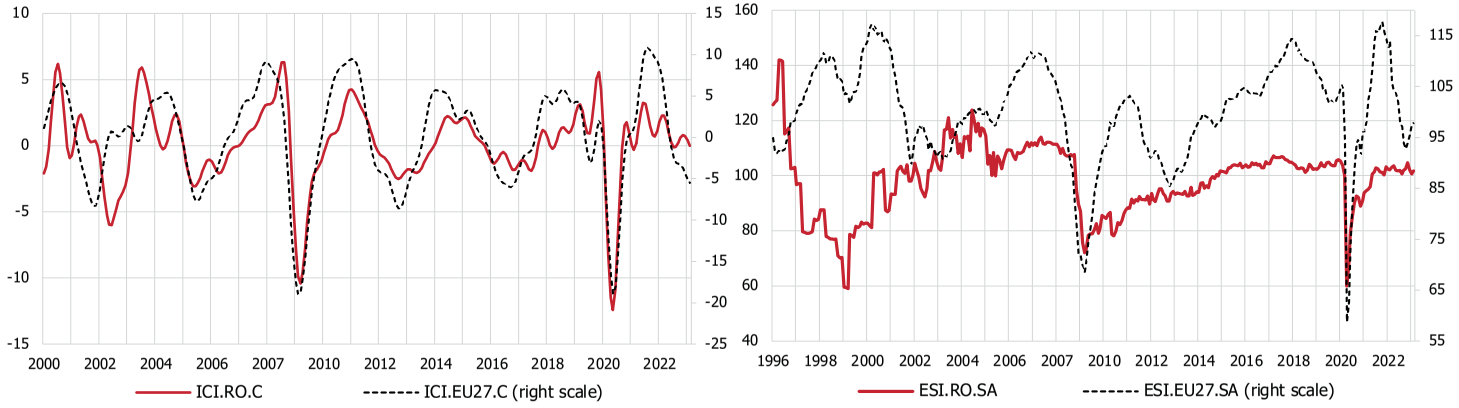

BLD.PL.C
BLD.EU27.C (right scale)


BLD.PL.SCA
BLD.EU27.SCA (right scale)

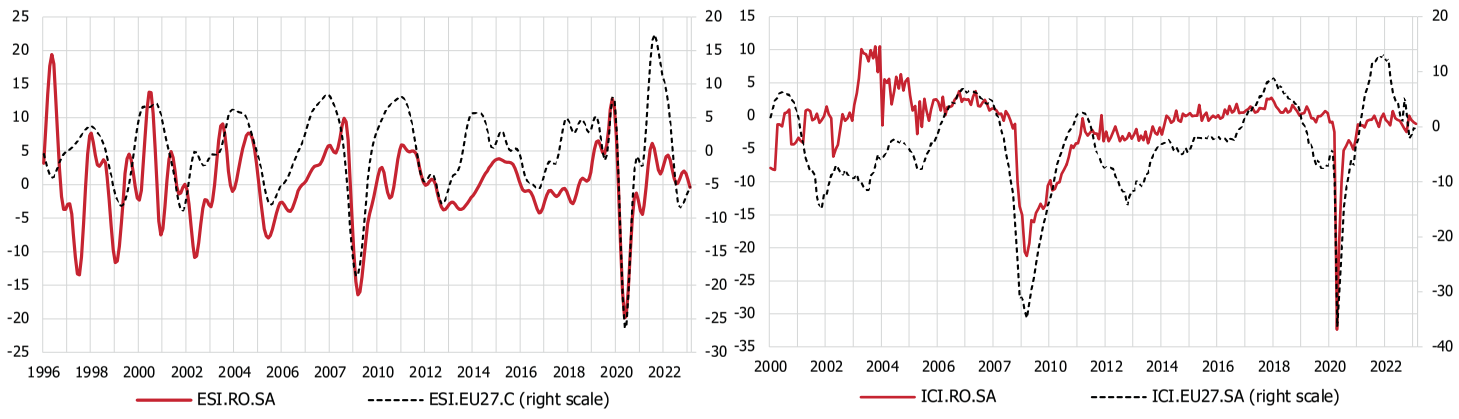
ROMANIA


IP.RO.C
IP.EU27.C (right scale)


IP.RO.SCA
IP.EU27.SCA (right scale)


ICI.RO.C
ICI.EU27.C (right scale)

ESI.RO.SA
ESI.EU27.SA (right scale)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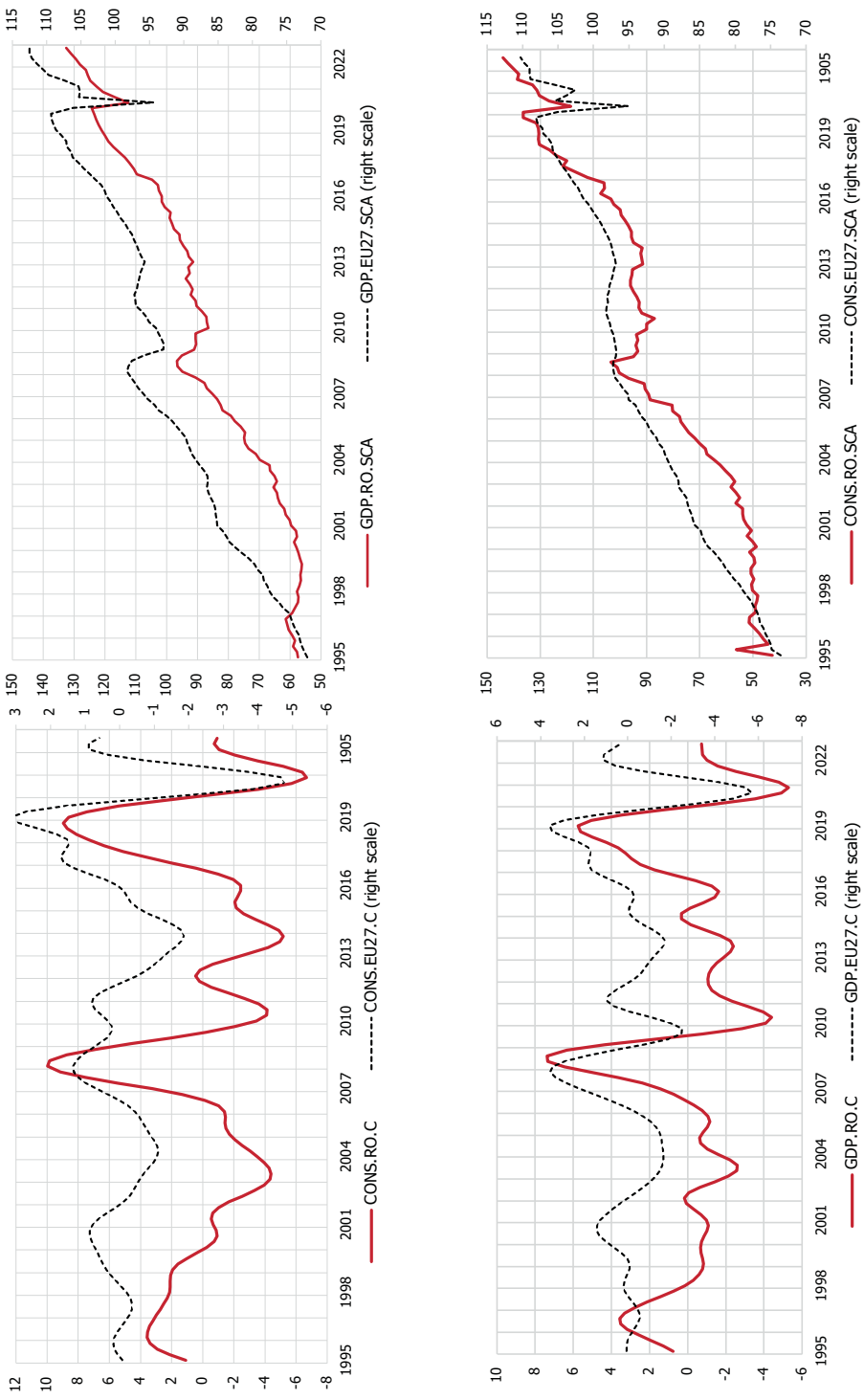
CONS.RO.C
CONS.EU27.C (right scale)
GDP.RO.SCA
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GDP.RO.C
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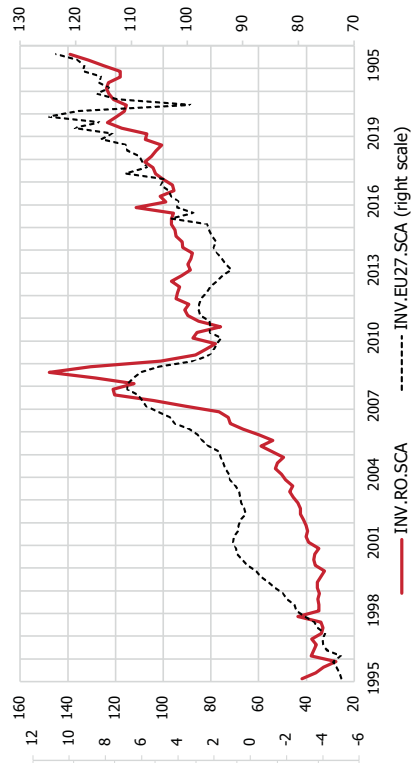
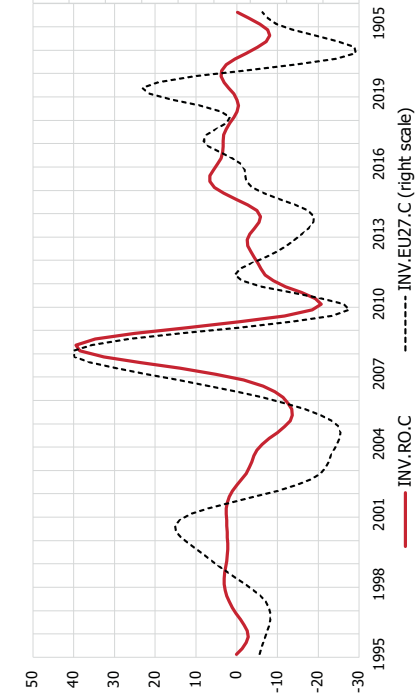
CONS.EU27.SCA (right scale)


INV.RO.SCA
INV.EU27.SCA (right scale)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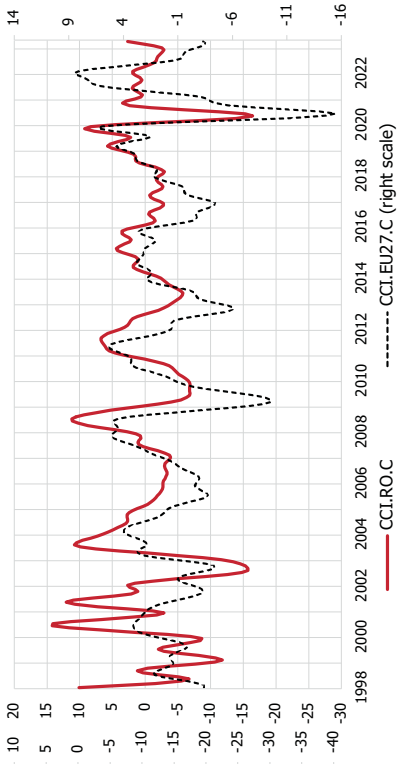
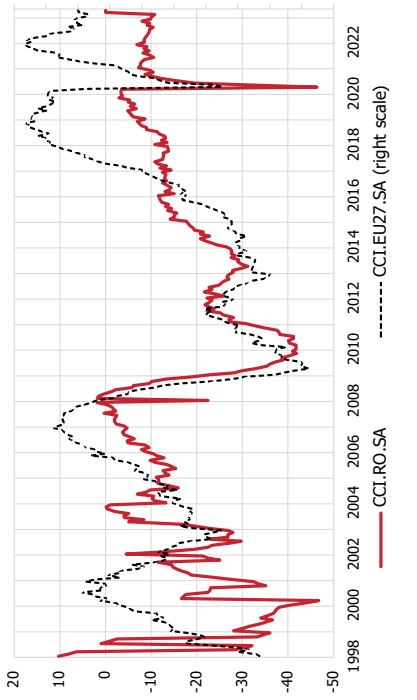
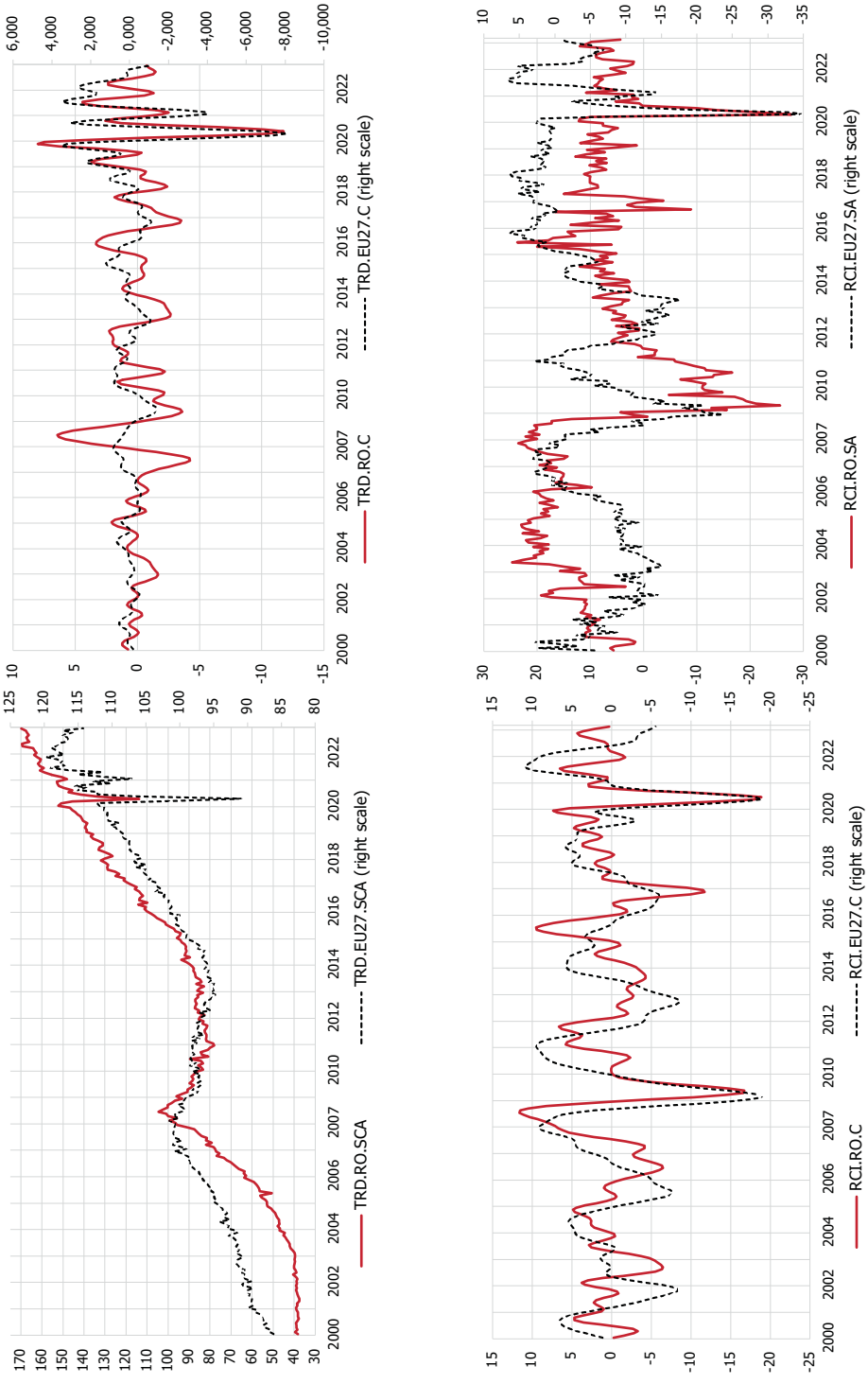

CCI.RO.C
CCI.EU27.C (right scale)


CCI.RO.SA
CCI.EU27.SA (right scale)


TRD.RO.SCA
TRD.EU27.SCA (right scale)
TRD.RO.C
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RCI.EU27.C (right scale)
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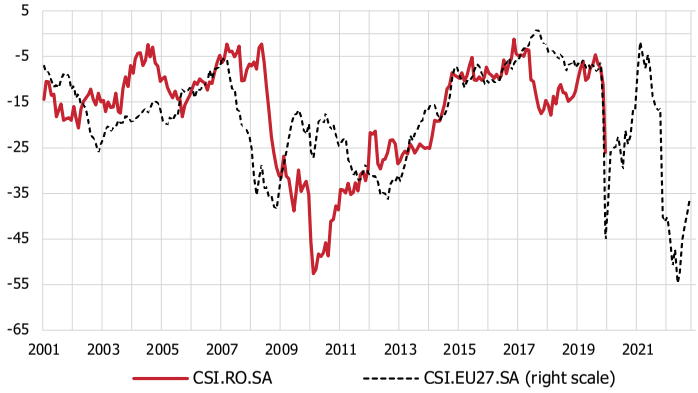
RCI.EU27.SA (right scale)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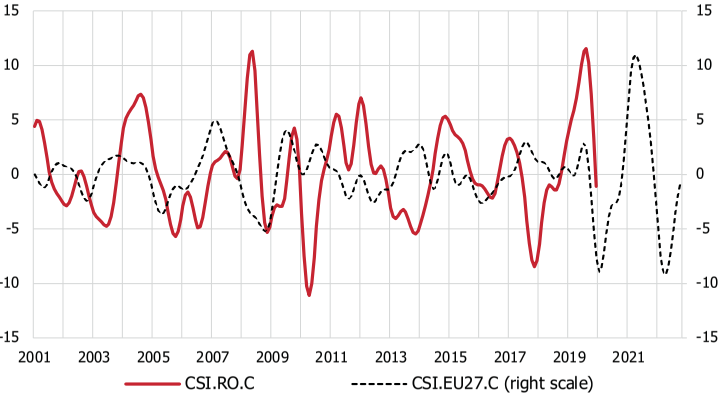
CSI.EU27.SA (right scale)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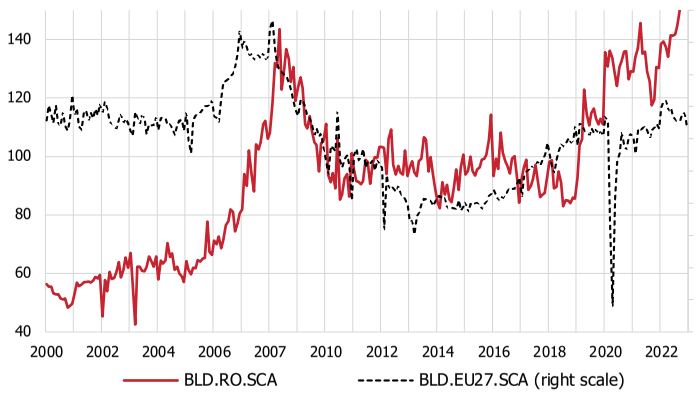
CSI.RO.C
CSI.EU27.C (right scale)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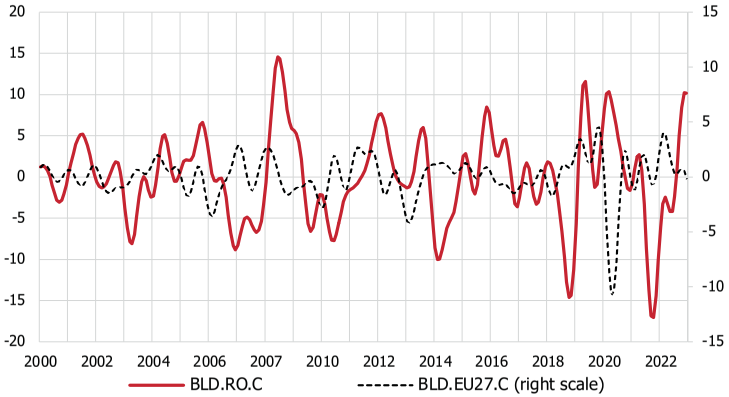
BLD.RO.SCA
BLD.EU27.SCA (right scale)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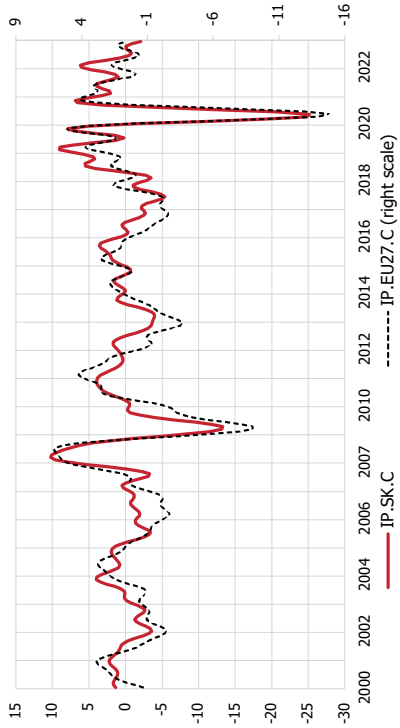
BLD.RO.C
BLD.EU27.C (right scale)

SLOVAKIA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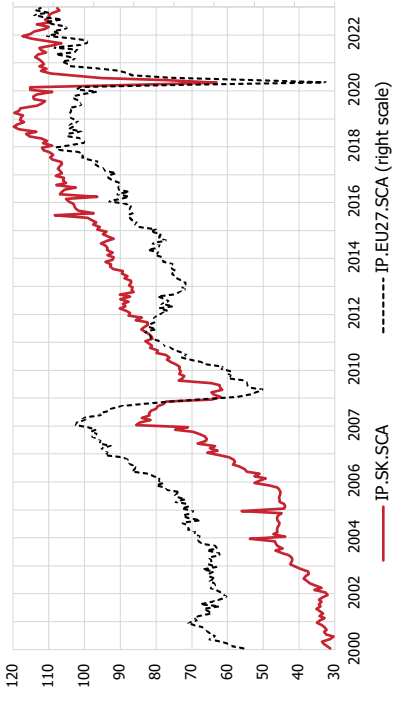
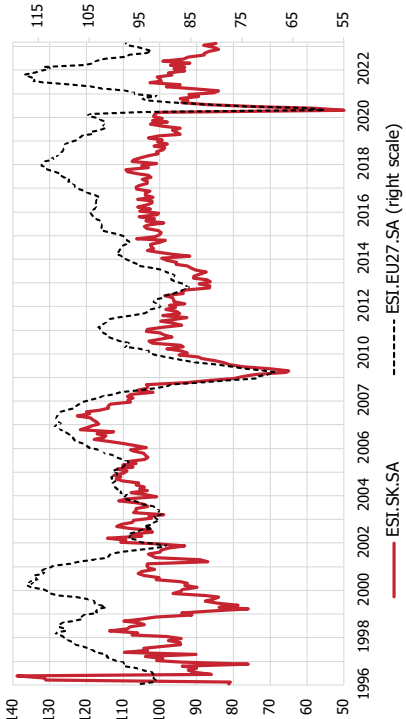
IP.EU27.C (right scale)


IP.SK.SCA
IP.EU27.SCA (right scale)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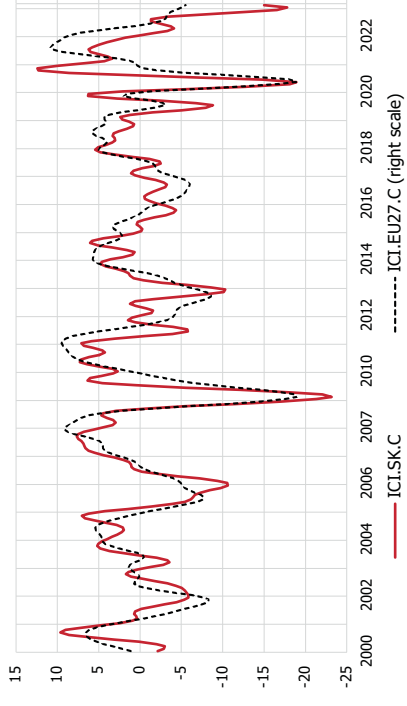
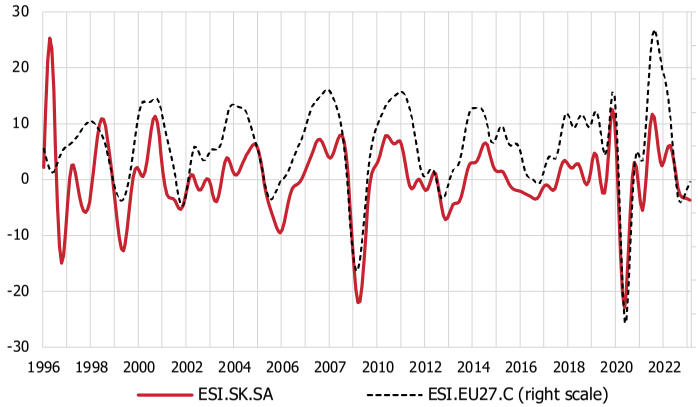
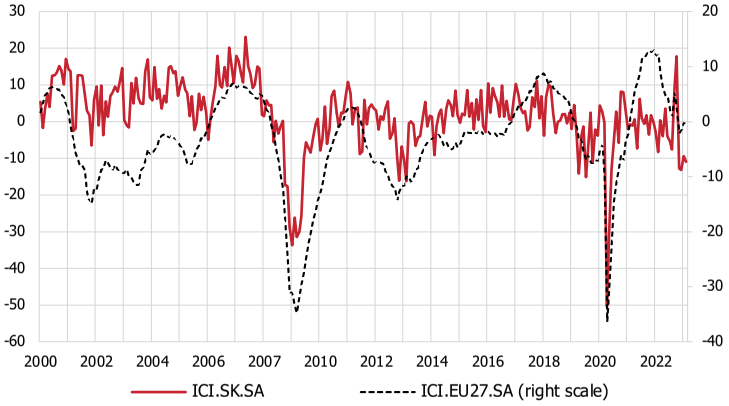

ICI.SK.C
ICI.EU27.C (right scale)


ESI.SK.SA
ESI.EU27.C (right scale)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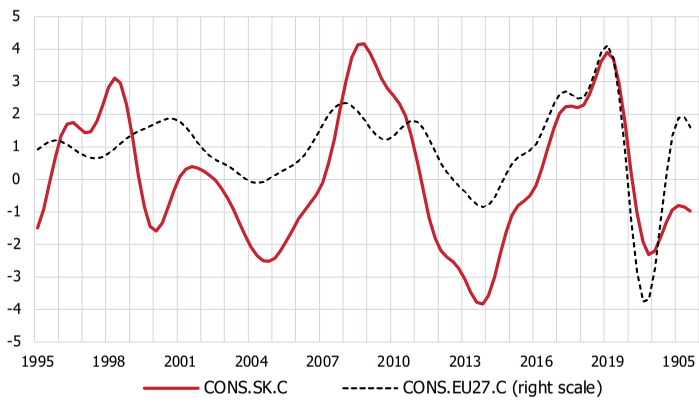
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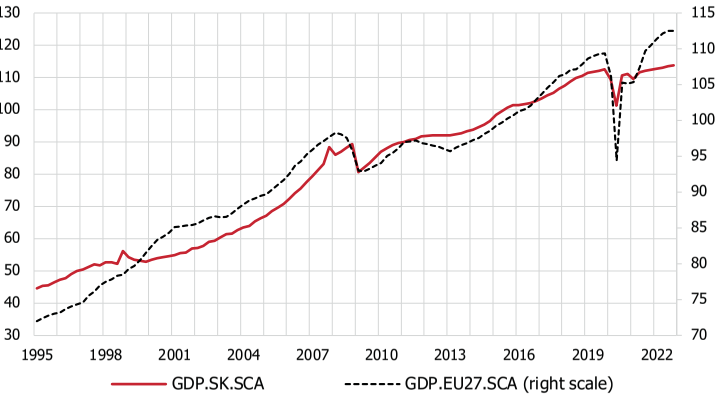
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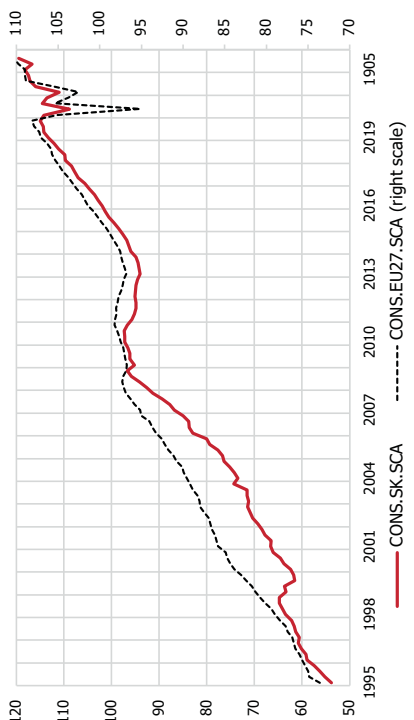
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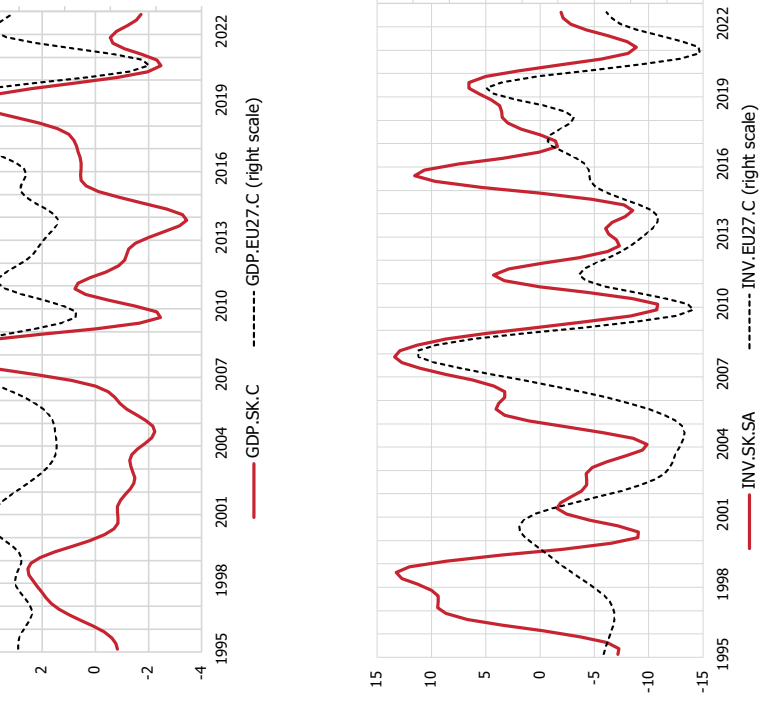
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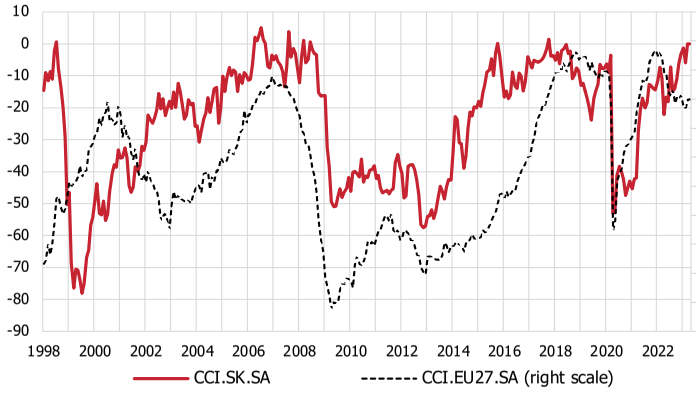
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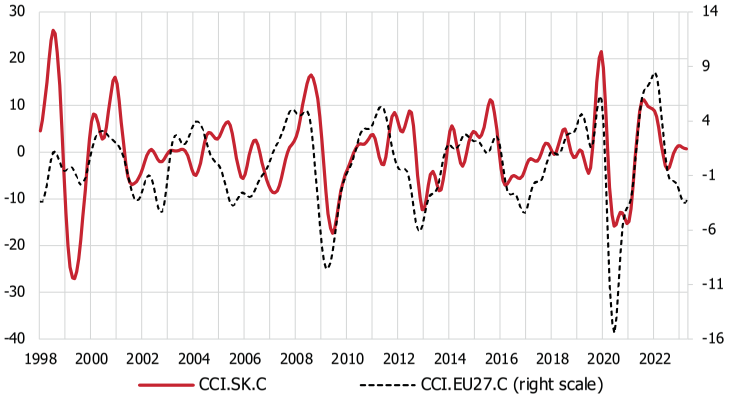
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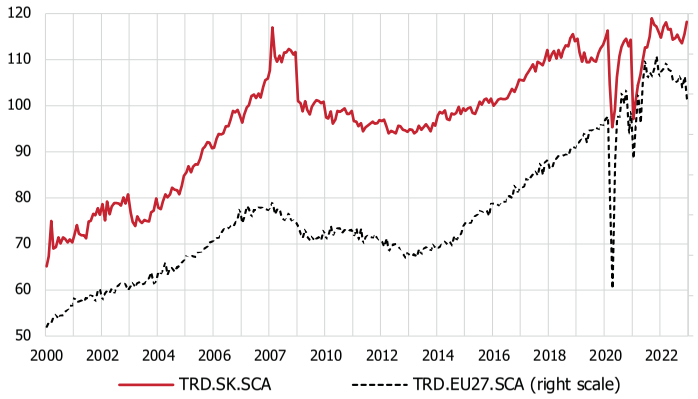
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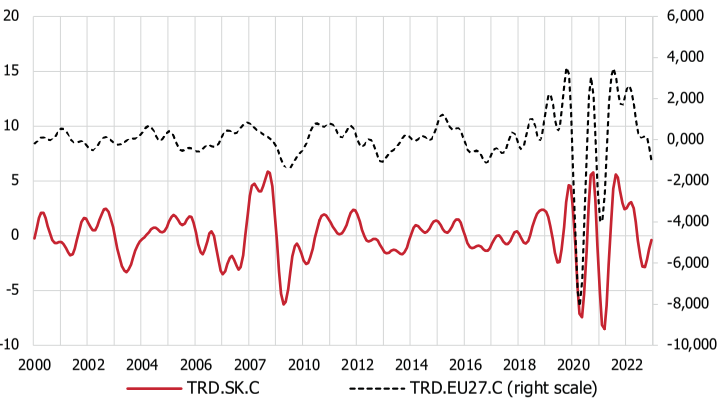
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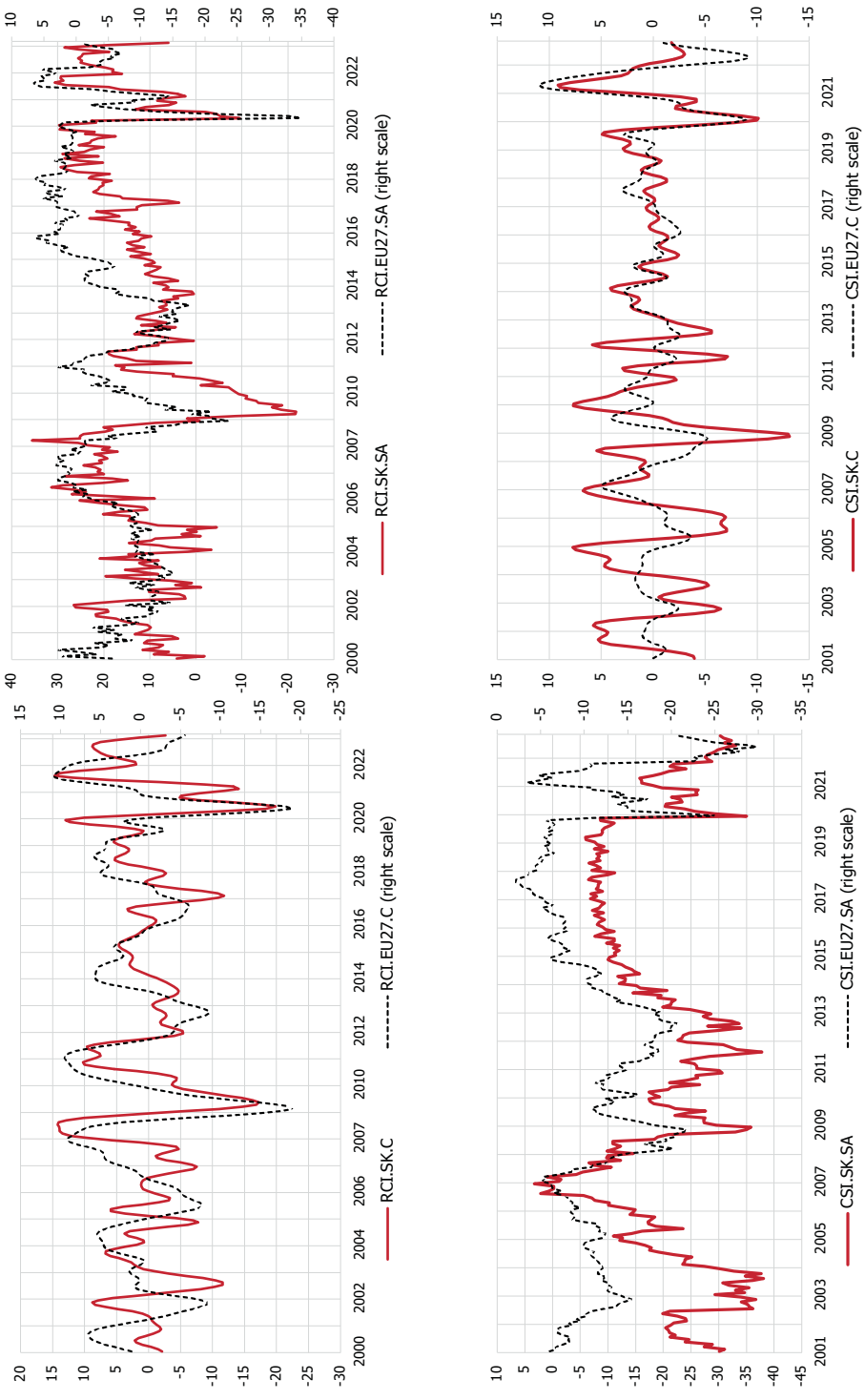
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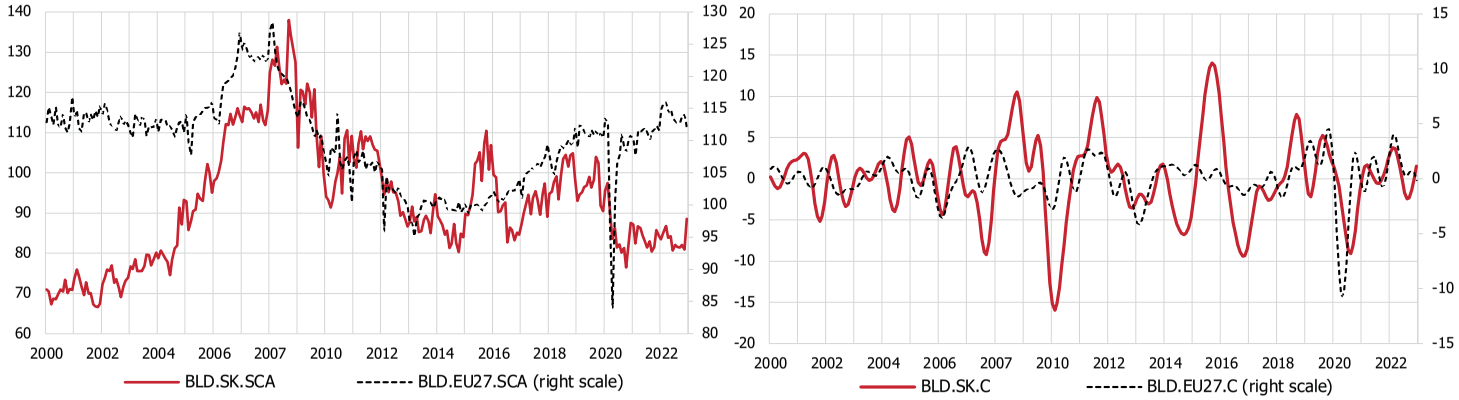
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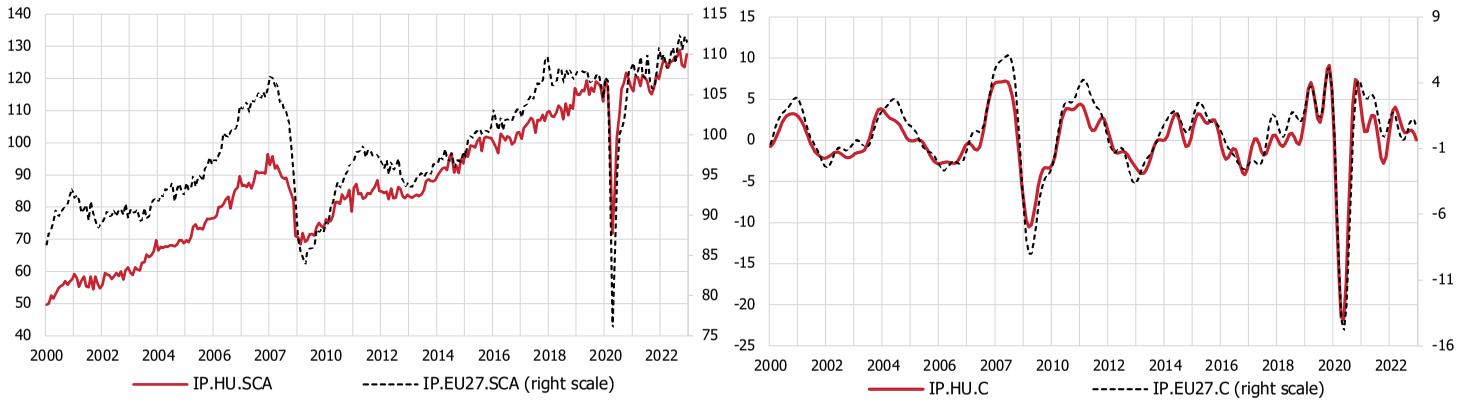
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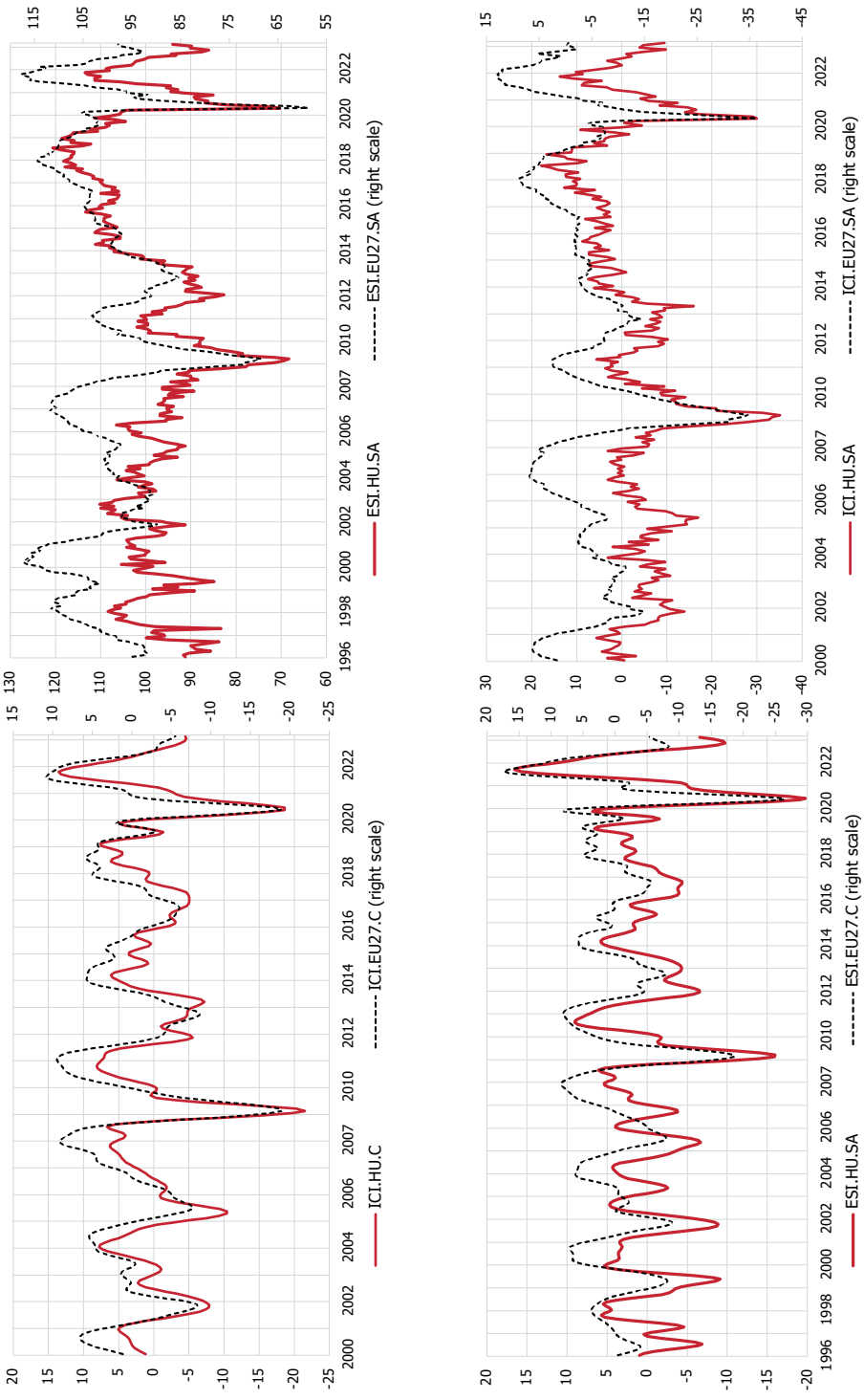
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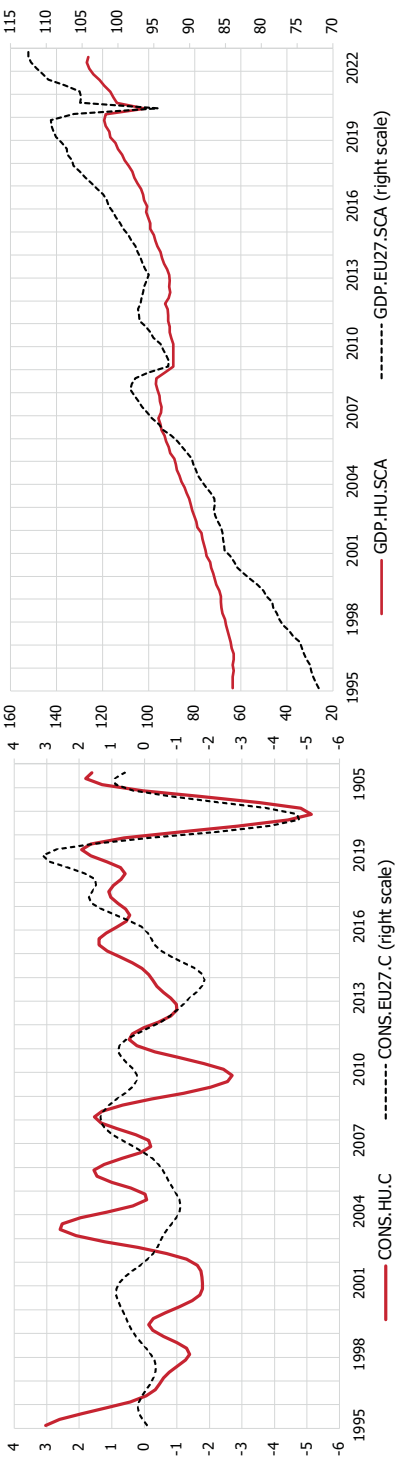
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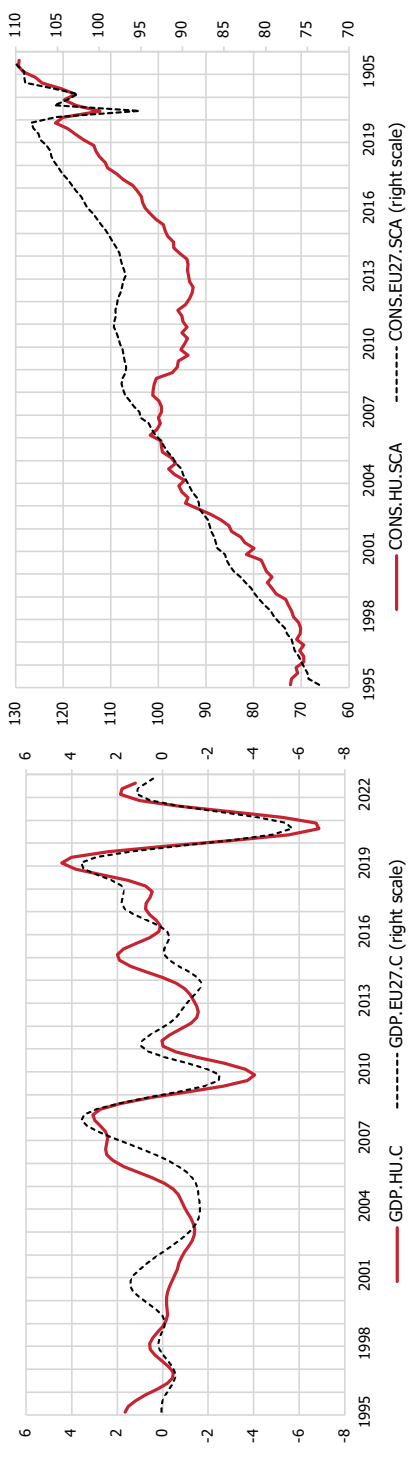
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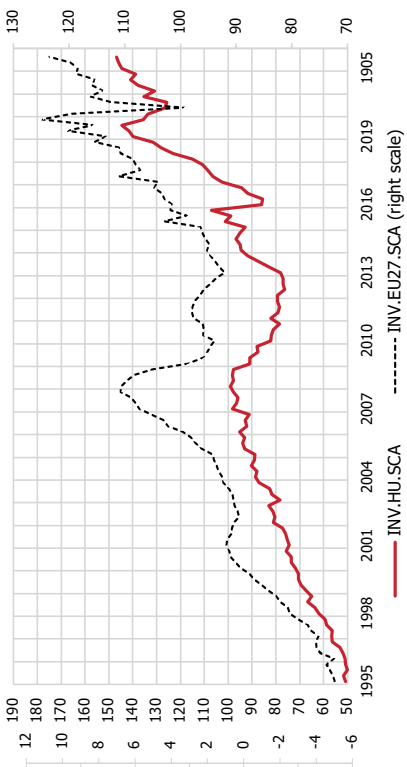
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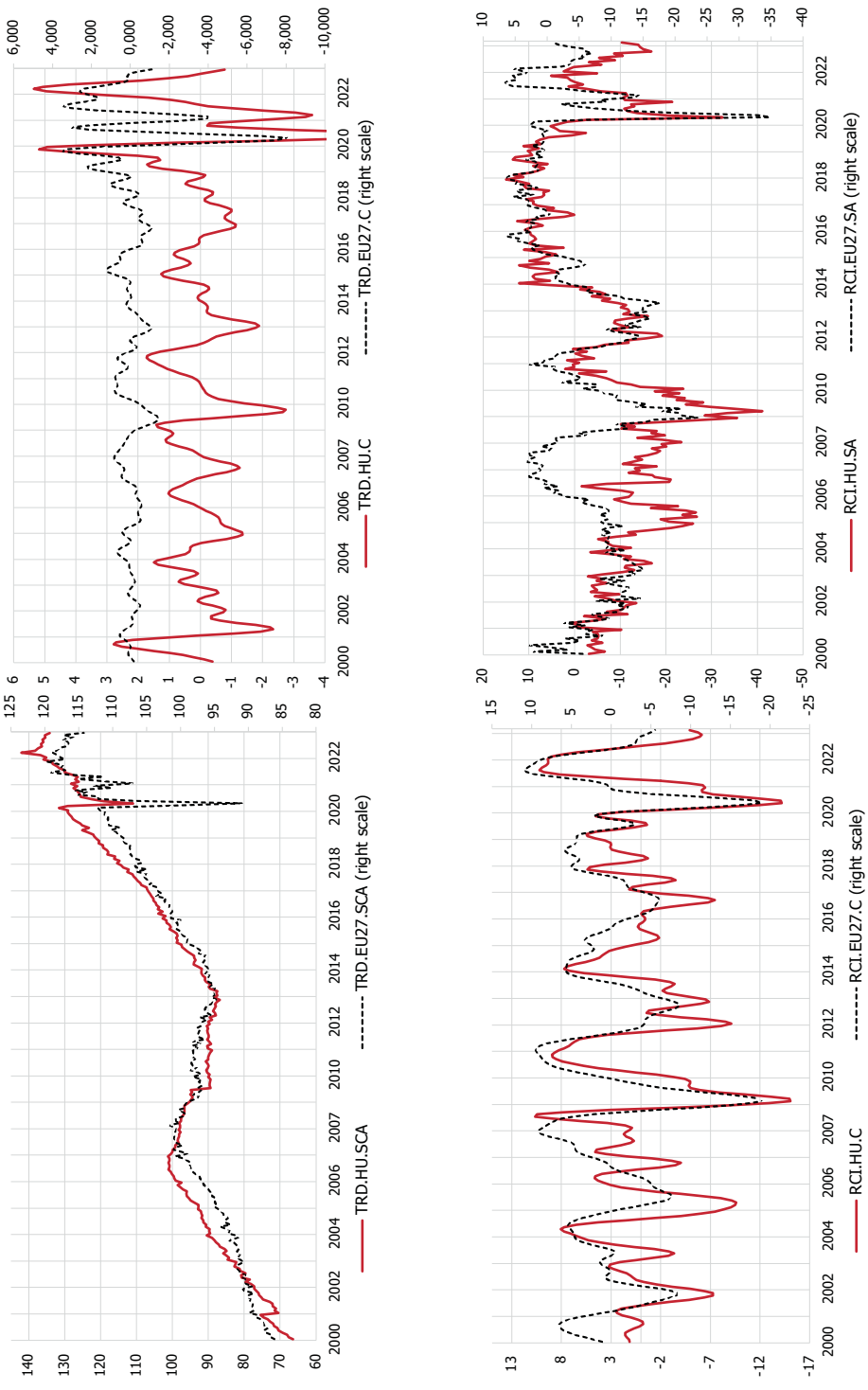
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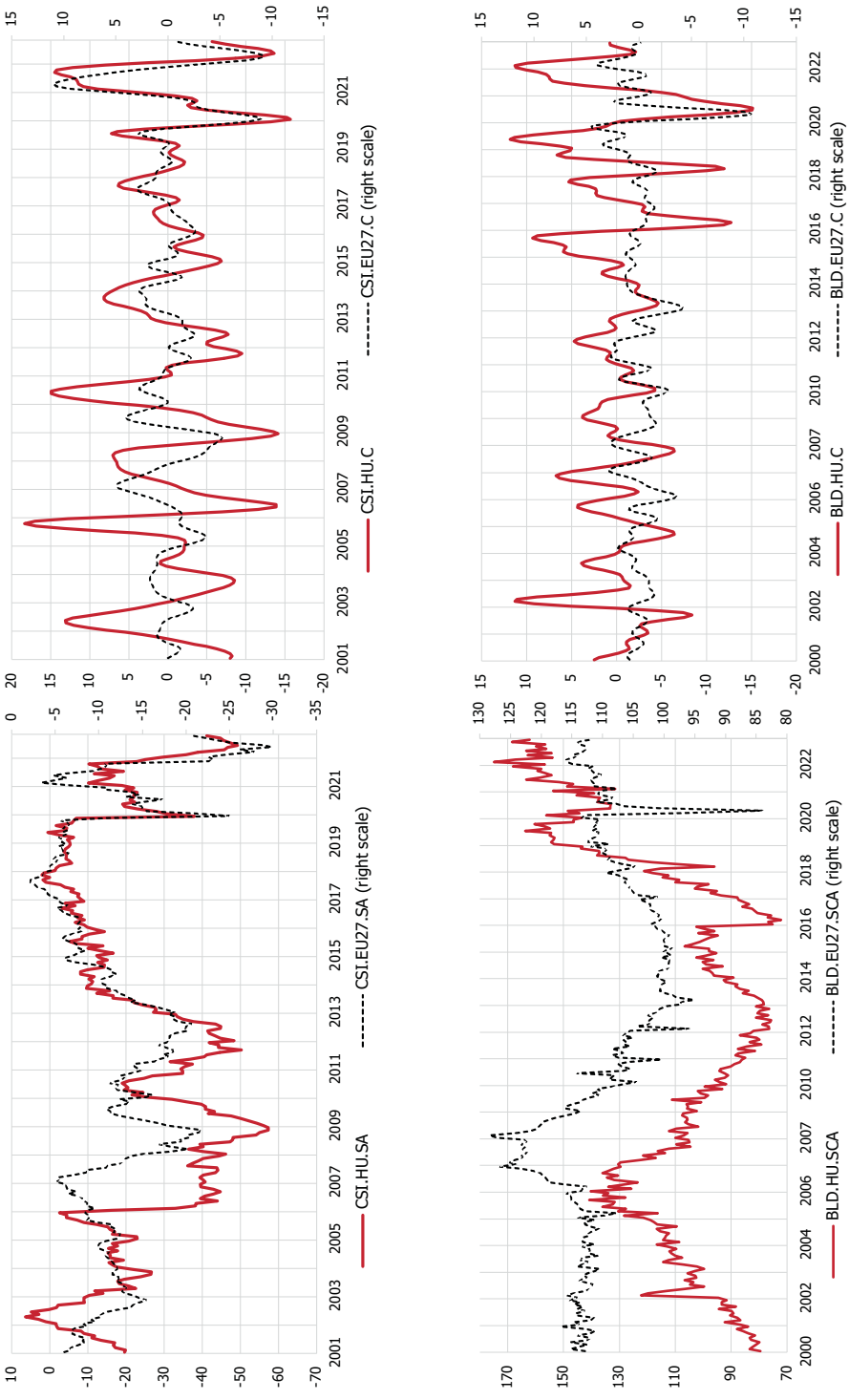

Source: own elaboration.

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GROWING COSTS OF PUBLIC DEBT SERVICING – CHALLENGES FOR FISCAL POLICY DURING CRISIS CONDITIONS IN SELECTED CENTRAL AND EASTERN EUROPEAN COUNTRIES

Michał Bitner
Artur Nowak-Far
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DOI: 10.33119/978-83-8030-625-7.2023_125_158

Abstract

Under various economic stresses between 2017 and 2022, fiscal policies of some Central and Eastern European countries (Czechia, Hungary, Poland, Romania, Slovakia) relatively soon experienced restriction of their negative net savings of public sectors. At the beginning of this period, despite low borrowing costs, these countries relied relatively little on borrowing. However, with the outbreak of the COVID-19 pandemic in 2020, all of these countries, except Hungary, experienced noticeable "current deficits" or negative net savings. As the economic situation worsened, the funding of public expenditures through deficits increased significantly in Hungary, Poland, and Romania, resulting in substantial nominal public deficits relative to GDP.

Paradoxically, the yield on treasury bonds in these countries reached record lows in 2020, accompanied by a significant reduction in spreads. However, by the end of the pandemic period, the cost of servicing public debt in these respective countries became significantly diverse. As of mid-2021, the average yield was 0.2% for Slovakia, 1.3% for Czechia, 1.4% for Poland, 2.4% for Hungary, and 3.2% for Romania. The pace of increase also varied. The rise in treasury bond yields quickly translated into higher costs of servicing public debt. Recently the costs for Czechia, Poland, and Romania amounted to approximately 1.7%, 2.1%, and 2.8% respectively, while in Hungary it reached 4.6%. Hungary's debt servicing costs seem unsustainable.

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In the last few years the world economy, along with the public finances of many countries, has experienced shocks unprecedented in recent history. The period of relative stability and growth following the financial and economic crisis of 2008–2012 was disrupted by the arrival of the COVID-19 pandemic. The pandemic has had a significant impact on societies and their economies. Social restrictions, particularly prolonged lockdowns, have caused severe disruptions on both the demand and supply sides. To prevent a drastic economic collapse, robust growth in public spending financed through debt was seen as a solution. In 2021, there was a gradual improvement in the epidemic situation, but optimism did not last long. In February 2022, Russia attacked Ukraine, triggering a full-scale war. Economic consequences of the war, including limitations in energy availability and many other products, especially agricultural goods, affected the entire world.

The situation of Central and Eastern European (CEE) countries has been and continues to be unique in many ways, largely due to their geographical location. All these phenomena have had a negative impact on public finances of these countries. One of

the symptoms of deep changes in the financial processes in this region is the significant increase in the yields of government bonds used to finance budget deficits and other borrowing needs.

This study focuses on challenges related to fiscal policy in CEE countries arising from the sharp increase in public debt and its servicing costs in the context of shocks caused by the pandemic and war. The aim of this study is to provide answers to the following questions:

1) What factors have led to a sharp increase in government debt yields?
2) Is there a relationship between adherence to sound economic governance (SEG)[1] principles and costs of servicing government debt?
3) How strong was the response of budget deficits and government debt to shocks caused by the pandemic and the war in Ukraine?
4) Do rising costs of debt servicing threaten the stability of public finances?
5) Do the adopted SEG principles remain relevant during periods of shocks?

The research covers the six largest economies in this part of Europe, namely Poland, Romania, Czechia, Greece, Hungary, and Slovakia, but its findings also indirectly relate to many other countries. Its results are compared with the reform plan of the European Union's (EU) economic governance system to identify the main challenges faced by the examined countries. Based on the conducted research, recommendations are also formulated about assumptions for government debt management strategies and long-term financial plans.

Review of literature on factors influencing the yield of government bonds

Theoretically, the yield of government bonds issued by a particular country consists of the lowest possible yield at any given time on bonds issued by any "sovereign" ("benchmark yield"), as well as a premium (expressed as a spread relative to the benchmark value) for the additional risk associated with acquiring a particular debt instrument. Identifying risk factors that influence the premium and interpreting them has been the subject of numerous empirical studies for many years, which finally led to a certain consensus. These factors can be divided into two groups: the first group is associated with phenomena occurring in individual borrowing countries (referred

[1] SEG refers to formal and informal rules, procedures, and practices, including cooperation between the state and its key stakeholders, regarding the formulation and implementation of economic policy in a manner that reflects the principles of democracy, the rule of law, economic rationality, and transparency of choices related to its fundamental structure [OECD, 2020, p. 12].

to as "internal" factors), while the second group reflects broader processes occurring with varying intensity in the global economy (referred to as "external" factors in relation to specific situations of individual countries).

Within the first group, two key categories of risk are identified:

a) Credit risk, reflecting the creditworthiness of the country as a debtor, which in turn is influenced by various economic, political, and institutional factors.
b) Liquidity risk, reflecting the speed and ease of selling debt instruments, assuming a lack of significant impact on the instrument's price from a single (relatively small) transaction [Haugh, Ollivaud, Turner, 2009, p. 6; Codogno, Favero, Missale, Portes, Thum, 2003, pp. 506–507].

Spread can also be influenced by various additional factors, such as regulations on taxation of capital income and restrictions on capital flows with foreign countries in each specific country [Codogno et al., 2003, p. 509]. Rules governing the publication of specific information, particularly macroeconomic data and plans for economic policy changes, can also have an impact [Attinasi, Checherita, Nickel, 2009, p. 9].

Among numerous "external" categories, such as interest rates set by central banks (especially the Fed), global economic prospects (particularly growth outlook in the United States), and spreading negative phenomena (contagion), significant attention is given to the propensity (or aversion) to take risk by investors operating in various markets (referred to as global or international risk aversion). A commonly used approximate measure of this aversion is difference between the yield of corporate bonds (with a given rating) and the yield of government bonds.[2] If bonds are denominated in local currency, there is also significant exchange rate risk associated with expectations of currency fluctuations. Therefore, any comparisons of spreads on government bonds issued by countries outside the euro area must include a certain measure of (particularly expected) exchange rate risk. An ideal measure of expected exchange rate changes should be based on comparing return on financial assets with similar characteristics but denominated in a currency other than the euro [Favero, Giavazzi, Spaventa, 1997, p. 959].

A dominant focus of research on factors determining the costs of servicing public debt is the analysis of the relationship between yield and spread of government bonds and various measures of credit risk. Alesina, De Broeck, Prati, and Tabellini [1992] found a slight relationship between the level and changes in public debt and the yield of that debt. Lemmen and Goodhart [1999] observed a positive relationship between the increased ratio of public debt to GDP, and between inflation volatility and the yield

[2] García-Herrero, Ortíz and Cowan [2006] use a yield indicator of corporate bonds with a Baa rating (Moody's), just like Rozada and Yeyati [2006], as well as Bernoth, Hagen, and Schuknecht [2004]. On the other hand, Caceres, Guzzo, and Segoviano [2010] employ an original index of global risk aversion.

of debt, as well as a negative relationship between inflation rate and income potential of the public sector. Lonning [2000] emphasized the superior importance of credit ratings, while acknowledging the influence of other factors perceived as direct reflections of certain aspects of creditworthiness. Bernoth, Hagen, and Schuknecht [2004] found a significant importance of the debt service burden measured by the ratio of debt service expenditures to total public revenues and a much weaker influence of "regulatory" relationships between public debt and deficit to GDP. However, Schuknecht, Hagen, and Wolswijk [2010] observed a significantly increased impact of "regulatory" fiscal relationships on the yield of public debt during the financial crisis. Similar conclusions were drawn from research conducted by Afonso, Arghyrou, and Kontonikas [2015]. A significant long-term relationship between the stability of public finances, as measured by selected indicators (gross and net public debt to GDP ratios, primary and structural sector results to GDP ratios), and the yield of government bonds was confirmed by Gruber and Kamin [2010]. Poghosyan [2012] found that in the short term, the yield of government bonds may deviate from the "long-term equilibrium" determined by certain fiscal (public debt to GDP ratio) and macroeconomic indicators (potential growth rate), as interest rates in the money market, inflation, and real GDP growth play a decisive role, while the impact of a change in the primary sector output to GDP ratio is minor.

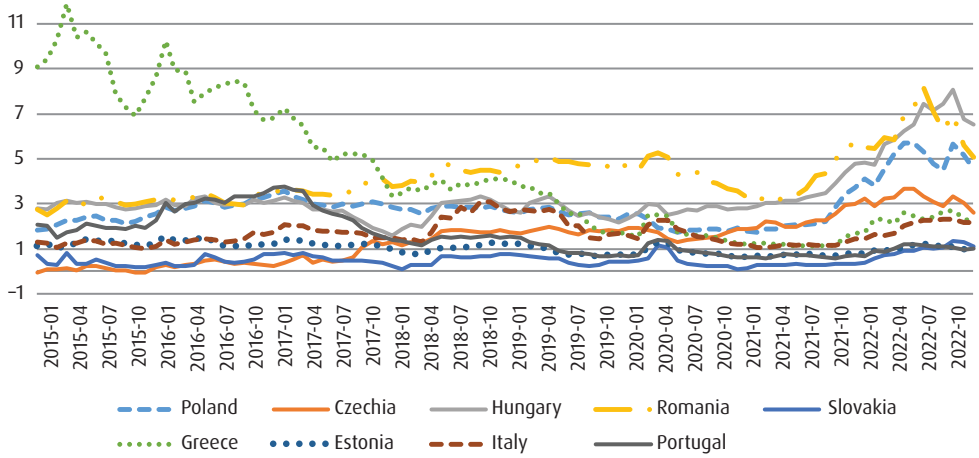
The literature devotes less attention to liquidity and general risk aversion, making it more challenging to reach a consensus on the impact of market liquidity on the valuation of government bonds. Gomez-Puig [2006] confirmed a significant influence of liquidity measured by the size of domestic government bond market on debt valuation, where the importance of this factor increased after the introduction of a common currency. Research by Beber, Brandt, and Kavajecz [2009] indicates that while credit risk assessment plays a primary role under normal market conditions, during financial crises investors prioritize instrument liquidity over creditworthiness of the sovereign issuer. Attinasi et al. [2009] highlight that both factors are important. However, studies conducted by Codogno et al. [2003] and Geyer, Kossmeier, and Pichler [2006] suggest a limited significance of liquidity. Favero, Pagano, and Thadden [2010] found that liquidity, measured by the spread between bid and ask quotes for benchmark bonds, remains similar in euro zone, and its fluctuations have minor impact on the expected yield perceived by investors. This aligns with earlier propositions put forth by Bernoth et al. [2004]. The phenomenon of general risk aversion as a factor influencing differentiation of government bond spreads was extensively examined by García-Herrero, Ortíz, and Cowan [2006]. General risk aversion as a factor that reinforces the impact of individual components of credit risk (the significance of both groups of factors increases during periods of heightened general risk aversion) was clearly identified by

Haugh et al. [2009], Attinasi et al. [2009], and Codogno et al. [2003]. Similarly, Geyer et al. [2006] and Favero et al. [2010] emphasize the importance of external factors as significant determinants of spread changes.

Selected stylized facts[3]

Since valuation of bonds issued by sovereigns depends on numerous factors, both country-specific and of regional or global nature, the indicators characterizing the examined countries were compared with relevant indicators observed in several selected Western European countries (Figure 1). Data for Germany are particularly important, as it is the only country maintaining the highest rating throughout the study period. Italy, Spain, and Portugal were chosen due to comparability of their ratings with the lowest rating obtained by some CEE countries.

Figure 1. Spread compared to German Bunds



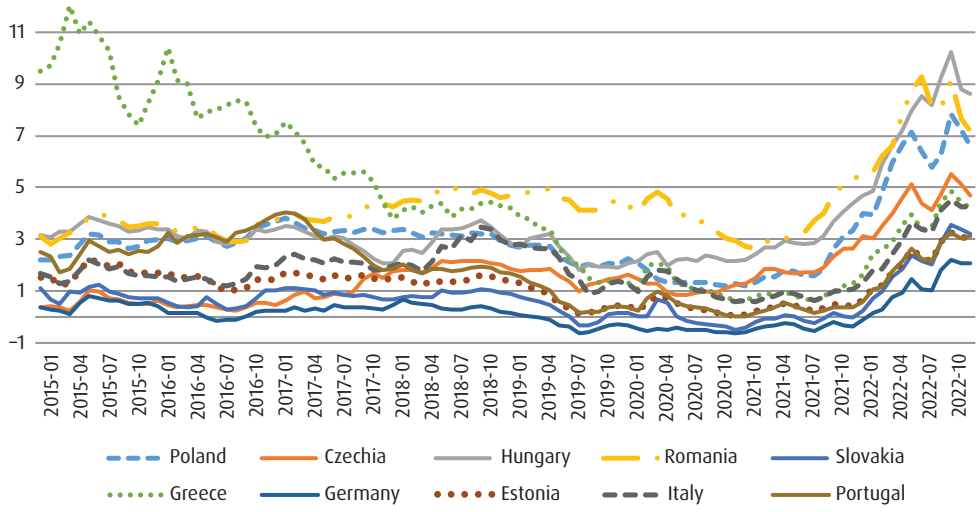
Source: self-reported data.

German Bunds, after an initial period of small increases at the end of 2015, entered a phase of declines, to finally reach zero. In 2017 and early 2018, a mild upward trend returned. However, by the end of the year, this trend reversed: from April 2019 until the end of 2021, the yield on German Bunds was negative (particularly in August – September 2019 and late 2020). In 2022, there was a steady increase in yield: for Ger-

3 We use the term "stylized facts" in its meaning specifi d by Kaldor [1978, p. 178].

many, it rose from 38 bps in December 2021 to 209 bps in December 2022. While these trends were noticeable in most of the compared countries, some of them were particularly intensive, resulting in substantial changes in spreads (Figure 2).

Figure 2. Yield of government bonds

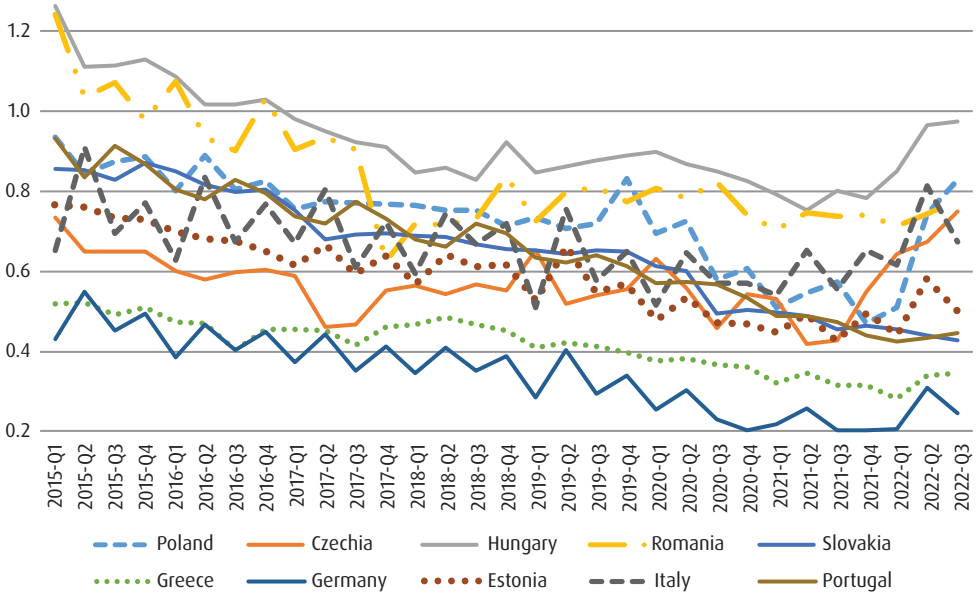


Source: self-reported data.

The yield on Czech bonds initially did not deviate much from the German benchmark, but from 2017 to 2019, it systematically increased to around 200 bps. In the period preceding the pandemic, the spread of Hungarian bonds fluctuated significantly (sharp declines in 2017 and increases in the following year), similarly to Romanian bonds (notably high increases, especially in 2017 and 2018). The declines in the spread of Portuguese bonds in 2017 and the increases in the spread of Italian bonds in 2018 are also noteworthy. Since the beginning of 2021, there has been an increase in spreads in all countries included in the comparison, but the intensity of this process varied. In Poland, it rose from 176 bps (February 2021) to 563 bps (October 2022); in the Czech Republic, from 155 bps (October 2020) to 367 bps (June 2022); in Romania, from 310 bps (February 2021) to 818 bps (July 2022); and in Hungary, from 280 bps (January 2021) to 806 bps (October 2022). In the case of Slovakia, significant changes in spreads can only be observed in relation to the size of bonds typical for this country – it increased from 10 bps (December 2020) to 136 bps (December 2022). During the same period, the spread of Italian bonds increased by 130 bps (from 104 bps in February 2021 to 234 bps in October 2022), and the spread of Greek bonds increased by 158 bps (from 110 bps in June 2021 to 268 bps in October 2022). Milder

increases were observed in Spain (from 67 bps in March 2021 to 123 bps in July 2022) and Portugal (from 60 bps in October 2021 to 119 bps in May 2022).

Figure 3. Debt servicing cost ratio



Source: self-reported data.

Changes in the yield of government bonds from January 2015 can be divided into several subperiods:

a) An initial period of small increases, which for German Bunds entered a phase of declines at the end of 2015, to finally reach almost zero;
b) Return of a mild upward trend lasting until the end of 2018;
c) General decline in yields until the second half of 2021;
d) Significant increases at the end of 2021 and in 2022.

Changes in the yield of government bonds resulted in changes in refinancing costs. In most cases, this ultimately led to changes in the cost of servicing debt. An approximate measure of these costs is the ratio of interest expenses in a given quarter[4] to the debt at the end of the previous quarter (debt servicing cost ratio – Figure 3). Although debt servicing costs generally showed a downward trend for most of the analysed period, there was a spectacular increase in these costs in some countries in 2022. In Poland, the value of interest in Q4 2020 was 0.51% of the debt as of the end of

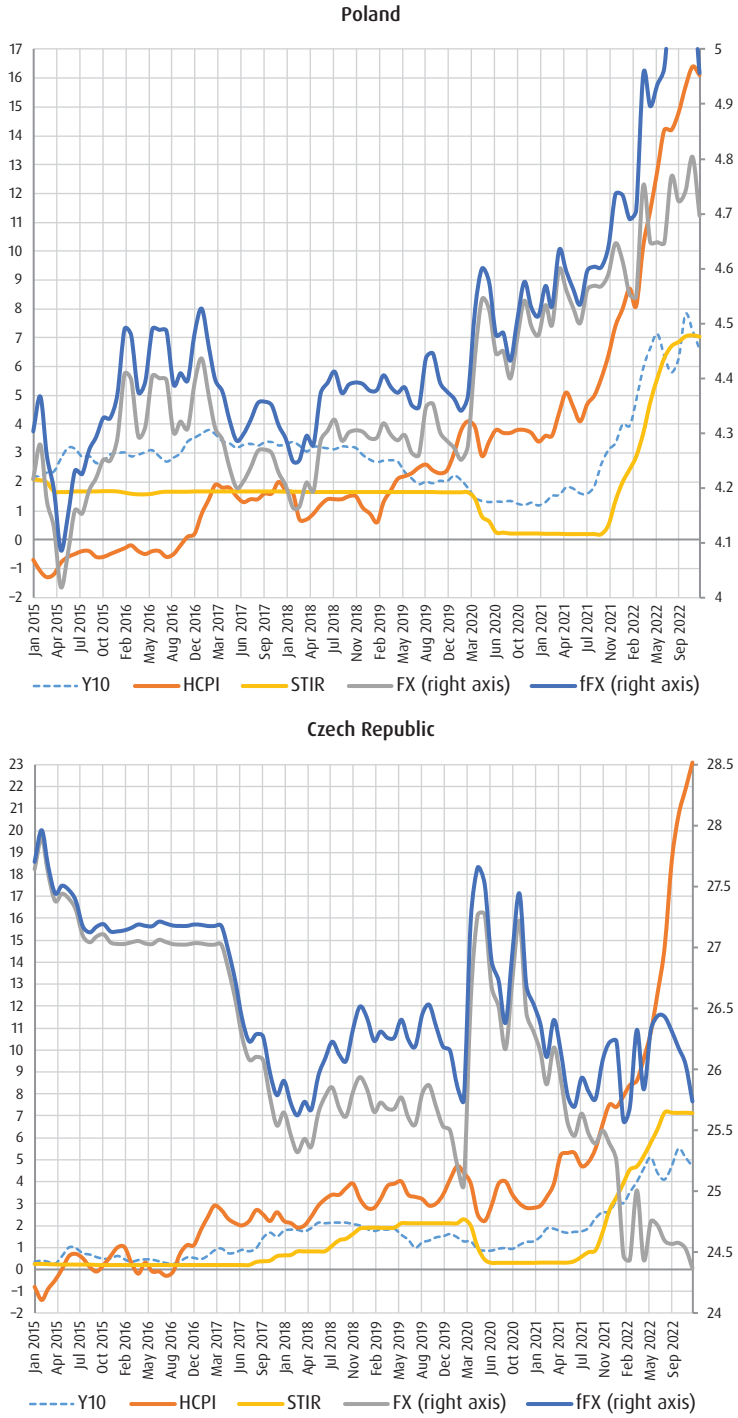
4 Since in most countries covered by the comparison state debt accounts for a majority of public debt, this approximation seems fair.

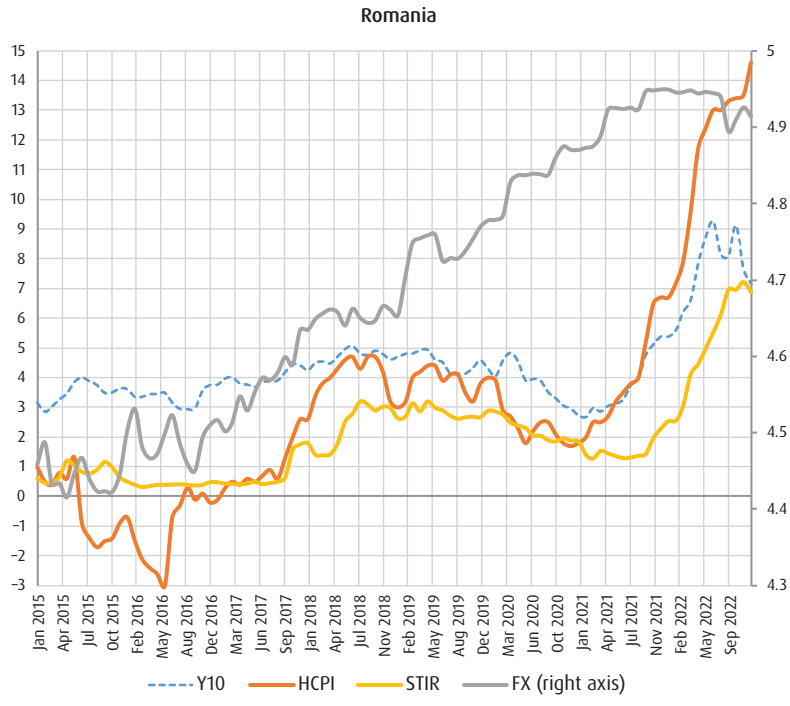
the previous quarter, and in Q3 2022, it reached as high as 0.83%. In the Czech Republic, the debt service ratio decreased from 0.74% in Q1 of the study period to 0.42% in Q1 2021, only to return to the original level in Q3 2022. The phenomenon of increasing debt service costs occurred with less intensity in Romania and Hungary: the debt service ratio in these countries increased from 0.7% (in Q3 2020) to 0.78% (one year later) and from 0.75% (in Q4 2020) to 0.97% (in Q3 2022), respectively. The nominal difference between the debt service ratio in relation to the debt at the end of Q2 2022 was: 0.64% of GDP in Poland, 0.53% in the Czech Republic, 0.15% in Romania, and 0.62% in Hungary. Therefore, there was a clear reversal of the downward trend in 2022.

To illustrate the relationships between the yield of government bonds and economic variables characteristic of individual economies, changes in yields in each of the examined countries were presented against two groups of indicators: monetary indicators (exchange rate, inflation, and money market interest rate) and fiscal indicators (public debt-to-GDP ratio, public deficit-to-GDP ratio, and net public savings-to-GDP ratio). Comparisons of monetary indicators (Figure 4) were made using a one-month lag, meaning that the average bond yield in month *n* was juxtaposed with average exchange rate, inflation (y/y) and average money market interest rate (for term 1 m) from month *n* – 1.

Among the analysed indicators, there is a relatively strong relationship between the money market interest rate and bonds yield. In Romania, changes in short-term rates were consistently accompanied by changes in the yield of 10 -year government bonds, which were higher during the 2015–2018 period, first by 250–350 bps, and later by 100–200 bps (only in the last months of 2022 did both rates converge). Similarly, in Hungary, the yield of 10 -year government bonds remained consistently higher than the short-term rate until mid-2022, and the difference between these two indicators was generally comparable to that observed in Romania. However, significant fluctuations in the yield of Hungarian bonds were notable between the beginning of 2017 and March 2020 (ranging from 1.8% to 3.7%), a period when the money market rate was close to zero. The strong upward trend in short-term rates since the end of 2021 led to a negative spread between the short-term rate and the yield of bonds in August 2022, reaching 600–700 bps in the last months of 2022. In the Czech Republic, a negative spread between short-term rate and yield of 10 -year bonds persisted throughout 2019 and the first few months of 2020. This phenomenon returned in December 2021 and reached over 200 bps by the end of 2022. In Poland, government bond yield fluctuated (from 2% to 3.7%) between early 2015 and the outbreak of the pandemic in April 2020, while short-term rate remained at 1.60–1.65%. Like in Romania, no negative spread between the yield of government bonds and the short-term rate occurred in Poland, although both rates have remained at similar levels since mid-2022.

Figure 4. Differences Y10 and monetary values




Romania
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Y10
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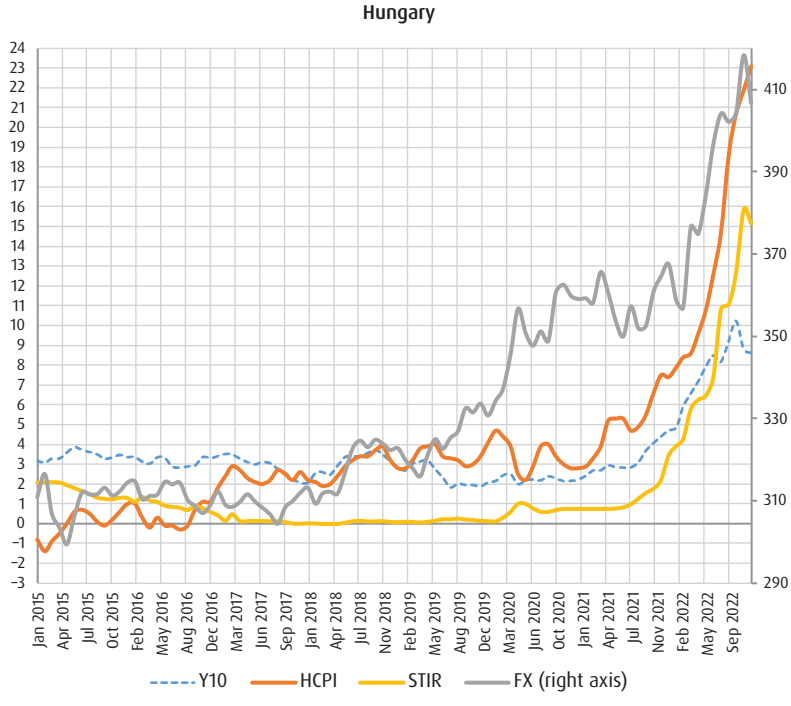
STIR
FX (right axis)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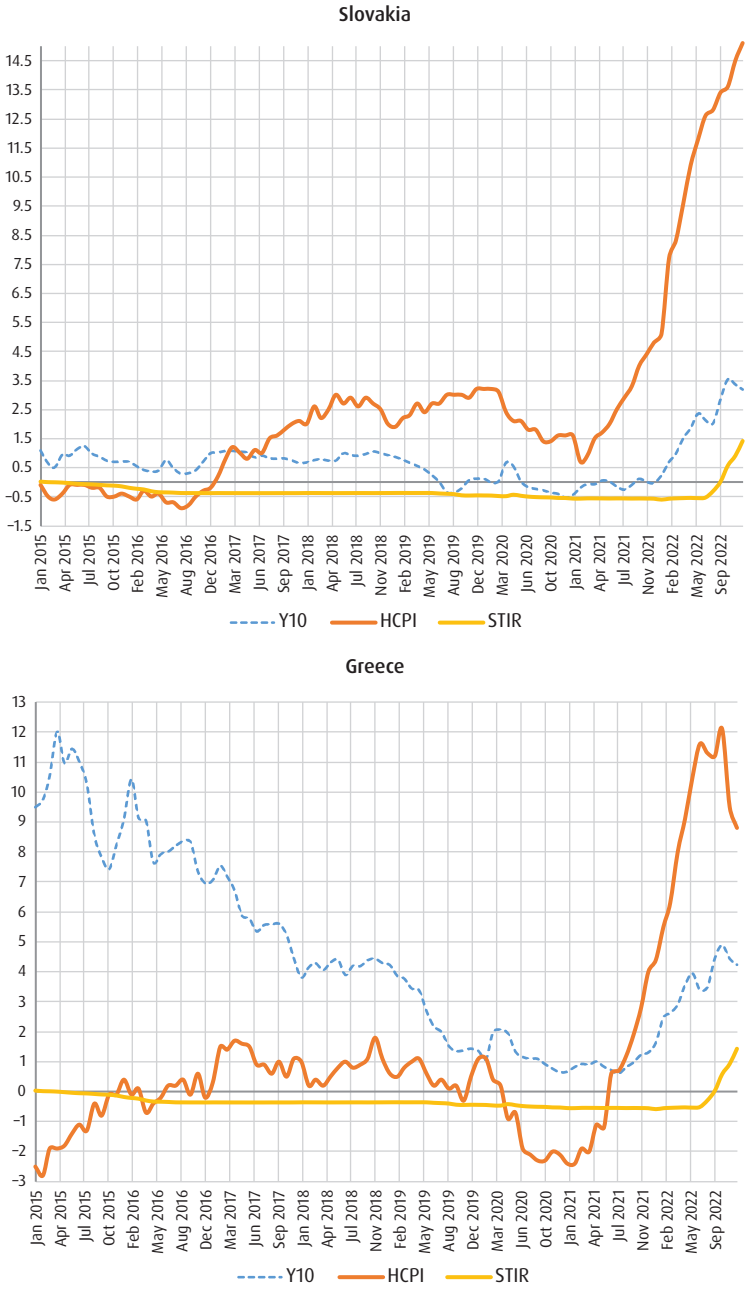


Source: self-reported data.

In each of the examined countries outside the euro zone, the increase in short-term rates from mid-2021 was accompanied by rising inflation, particularly pronounced

in the Czech Republic and Hungary. In both these countries, inflation rate (year-on-year) exceeded 23% by the end of 2022 (7% in Czechia and over 17% in Hungary). Data from the period between the beginning of 2015 and mid-2021 indicate no direct relationship between inflation and bond yield when inflation remains within the inflation target or only slightly exceeds it. This was especially evident in Poland in 2015 and 2016 (slight deflation with bond yields hovering around 3%), as well as in Romania from mid-2015 to the end of the following year (when the yield of bonds was around 3.5% despite deflation reaching 2.5% in some months). It is also worth noting that in the Czech Republic, inflation rate significantly exceeded the yield of 10 -year bonds since the end of 2016. No correlation between inflation and yield of government bonds is visibly present in Slovakia and Greece. In the former, inflation during most of the study period (including from February 2022) was lower than Romania's inflation by less than 1 percentage point; the average yield of Romanian bonds between 2015 and mid-2021 was 3.89%, while the yield of Slovakian bonds was 0.52%. By the end of 2022, Greece had significantly lower inflation than Slovakia (by over 5 percentage points) and government bonds yield over 100 bps higher.

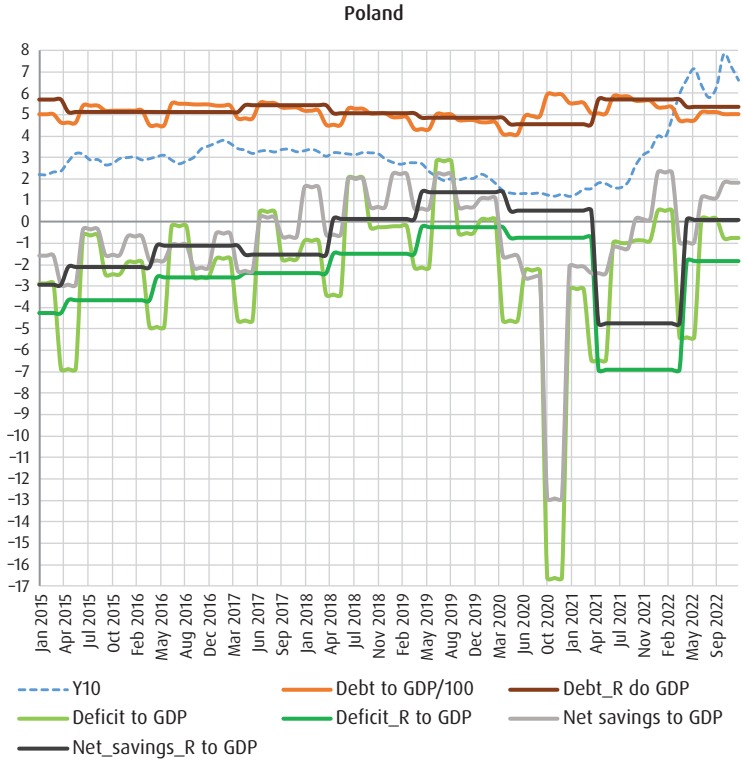
No clearer systematic dependencies were observed between any of the compared indicators and the exchange rate in countries outside the euro zone. The presented data do not allow for the recognition of changes in interest rates as one of the main factors influencing exchange rate fluctuations. For example, there was a relatively strong depreciation of the Polish zloty over a few months starting from May 2015 despite stable purchasing power and short-term interest rates and a decreasing EURIBOR rate. Similarly, the Czech koruna experienced a moderate increase starting from the end of 2020, despite inflation significantly exceeding the money market interest rate in the Czech Republic. Overall, however, changes in exchange rates in all the examined countries were shallower than changes that, according to the theory of interest rate parity, one could expect based on differentiation of interest rates (at least in non-short-term perspective).

Significant changes in the yield of government bonds during periods of relative stability in monetary indicators, as well as differences in the pace of these changes in 2022 that cannot be explained by monetary factors, make us search for factors determining the bonds yield among variables that are fundamental for credit risk perception, namely, identification of relationships between the yield of government bonds and fiscal variables. Referring to variables discussed in the literature and rating methodologies, the analysis presented here is based on the relationships between public debt, public deficit, and net public sector savings ratio to GDP. Since these variables (except for GDP) are reported with a delay, an appropriate time lag, resulting from the schedule of data publication by Eurostat, was applied. In the case of quarterly fiscal variables,

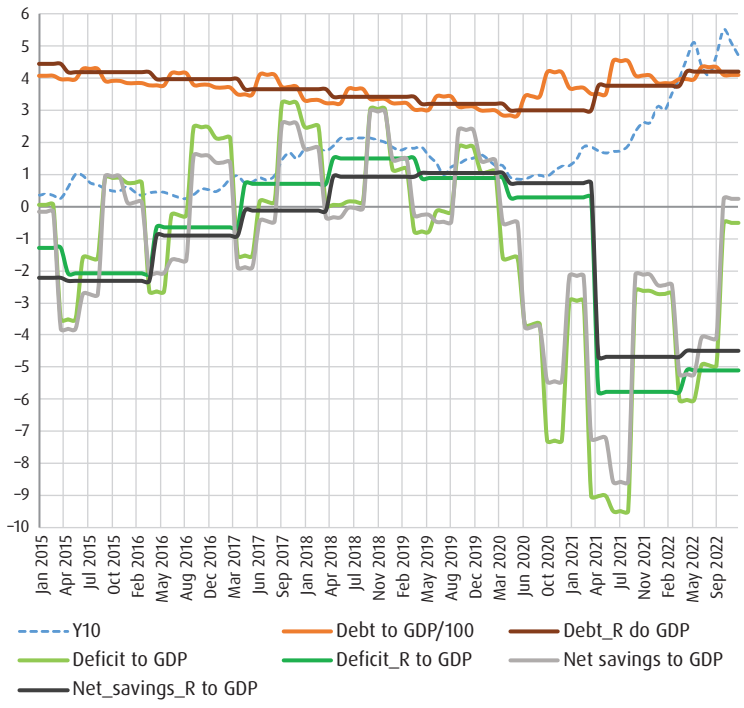
the bond yield in month *n* starting the quarter *q* and the following two months were compared with data from the quarter ending in month *n* – *4*, while for annual variables, it was assumed that the impact of data published for year *n* – *1* starts in May of the following year (Figure 5).

The presented data indicate low usefulness of analyses based on quarterly indicators. Some of these indicators show noticeable repeatability resulting, it seems, from the cyclicality of phenomena initiated by fiscal management processes during the fiscal year. In several examined countries (Poland, Czechia, Romania, and Hungary), the ratio of public debt to GDP regularly decreases over the following three quarters comprising the 12 -month periods, and this cycle aligns with the calendar year. In other countries (Slovakia and Greece), this ratio decreases in the second and third quarters of the calendar year, only to increase slightly in the last quarter. The year 2020 (the first year of the pandemic) was exceptional in this regard, as in all examined countries, the debt-to-GDP ratio reached its highest values in the second quarter. The amplitude of quarterly fluctuations is noteworthy: in Poland and Hungary, the difference reaches an average of 20% of the maximum ratio value, while in Slovakia and the Czech Republic, it is slightly smaller, while in Romania it reaches as much as 30%.

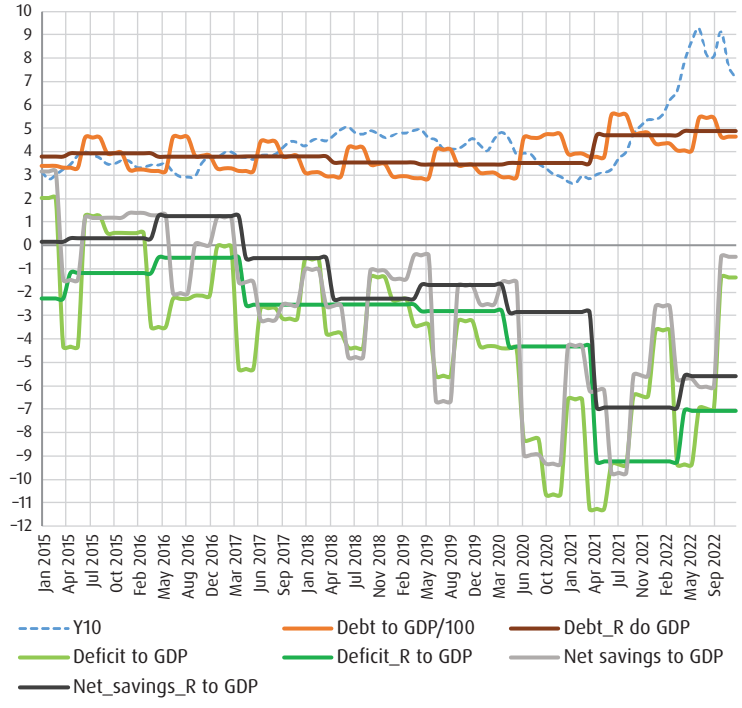
Figure 5. Differences Y10 and fiscal values

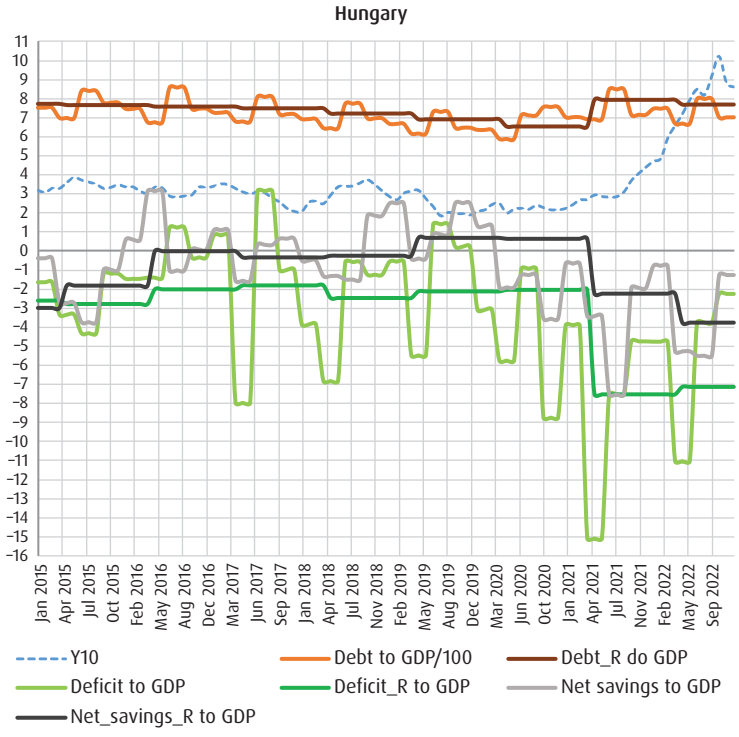


Czech Republic



Romania

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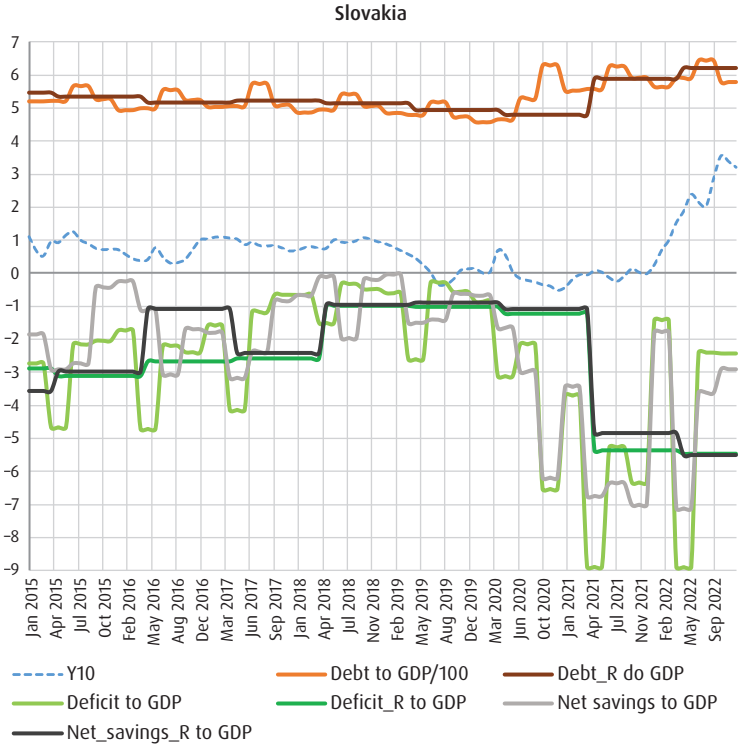
Deficit to GDP
Deficit_R to GDP
Net savings to GDP
Net_savings_R to GDP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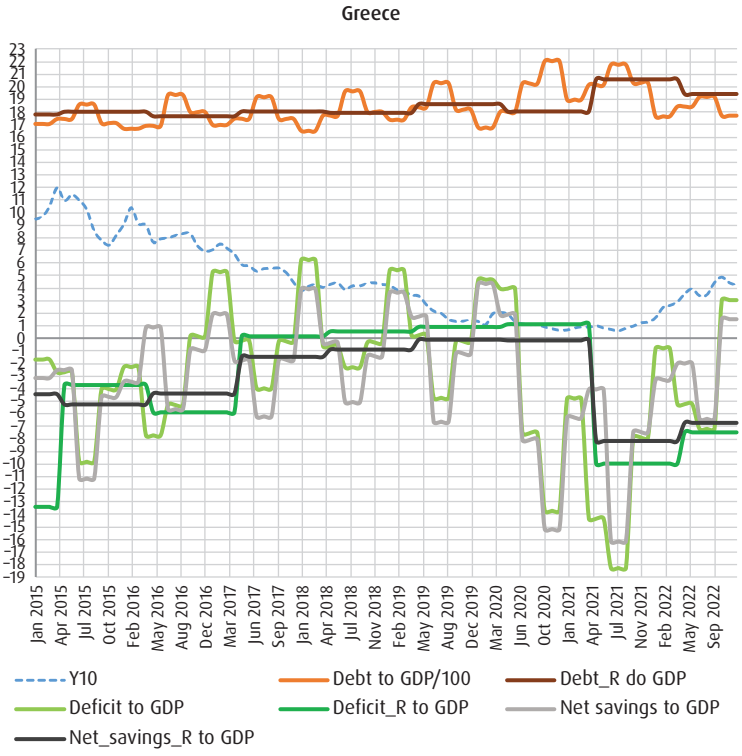
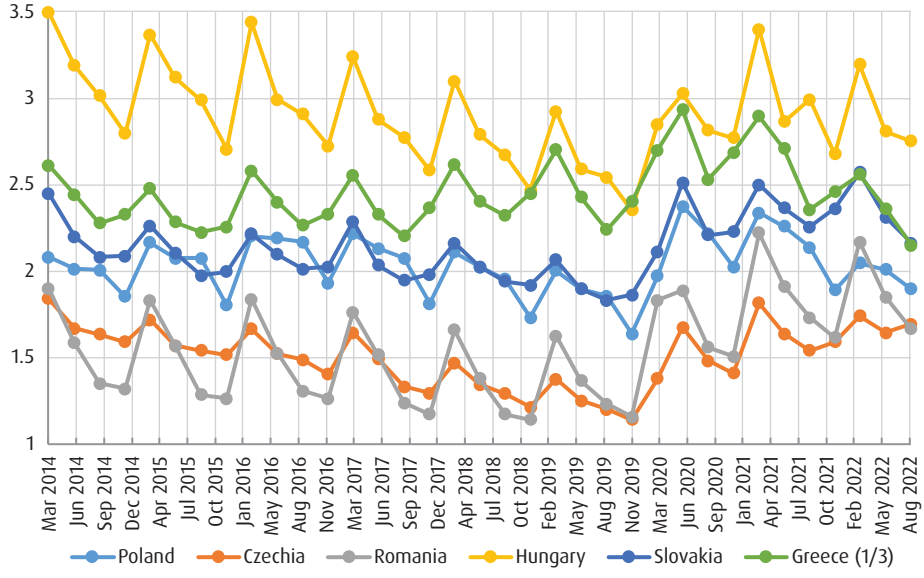
Y10
Debt to GDP/100
Debt_R do GDP
Deficit to GDP
Deficit_R to GDP
Net savings to GDP
Net_savings_R to GDP



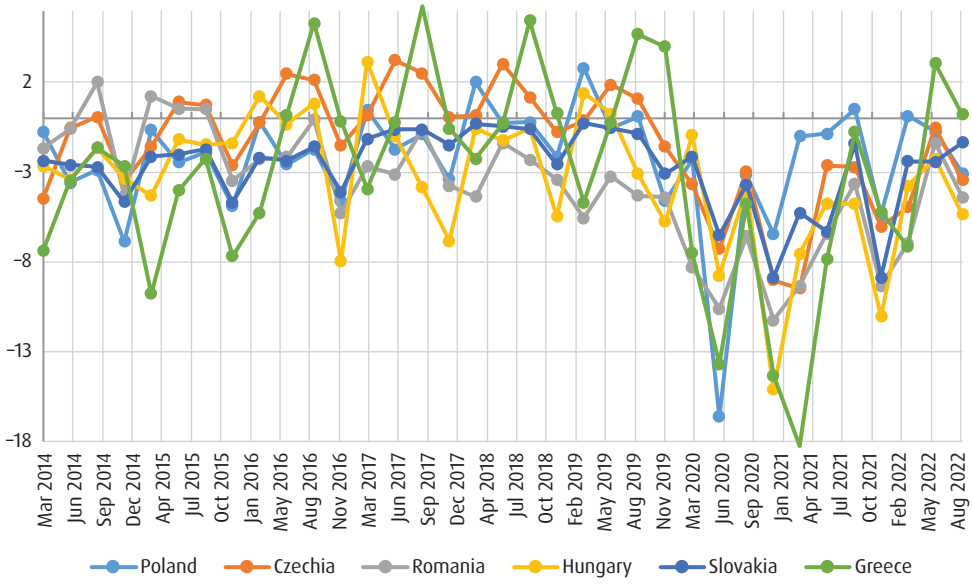
Source: self-reported data.

Figure 6. Cyclical quarterly public debt ratio to GDP



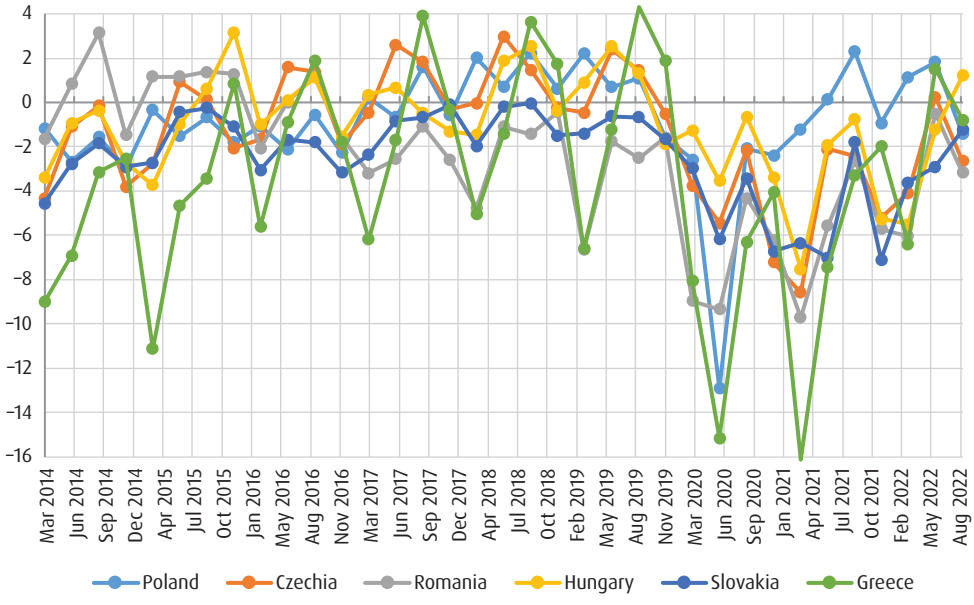
Source: self-reported data.

Figure 7. Quarterly deficit-to-GDP ratios



Source: self-reported data.

Figure 8. Quarterly net savings-to-GDP ratios



Source: self-reported data.

Regarding the ratio of deficit and net savings to GDP, there is no regularity in changes across individual quarters. However, the range of differences between adjacent quarters is striking (figures 7 and 8). For example, in 2015, the smallest and largest values of quarterly deficit-to-GDP ratios were: –4.91% and 0.65% in Poland, –2.64% and 0.9% in the Czech Republic, –3.49% and 1.23% in Romania, –1.19% and –4.32% in Hungary, –4.7% and –1.72% in Slovakia, –9.78% and –0.66% in Greece. Similarly strong differences are characteristic for the ratio of net savings of the public sector to GDP.

Therefore, since it is justified to assume that markets primarily use information about annual phenomena (processes), potential relationships between these indicators and bond yields should be cautiously identified, focusing more on trends than changes occurring within weeks or months.

An initial analysis of the gathered information indicates that the thesis about significant importance of fiscal indicators in the context of sovereign bond valuation is controversial. In some cases, a certain degree of expected correlation between the trend of bond yield changes and changes in net savings ratio can be observed. Such a correlation occurred, for example, in Poland between 2017 and 2019 and in Greece between 2015 and 2020. On the other hand, in the Czech Republic, a gradual increase in bond yields accompanied the improvement of this indicator between 2016 and 2017, and a significant reduction in the savings ratio in Slovakia in 2016 did not lead to a decrease in the valuation of Slovak bonds. In all the examined countries, especially in Poland and Czechia, values (and changes) of net savings-to-GDP ratio are related to values (and changes) of the public sector's result-to-GDP ratio. Therefore, observations regarding the influence of net savings ratio on bond yields also apply to the public sector indicator. Regarding the values and dynamics of the public debt-to-GDP ratio, it is essential to note significant differences in the level of this indicator in individual countries. In 2013, which, according to the applied time lag, affected the markets starting from May 2014, it was the lowest in Romania and Czechia (37.8% and 44.4%, respectively), acceptable in Slovakia and Poland (54.7% and 57.1%, respectively), and above the regulatory threshold in Hungary (77.2%) and significantly higher in Greece (178.2%). Although this indicator remained stable in Greece until 2019, Greek bond yield decreased from 10.4% in February 2016 to 1.3–1.4% in the last months of 2019. On the other hand, the gradual reduction of the debt ratio in Czechia (to 30% in 2019) was accompanied by a steady increase in bond yields in 2017 and 2018.

Analysis of fiscal indicators is a crucial element in assessing the credit risk of a sovereign state as a debtor, although in the methodologies of rating agencies, it is just one of many stages of such assessment. However, in studying the factors influencing sovereign bond yields, credit rating cannot be disregarded, taking into account possible

differences in risk assessment methods used by various agencies. The rating scale has been expressed as numerical score, to make the data clearer (table 1).

Table 1. Numerical rating score

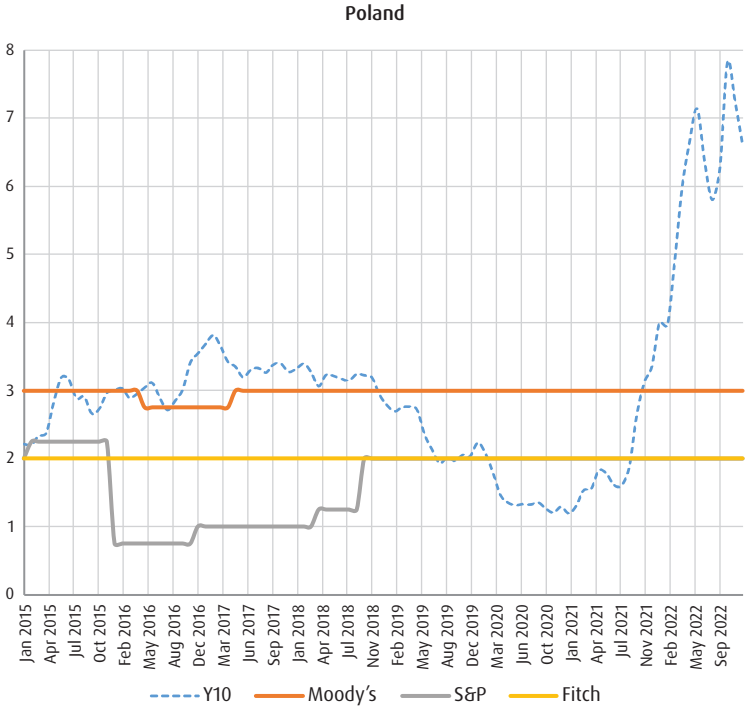
Number of points	Moody's	S&P	Fitch	Number of points	Moody's	S&P	Fitch
5	Aa3	AA–	AA	0	Baa2	BBB	BBB
4	A1	A+	A+	–1	Baa3	BBB–	BBB–
3	A2	A	A	–2	Ba1	BB+	BB+
2	A3	A–	A–	–3	Ba2	BB	BB
1	Baa1	BBB+	BBB+	–4	Ba3	BB–	BB–

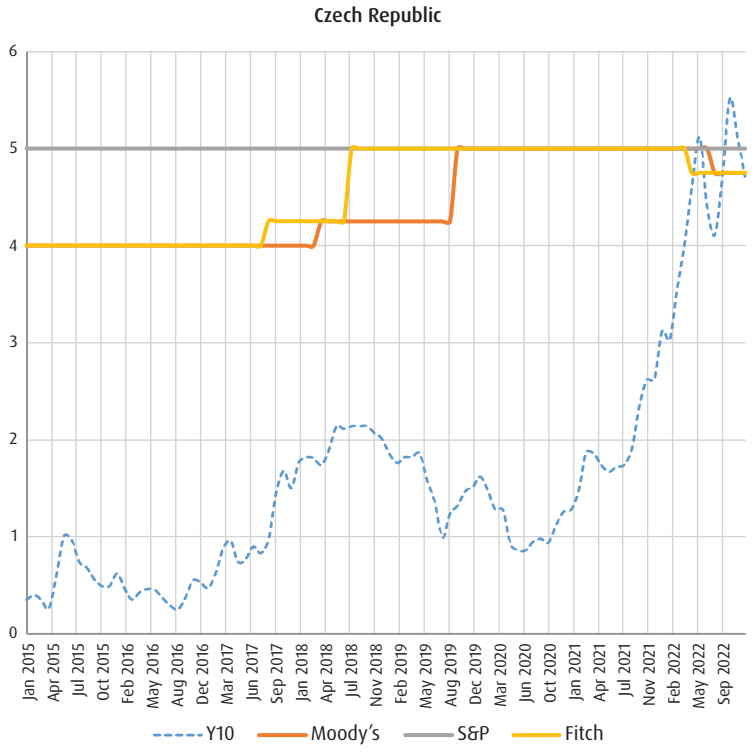
Comments: During the analysed period, Greek bonds were rated at Caa1 (Moody's) and CCC+ (S&P, Fitch), corresponding to the score –8. Ratings falling within the range from B1 (B+) to B3 (B-) were assigned the following scores: –7, –6, –5, respectively. In the case of a positive outlook, the score was increased by 0.25, and in the case of a negative outlook, it was decreased by 0.25.

Source: self-reported data.

The rating was juxtaposed with treasury bonds yield (Figure 9), without the time lag.

Figure 9. Changes Y10 and rating




Czech Republic
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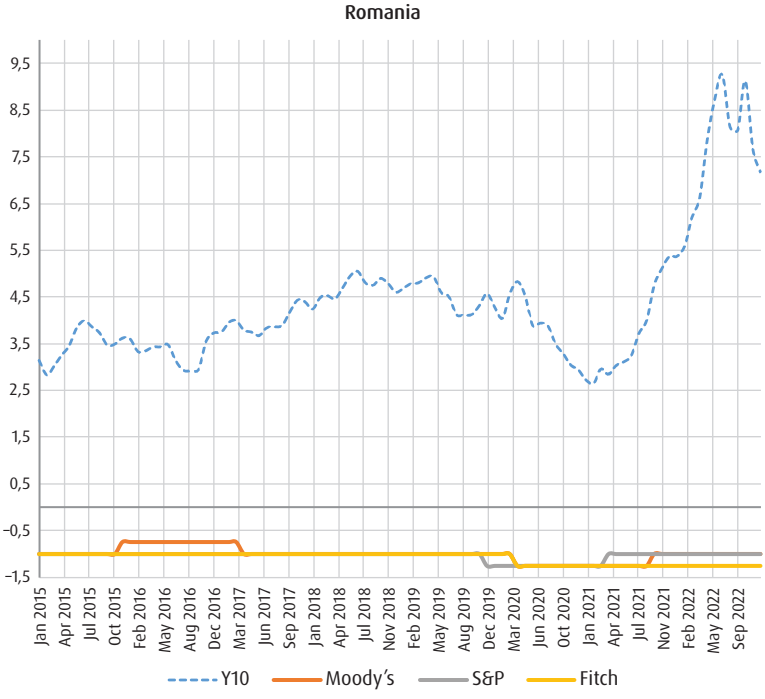
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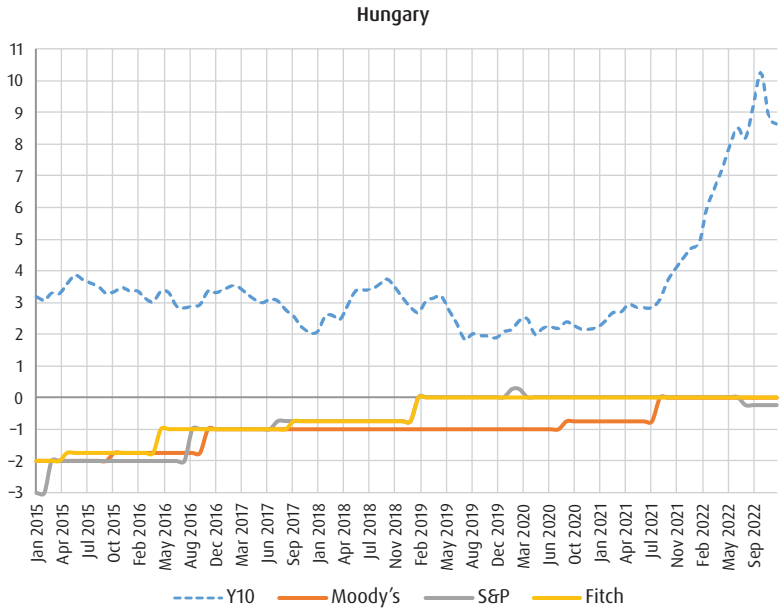
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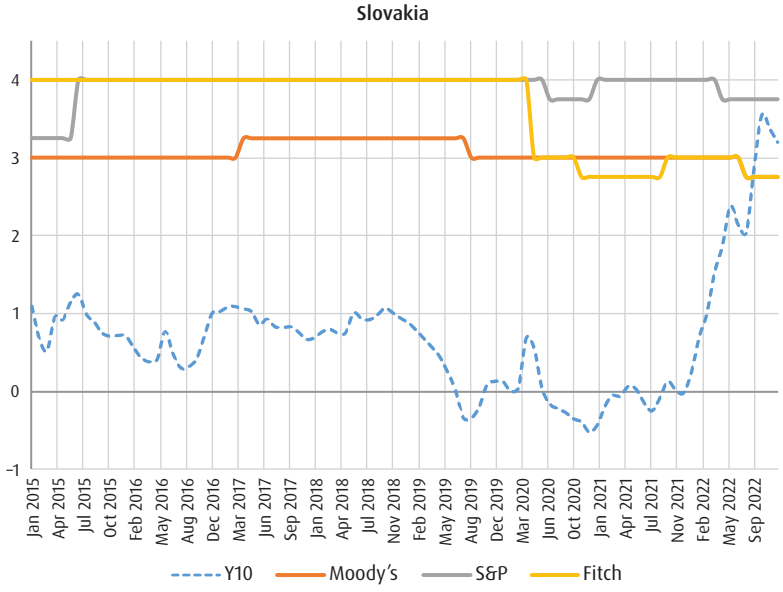
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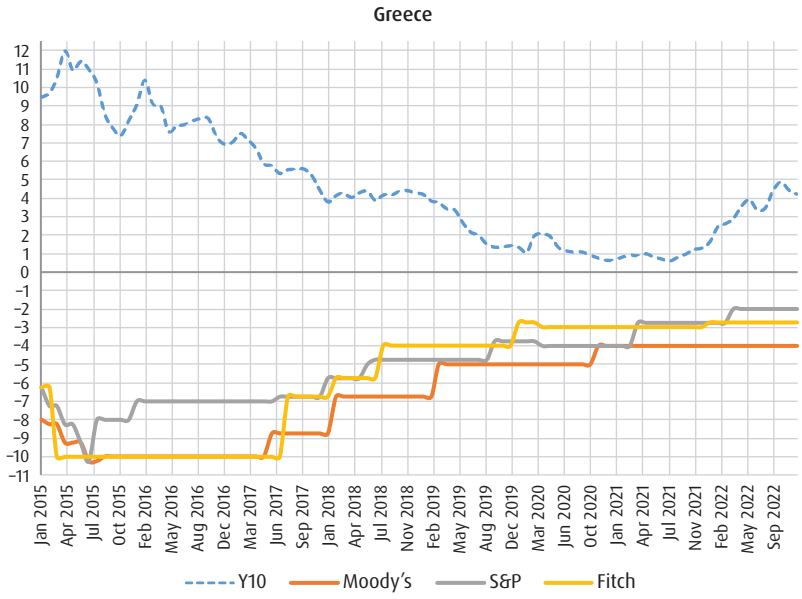

Source: self-reported data.

The most spectacular case that leads to formulating general views on the relationships between the examined variables is Greece. The most general thesis of this kind suggests a connection between rating improvement and a gradual decrease in bond yields. If we consider this observation as a simplification, it is not entirely unfounded. However, the conducted study reveals that during the period of very low rating in 2016, bond yields exhibited a distinctly decreasing trend. It is noteworthy that Greek bond yields increased in Q1 2015, despite a downgrade in Greece's rating by all agencies, and then decreased in the middle of the year, coinciding with an upgrade by S&P. In 2018, Greek bond yields were roughly similar to the yields of Romanian and Hungarian bonds, despite Greece's lower bond rating by several notches (which, depending on the agency, corresponded to highly speculative assets).

Apart from the case of Greece, there are no clear connections between rating changes and changes in government bond yields. Notably, regular improvement of Hungary's rating in 2015–2016 was not accompanied by a noticeable decrease in government bond yields. It is also challenging to associate the increase in Polish bond yields at the end of 2016 with the downgrade by S&P earlier that year.

Impact of individual factors on the yield of EEU countries' bonds – multiple regression

The aim of the study is to determine the relationship between the yield (actual cost of servicing) of long-term government bonds (dependent variable) and selected factors that theoretically should (or could) influence the yield (independent variables). The vector of government bond yield includes average monthly yields of 10-year bonds issued by individual countries in their national currency, i.e., the criteria of convergence as defined in Protocol 13 to the TFEU. Factors determining the level of government bond yields were selected based on theoretical assumptions from the previously cited literature. The factors that may influence the yield of public debt include general phenomena concerning the value of a given currency, fundamental macroeconomic indicators, effectiveness of fiscal policy, secondary bond market liquidity, and overall risk aversion. Additionally, in the period that began with Russia's aggression against Ukraine, the study aims to identify the impact of specifically risk aversion resulting from perceiving CEE countries as threatened by particular risk of various negative consequences stemming from the ongoing war in their vicinity. As the primary objective of the study is to establish any differentiation in these relationships in each of these countries, a regression analysis was conducted for each of them based on the following model:

$$Y10_t = \beta_0 + \beta_{STIR} * STIR_{t-1} + \beta_{FX} * FX_{t-1} + \beta_{GD} * GD/GDP_{y-1} + \beta_R * R_t +$$
$$+ \beta_{BaaY10} * BaaY10_{t-1} + \beta_L * L_{y-1} + \beta_{UKR} * UKR + \varepsilon_t,$$

where:
$Y10_t$ – yield of 10-year government bonds in a given month,
$STIR_{t-1}$ – short-term interest rate in the previous month,
FX_{t-1} – average exchange rate in the previous month,
GD/GDP_{y-1} – ratio of public debt to GDP in the previous year (according to the time lag adopted in the study),
$BaaY10_{t-1}$ – measure of overall risk aversion in the previous month,
R – rating (average numerical score),
L – liquidity of government bonds,
UKR – indicator of the impact of aggression on Ukraine taking values: 1 – in September 2023, and 0 – in other months of 2023.

Table 2. Description of variables and their expected impact

Variable	Measure	Source	Expected impact
$Y10_t$	yield of 10-year government bonds in month t	Eurostat	
FX_{t-1}	exchange rate of national currency to euro in month $t-1$	Eurostat	+
$STIR_{t-1}$	short-term (1 month) interest rate in month $t-1$	Eurostat	+
GD/GDP_{y-1}	government and municipal sector debt ratio to GDP in the previous year (according to time lag)	Eurostat	+
R_t	rating	Eurostat	–
$BaaY10_{t-1}$	spread of corporate bonds with Baa rating (Moody's) in relation to 10-year US treasury bonds	Federal Reserve	+
L_{y-1}	share of domestic long-term treasury bond market in the European market in the year preceding month t	Eurostat	–

Comments: description of analysed variables and regression results for countries covered by the study can be found in the attachment.

Source: self-reported data.

Statistically significant result was obtained the short-term interest rate for all countries. The study confirms clear dominance of this factor in shaping the yield of government bonds in Poland, Romania, Slovakia, and Hungary. In the Czech Republic, it plays a slightly smaller role but still exerts a significantly greater influence than any other factor. It is relatively least significant in Greece, although here also it is still the most important factor. The currency exchange rate appears to have a significant impact on the yield of government bonds in Romania, while in the Czech Republic, the influence of this variable is paradoxically negative. Significant impact of the main fiscal factor, i.e., the ratio of public debt to GDP, was confirmed in Romania, Poland, and Hungary. However, ambiguous results were obtained regarding the rating: results for Slovakia, Czech Republic, and Romania suggest that financial markets valuation of government bonds is not based on perceptions of sovereign credit risk in international trading. On the other hand, the study indicates influence of the war in Ukraine on the yield of government bonds in Slovakia, Romania, Greece, and Hungary.

Public debt and proposed new framework for EU economic governance

New phenomena and trends in public debt management are an essential context for the reform of economic governance proposed by the European Commission. It is a response to the significant increase in debt issuance to stabilize and rebuild the economies of EU Member States during and after the COVID-19 pandemic, as well as

to the increased defence spending necessary after Russia's invasion of Ukraine in February 2022. An important regularity in this context was the emergence of significant and asymmetric consequences and reactions. The reform is also an attempt to make the necessary transformation expenditures (aimed at increasing environmental protection, digitization, socio-economic resilience, cohesion, and energy independence) more coherent in terms of their impact on the economies of Member States and the EU as a whole.

The aim of the reform is make reference criteria of debt and budget deficit more important again, compliance with which should be a long-term objective of Member States, while assuming that their actions in this area will be assessed in the context of fiscal policy frameworks established by the Council (ECOFIN), specified in the EU's CSR (country-specific recommendations), and reflected in national medium-term fiscal-structural plans. The reform, therefore, envisages a distinctly more diversified approach, including:

a) maintaining fundamental fiscal rules concerning the main convergence/stabilisation indicators of public debt and budget deficit;
b) taking into account debt diversity in coordinated actions, including diversity reflecting different structural contexts in which public debt has accumulated, and consequences of this debt;
c) moving away from rigid debt reduction frameworks (i.e., requirement to reduce the debt by one-twentieth annually) and replacing them with a risk analysis-based approach, whose main goal is to determine debt reduction requirements that allow for its proper servicing (from the perspective of macroeconomic equilibrium);
d) linking debt reduction programmes to reforms consolidating finances of the public sector and investments funded from public funds.

Within the proposed planning coordination framework, each Member State would have to agree with the Commission on commitments regarding debt reduction over a minimum period of four years. During this period, the plan could only be revised if there were new objective circumstances that would undermine the plan intentions in their original form.

A key indicator for coordination would be the volume of a Member State's original net expenditures funded from internal sources (referred to as the "single operational indicator", SOI). SOI makes it possible to measure public sector expenditures without taking into account expenditure net of discretionary revenue measures, interest payments, and expenditures related to cyclical unemployment.

National path of SOI changes would have to ensure the possibility to reduce public debt in the long term. Medium-term national plans would be assessed according to the procedure already set out in the *Stability and Growth Pact.* To monitor these plans

at the EU level, Member States would annually submit *annual progress reports* (APR), which would also be part of multilateral surveillance in accordance with Articles 121 and 126 of the Treaty on the Functioning of the European Union (TFEU), as well as other provisions adopted on their basis. The second legal basis would serve the implementation of one of the fundamental mechanisms proposed in the Commission's communication, namely broadening of the excessive deficit procedure (EDP), so that:

a) it would be triggered when a Member State unlawfully deviates from the commitments based on the logic of SOI (with some differentiation regarding whether the deviation would be considered a "mild or a "serious error");
b) The catalogue of sanctions provided for EDP would be expanded to include additional restrictions of reputational nature.

The plan also foresees establishment of a new corrective instrument for a Member State's failures in implementing SOI programmes. This would involve replacing the state's plan with a "stricter path", probably somewhat parallel to the existing transfer of competencies from states to the Council in the case of non-compliance with recommendations within the small and medium-sized enterprises (SME) monitoring procedure (Article 121 of the TFEU). However, this proposal remains somewhat enigmatic. The idea of establishing a monitoring mechanism (with a significant role for the European Fiscal Board), based on the assessment of national reports (Alert Mechanism Report) and the identification of imbalances (which is an element of the existing six-pack), appears to be more concrete.

Summary

Initial years of the analysed period saw regular improvement in the basic indicators characterizing the public financial economy in most countries under review. Notably, gradual reduction or even elimination of negative net savings of the public sector was observed in Poland, Czechia, Hungary, and Greece. Only in Romania did the net savings to GDP ratio worsen, albeit relatively slightly. In Czechia, Slovakia, and Greece, net savings were primarily linked to the public sector's results, while in other countries, difference between net savings and the public sector's result reflected the scale of public investments. Economic growth, however, compensated for the negative impact of financing investments through borrowing on the public debt-to-GDP ratio. Overall, costs of borrowing were relatively low, albeit significantly diverse, with higher costs in Romania, Hungary, and Poland than in the Czech Republic and Slovakia. Even in Greece, a country with an improving but considerably worse rating, the yield on government bonds was not higher than in Czechia by the end of 2019.

Impact of the pandemic on the public finances of CEE countries cannot be overstated: they responded primarily with staggering "current deficits" (negative net savings) reaching 5% of GDP in 2020 and even 7% to 8% of GDP in Romania and Greece. Only in Hungary was the scale of the public sector's "current result" response in the first pandemic year relatively small. It is noteworthy that in most analysed countries, this situation did not improve in 2021 (and worsened significantly in Hungary), except for Poland, where the public sector's "current result" returned to equilibrium. During the pandemic in Hungary, Poland, and Romania, importance of financing investments from the perspective of generating nominal deficit grew: in Hungary, nominal deficit reached 7.5% of GDP in 2020 (with negative net savings at 2% of GDP), while in Poland and Romania, where investment-related needs accounted for about one-third of the public sector's deficit in 2020. As a result of the nominal deficits in 2020–2021, public debt-to-GDP ratio (measured by the difference between 2021 and 2019) increased by more than 10 ppts in all analysed countries, except for Poland. (In Slovakia and Greece it reached 14 ppts).

Paradoxically, the yield on government bonds issued by all surveyed countries was at a record low in 2020, and this situation persisted in Slovakia and Greece until the end of the following year. Although the spread in relation to the yield on German Bunds flattened everywhere, relative differences in the cost of servicing public debt between countries remained significant. From mid-2020 to mid-2021, the yield on Slovak bonds averaged 0.2%, Greek bonds – 0.9%, Czech bonds – 1.3%, Polish bonds – 1.4%, Hungarian bonds – 2.4%, and Romanian bonds – 3.2%. The scale of increases in the yield on government bonds at the end of 2021 and the following year also varied significantly. In the "record-breaking" October 2022, the yield on Slovak bonds averaged 3.6%, Greek bonds – 4.4%, Czech bonds – 5.5%, Polish bonds – 7.8%, Romanian bonds – 9.1%, and Hungarian bonds – 10.3%.

Increase in the yield on government bonds leads to higher burden on public budget in terms of debt servicing costs. The bigger the costs, the higher the central sub-sector debt-to-GDP ratio. An increase of 1 ppt in the government bond yield translates to additional quarterly burdens on the public sector ranging from around 0.11% to 0.12% of annual GDP in Czechia, Poland, and Romania, around 0.15% of annual GDP in Slovakia, around 0.18% in Hungary, and around 0.45% of GDP in Greece. Therefore, if the observed yield levels in individual countries persisted for a sufficiently long time, additional annual public sector expenses compared to the second half of 2020 and the first half of 2021 would amount to 1.7% of GDP in Czechia, 2.1% in Romania and Slovakia, 2.8% in Poland, 4.6% in Hungary, and 6.4% in Greece. Especially in the case of the latter two countries, this could threaten the stability of public finances.

Analysis of regression allows for drawing conclusions about the factors influencing the yield of government bonds in individual countries and, consequently, widespread declines in yields in 2020 and the first half of 2021, followed by increases at the end of 2021 and in 2022. Undoubtedly, the most crucial factor determining the volume of government bond yields in all surveyed countries are short-term interest rates on the money market. It appears that investors also consider, to some extent, the "condition" of public finances, measured by the public debt-to-GDP ratio. However, the impact of this factor can only be analysed in the long term, as the observed quarterly cycle of changes in the nominal deficit and public debt-to-GDP ratio does not make it possible to make investment decisions based on quarterly data. Surprisingly, significance of the rating as a factor co-determining differences in government bond yields in individual countries was surprisingly non-existent. The study shows that it is reasonable to treat exchange rate risk as a variable independent (against theoretical assumption of effective interest rate parity) from the interest rate, and at the same time suggests that exchange rate does not affect bonds yield. In general, the analysis indicates that the war in Ukraine significantly contributed to the increase in government bond yields in most surveyed countries in the spring and summer of 2022. Disbursements of EU funds for the implementation of national reforms must have worked in the opposite direction.

The study also indicates that stability of the public finance system, which includes the ability to finance borrowing needs at a reasonable cost, depends not only on the fiscal policy (regarding net savings of the public sector, deficits, and public debt) but also on monetary factors (primarily short-term interest rates on the money market). Based on the study results, the following recommendations can be formulated:

1) A holistic approach to economic policy is advisable, whereby individual goals (especially economic growth, stabilization of money purchasing power, and minimising unemployment) are treated in a balanced manner.
2) In EU Member States outside the euro zone, such an approach should involve simultaneous efforts to improve the budget situation (without showing an excessive budget deficit as defined in Article 126 (6) of the Treaty on the Functioning of the European Union) and achieve good price stability (as defined in Article 140 (1), first indent of the Treaty on the Functioning of the European Union). The proposed changes in the system of economic governance by the European Commission can be seen as a significant trigger for improvements at the national level.
3) Legal rules of SEG in place in the EU require flexibility in a way that they can also be applied during external "shocks" (without the need to resort to "general escape clauses").

ATTACHMENT

Table A1. Description of analysed variables (%)*

	Poland				Romania			
	average	min	*max*	s	average	min	*max*	s
$Y10_t$	3.03	1.19	7.82	1.41	4.37	2.65	9.26	1.41
FX_{t-1}	4.38	4.02	4.80	0.17	4.69	4.42	4.95	0.18
$STIR_{t-1}$	1.82	0.18	7.08	1.55	2.00	0.33	7.21	1.60
D_{y-1}	51.81	45.71	57.17	3.49	38.96	34.46	48.64	4.72
R_t	2.21	1.83	2.42	0.19	–1.04	–1.25	–0.92	0.10
L_{y-1}	2.37	2.28	2.53	0.09	0.70	0.53	0.94	0.16
	Hungary				Czech Republic			
	average	min	*max*	s	average	min	max	*s*
$Y10_t$	3.49	1.83	10.25	1.74	1.61	0.25	5.52	1.22
FX_{t-1}	333.40	299.43	418.31	28.23	26.11	24.36	27.89	0.89
$STIR_{t-1}$	1.67	–0.01	15.87	3.08	1.41	0.20	7.14	1.87
D_{y-1}	73.74	65.33	79.30	4.35	36.87	30.05	44.42	4.31
R_t	–0.77	–2.33	0.00	0.67	4.67	4.33	5.00	0.29
L_{y-1}	0.89	0.84	0.94	0.03	0.79	0.73	0.87	0.04
	Slovakia				Greece			
	average	min	*max*	s	average	min	*max*	s
$Y10_t$	0.68	–0.52	3.55	0.78	4.56	0.59	12.00	3.16
$STIR_{t-1}$	–0.33	–0.60	1.42	0.29	–0.33	–0.60	1.42	0.29
D_{y-1}	53.11	47.97	62.19	4.13	184.93	176.75	206.25	9.33
R_t	3.53	3.08	3.75	0.23	–5.85	–10.17	–2.92	2.44
L_{y-1}	0.52	0.50	0.57	0.03	0.61	0.47	0.88	0.14
*BaaY*10	2.34	1.65	3.56	0.46				

* Data presented as percentage, except for variables FX_{t-1} and R_t.

Source: self-reported data.

Table A2. Regression results for countries covered by the study

	Poland							Romania					
	β	Std. err.	*b*	Std. err.	*t*(88)	*p*-value		*β*	Std. err.	*b*	Std. err.	*t*(88)	*p*-value
Intercept			0.009290	0.026590	0.34936	0.727652	Intercept			−0.13806	0.050346	−2.74230	0.007391
STIR	0.792725	0.049943	0.720629	0.045400	15.87272	0.000000	*STIR*	0.717002	0.049752	0.63248	0.043887	14.41166	0.000000
FX	0.041881	0.042027	0.003450	0.003462	0.99654	0.321722	*FX*	0.523673	0.154449	0.04105	0.012108	3.39058	0.001046
D	0.151203	0.037762	0.061076	0.015253	4.00408	0.000130	*D*	0.317949	0.055209	0.09528	0.016545	5.75899	0.000000
R	−0.172918	0.035161	−0.012493	0.002540	−4.91795	0.000004	*R*	0.166142	0.064290	0.02323	0.008988	2.58424	0.011407
*BaaY*10	−0.088810	0.050536	−0.271548	0.154521	−1.75735	0.082335	*BaaY*10	0.012208	0.041306	0.03748	0.126805	0.29556	0.768264
L	−0.013283	0.054461	−0.221467	0.908005	−0.24391	0.807872	*L*	−0.602915	0.157501	−5.48586	1.433087	−3.82800	0.000241
UKR	0.091446	0.046375	0.004927	0.002498	1.97189	0.051762	*UKR*	0.219355	0.043106	0.01187	0.002332	5.08880	0.000002
R = .94947120; R^2 = .90149556; ad justed R^2 = .89365998 $F(7.88)$ = 115.05; p < 0.0000; std. error of estimate: .00459							R = .95195293; R^2 = .90621438; ad justed R^2 = .89875416 $F(7.88)$ = 121.47; p < 0.0000; std. error of estimate: .00450						
	Czechy							Węgry					
	β	Std. err.	*b*	Std. err.	*t*(88)	*p*-value		*β*	Std. err.	*b*	Std. err.	*t*(88)	*p*-value
Intercept			0.021576	0.028642	0.75332	0.453268	Intercept			0.01155	0.031927	0.36162	0.718503
STIR	0.538456	0.064386	0.352329	0.042130	8.36298	0.000000	*STIR*	0.788708	0.073378	0.44629	0.041521	10.74858	0.000000
FX	−0.206055	0.068643	−0.002816	0.000938	−3.00182	0.003492	*FX*	−0.069134	0.131341	−0.00004	0.000081	−0.52637	0.599954
D	0.001049	0.065369	0.000298	0.018550	0.01605	0.987233	*D*	0.157118	0.043096	0.06305	0.017294	3.64578	0.000451
R	0.143499	0.050243	0.006054	0.002120	2.85609	0.005350	*R*	0.066220	0.075527	0.00173	0.001977	0.87677	0.382999
*BaaY*10	−0.163760	0.041831	−0.434590	0.111011	−3.91482	0.000178	*BaaY*10	−0.014467	0.041204	−0.05478	0.156033	−0.35110	0.726350
L	0.196199	0.058251	5.670317	1.683509	3.36815	0.001124	*L*	−0.032037	0.103313	−1.67970	5.416648	−0.31010	0.757218
UKR	0.018413	0.041795	0.000861	0.001954	0.44057	0.660607	*UKR*	0.244938	0.037128	0.01634	0.002477	6.59720	0.000000
R = .96234721; R^2 = .92611216; ad justed R^2 = .92023471 $F(7.88)$ = 157.57; p < 0.0000; std. error of estimate: .00345							R = .96021406; R^2 = .92201105; ad justed R^2 = .91580738 $F(7.88)$ = 148.62; p < 0.0000; std. error of estimate: .00506						

cont. Table A2

	Słowacja							Grecja					
	β	Std. err.	*b*	Std. err.	*t*(89)	*p*-value		*β*	Std. err.	*b*	Std. err.	*t*(89)	*p*-value
Intercept			−0.052733	0.023674	−2.22748	0.028437	Intercept			−0.047591	0.033786	−1.4086	0.162436
STIR	0.712144	0.055197	1.927716	0.149415	12.90178	0.000000	*STIR*	0.275671	0.036315	3.006623	0.396067	7.5912	0.000000
D	0.167147	0.088489	0.031719	0.016792	1.88892	0.062160	*D*	0.015524	0.057525	0.005250	0.019455	0.2699	0.787882
R	0.301237	0.076811	0.010409	0.002654	3.92178	0.000173	*R*	−0.931991	0.056548	−0.012071	0.000732	−16.4814	0.000000
*BaaY*10	−0.078945	0.052909	−0.134320	0.090022	−1.49208	0.139216	*BaaY*10	0.060722	0.040256	0.416270	0.275967	1.5084	0.134993
L	0.090794	0.118755	2.781123	3.637583	0.76455	0.446561	*L*	0.083147	0.072267	1.873194	1.628086	1.1505	0.252999
UKR	0.489634	0.062738	0.014679	0.001881	7.80439	0.000000	*UKR*	0.195521	0.039855	0.023617	0.004814	4.9058	0.000004
R = .90123128; R^2 = .81221783; ad justed R^2 = .79955836 $F(6.89) = 64.159$; $p < 0.0000$; std. error of estimate: .00351							R =.95037367; $R2$ =.90321012; ad justed R^2 = .89668496 $F(6.89) = 138.42$; $p < 0.0000$; std. error of estimate: .01015						

Source: self-reported data.

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THREATS TO FOOD SECURITY IN CENTRAL AND EASTERN EUROPE AND WAYS TO OVERCOME THEM[1]

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DOI: 10.33119/978-83-8030-625-7.2023_159_186

Abstract

The main purpose of the study is to present factors that have been threatening food security in the CEE region in 2019–2023 and to propose ways to overcome them, taking into consideration various scenarios of development of the current military situation in Ukraine within the short and medium term. To this end, non-reactive research methods were applied, i.e., analysis of reference literature, critical analysis of official documents, descriptive statistical method, as well as strategic analysis, scenario method, and SWOT analysis.

Since the beginning of the 21st century, certain phenomena have had an increasingly negative impact on food security, including, among others, extreme weather events (droughts, hurricanes) with accompanying crop failures, which deteriorate overall agricultural production. In recent years, these unfavourable conditions were further aggravated by spreading viral epidemics and the outbreak of an armed conflict in Ukraine. This war puts farmers and the entire Ukrainian agribusiness in a completely different position than their counterparts in other CEE countries. It entails destruction of both the potential and productive power of the industry, lack of proceeds from exports, as well as a need to sell goods at lower prices, and inability to replace means of production. Before the war in Ukraine ends, the rest of CEE countries can obtain cheap Ukrainian raw materials and enter markets traditionally dominated by Ukrainian export. On the other hand, however, their own agricultural markets are disrupted – a challenge Poland had to face in early 2023. Continuation of the conflict after 2023 means further reduction of Ukrainian production potential and lack of raw materials from this country on the world markets, which will additionally make fluctuations in agricultural prices more rapid and unpredictable. As a result, this will mean worse food security or even food insecurity for a bigger number of countries.

This in turn will force state authorities of individual countries and EU institutions to become more involved in shaping market, economic, and social processes.

[1] Materials collected and described by dr Yuliia Zolotnytska from the Market and Competition Institute of SGH Warsaw School of Economics were used for this study.

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Food crises, turbulence on global agricultural markets and spreading military conflicts raise the significance of food security in political agendas or strategies of governments and international organisations.

Because of its fundamental importance for human existence, food security is a complex issue, which requires multidimensional and multileveled analysis. Whether food security is ensured depends on economic, social, and political conditions, as well as on those related to regional and global climate. According to the commonly binding definition by FAO, "food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" [2009, p. 8].

The concept of food security has been continuously evolving since the first attempt to define it in 1974 [Kowalczyk, 2016, p. 31 and further]. Today it is based on four main pillars:

1) availability,
2) affordability,
3) adequate diet and food safety,
4) stability of the food system.

Both in the reference literature and in discussions held in FAO, international organisations, and among scientists, two pillars/dimensions of food security are more and more commonly indicated: sustainability of the food system and so-called agenda, i.e. agency of the consumer.

A relatively stable situation of food security in the Central and Eastern Europe[2] was disrupted first by the COVID-19 pandemic in 2020, and then by the Russian invasion in Ukraine in February 2022. The situation was additionally aggravated by extreme weather, such as droughts and hurricanes.

Goal and methodology of research

The goal of the study is to present the factors that have been threatening food security in the CEE region in 2019–2023 and to propose ways to overcome them, taking into consideration various scenarios of development of the current military situation in Ukraine in the short- and medium-term. To this end, non-reactive research methods were used, i.e. analysis of reference literature (including studies of other authors), critical analysis of official documents, descriptive statistical method, as well as strategic analysis, scenario method, and SWOT analysis.

According to Johnson, Scholes and Whittington, the scenario method is not only justified, but also recommendable when an analysed environment is highly volatile due to complex and/or dynamic changes [2005, p. 76]. It may be very difficult to formulate one prediction of the circumstances' impact (military conflict in this case) on the course of the examined phenomenon (food security in this case), such prediction being highly uncertain. It is therefore better to present future events as a system of various options with various rate of probability.

A standard scenario preparation process comprises usually several stages, most important of which, apart from defining the problem (scenario base), is identification and analysis of key driving factors (forces), followed by ranking these factors by their significance and uncertainty.

A scenario is usually defined as "an account or synopsis of a possible course of action or events" [Merriam-Webster Dictionary, 2023] or "a set of market projections based on alternative assumptions than those used in the baseline" [OECD, 2023]. Andreescu, Gheorghiu, Zulean and Curaj define scenario as a "uniting vision" [2013, p. 713], while Bezold says that it covers "most likely future" and "possibilities that

[2] The analysis covers 11 EU Member States: Bulgaria, Croatia, Czechia, Estonia, Lithuania, Latvia, Poland, Romania, Slovakia, Slovenia, and Hungary, as well as Ukraine.

may occur if the current system fails" [2005, p. 81]. This means that scenarios could/should show paths of future evolution of the surrounding reality, or, more specifically, a section of this reality. They can also warn, or even scare the reader with probable or presumable effects of present events or processes, which is particularly true for events analysed in this study.

SWAT analysis has been used to identify and organise baseline phenomena and processes determining food security systems in the analysed countries. It was prepared in two versions: according to stakeholder groups of food security systems and according to key dimensions of this variable. Next, pursuant to basic principles of SWAT analysis, possible strategies were developed in line with the following guidelines: reduce risks and use opportunities, eliminate weaknesses and enhance strengths.

It is worth mentioning that in the second decade of the 21 st century High Level Panel of Experts (HLPE) from the Committee on World Food Security (CFS) proposed two additional dimensions of food security [HLPE, 2020, p. 7], which have not yet been approved by FAO and other international organisations. These comprise agency and sustainability.

Agency, perceived as a key element of development, refers to the ability of individuals or groups to take their own decisions on what food they eat, what food they produce, how the food is produced, processed, and distributed in food systems, and to their ability to engage in processes shaping food policy and management systems. Sustainability refers to long-term capability of food systems to ensure food security in a way consistent with basic economic, social, and environmental rules, which are a source of food security for future generations.

As for the presented levels of analysis, food security may be considered in the following aspects:

1) international,
2) national,
3) household,
4) individual.

This study uses mainly secondary data from international organisations, such as: Food and Agriculture Organisation of the United Nations (FAOSTAT), World Bank, International Monetary Fund, regional organisations (Eurostat), and national organisations: State Statistics Service of Ukraine and Ukrainian Ministry of Agrarian Policy and Food.

Analysis of food security dimensions

There are three types of food security policies exercised by state governments:

1) food self-reliance – domestic production focuses on exporting produce using comparative advantages, which allows them to generate adequate financial resources to import necessary agricultural food products;
2) food self-sufficiency – a country produces food for its own needs, relying mostly on boosting agricultural production, without importing necessary products;
3) food sovereignty – the broadest term, whose meaning goes beyond food security. It refers to access to food and food sources; it highlights both the right to nutrition and the right to food production.

Availability of food

First key dimension of food security is physical availability of food. It is reflected by the number of malnourished and starving people. According to the report *The State of Food Security and Nutrition in the World* [FAO, 2022] showing the number of malnourished people in the CEE, relatively the most difficult situation in 2019–2021 was in Bulgaria, Slovakia and Ukraine (Table 1). The biggest number of malnourished people (severe food insecurity, excluding moderate food insecurity) in the years 2019–2021 was recorded in Ukraine, Romania, and Poland (1.4 million, 0.7 million, 0.4 million respectively). In respect of moderately malnourished people the situation was similar. The highest numbers were also recorded in the aforementioned countries: 9.9 million in Ukraine, 2.8 million in Poland, 2.6 million in Romania. The best situation was found in Slovenia and Estonia.

A problem which is antipodal to hunger is obesity. According to WHO data [2022, p. 5] obesity prevalence for adults in the WHO European Region is higher than in any other WHO region except the Region of the Americas. Overweight and obesity in adults have reached there epidemic proportions. WHO estimates that 59% of adults are living with overweight or obesity, with more than half of adults in 50 out of 53 Member States in the European Region living with overweight or obesity.

Eurostat's data from 2019 show that the highest rates of women classified as obese were found in Estonia (23.6%), Latvia (25.7%), Ireland (26.0%), and Malta (26.7%), while the highest rates of obese men were recorded in Croatia (23.7%), Ireland (25.7%), Hungary (25.8%) and Malta (30.6%) [Eurostat, 2019].

WHO underlines that obesity is most prevalent in people with lower educational attainment. What is more, gender analysis shows that in the WHO European Region inequalities in levels of overweight and obesity between men and women are

widespread and heterogeneous across socioeconomic determinants such as income, education, employment status, and place of residence [WHO, 2022, p. 3].

Table 1. Number (million) and percentage (%) of (severely and moderately) malnourished people in populations of the CEE countries

Country	Malnourished people		Total number of people experiencing severe food insecurity in population		People experiencing severe and moderate food insecurity	
	2004–2006	2019–2021	2014–2016	2019–2021	2014–2016	2019–2021
Bulgaria	0.4 4.9	0.2 3.0	0.1 1.9	0.2 2.9	1.1 14.9	1.1 15.5
Czech Republic	* < 2.5	* < 2.5	< 0.1 0.7	0.2 1.6	0.6 5.8	0.6 5.8
Hungary	* < 2.5	* < 2.5	0.1 1.4	0.2 2.1	1.1 11.3	1.0 10.6
Poland	* < 2.5	* < 2.5	0.7 1.8	0.4 0.9	3.4 8.9	2.8 7.4
Romania	* < 2.5	* < 2.5	1.1 5.6	0.7 3.7	3.8 19.3	2.6 13.4
Slovakia	0.3 5.5	0.2 3.8	< 0.1 1.1	< 0.1 1.6	0.3 6.2	0.4 7.7
Ukraine	* < 2.5	1.2 2.8	0.9 2.0	1.4 3.2	8.9 19.8	9.9 22.7
Estonia	* < 2.5	* < 2.5	< 0.1 0.9	< 0.1 0.8	0.1 9.5	0.1 7.9
Latvia	* < 2.5	* < 2.5	< 0.1 0.6	< 0.1 0.7	0.2 9.9	0.2 9.4
Lithuania	* < 2.5	* < 2.5	< 0.1 2.5	< 0.1 1.9	0.4 15.3	0.3 9.8
Croatia	* < 2.5	* < 2.5	< 0.1 0.6	< 0.1 1.6	0.3 6.5	0.5 11.4
Slovenia	* < 2.5	* < 2.5	< 0.1 0.9	< 0.1 0.6	0.3 12.3	0.2 7.4

* Data disregarded due to malnutrition rate in total population lower than 2.5%.

Source: FAO [2022, pp. 146–147, 159–160].

The data indicate a phenomenon of triple burden of malnutrition in the European countries [Obiedzińska, 2016, p. 125], which comprises:

1) quantitative malnutrition – caloric deficiencies;
2) qualitative malnutrition, also called hidden malnutrition – deficiencies of trace minerals (vitamins, micronutrients);
3) overweight and obesity and other diseases related to overconsumption of food.

Affordability of food

In 2021 average annual household disposable income was EUR 18 019 per EU citizen, according to purchasing power standard [Eurostat, 2022c]. In EU Member States it varied from EUR 32 132 in Luxembourg and EUR 24 560 in the Netherlands to EUR 9375 in Bulgaria and EUR 8703 in Romania.

In 2021 EU households spent over EUR 1035 billion on food and non-alcoholic beverages. In comparison to 2020, the share was 14.8%, which means a drop of 0.5 ppt. Among EU Member States the highest share of food and non-alcoholic beverages in 2021 was recorded by such CEE countries as: Romania (24.8%), Lithuania (20.4%), Bulgaria (20.1%), Estonia (19.9%), Poland and Slovakia (both 19.9%) [Eurostat, 2023]. The lowest share of this category of expenditures was recorded in Ireland (8.3%), Luxembourg (9.0%), Austria (10.9%), Denmark, and Germany (both at 11.8%). Compared to 2020, the share of total household expenditures on food decreased in all EU countries, except for Poland and Slovakia (both experiencing a 0.2 ppt increase). The biggest drops were observed in Lithuania (1.4 ppt), Croatia, Estonia, and Slovenia (1.3 ppt each).

Table 2. Changes in food prices in the CEE region from April 2022 to March 2023 (%, y/y)

	April 2022	May 2022	June 2022	July 2022	August 2022	September 2022	October 2022	November 2022	December 2022	January 2023	February 2023	March 2023
Bulgaria	20.7	22.1	23.2	23.6	23.6	24.9	25.7	26.1	25.6	24.6	23.5	n/a
Croatia	13.4	15.9	17.4	19.0	19.8	19.6	20.4	19.6	19.6	17.8	17.7	n/a
Czechia	11.1	15.5	18.7	20.0	20.2	21.8	26.2	27.1	26.4	25.6	24.6	n/a
Estonia	14.6	17.0	19.2	19.7	21.4	24.4	28.0	28.2	29.8	27.4	25.2	n/a
Lithuania	22.0	25.5	28.9	30.4	31.0	31.2	34.5	36.1	35.0	33.4	30.7	n/a
Latvia	17.8	18.7	22.5	24.5	26.1	27.8	29.9	30.0	29.3	28.4	25.2	n/a
Poland	13.4	14.2	14.9	15.9	18.1	20.0	22.9	23.0	22.1	21.2	24.8	24.0
Romania	13.5	14.2	14.7	16.1	18.2	19.1	20.6	21.5	22.0	22.5	22.3	n/a
Slovakia	13.9	16.0	17.9	19.1	21.0	23.3	26.0	27.8	28.1	27.5	27.8	n/a
Slovenia	9.4	11.1	12.8	13.5	14.1	14.7	17.7	19.4	18.9	19.4	18.3	19.0
Ukraine	23.1	24.1	28.3	29.5	31.3	32.1	36.1	35.2	34.4	32.8	31.5	n/a
Hungary	15.6	18.6	22.1	27.0	30.9	35.2	40.0	43.8	44.8	44.0	43.3	n/a

Note: data (from International Monetary Fund, Heaven, and Trading Economics) reflect food (food and non-alcoholic beverages) prices infl tion in each country.

Source: World Bank [2023, p. 19–24].

In 2021 11.9% of EU population experienced material and social deprivation, with a significant 6.3% experiencing it to a severe degree. Among the analysed countries from the CEE region the situation was the worst in Romania, Slovakia, and Bulgaria (34.4%, 36.0% and 44.9% of population, respectively) [Eurostat, 2022b].

Apart from income, another factor of food affordability are prices. From April 2022 to March 2023 they were particularly volatile (Table 2).

The biggest price increases were found in Hungary (over 40%), Ukraine (about 35%) and Lithuania (30–35%), while relatively smallest ones were in Slovenia and Croatia (below 20% in both cases). Still, even the smallest growth (not more than 15–20% within a year) had a significant impact on affordability of food for broad consumer groups in the CEE countries under research, and it contributed to lower food security.

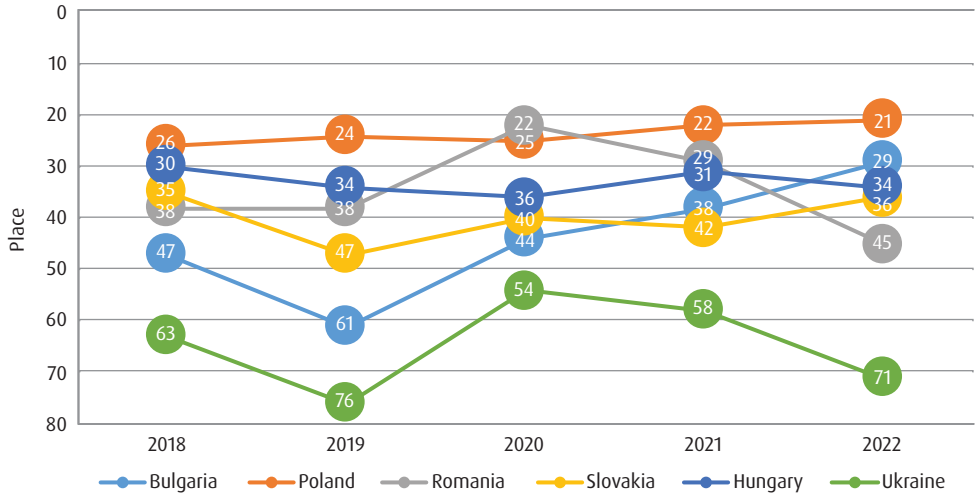
Global Food Security Index

An example of a synthetic measure of food security is the Global Food Security Index (GFSI), designed by a team of experts as part of Economist Intelligence Unit. The index is prepared each year, starting from 2012. GFSI is a dynamic, quantitative and qualitative comparative model, allowing for a comprehensive, synthetic evaluation of factors affecting food security. The index comprises a range of several dozen indicators describing individual dimensions of food security (in 2012 there were 25 indicators divided into three areas [EIU, 2012], while in 2022 there were already 68 indicators grouped in four dimensions, which included also a new one: sustainability and adaptation [Economist Impact, 2022]) [3]. In the first year (2012) the GFSI ranking comprised 105 countries, by now the number increased to 113. First, measures used for GSFI modelling are standardised in the system (0.1). Next, each dimension is assigned a number of points achieved by a country, from 0 to 100. Further, a synthetic indicator is calculated by a weight system, also from 0 to 100.

GFSI for selected CEE countries indicates significant changes in the analysed period of 2018–2022 (Figure 1). This refers most of all to Ukraine (54th place in the 2020 ranking, 71st place in 2002), Romania (22nd place in 2020 and 45th place in 2022) and Bulgaria (47th place in 2018, 61st in 2019 and 29th in 2022), where changes in the case of Bulgaria were positive. In the other countries of the region GFSI fluctuations were relatively small. The aforementioned data do not yet reflect the effects of the war in Ukraine, just the consequences of the COVID-19 p andemic and earlier crises.

3 In 2017–2021 the fourth dimension referred to natural resources and resilience of the food system.

Figure 1. Global Food Security Index in CEE countries in 2018–2022



Source: self-reported data based on data from Table A1.

Factors affecting food security

Impact of the COVID-19 pandemic

Phenomena accompanying the pandemic have a negative impact on the market processes. They translate into more uncertainty about the future, increase business risk and generate turbulences and chaos on the market. The main causative factor are restrictions in international trade, as well as in transportation and movement of goods and people. This is true not only for industries highly dependent on exports, which in Poland is the food sector, including meat and meat products, grain and grain products, pastry, and dairy products. The time of epidemic is also difficult for import-reliant sectors, which in Poland are livestock production, fish and fruit processing (not only citrus fruits), oil seeds and high-protein seeds processing [Kowalczyk, 2020, pp. 43–53].

Restrictions imposed because of the COVID-19 pandemic, significantly different across various social groups, countries, and regions of the world, had a double-aspect impact on food security. Arguably the most vulnerable suffered the most from closing schools (for some children school lunch was the only meal during a day), restrictions in the functioning of enterprises (restaurant workers), remote work and the quarantine obligation (lower-skilled workers, blue-collar workers that could not work remotely)

and many other measures introduced by state governments (often by mimicking other authorities' actions). At the same, the COVID-19 pandemic had a positive impact on the quality of food of those who started to prepare their meals at home and eat healthier due to remote work, also as a result of growing awareness of the effect that various factors have on human health and immunity.

Prices of produce

Before the war in Ukraine, FAO food index had been growing since mid-2020, which had been caused by the coronavirus crisis and crop failure in many world regions, mainly in Africa. After the Russian invasion of Ukraine the trend intensified, and the food price index in March 2022 increased by 13.1% compared to February 2022 (an increase of 18.5 ppts). It was a particularly hard blow for food security of the countries of North Africa, Middle East and some countries of South Asia, as imported food covers approximately 50% of their food needs.

FAO Food Price Index (FFPI) in April 2023 was on average at 127.2 points, a drop by 4.6 points compared with February of the same year. During the last 12 months, i.e. from April 2022, the value of the index fell by as much as 31.2 ppts. [FAO, 2023]. It was a consequence of falling prices of vegetable oils, cereals, and dairy products with simultaneous rise in sugar prices (Table 3).

In April 2023 FAO cereals price index was at 136.1 points on average, a drop by 10.6 ppts. compared to February 2023 and by 33.6 ppts compared to April of the previous year. The decline in the index value reflects a fall in global prices of almost all main types of cereal.

In connection with seasonal supply in South America at the end of harvesting campaign, due to expected record crops in Brazil and extended Black Sea Grain Initiative, prices of corn also fell (by 4.6%) in March 2023. World prices of other coarse grains, such as of barley and sorghum fell by 6.7% and 5.7% respectively because of small demand on global corn and wheat markets. World prices of rice decreased in March 2023 by 3.2% as a consequence of current and upcoming harvesting campaigns in the major exporting countries, mostly India, Vietnam and Thailand.

Vegetable oils price index in April 2023 was at 130.0 points on average, a drop by 5.9 ppts compared to February 2023 and by as much as 107.5% compared to April of the previous year. Dairy price index in April 2023 was at 124.6 points on average, a drop by 4.8 ppts compared to February 2023, and by as much as 22.1 ppts compared to the same period of the previous year. Meat price index in April 2023 was on average 114.5 points, which is slightly more (by 1.2 ppts) than in February 2023, but dropped by 7.4 ppts in relation to the previous year. Sugar price index in April 2023 was at 149.4

points on average, a drop by 24.2 ppts compared to February 2023, and by 27.9 ppts in relation to April 2022.

Table 3. Nominal and real FAO food price indices in the years 2012–2023*

Year	Food price index		Meat price index		Dairy price index		Cereals price index		Oils price index		Sugar price index	
	nominal	real	nominal	real	nominal	real	nominal	real	nominal	real	nominal	real
2012	122.8	111.5	105.0	95.3	111.7	101.3	137.4	124.7	138.3	125.5	133.3	121.0
2013	120.1	109.5	106.2	96.8	140.9	128.5	129.1	117.7	119.5	108.9	109.5	99.8
2014	115.0	106.3	112.2	103.7	130.2	120.3	115.8	107.0	110.6	102.2	105.2	97.2
2015	93.0	95.1	96.7	98.9	87.1	89.1	95.9	98.0	89.9	91.9	83.2	85.0
2016	91.9	97.8	91.0	96.8	82.6	87.9	88.3	94.0	99.4	105.8	111.6	118.8
2017	98.0	100.8	97.7	100.5	108.0	111.1	91.0	93.6	101.9	104.8	99.1	101.9
2018	95.9	94.2	94.9	93.2	107.3	105.4	100.8	99.0	87.8	86.2	77.4	76.0
2019	95.1	95.6	100.0	100.6	102.8	103.4	96.6	97.2	83.2	83.7	78.6	79.1
2020	98.1	99.2	95.5	96.6	101.8	102.9	103.1	104.2	99.4	100.5	79.5	80.4
2021	125.7	125.1	107.7	107.2	119.1	118.5	131.2	130.5	164.9	164.0	109.3	108.8
2022 IV 2022	143.7 158.4	140.6 –	118.8 121.9	116.2 –	142.4 146.7	139.3 –	154.7 169.7	151.3 –	187.8 237.5	183.7 –	114.5 121.5	112.0 –
IV 2023	127.2	125.3	114.5	106.9	124.6	129.8	136.1	141.8	130.0	135.0	149.4	112.3

* For 2022 the data refer to the period from January to December and from January to April; for 2023 the data refer to the period from January to April.

Source: self-reported data based on FAO [2023].

In general most price indices for agricultural products are gradually returning to the levels from before the Russian invasion of Ukraine, however they are still prone to rapid, rather short-term, strong fluctuations, which can be explained by unpredictability and higher risk, typical for global agricultural markets.

War in Ukraine

At least since mid-2010 s, more and more environmental, economic and political, as well as military phenomena generate adverse changes in the global food security system. The changes are, for example, droughts not seen for 40 or even 60 years in the Horn of Africa, i.e. countries such as Ethiopia, Somalia, Kenya, Djibouti, Eritrea [The Economist, 2011]. Another factor are military conflicts in countries vital for food production, such as Ukraine (2014, 2022) or more and more frequent virus epidemics.

This creates new conditions, unfavourable for food security, which destabilize long-term positive processes improving food security for the world and individual regions and countries, disrupt food supply chains, cause rapid changes on food markets, and encourage state policy-makers to turn to the strategy of self-sufficiency.

In recent years consumers have begun to be more interested both in food security in general and its individual dimensions, especially food quality and safety. This is shown by the results of the Eurobarometer survey, conducted in the EU states both before the COVID-19 pandemic and in 2022. While in 2019 41% of EU consumers were interested in food safety (from 65% in Cyprus to 17% in Italy) [EFSA, 2019, p. 6], in 2022 the rate was 70% (from 99% in Greece to 33% in Poland) [EFSA, 2022, p. 11]. The reason for such a dramatic shift in the attitude to food security in 2019–2022 was undoubtedly the coronavirus pandemic and related risk. Other food security aspects also grew in significance in this period, such as food affordability. Food prices, as one of determinants of affordability, were a decisive factor for 51% of consumers in their purchasing decisions in 2019, and for 54% in 2022 [EFSA, 2022, s. 13].

Other dimensions, such as physical availability and stability of the security system, also suffered due to extreme weather events, pandemic, or the war in Ukraine. Worse crops, supply chains broken by pandemic restrictions and recent consequences of the war resulted in shorter and longer food shortages even in European countries. Thus, the stability of food security system was disrupted at all levels – from an individual household to the global network.

The military aggression of Russia against Ukraine has led to serious problems with exports of food and aggravating global food risks, such as worse food affordability or destabilized prices of basic agricultural products on the global markets. Lack of Ukrainian grain on the global market has caused more hunger in Africa and Middle East already in mid-2022.

Table 4. Area of main summer crops in 2021–2022 (thousand ha)

Crop	Spring 2021	Spring 2022	2022/2021 (%)
Barley	1132.3	951.4	–16.0
Soya	1271.5	1212.6	–4.6
Potatoes	1280.4	1104.2	–13.8
Corn	4972.3	4639.4	–6.7
Sunflower	6523.9	4702.7	–27.9
Total summer crops	16 197.0	13 431.2	–17.1

Source: State Statistics Service of Ukraine [2022].

The war in Ukraine caused reduction in the area of sowing summer crops already in spring 2022 (Table 4). Compared to spring 2021, it was by 2.8 million hectares less (–17.1%). The area of sunflower cultivation was smaller by 27.9%, and barley – by 16.0%.

Even more significant were changes in the area of sowing winter crops between autumn 2021 and autumn 2022 (Table 5). The area of these crops reduced by as much as 3.9 million ha, which is 42.2%; the area of barley and wheat, which are key for Ukrainian grain exports, was smaller by 54.9% and 46.1%.

Because of hostilities or temporary occupation of its territories, Ukraine is deprived of access to 13.6 million ha (22%) of its land. According to data from late February 2023, even 5 million of arable land (around 15% of total Ukraine's arable land) is (probably) mined. Emergency services have managed to de-mine only 70 thousand ha on liberated territories (Kyiv and Chernihiv regions). Such a significant reduction of sowing area in Ukraine has already affected global agricultural markets and food security of many regions of the world. FAO data show that the number of starving people grew in 2022 b y more than 60 million [UN, 2022].

Apart from constrained access to arable land, the war also causes other problems to the Ukrainian agriculture. The major one is lack of financial resources for the purchase of sufficient amount of capital goods by farmers. In 2022 farmers had only 80% of seeds necessary for autumn sowing, 58% of fuel, 53% of plant protection products and 46% of fertilizers (PSSU, MPAU). In the second half of 2023 and in the first half of 2024 this will have disastrous consequences for food security of Ukraine and many world regions.

Table 5. Area of main winter crops in 2021–2022 (thousand ha)

Crop	Autumn 2021	Autumn 2022	2022/2021 (%)
Wheat	6869.8	3700.0	–46.1
Barley	1331.7	600.0	–54.9
Rape	971.8	999.0	2.8
Total	9173.3	5299.0	–42.2

Source: State Statistics Service of Ukraine [2022].

Scenario analysis

The nature and probability of implementation of recommendations for food security of CEE countries is determined by multiple factors, but a key one is definitely further course of the war in Ukraine. It determines both the situation of Ukrainian

agriculture and its position on the global markets, and, consequently, the condition of these markets, which refers especially to the grain and oilseed markets, and, to a lesser extent, poultry market. This translates directly to the conditions of building food security of many countries, including the CEE region.

Because of multiple determining factors, it is only possible to predict further development of the conflict in Ukraine by using a scenario method.

Experts asked by *The Wall Street Journal* named the following main factors driving the development of military operations in Ukraine [Visit Ukraine, 2023]:

- Weather: on many territories of both Ukraine and Russia there are so-called dirt seasons; they had already influenced military developments in the past, for example during the German aggression of the USSR in 1941;
- Bakhmut: defensive power of some Ukrainian strategic points, such as Bakhmut or earlier Mariupol; such "resistance points" carry not only military, but also symbolic significance, as they integrate the society around the defence of their motherland;
- The offensive of the Ukrainian armed forces: Ukraine continues to retain most of the strategic initiative on several important directions (Svatove – Kreminna line in Luhansk region and Melitopol – Berdyansk line in Zaporizhia region);
- Defence power of Russia: the development of military actions will largely depend on the power and determination of Russian occupiers;
- Onslaught of Russia: Russian troops may try to launch a "major offensive", also from the territory of Belarus (for example on Kyiv);
- International support for Ukraine.

The above review of determinants of further war development shows that the experts consider military actions to be of key significance, not leaving any space for peace talks, international initiatives, or broad protests against the brutality of war.

Based on the analysis of the causative factors, multiple scenarios of further course of the war in Ukraine are formulated. Their number changes depending on the underlying assumptions, and it may be from three to six scenarios within one study.

For example Togt [2022] proposes a threefold development, and projects the following options:

1) Victory of Ukraine (liberating all the occupied territories, including Crimea and so-called Donetsk and Lugansk Republics, or only territories captured on 24 February 2022);
2) Victory of Russia (not likely; consequences: building a global, however mostly European, security system in accordance with Moscow's wishes and subordination of Ukraine);
3) Stalemate (prolonged conflict ensuing from lack of either side's ability to maintain military efforts and to advance on the battleground).

The three scenarios are based on quite a simplified approach, but their logic is indisputable. As Togt concludes, "As long as Moscow still has the will and the capabilities to continue its aggression, this conflict will not be settled." [Togt, 2022].

A fourfold scenario of the course of the war in Ukraine was one of the first to appear after the Russian aggression, already on 1 March 2022 [Pavel, Engelke, Cimmino, 2022]. It comprises the following options of possible end of the conflict:

1) Miracle on the Dnipro river (the most optimistic scenario, assuming that bolstered by defensive assistance from NATO members, Ukraine's military and civilian resistance overcome Moscow's advance and grind the war to a halt);
2) A quagmire (a partial success of Russia, installing a puppet government in Kyiv dependent on Moscow, with simultaneous continuation of the military conflict; repeating the Afghanistan war pattern);
3) A new Iron Curtain (a long-term aftermath of the second scenario, a new division of the world/Europe into two rival blocs);
4) A NATO-Russia war (the most radical scenario – conflict in Ukraine becomes a beginning of a new, this time global war).

Some phenomena indicate that the development of events in Ukraine will not be radical (third and fourth scenarios). One of the factors is the heroic resistance of Ukrainian troops, which inspired common support for Ukraine across Europe and non-European countries. Let us bear in mind, though, that, as the authors of the prognosis highlight, "Wars, once begun, rarely follow a script. More frequently, they lead combatants and non-combatants alike down unanticipated pathways, with occasionally world-changing results." [Pavel, Engelke, Cimmino, 2022].

Four scenarios of the situation development in Ukraine were also prepared by Graf [2023]. The first one is *forever war,* the second – *ceasefire*, the third – *Russian consolidation*, and the fourth is *Ukrainian victory*. A premise for the first scenario to become reality is the natural conflict of interests of both sides. An argument for the second scenario may be the very painful losses on both sides, and notably, on the Ukrainian side, consequences of exceptionally barbarous practices of the Russian army. Obviously, a ceasefire does not solve the base causes of the war, but it does make it possible to reduce human suffering. Russian consolidation (the third scenario) is possible after several successful offensives that would consolidate territorial gains, at least in the occupied Ukrainian regions. The scenario of Ukraine's victory occurs in almost every prognosis, although it is very uncertain both in respect of time of its fulfilment and consequences for Ukraine and the world. As soon as in the spring 2022, the president of Ukraine expressed concerns whether pushing Russian troops out of all the Ukrainian territories would be possible without provoking a third world war [Meduza, 2022].

Experts engaged by BBC News [2022] propose five baseline scenarios (December 2022) of ending the military conflict in Ukraine:

1) Broad Russian offensive in 2023;
2) Regaining completely Ukraine's territorial integrity by mid-2023 (arguments: unprecedented in modern war history motivation, determination and courage of the Ukrainian military and Ukrainian nation as a whole; after years of appeasement of a Russian dictator, the West has finally grown up to realise the magnitude of historical challenge for the world peace it faces);
3) The war will not end by the end of 2023 (argument: Russia had miscalculated material and human costs of the war; a "better" solution in this situation appears to be a moderate, long-protracted conflict than a definite end of operations);
4) The military operations will gradually weaken, and Ukraine will regain Crimea;
5) Both sides will decide to continue with brutal offensives (in these conditions, the weather, such as severe frost, may cause the hostilities to end).

A projection based on six possible scenarios of the war in Ukraine is the most extensive [Fesenko, 2023]. The six scenarios provide for the following possible courses of action:

1) A Russian military victory (unlikely, considering the development of military operations so far);
2) A peace treaty between Russia and Ukraine (unlikely because of the stance of each side of the conflict);
3) A direct military conflict between Russia and NATO (a very dangerous scenario for Europe and the world, posing a nuclear threat);
4) Freezing of the war (stabilization of the front line, and the transition of hostilities to a positional phase for a long period, a year, and maybe longer; the chances for this scenario become reality will grow if no military resolution is achieved by the end of 2023);
5) Complete liberation of the occupied territories;
6) Combat draw (gradual, stage-by-stage liberation of most of the occupied territories, except Crimea and, possibly, part of the Donbas; this means the Ukrainian military reaching the approximate borders of 24 February 2022.)

As highlighted by Graf [2023], none of the scenarios written in 2022 has been fully realized. Neither Ukraine was annexed completely, nor Russia fully won. Three factors contributed to this:

1) unpredicted, high efficiency of the Ukrainian army on the battlefield;
2) Russian operational and tactic errors;
3) unexpected vast financial and military support from the West.

In these conditions, according to most projections and expert opinions, 2023 will be key. It is forecast that some "breakthrough" events will happen, which will provide a different perspective on the conflict, however without indicating the "winner" unambiguously, both in military terms and in general. Overall, this means that chances for the realisation of the stalemate scenario or some form of suspension of military operations are low [Gressel, 2023]. Naturally, there are visible signs of sympathy with Ukraine as the victim of aggression.

Considering the aforementioned observations, to present conclusions and recommendations in further part of the study, we adopt two possible scenarios from the perspective of military operations:

1) finishing the war by the end of 2023;
2) the conflict dragging on in different possible forms, without formal end of the war and peace treaty.

Conclusions and recommendations

In order to systematize the phenomena and processes influencing the food security of the CEE countries, including Poland, a SWOT analysis was conducted. It comprised two scenarios of the armed conflict in Ukraine: the end of hostilities by the end of 2023 (Table A2) and after that date (Table A3). The analysis was conducted in relation to the main stakeholders and with consideration of the key dimensions of food security (Table A4). Finally, a set of strategies illustrating the relationships between the strengths and weaknesses of food security and its opportunities and threats for each dimension of food security was developed.

The war in Ukraine puts Ukrainian farmers and the entire Ukrainian agribusiness in a totally different position than their counterparts in other CEE countries. It means a destruction of both potential and the productive power of the industry, lack of proceeds from exports, as well as a need to sell goods at lower prices, and inability to replace means of production. Before the war in Ukraine ends, the rest of CEE countries can obtain cheap Ukrainian raw materials and enter markets traditionally dominated by Ukrainian exports. On the other hand, however, their own agricultural markets are disrupted – a challenge Poland had to face in early 2023.

Continuation of the conflict after 2023 means further reduction of Ukrainian production potential and lack raw materials from this country on the world markets, which will additionally make fluctuations in agricultural prices more rapid and unpredictable. This means that at the end of the day food security will be reduced or

even non-existent in an increasing number of countries, particularly in Africa, Middle East, and South Asia.

This will force state authorities of individual countries and EU institutions to become more involved in shaping market, economic, and social processes. New national strategies and common agricultural policy (CAP) cannot be disconnected from economic reality. The market mechanism, inefficient even in relatively stable times, will turn out to be ineffective when confronted with complex economic, political and military processes, not to mention environmental effects. This entails a need for greater involvement of state and EU bodies in the economy and markets. Without it, maintaining an optimal state of food security will be very difficult, if possible at all.

The analysis of food security systems of the CEE countries displays many strengths (Table A4). These are: considerably large area of arable land, big processing potential, good raw material, social policy supporting consumer income, good food quality and effective EU law (this does not refer to Ukraine, although it has harmonised some of its regulations with EU provisions). Weaknesses include relatively low consumer income, high rate of food waste and periodical supply disruptions. Opportunities to improve the situation are stabilization of agricultural markets when the war in Ukraine ends, decline in food prices, improved effectiveness of regulatory food controls, introduction of new measures of support for consumer income. However, what seems alarming in this situation is the prolonged armed conflict in Ukraine and its consequences, such as increase in agricultural commodity prices, destabilization of global markets, inflation, and food shortages.

Based on the conducted SWOT analysis, a range of strategies were developed addressing both the strengths and weaknesses of food security systems in the CEE countries (Tables 6 and 7). For example, factors that can counteract the rise in food prices (a weakness of the FS systems in the CEE countries), are economic stabilization and increased consumer income levels, as well as normalization of agricultural markets after the end of military operations in Ukraine (W-O strategies). On the other hand, what can exacerbate this unfavourable situation is a prolonged conflict in Ukraine and ensuing further increase in agricultural prices, as well as ongoing inflation (W-T strategies).

Table 6. SWOT analysis matrix illustrating relationships between the strengths of food security and its opportunities (SO) and threats (ST)

Dimension	Strengths	SO strategies	ST strategies
Physical availability	S_1 – sufficient supply of arable land S_4 – effective supply chains	O_1 – procurement of cheap raw material from Ukraine O_3 – normalisation, and decrease in food prices in further perspective O_8 – stabilization of global agricultural markets after the war in Ukraine ends	T_1 – ongoing destabilization of agricultural markets T_8 – ongoing destabilization of global agricultural markets if the war in Ukraine continues
	S_2 – big food processing potential	O_3 – normalisation, and decrease in food prices in further perspective O_8 – stabilization of global agricultural markets after the war in Ukraine ends	T_1 – ongoing war in Ukraine
	S_3 – supply of cheap raw material from Ukraine	O_1 – procurement of cheap raw material from Ukraine	T_1 – ongoing war in Ukraine T_8 – ongoing destabilisation of global agricultural markets if the war in Ukraine continues
Affordability	S_5 – cheap agricultural raw material for food production S_6 – social policy supporting consumer income	O_4 – increase in consumer income as a result of economic stabilization O_5 – introduction of new measures of support for consumer income O_6 – stabilization of global agricultural markets after the war in Ukraine ends	T_3 – increase in agricultural commodity prices as a result of prolonged war in Ukraine T_4 – ongoing inflation T_5 – fall in consumer income as a result of recession and economic crises
Food safety	S_7 – high food quality resulting from obeying the EU food law S_8 – relatively low rate of counterfeit food	O_7 – improved effectiveness of regulatory food controls, contributing also to lower rate of counterfeit food	T_6 – imports of Ukrainian produce with lower quality parameters T_7 – increase in the rate of counterfeit food
System stability	S_9 – effective EU food law	O_9 – introduction of legal regulations on agricultural markets stabilization	T_7 – increase in the rate of counterfeit food T_8 – ongoing destabilization of global agricultural markets if the war in Ukraine continues
	S_{10} – food self-sufficiency of CEE countries	O_4 – increase in consumer income as a result of economic stabilization O_5 – introduction of new measures of support for consumer income O_6 – stabilization of global agricultural markets after the war in Ukraine ends	T_9 – reduced food supply on global markets resulting from self-sufficiency strategies implemented by an increasing number of countries

Source: self-reported data.

Table 7. SWOT analysis matrix illustrating relationships between the weaknesses of food security and its opportunities (WO) and threats (WT)

Dimension	Weaknesses	WO strategies	WT strategies
Physical availability	W_1 – destabilization of global agricultural markets	O_8 – stabilization of global agricultural markets after the war in Ukraine ends	T_8 – ongoing destabilization of global agricultural markets if the war in Ukraine continues
	W_2 – high rate of food loss and waste	O_9 – introduction of legal regulations on agricultural markets stabilization	T_4 – ongoing inflation T_5 – fall in consumer income as a result of recession and economic crises
Affordability	W_3 – relatively low-income rate of a significant share of CEE societies	O_4 – increase in consumer income as a result of economic stabilization O_5 – introduction of new measures of support for consumer income	T_3 – increase in agricultural commodity prices as a result of prolonged war in Ukraine
	W_4 – increase in food prices after 2019	O_3 – normalisation, and decrease in food prices in further perspective O_4 – increase in consumer income as a result of economic stabilization	T_3 – increase in agricultural commodity prices as a result of prolonged war in Ukraine T_4 – ongoing inflation T_5 – fall in consumer income as a result of recession and economic crises
Food safety	W_5 – increase in the rate of counterfeit food after 2019 W_6 – periodical increase in the share of counterfeit food	O_7 – improved effectiveness of regulatory food controls, contributing also to lower rate of counterfeit food	T_6 – imports of Ukrainian produce with lower quality parameters T_7 – increase in the rate of counterfeit food
System stability	W_7 – periodical disruptions of food supply	O_1 – procurement of cheap raw material from Ukraine O_2 – stabilization of global agricultural markets O_8 – stabilization of global agricultural markets after the war in Ukraine ends	T_1 – ongoing war in Ukraine T_2 – ongoing destabilization of agricultural markets T_8 – ongoing destabilization of global agricultural markets if the war in Ukraine continues
	W_8 – effects of war in Ukraine	O_6 – stabilization of global agricultural markets after the war in Ukraine ends	T_3 – increase in agricultural commodity prices as a result of prolonged war in Ukraine T_6 – imports of Ukrainian produce with lower quality parameters T_8 – ongoing destabilization of global agricultural markets if the war in Ukraine continues T_9 – reduced food supply on global markets resulting from self-sufficiency strategies implemented by an increasing number of countries

Source: self-reported data.

Summary

Since the beginning of the 21s t century certain phenomena have had an increasingly negative impact on food security of individual countries or regions and the entire world. These phenomena are increasingly extreme weather events (droughts, hurricanes) with accompanying crop failures and locust plagues, which damage agricultural production in many regions of the world, thereby causing food crises and increasing the number of malnourished and starving people. In recent years, these unfavourable conditions were further aggravated by spreading viral epidemics and the outbreak of armed conflict in Ukraine. It has undermined the target level of food security in many countries.

Major factors causing the development of this difficult situation within basic food security dimensions include:

1) food availability: high food prices, problems connected with transports and logistics;
2) food affordability: high food prices resulting from increase in prices of energy and fertilizers, and rapid fluctuations of agricultural raw materials supply, unfavourable practices in trade policy (e.g. export bans), uncertainty about the future of Ukrainian exports;
3) food quality: high prices of food reduce consumers' purchasing power and constrain ensuring properly diversified and healthy diet, and contribute to higher share of lower-quality and counterfeit food;
4) system stability: uncertainty about further course of the Russian-Ukrainian war and its escalation, tighter monetary policy and global recession, currency depreciation, growing barriers to state borrowing, military conflicts (including protracted wars), adverse impact of climate change.

Apparently, future global economy will be shaped by phenomena such as protracted armed conflicts, which will increase the role of the state and its institutions in the economy and will further justify interventionism in the agricultural sector. There will also be significant fluctuations in the prices of agricultural and food products in global markets. Lastly, actions taken within national policies will essentially involve a reversal of the process of globalization and "disassembly" of global supply chains in favour of their reconfiguration[4].

4 As of 13 March 2023, 23 countries have imposed 29 bans on food export, 10 countries have introduced 14 measures limiting exports.

Counteracting the phenomena adverse for food security will involve:

1) promoting fair and transparent trade system,
2) undertaking multiple measures to enhance international cooperation on addressing food crises and world hunger problems,
3) upgrading food transportation and storage infrastructure, as well as seaports and channels connecting them, so as to make free trade in agricultural goods and food possible.

Without these essential measures not only improvement, but even maintaining a minimum level of food security will be impossible in an increasing number of countries, in all regions of the world.

ATTACHMENT

Table A1. Ranking and scores assigned under the Global Food Security Index to CEE countries in 2018–2022*

CEE country	2018		2019		2020		2021		2022	
	place	score	place	score	place	score	place	score	place	score
Bulgaria	47	64.5	61	66.2	44	67.4	38	70.5	29	73.0
Poland	26	75.4	24	75.6	25	73.5	22	74.9	21	75.5
Romania	38	68.9	38	70.2	22	74.2	29	72.4	45	68.8
Slovakia	35	70.3	47	68.3	40	69.2	42	68.7	36	71.1
Hungary	30	72.8	34	72.7	36	70.1	31	72.1	34	71.4
Ukraine	63	55.7	76	57.1	54	58.8	58	62.0	71	57.9

* GFSI is not calculated for the following CEE countries: Czechia, Croatia, Estonia, Latvia, Lithuania, and Slovenia.
Source: self-reported data based on Economist Impact [2022].

Table A2. SWOT analysis of food security system, based on the scenario of military operations ending by the end of 2023

Strengths	Weaknesses
Farmers 1) restoring fully of Ukraine's access to the global market and thereby reducing competitiveness for EU farmers **Food producers** 1) supply of cheap agricultural raw materials from Ukraine 2) opportunity to take over recipients purchasing goods in Ukraine **Agri-food trade** 1) cheap agricultural raw materials from Ukraine 2) opportunity to take over recipients purchasing goods in Ukraine **Retail trade in food** 1) higher profitability due to cheaper goods from Ukraine **Public sector** 1) elimination of market difficulties as a result of the end of war	**Farmers** 1) market competition from Ukrainian agricultural goods 2) restricted possibilities of agricultural production for Ukrainian farmers **Food producers** 1) necessity to find other sources of agricultural raw materials if imports from Ukraine is banned **Agri-food trade** 1) necessity to find other sources of agricultural raw materials if imports from Ukraine is banned **Retail trade in food** 1) possible commodity shortages due to disruption of many markets caused by the military conflict **Public sector** 1) farmers' pressure to restrict agricultural imports from Ukraine
Opportunities	**Threats**
Farmers 1) introduction of advantageous legal solutions under CAP (tariffs, quotas on imports from Ukraine) 2) introduction of additional forms of support for EU farmers **Food producers** 1) taking over markets traditionally dominated by Ukrainian firms **Agri-food trade** 1) taking over markets traditionally dominated by Ukrainian firms **Retail trade in food** 1) normalization of market relations **Public sector** 1) restoring trade relations with Ukraine on pre-war conditions	**Farmers** 1) maintaining relief for imports from Ukraine **Food producers** 1) permanent constraints in the supply of Ukrainian agricultural goods 2) limited processing potential in Ukraine resulting from war losses 3) loss of previous markets by Ukrainian firms **Agri-food trade** 1) constraints in the supply of Ukrainian agricultural goods 2) loss of previous markets by Ukrainian firms **Retail trade in food** 1) lower supply of agricultural raw materials from Ukraine **Public sector** 1) periodical dissatisfaction and protests of farmers caused by imports of Ukrainian produce

Source: self-reported data.

Table A3. SWOT analysis of food security system, based on the scenario of military operations ending after 2023

Strengths	Weaknesses
Farmers 1) smaller competition from the Ukrainian agriculture if additional import restrictions are imposed **Food producers** 1) possibility of obtaining cheaper agricultural commodities from Ukraine if Russia continues to block exports **Agri-food trade** 1) possibility of obtaining cheaper agricultural commodities from Ukraine if Russia continues to block exports **Retail trade in food** 1) possibility of obtaining cheaper agricultural goods	**Farmers** 1) considerable obstacles for Ukrainian farmers' production (lack of inventories and financial resources) 2) reduced area of arable land for agricultural production in Ukraine **Food producers** 1) negative impact of protracted military operations on the size of agricultural production in Ukraine and ensuing increase in prices of agricultural commodities 2) limited processing potential in Ukraine resulting from war losses **Agri-food trade** 1) negative impact of protracted military operations on the size of agricultural production in Ukraine and ensuing increase in prices of agricultural commodities **Retail trade in food** 1) shortage of agricultural goods imported from Ukraine (poultry, eggs, vegetable oils) **Public sector** 1) necessity to counteract negative processes on the agricultural market, caused by the war in Ukraine
Opportunities	Threats
Farmers 1) smaller competition from the Ukrainian farmers **Food producers** 1) looking for new markets to sell produce (South and North America) **Agri-food trade** 1) looking for new markets to sell produce (South and North America) **Retail trade in food** 1) possibility of obtaining cheaper agricultural goods **Public sector** 1) introduction of new CAP instruments to support EU producers 2) introduction of new solutions in Ukraine's agricultural policy to address the consequences of war in agri-business	**Food producers** 1) lack of products traditionally imported from Ukraine to CEE countries (sunflower oil, oilseeds, poultry) **Agri-food trade** 1) permanent lack of products traditionally imported from Ukraine to CEE countries (sunflower oil, oilseeds, poultry) **Public sector** 1) permanent farmers' pressure to restrict agricultural imports from Ukraine

Source: self-reported data.

Table A4. SWOT analysis of food security systems of the CEE countries

Dimension	Strengths	Weaknesses	Opportunities	Threats
Physical availability	S_1 – sufficient supply of arable land S_2 – big food processing potential S_3 – supply of cheap raw material from Ukraine S_4 – effective supply chains	W_1 – destabilization of global agricultural markets W_2 – high rate of food loss and waste	O_1 – procurement of cheap raw material from Ukraine O_2 – stabilization of global agricultural markets	T_1 – ongoing war in Ukraine T_2 – ongoing destabilization of agricultural markets
Affordability	S_5 – cheap agricultural raw material for food production S_6 – social policy supporting consumer income	W_3 – relatively low-income rate of a significant share of CEE societies W_4 – increase in food prices after 2019	O_3 – normalisation, and decrease in food prices in further perspective O_4 – increase in consumer income as a result of economic stabilization O_5 – introduction of new measures of support for consumer income	T_3 – increase in agricultural commodity prices as a result of prolonged war in Ukraine T_4 – ongoing inflation T_5 – fall in consumer income as a result of recession and economic crises
Food safety	S_7 – high food quality resulting from obeying the EU food law S_8 – relatively low rate of counterfeit food	W_5 – increase in the rate of counterfeit food after 2019 W_6 – periodical increase in the share of counterfeit food	O_6 – stabilization of global agricultural markets after the war in Ukraine ends O_7 – improved effectiveness of regulatory food controls, contributing also to lower counterfeit food rate	T_6 – imports of Ukrainian produce with lower quality parameters T_7 – increase in the rate of counterfeit food
System stability	S_9 – effective EU food law S_{10} – food self-sufficiency of CEE countries	W_7 – periodical disruptions of food supply W_8 – effects of war in Ukraine	O_8 – stabilization of global agricultural markets after the war in Ukraine ends O_9 – introduction of legal regulations on agricultural markets stabilization	T_8 – ongoing destabilization of global agricultural markets if the war in Ukraine continues T_9 – reduced food supply on global markets resulting from self-sufficiency strategies implemented by an increasing number of countries

Source: self-reported data.

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DIGITAL TECHNOLOGIES AND ACCESS TO HEALTHCARE SERVICES IN THE COUNTRIES OF CENTRAL EASTERN EUROPE

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DOI: 10.33119/978-83-8030-625-7.2023_187_204

Abstract

The study aims to assess accessibility of healthcare services in Central and Eastern European (CEE) countries and to identify digital technologies that can help make these services more accessible. In view of many barriers associated with the digitalisation of healthcare systems both on the part of healthcare providers and their clients (patients), the authors make recommendations for the use of digital health solutions for the effective delivery of healthcare services to those who need them, as well as for the management of the healthcare system. The study is divided into three parts. The first one provides a macroeconomic analysis of access to health services and the level of digitalisation in CEE countries. The next part identifies key determinants of access to health services for patients in the countries under research, based on the results of the European Health Interview Survey (EHIS). The last part provides an in-depth analysis of the degree of digital technology implementation in the healthcare system in Poland.

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The study aims to assess accessibility of healthcare services in Central and Eastern European (CEE) countries, and to identify digital technologies that can make these services more accessible. There is an urgent need to learn the lessons from the COVID-19 pandemic, when healthcare digital innovations were quickly integrated and scaled to solve problems connected with medical services. Patients had constant access to basic healthcare services thanks to digital solutions, which made it possible to both reduce infection risk and keep social distancing. However, there are many barriers to healthcare system digitalisation both on the part of healthcare providers and their clients (patients). Therefore an important part of this study are recommendations on how to make digital solutions an effective way of providing healthcare services to those who need them, and how to manage the healthcare system.

Transformation towards a patient-centred healthcare model is necessary to meet the demographic changes associated with an ageing society. According to the Deloitte report [2018], digital technologies are reshaping the relationships between patients and healthcare providers, as well as relations within the entire healthcare system. Therefore, significant importance is placed on solutions such as electronic medical records, digitalisation of medical documentation, and tools available in telemedicine, e-health, and artificial intelligence.

Macroeconomic analysis of access to health services and level of digitalisation in CEE countries

A characteristic of healthcare services market is that the location of medical entities representing supply of services does not match local demand. The problem of uneven distribution of healthcare potential in Poland was identified in the report of NIK (Polish Supreme Audit Office) [2019], but a similar situation also occurs in many other countries. Based on research conducted in the United Kingdom, a concept of so-called *inverse care law* was formulated, which states that the availability of healthcare services in a given region is inversely proportional to the size of population residing there [Hart, 2000]. What is helpful in combating unequal access to medical services are digital technologies. An advantage of telemedicine solutions is that there is no need to provide healthcare services that do not require the presence of both parties, i.e., the medical entity and the patient, at the same time and in the same place. Thus digital technologies increase the accessibility of medical services, especially in regions struggling with shortage of traditional healthcare entities [Czerwińska, 2015].

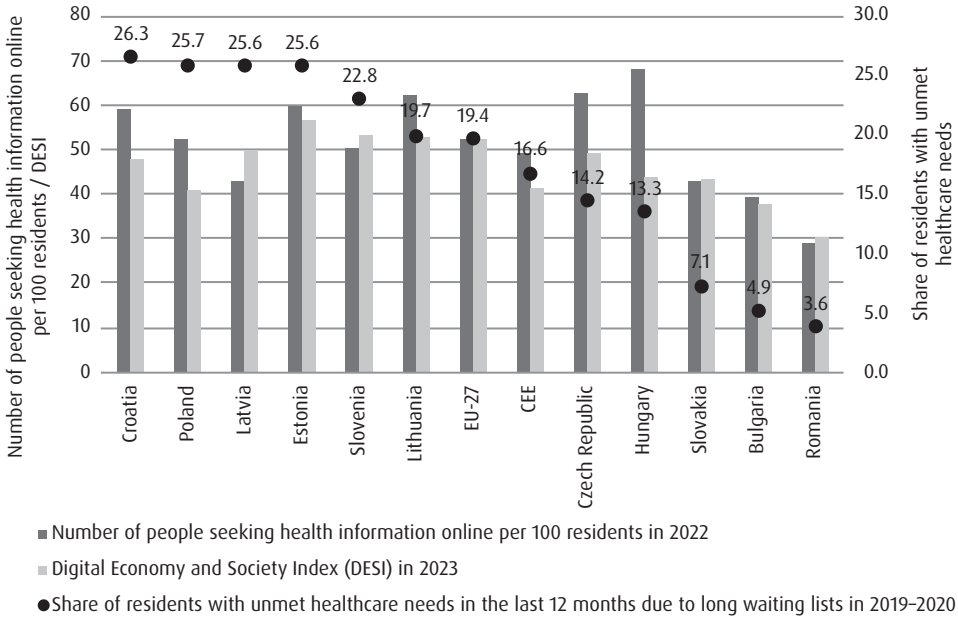
A problem affecting the diversified access to healthcare services are digital health inequalities, understood as differences in access, use, and effectiveness of digital technologies for monitoring health status, diagnosing, and treating diseases among different social groups [Libura, 2023]. A precondition for the functioning of remote medical services market is the development of an information society. An analysis of digital competence development in CEE countries is facilitated by the Digital Economy and Society Index (DESI). DESI is a weighted average of five sub-indices, which include connectivity and infrastructure, human capital, internet usage, digital technology integration, and digital public services.

Figure 1 presents data on the share of residents with unmet healthcare needs in the last 12 months due to long waiting lists, juxtaposed with data on the share of residents seeking health information online, and data on the level of DESI in the analysed CEE countries.

The chart above shows that Poland has the second highest percentage of residents with unmet healthcare needs due to long waiting lists among the analysed countries (25.7%). This is significantly worse than the average for the entire CEE (16.5%) and the European Union (EU) (19.4%). Countries with the highest share of residents searching for health information online are Hungary (68 people per 100 residents), Czech Republic and Lithuania (62), and Estonia and Croatia (59). Poland follows closely with the same score (52) as the EU average, surpassing the average level in all CEE countries (49). High scores in terms of the percentage of residents using the Internet for health information were recorded in Hungary, Czech Republic, Lithuania, Estonia, Croatia,

and Poland, which presents a great opportunity for the development of digital technologies and healthcare sector digitalisation in the future. On average, every other citizen in the entire CEE region uses the Internet to search for health information. The highest score in terms of the Digital Economy and Society Index was achieved by Estonia (57), followed by Slovenia (53) and Lithuania (53). The DESI value in these three countries exceeded the average DESI value for the EU (52), which was significantly higher than the average level of this index in all CEE countries (41%). Poland, with a score of 41, was among the three countries with the lowest DESI index, ahead of Bulgaria (38) and Romania (31).

Figure 1. Unmet healthcare needs and the level of digitalisation in CEE countries in 2019–2023

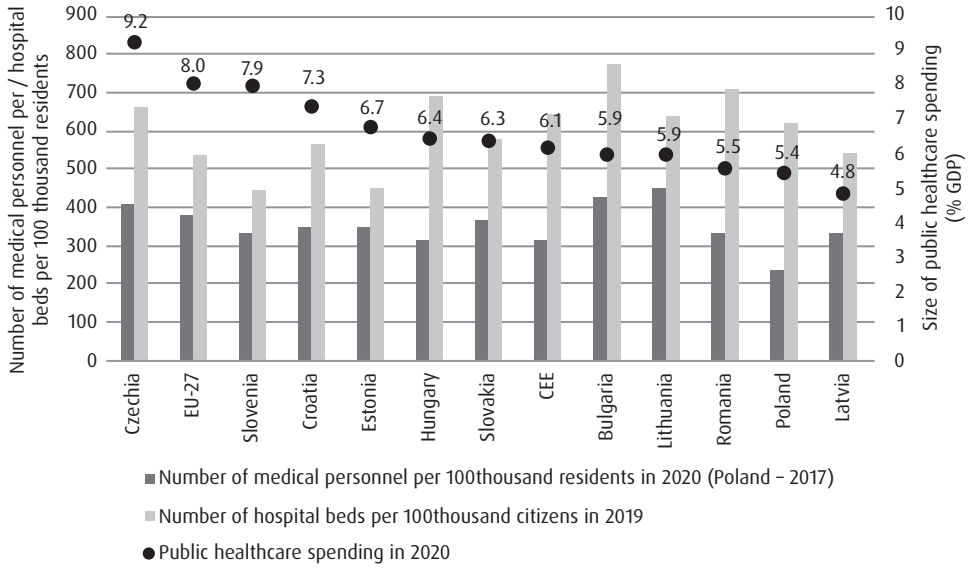


Source: self-reported data based on Eurostat [2022], EHIS [2019, 2020] and European Commission [2022].

One of the most important factors determining the availability of healthcare services is medical personnel, who influence the effective functioning of the entire healthcare system. Doctors and other medical professionals are responsible for providing healthcare, which is one of the greatest goods for individuals and society as a whole. Development and maintenance of medical personnel in a country, as well as the overall functioning of the healthcare system, are largely dependent on public spending. These expenditures make it possible not only to satisfy current health needs but also to address in the long term grand challenges related to critical health and develop-

mental issues, such as ageing population and civilization diseases [Kowalski, 2022]. A comparison of these expenditures, available medical personnel, and number of hospital beds per 100 thousand residents is presented in Figure 2.

Figure 2. Size of public healthcare spending and number of medical personnel and hospital beds per 100 thousand residents in the years 2019–2020*



* Excluding data about the number of medical personnel in Poland from 2017.

Source: self-reported data based on Eurostat [2020a–c] data.

According to the data presented in the chart, the Czech Republic has the highest level of public spending on healthcare among the analysed countries (9.2% of GDP). It is the only country in the CEE that outperforms the EU average (8%) in this regard, surpassing the average level for the entire CEE (6.1%). Poland, with public healthcare spending at 5.4% of GDP, ranked second to last, ahead of Latvia (4.8%). At the same time, Poland ranked lowest in terms of medical personnel (excluding nursing and care specialists) per 100 thousand residents. This category includes primarily doctors, as well as dentists, pharmacists, physiotherapists, etc. Poland has 237 medical personnel per 100 thousand residents, which is significantly lower than the CEE average (316) and the EU average (381). The highest numbers were recorded in Lithuania (448), Bulgaria (428), and the Czech Republic (410).

Data presented in Figure 2 indicate that Poland is in the middle range in terms of the number of hospital beds (617 hospital beds per 100 thousand residents). However, it is worth noting that this indicator is higher for the CEE (645) than for the EU (531).

This is due to an outdated healthcare service model in this region. A characteristic feature of this model is insufficient access to specialized outpatient medical services. Under a modern model implemented in many Western European countries, greater emphasis is placed on prevention and outpatient care, and patients are admitted to hospitals only when necessary. Under the dominant model in the CEE, including Poland, the problem lies in unavailability or long waiting times for diagnostic tests outside of hospital care. The necessity of hospitalizing patients solely for diagnostics or minor procedures results in higher treatment costs and administrative expenses, as well as waste of time for both patients and medical personnel.

An opportunity for further improvement in the efficiency of healthcare systems are digital technologies. They can play a particularly significant role in the CEE, as in many countries in this region the percentage of people looking for health information online exceeds the EU average. Telemedicine solutions enable rapid communication between patients and healthcare providers and transfer of data (e.g., test results) between different entities in the healthcare market, as well as direct contact between patients and healthcare workers. They include e-consultations, electronic medical records, health information networks, health information available on the Internet, and electronic registries and mobile devices used for monitoring the patient's condition, as well as a single electronic system for queue monitoring, which makes it possible to schedule an appointment with a doctor or medical test faster than by traditional methods. Digitalisation, on the one hand, improves the quality, accessibility, and effectiveness of healthcare services, and reduces healthcare costs on the other hand. From a macroeconomic perspective, telemedicine leads to economic growth through its impact on efficiency and competitiveness in healthcare [Czerwińska, 2015].

Key determinants of access to health services in the CEE countries

The aim of health policy, both in individual Member States and across the EU, is to ensure equal access for all Europeans to modern and effective medical care [European Union, 2019], which is one of the social determinants of citizens' health [Wilkinson, Marmot, 2003, p. 7; Modranka, Suchecka, 2014]. Equal access to healthcare means that individuals or households with similar needs for medical care have access to it regardless of their income (horizontal equity) [Wagstaff, Doorslear, 1992, cited in: Suchecka, 2007].

Universal access to healthcare, recognized as the right of every citizen, should primarily depend on needs rather than the ability to pay. Despite constitutional guarantees and government efforts to equalize access to publicly funded medical services,

especially in the case of poorly developed countries, access remains uneven and limited [González, Triunfo, 2020].

One piece of research that provides statistical data on citizens' health and availability of medical services is the aforementioned EHIS[1], whose results will be presented in this section. The survey was conducted in 2019 on individuals aged 15 and older living in EU countries, including Poland[2]. Let us note that the presented data were collected a year before the outbreak of the COVID-19 pandemic. Therefore, they can serve as a basis for analysis but do not fully reflect the current situation [GUS, 2019].

According to EHIS, the most commonly identified factors influencing unmet healthcare needs in EU countries are: waiting time for appointments, financial reasons, and distance to the nearest healthcare facility. The weighted average of population indications for the 12 CEE countries was as follows: for long waiting periods – 16.5%, financial reasons – 12.6%, and geographic distance – 3.64%.

Figure 3 compares two of the three aforementioned determinants of unmet healthcare needs: financial reasons and waiting time for appointments.

Data presented on Figure 3 indicate that the situation in CEE countries is quite diversified. The highest percentage of patients perceiving financial constraints as the reason for unmet healthcare needs, along with long waiting times for appointments, was observed in Croatia, Estonia, Lithuania, Serbia, and Slovenia. Latvia and Poland are the countries where the length of waiting time for medical services is primarily responsible for unmet healthcare needs, with moderate significance of financial issues. The best situation in terms of both variables, i.e., small share of individuals reporting unmet medical needs due to either waiting time or financial problems, is found in the Czech Republic and Slovakia.

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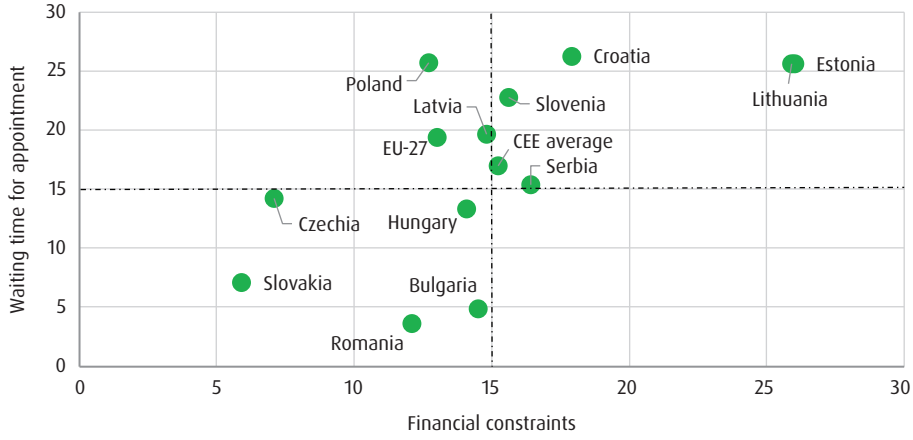
1 "EHIS survey is conducted by Member States in accordance with Eurostat recommendations regarding the thematic scope and research tools used. The European Health Statistics System provides for full implementation of all EHIS modules in all EU Member States and cyclical repetition of the survey, as stipulated in the community law. Implementation of the EHIS 2019 survey constitutes the fulfilment of tasks specifi d in Commission Regulation (EU) 2018/255 of 19 February 2018 on the implementation of Regulation (EC) No 1338/2008 of the European Parliament and of the Council as regards statistics based on the European Health Interview Survey (EHIS). The legal basis for the EHIS survey in Poland was the Act of 29 June 1995 on official statistics (Dz.U. of 1995, No. 88, item 439, as amended) and Regulation of the Council of Ministers of 14 September 2018 on the program of statistical research in offi al statistics for 2019 (Dz.U. of 2018, item 2103)" [GUS, 2019, p. 10].

2 "EHIS survey (third round) was conducted in Poland by GUS from September to December 2019. Th survey was carried out using the method of direct interview, utilizing three questionnaires and auxiliary cards. In contrast to the EU requirements, which involve surveying individuals aged 15 and older, the national version of the survey also included children. The obtained statistical information was generalized to the population of Poland residing in households as of December 31, 2019" [GUS, 2019, p. 10].

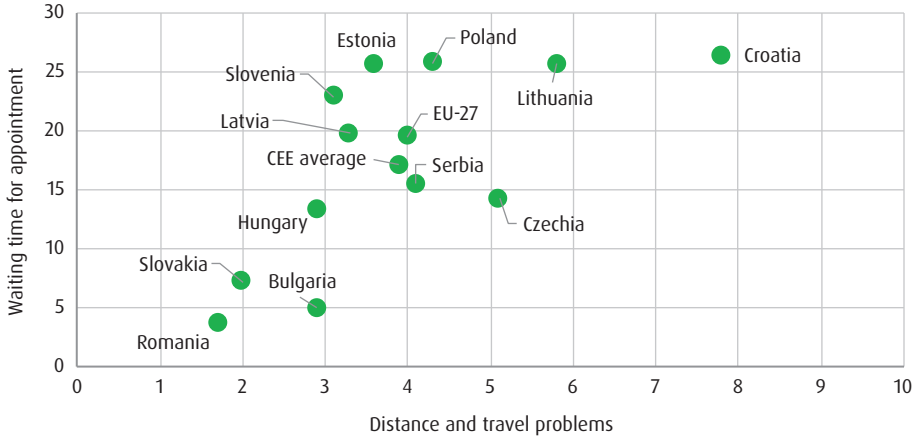
Figure 3. Self-assessment of unmet healthcare needs due to financial constraints and waiting time for appointments (% of indications)



Source: self-reported data based on Eurostat and EHIS [2019].

Figure 4 presents two other determinants: problems connected with distance and travel to the nearest healthcare facility and waiting time for appointments.

Figure 4. Self-assessment of unmet healthcare needs due to distance and related costs of transport, and waiting time for appointment (% of indications)



Source: self-reported data based on Eurostat and EHIS [2019].

The data presented in Figure 4 confirms the high variability of indications regarding unmet healthcare needs due to distance, transportation costs, and waiting time

for appointments in the analysed CEE countries. The highest percentage of patients indicating distance as the reason for unmet healthcare needs, along with long waiting times for appointments, was observed in Croatia and Lithuania. Estonia, Latvia, Poland, Serbia, and Slovenia are the countries where the length of waiting time for medical services is primarily responsible for unmet healthcare needs, with moderate significance of distance. The best situation, considering both variables, occurs in Bulgaria, Romania, Slovakia, and Hungary.

The most important determinants of unmet healthcare needs were excessively long waiting times for appointments and inability to cover the costs of medical examinations. This is fully confirmed by studies conducted in Poland by the foundation *My Pacjenci*, which show that 90% of patients expect specialist appointments to take place within a month; otherwise, they opt for commercial services or simply give up treatment. Among patients who choose private visits, the main problem is high costs of private consultations [Okoniewska, 2021].

While waiting time for medical appointments is closely related to the capacity of the healthcare system, the inability to cover treatment costs is primarily a result of low patient income. Raittio, Aromaa, Kiiskinen, Helminen, and Suominen [2016], studying the level of dental care in Finland, refer to this phenomenon as "income-related inequality", while González and Triunfo [2020], analysing the functioning of the healthcare system in Uruguay, describe this state directly as "pro-rich inequity".

In summary, considering self-assessment of unmet healthcare needs in terms of waiting time for appointments, Poland ranks among the leading countries in CEE. However, in terms of barriers hindering access to healthcare due to financial reasons and distance from medical facilities, Poland achieves better results than many other countries in the region. The long-term strategic goal should therefore be to shorten waiting times for appointments through investments in healthcare personnel (increasing the number of healthcare professionals), and in the short term, to introduce an effective queue management system for all patients, regardless of age group, when it comes to specialist care.

Healthcare digitalisation in Poland

As mentioned earlier, digitalisation presents an opportunity for healthcare systems worldwide, including Poland. Digital technologies can play a crucial role in transforming the healthcare system and making it more functional and efficient. The technologies can enhance the quality of healthcare services, benefiting both patients and healthcare professionals. Telemedicine solutions, for instance, allow for remote

monitoring of patients' health regardless of their physical location, whether inside or outside a hospital. Patient health data can be transmitted between the patient, doctors, and care facilities. In this way, digital solutions contribute to reducing disparities in access to healthcare. The main goals of digitalisation in the healthcare system include optimizing physicians' work, improving patient outcomes, reducing human errors, and lowering costs [Schrijvers, 2017].

It can be observed that recent global crises, including the COVID-19 pandemic, have accelerated the transformation of healthcare systems. According to the Deloitte report *Digital Transformation: Shaping the Future of European Healthcare*, nearly 65% of respondents indicated that their respective governments increased the use of digital technologies to support healthcare workers during the pandemic. Furthermore, 64.3% of respondents stated that these technologies were also used to improve communication with patients [Deloitte, 2020]. Research conducted in Poland shows a need for the development of technology towards the widespread use of e-health solutions such as e-prescriptions, online medical consultations (e-consultations), and online doctor appointments [Kantar, 2020]. These findings are a consequence of the current conditions related to the pandemic.

Digitalisation of the healthcare system in Poland is progressing. An example is the *Future Health Index 2019* , commissioned by Philips, which published research results regarding the openness of patients and healthcare professionals to modern technologies. According to the respondents' declarations, as many as 77% of medical personnel use at least one digital solution (including mobile applications) in their practice or hospital. This result is close to the average for the 15 countries surveyed, which was 78%. These results align with Eurostat data presented in Figure 1, which indicates that around 52% of the population in both Poland and the entire EU-27 use the Internet to seek health-related information. At the same time, healthcare leaders see new technologies as opportunities to address the challenges faced by the current healthcare system, including staffing shortages and disparities in access to healthcare [Future Health Index, 2019].

Digitalisation in Polish healthcare encompasses several elements:

- Electronic medical documentation (EMD);
- E-prescriptions;
- E-referrals;
- Development of telemedicine;
- Information and telecommunications technologies applied to support healthcare activities.

A key element determining the possibility of implementing digital solutions is the project called "Electronic Platform for Collecting, Analysing, and Sharing Digi-

tal Resources on Medical Events". Under this project services such as e-prescriptions, e-referrals, e-medical certificates, and e-orders for medical supplies were launched in 2019. Another important solution is the implementation of electronic medical documentation. Legal obligation to maintain full electronic documentation came into effect on January 1, 2020. Equally important for healthcare system digitalisation is also development of telemedicine, mobile health, and artificial intelligence. Let us present how these solutions are implemented in Poland.

According to a study conducted by e-Health Centre in collaboration with the Ministry of Health from 25 May to 24 June 2022, solutions related to electronic medical documentation are the most widespread among healthcare service providers in Poland [Centrum e-Zdrowia, 2022, p. 4][3]. A vast majority of respondents declared that they have a sufficient number of workstations connected to a network that allows for the implementation of electronic medical documentation (EMD). Hospitals were the most frequent adopters of EMD for outpatient test results along with descriptions of non-outpatient diagnostic tests (52.6% and 53% of the entities surveyed, respectively). This also applies to transmission of information to physicians referring patients to specialized clinics or hospital treatment regarding diagnosis, treatment methods, prescribed medications, etc. (73%). Hospital entities also commonly exchange EMD with other entities through the e-Health system. Respondents also emphasized the importance of the EMD repository, which serves as a storage location for electronic documents along with metadata for search purposes (Table 1). It is worth noting that the implementation of EMD solutions makes it possible to fully utilize blockchain technology. All patient data gathered in one facility is accessible to other facilities. An important aspect of EMD is that each patient has their own database, and they have full control over which data can be shared with other facilities and to what extent (blockchain technology).

Data presented in Table 2 indicates that among healthcare service providers digitalisation of medical documentation is much less advanced. It involves transforming analogue data into digital data and aims to spread and popularize digital technology, and to introduce medical infrastructure on a large scale. Only 26.1% of the surveyed entities have digitalised paper-based documentation (Table 2). Provision of e-services also lags behind, with only 16.8% of the surveyed entities providing patients with

3 The research was held from 25 May to 24 June 2022. Its purpose was to obtain information about the use of IT and preparedness for electronic medical documentation, as well as the utilization of new technologies, particularly telemedicine and artific al intelligence. It was conducted with CAWI method. The survey covered entities providing inpatient and round-the-clock healthcare services (hospitals and non-hospital entities) as well as entities delivering outpatient healthcare services. A total of 11,580 fill d and verifi d questionnaires were obtained.

access to such solutions through a website, most commonly hospitals and entities providing outpatient healthcare services (Table 3).

Table 1. Solutions applied in the area of electronic medical documentation

Solution	Hospitals	Non-hospital units	Entities providing outpatient healthcare services
	Share of respondents declaring implementation of each solution in the total number of surveyed entities (%)		
Having a sufficient number of EMD workstations	73.9	79.1	86.1
Keeping EMD by the surveyed entities for: ▪ test results along with descriptions ▪ descriptions of laboratory tests ▪ information for a physician referring a patient to a specialist clinic	 52.6 53.0 73.8	 36.7 31.1 52.2	 26.1 31.8 43.1
Exchange of EMD with other entities	43.8	30.8	29.5
Keeping EMD repository	85.3	59.5	71.3

Source: Centrum e-Zdrowia [2022, p. 11, 15, 25].

Table 2. Digitalisation of medical documentation

Solution	Hospitals	Non-hospital units	Entities providing outpatient healthcare services
Share of respondents declaring digitalisation of paper documentation in the total number of surveyed entities (%)	26.6	22.2	21.7

Source: Centrum e-Zdrowia [2022, p. 28].

Table 3. Ensuring access to e-services among surveyed entities

Solution	Hospitals	Non-hospital units	Entities providing outpatient healthcare services
Share of entities declaring that they ensured their patients access to e-services in the total number of surveyed entities (%)	41.1	16.0	15.0

Source: Centrum e-Zdrowia [2022, p. 30].

Technological progress and the emergence of digital technologies have contributed to the development of e-health and related fields such as telemedicine and mobile health (m-health)[4]. Recent years, including the period of the COVID-19 pandemic,

4 Telemedicine is the provision of healthcare services remotely by all workers of the healthcare sector, using ICT to exchange important information in order to diagnose and treat illnesses and traumas and to prevent

have demonstrated the benefits associated with the development of such solutions. According to recent research conducted by e-Health Centre in collaboration with the Ministry of Health, telemedicine services are provided by both hospitals and other entities (Table 4). One-third of the surveyed hospitals (32.4%) provide these services, as do one in four entities providing outpatient services, and one in five non-hospital units (19.4%). Regardless of the type of entity, tele-consultations and tele-advice are the most popular solutions. Tele-monitoring/tele-care is only applied in a few cases. Respondents relatively rarely use tools supported by artificial intelligence (only 6.6% of the surveyed hospitals and 2.3% of entities providing outpatient services). These solutions are most commonly used in imaging diagnostics such as CT (computed tomography) and MR (magnetic resonance) imaging. It should be emphasized that artificial intelligence is currently considered a medical innovation that can simplify the work of doctors by performing tasks that were previously carried out by humans. It is applied in areas such as imaging diagnostics, research on new drugs, genomics, and virtual patient and physician assistants [Cieślar, Korniiuchuk, 2021].

Table 4. Telemedicine, e-Health and AI solutions

Solution	Hospitals	Non-hospital units	Entities providing outpatient healthcare services
Share of respondents saying they apply telemedicine solutions in the total number of surveyed entities	32.4	19.4	25.3
Share of respondents saying they apply e-Health solutions in the total number of surveyed entities	7.7	3.1	4.3
Share of respondents saying they apply AI solutions in the total number of surveyed entities	6.6	1.3	2.3

Source: Centrum e-Zdrowia [2022, p. 35, 38, 41].

Taking into account results of the research, attention should also be paid to the assessment of digital maturity by the surveyed entities. More than half of them (53.4%) rated this aspect as average. High and very high ratings were given by 19.3% of respondents, while low and very low ratings were given by 26.6%. The biggest barriers to digitalisation for entities were insufficient financial resources for IT investments (82.3%), inadequate digital skills of personnel (45.2%), and resistance from medical staff (41.3%) [Centrum e-Zdrowia, 2022, p. 83]. Investments in human capital are a crucial element of digitalisation development. According to the DESI indicator regarding

them, as well as to carry out tests and assessments, and to further educate workers providing healthcare services. M-health is defin d as activities in the area of medicine and public health, performed with the use of mobile devices, such as cell phones, patient monitoring devices, palmtops and other wireless devices [cited in: Dymyt, Dymyt, 2018, p. 72].

human capital, Poland ranked third from the bottom among the CEE countries (just behind Romania and Bulgaria) in terms of assessing digital skills of medical workforce.

Although the above-mentioned data regarding the rate of digitalisation in healthcare entities may not be too optimistic, it is positively evaluated by the Polish society. This is evidenced by, among other things, the results of *Barometer Bayer 2020* survey conducted by Kantar on behalf of the Bayer company. Almost 80% respondents highlighted a need for the development of technology towards the widespread use of e-health solutions such as e-prescriptions, online medical consultations (e-consultations), and online doctor appointments [Kantar, 2020].

Summary

The COVID-19 pandemic has highlighted the need for digital transformation in the healthcare sector in all EU countries in order to make it more efficient and resilient to crises [Regulation (EU) 2021/522].

Results of a study conducted based on data from multiple sources, including the EHIS questionnaire, indicate the need for urgent public health interventions in the countries of the region to increase equal access to healthcare services and reduce existing disparities. A key problem is the long waiting time for appointments, identified as the most important variable preventing healthcare needs from being satisfied. In the case of Poland, where the percentage of healthcare specialists is the lowest in the region (237 specialists per 100 thousand inhabitants in Poland compared to an average of 315 specialists per 100 thousand inhabitants in CEE countries), a long-term strategic goal should be to invest in educating more healthcare specialists (doctors, dentists, pharmacists). Eurostat data indicate that every other Pole declares looking for health information online; digitalisation reports indicate that 80% of respondents want the development of digital technologies in the field of e-health. Therefore, decision-makers should focus in the short term on implementing an efficient single management system for already existing data (e.g., specialist appointment queues or electronic access to medical tests for all patients regardless of age group).

Digital technologies are an opportunity for further improvement in the efficiency of healthcare systems. Telemedicine solutions enable fast communication between patients and healthcare providers, transfer of data between different entities in the healthcare market, as well as direct contact between patients and healthcare workers. These solutions include e-consultations, electronic medical records, health information networks, online health information, and electronic registries and wearable devices used for monitoring the patient's condition. Digitalisation, on the one hand,

improves the quality, accessibility, and effectiveness of healthcare services, and on the other hand, reduces healthcare expenses, thereby mitigating the second most important barrier, which is high treatment costs. From a macroeconomic perspective, telemedicine leads to economic growth through its impact on efficiency and competitiveness in healthcare [Czerwińska, 2015].

Based on the considerations presented above, the following conclusions can be formulated:

- Citizens of CEE countries often search for health information online (on average, every other citizen), and they do not differ significantly in this regard from residents of other EU countries.
- Poland, Croatia, Estonia, and Latvia have the highest rate (over 25% of the population) of self-reported unmet healthcare needs related to access to healthcare due to long waiting times (so-called queues) among all EU countries.
- Digital technologies are of great importance for improving the quality of healthcare; they make medical services increasingly accessible and can facilitate the work of healthcare personnel and streamline the functioning of medical facilities.
- The COVID-19 pandemic has undoubtedly accelerated the digitalisation process in the Polish healthcare system; there is an increasing utilization of both digital technologies supporting the work of doctors and e-health solutions.
- One of the most important tools for healthcare system digitalisation is the use of electronic medical records, which ensure the proper flow of documentation between entities providing medical services; the pandemic has also accelerated the development of telemedicine. However, solutions such as digitisation and AI-supported tools in medical entities are still relatively rare.
- Digitalisation in the healthcare sector is positively regarded by the Polish society; telemedicine, as well as the e-prescription system, are particularly appreciated.
- Digitalisation in the healthcare system is an ongoing process that requires significant investments in IT technologies and the training of healthcare personnel to enhance their digital competencies.
- A long-term goal for Poland should be to invest in an increased number of adequately qualified physicians in the healthcare system to reduce waiting times for specialist appointments.

The main recommendations from the report include investments in human resources and digitisation systems. Specific resources are needed to increase the number of medical personnel and their digital training. Implementation of a single, efficient medical information management system is also crucial. Both of these elements are necessary to reduce the high percentage of the population reporting unmet healthcare needs in Poland.

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ENERGY SECURITY OF CENTRAL AND EASTERN EUROPEAN COUNTRIES IN THE FACE OF THE PROCESS OF DECARBONISATION AND TRANSFORMATION OF ENERGY MARKETS

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DOI: 10.33119/978-83-8030-625-7.2023_205_224

Abstract

The aim of the paper is to analyse, with due consideration for the energy security aspects, the dependencies between price dynamics of crude oil, natural gas, coal, ETS and changes in the energy mix across the Central and Eastern European (CEE) countries. The background deliberation covers, inter alia, historical and political preconditions of this group of countries, assessment of their energy mix evolution as well as their energy security and energy transition prospects under the European Green Deal (EGD). Given the identified causalities, the analysis demonstrates that the price volatility of fossil fuels and ETS can determine the energy mix changes (shifts in the share of renewables). Furthermore, simple price shocks (changes in price levels) seem to have a stronger effect on the energy mix changes than the price uncertainty (volatility of price levels). It allows us to claim that increasing the share of renewable energy within the energy mix of the Central and Eastern European countries might have been caused by price increases in fossil fuels and ETS rather than by the scope of volatility of these variables.

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Countries of the Central and Eastern Europe (CEE) are dynamically developing and highly competitive economies which are undergoing a process of economic convergence. They operate in the circumstances which are conducive to development, at the same time being a region full of various discrepancies and discords, where many new processes and economic phenomena can be observed. Their responses to changes taking place in Europe are special in their own right and happen at a pace unparalleled by other countries of the continent.

In the context of the increasingly widespread dispute over the significance of the energy transition, not just in the face of the energy market transformation, but also in terms of the opportunities for the economic and social development and, which is key, the prospects of preserving the natural environment intact, a question arises about how CEE countries will go about it, particularly with their historical, political, environmental and economic conditions being more of a liability than an opportunity.

An important purpose of the study is the analysis of interdependencies between the crude oil, natural gas and coal price dynamics, the Emission Trading System (ETS) and changes in the energy mix of CEE countries in the circumstances of energy secu-

rity. The analysis is based on a causal dependence as understood by Granger and was conducted with a view to the underlying specific goals of the study which include:

- indicating key historical, political, environmental and economic conditions of CEE countries posing a challenge to the energy transition of their economies;
- assessment of the pace of transforming CEE countries' energy mixes;
- pointing out to the crucial determinants of change in the structure of the energy produced, including the threats arising from the degree of dependence on hydrocarbon imports;
- evaluation of the current energy security standard and the pace of transformation in terms of implementing the provisions of the European Green Deal (EGD).

Key conditions for the energy transition in CEE countries

After the end of World War II, CEE[1] countries found themselves either in the orbit of the CCCR influence or even became an integral part of the Soviet Union. Energy-wise, this fact affected the ways these markets developed strategically, as well as had an impact on the locations of the transmission and production infrastructure and, widely speaking, on the choice of electric energy and heat energy production technologies.

CCCR, and Russia as its succesor, applied the policy of the "obedience premium"[2] and "management by crisis"[3],[4] towards the CEE countries. The tools of this policy were prices and terms of delivery of natural gas, as well as occasionally provoked crisis situations aimed at exerting pressure on opponents. On top of that, the second half of the 20th century was the time of a widespread electrification and urbanisation which made CEE countries expand their electric energy systems and power plants much faster, leading to the heavy industry syndrome and imports dependence inside the so called Eastern Block.

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1 Due to study data availability, in this paper the group of CEE countries analysed was limited to: Lithuania, Latvia, Poland, Slovakia, the Czech Republic, Hungary, Croatia, Bulgaria, Slovenia, Estonia and Romania.

2 The obedience premium is commonly used by Russia in relation to the countries importing the Russian natural gas. Hungary (391 USD) or Germany (379 USD) who supported the Russian energy policy were able to buy gas at lower prices than Lithuania, Poland (526 USD) or Ukraine (426 USD).

3 The scenario of provoking a gas crisis was used a number of times. The fir t time energy resources pressure was used was in 2006, when Ukrainian authorities, established during the Orange Revolution of 2004, took a pro-western course. Until that moment the price of the Russian gas for Ukraine had amounted merely to 80 USD per 1000 m^3.

4 Already before the collapse of CCCR, Soviet diplomats Walentin Falin and Julij Kwicinski had presented a plan of using the strategic transmission infrastructure to exert a political pressure on the countries of the Eastern Block.

Figure 1. System of gas pipelines under construction and the existing ones

Source: Masiero, Muys, Solberg [2014].

The system of supplying gas to CEE grew dynamically in the '80s of the 20th century[5] The most important gas trunkline was launched at that time, it was running through Russia, Ukraine, Czechoslovakia to Baumgarten and Germany and was named

5 The fir t gas pipeline was built in 1968, connecting CCCR and Austria. Gas was delivered to Baumgarten which until that day had been one of the largest Europe's gas hubs.

"Brotherhood"[6]. This trunkline, along with a network of pipelines, created a foundation for the new strategy of exercising control over former Eastern Block countries and generating a significant budget revenue in foreign currencies.

The second gas pipeline, a key route for supplying the region with gas, was constructed over a decade after "Brotherhood" had been put into service, i.e. in 1997. Yamal-Europe pipeline runs across Belarus and Poland to Germany. The decision of building this pipeline was made based on the forecasts of a massive surge in the demand for natural gas. This gas pipeline architecture gave rise to a number of far-reaching consequences. Firstly, it caused a major dependence of CEE and the Balkans on supplies of the Russian gas. Belarus, Estonia, Lithuania, Latvia, Moldova and Slovakia in 2013 were still 100% dependent of the deliveries of the Russian gas. Reliance on gas imports from Russia exceeded 50% in Bulgaria, the Czech Republic, Poland, Slovenia, Hungary and Ukraine. Many CEE countries are still searching alternative solutions to the Russian gas using gas interconnectors[7] and LNG terminals. This drives up costs (transit charges) and increases the risk of supply breaks, at the same time elevating the international role of some countries, which is a positive outcome. The approach will allow countries to get independent of using gas for political purposes, and in a long term perspective, will ensure lower prices and higher competitiveness on the gas market.

Political concerns are certainly worth paying attention to. Not all countries of the region are EU members. It means there are constraints in the access to infrastructural project financing, but most of all, there exist no consistent policies and regulations to be followed.

Over the recent three decades CEE countries have implemented major changes in their energy policies, particularly in terms of higher energy efficiency, increasing the share of RES, reducing carbon dioxide emissions and better adaptation to climate change. However, the war in Ukraine has verified the existing energy security architectures of many countries in Europe, by unleashing their unequal access to the infrastructure allowing to receive and handle the arriving LNG supplies. Currently, there are about 20 gas terminals operating on the territory of EU countries. Most of them are located in Spain in Murgados, Bilbao, Barcelona, Sagunto, Cartagena and Huelva. Their joint regasification capacity is over 60 bn m^3 of gas annually. In the CEE region there are two terminals working in Świnoujście (Poland) and the Lithuanian Klaipeda (a floating FSRU unit). As a consequence of the energy crisis, countries which

6 The route of the pipeline was, from the very start, determined by political interests. Distrust of CCCR towards the governments in Poland and GDR made it impossible to locate its gas infrastructure on the territories of those countries.

7 Good examples of the trend can be interconnectors built in Romania, Hungary and the Baltic countries as well as the FSRU terminal in the Gdansk Bay, and the Croatian gas port on the Krk Island.

up to now have relied chiefly on gas volumes transmitted via pipelines from the East, have decided to expand their LNG supplies. The challenge remains how to ensure fuel supplies in the face of a record demand for LNG and a limited number of tankers. Making long-term contracts plays a special role in protecting the necessary supplies.

The share of renewable energy in the energy mixes of CEE countries is much lower than in the developed countries of Western Europe thus they need a speedy energy transition in order to quit the currently dominant hydrocarbons. What seems fundamental in the planning of the energy transition process and in embracing the change is the social participation.

Achieving climate neutrality by the countries of the region is possible not just through RES, but also through investments in nuclear energy which will make it easier to undergo a full energy transition process. The Czech Republic is the greatest advocate of nuclear energy in the region and at present it has six nuclear reactors which generate over one third of the electric energy[8] used in this country.

Energy transition becomes the main topic of disputes because both the paths and pace of the planned turnaround, as well as the accompanying circumstances vary significantly among countries. Energy transition will generate high costs in CEE countries due to their extensive use of fossil fuels and obsolete energy systems. These challenges may trigger energy price increases, thus slowing down economic growth and diminishing the social acceptance of the climate policy. Energy transition which constitutes a major financial, infrastructural, systemic and organisational challenge is also probably the most vital stimulus of economic growth. Energy market operations, in their own right an important part of the economy, determine not only the competitiveness of particular economic sectors, but most of all provide energy security. The process of switching from hydrocarbon energy carriers to low-emission sources will boost the awaited technological changes, accounting for a higher level of energy efficiency and equipment reliability.

CEE countries possess a great development potential due to their stable and competitive economies, numerous expansion opportunities, a geographical location conducive to transport development, also transit development, high market concentration, highly aspiring societies and the economic clout that comes from over a thousand years of their presence in the political and economic system of Europe and the world. The paths of growth these countries took after 1989 allowed them to close the gap that had existed between them and the highly developed economies of Western Europe.

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8 The REPowerEU programme announced by the European Commission, aimed at the EU quitting the use of the Russian fossil fuels and supporting the fair energy transition, names nuclear energy as one of the key tools of gaining a quick independence of the resources imported from the East.

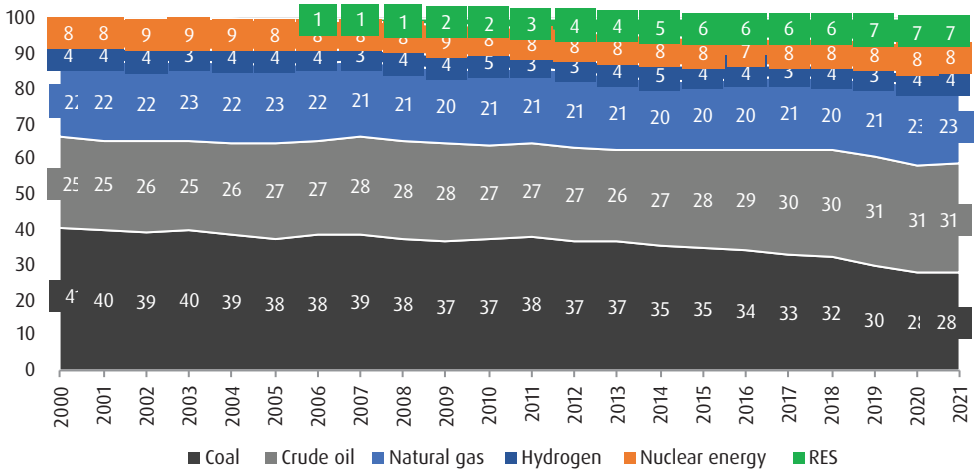
Assessment of the existing pace of change in the energy mixes of CEE countries

The energy mix[9] of CEE economies is characterised by a shrinking share of coal in primary energy consumption, falling from 41% in 2000 to 28% in 2021 (a decline of 13 p.p., i.e. of about 32%) over the last two decades. This way coal has ceased to be a dominant energy resource in the region which currently, in terms of primary energy, seems to rely strongly on crude oil. Crude oil's share in the energy mix of CEE economies has risen from 25% in 2000 to 31% in 2021 (a rise of 6 p.p., i.e. of 24%). This major change has not, however, translated into any significant reduction in the region's dependence on highly emissive fossil fuels, as the joint share of hard and brown coal and crude oil in the energy mix has fallen by less than 11% (a fall of 7 p.p. from 66% in 2000 to 59% in 2021). The share of natural gas in the region's energy mix over the last two decades has remained fairly unchanged, hovering around 20–23%. A joint share of all fossil fuels in the regional energy mix, including the low-emission gas, has gone down from 88% in 2000 to about 81 –82% in 2021 (a slump of 7 p.p., i.e. of about 8%). Consequently, a joint share of the remaining energy sources (RES, nuclear energy and water energy) has increased by 7 p.p. from 12% in 2000 to 19% in 2021, i.e. by about 58%. In the light of a basically unchanged joint share of the nuclear and water energy in the CEE energy mix, the structural change of replacing fossil fuels, accounting for a change of 7 p.p. in the scale of the entire energy mix of the region, is caused by RES effectively appearing on the energy mix and reaching the level of 7% in the last over a dozen years.

Structural evolution of the energy mix in CEE in the years 2000–2021 was consistent with the changes in the global energy mix, the only difference being that in the global energy mix a slump in the use of nuclear energy could be observed at that time (from about 7% to about 4%), while in CEE the share of nuclear energy in the regional energy mix remained unchanged (at 8%). The other discrepancy between the region and the world economy at the turn of the 20th and 21s t century was that RES were effectively absent from the CEE energy mix (their share rose to over 1% only in 2006), although in the world economy they had appeared quite a bit earlier [Ritchie, Roser, Rosado, 2022].

9 The energy mix analysed based on the data published in the BP report [2022], using the taxonomy of this summary (the taxonomy in which the entire energy mix of the primary energy consists of: fossil fuels, coal, crude oil, natural gas, renewable energy sources, nuclear energy and water energy). The energy mix is analysed in this paper as a total use of primary energy, which should be set apart from the energy mix of the electrical energy use that has a different structure and no share of crude oil.

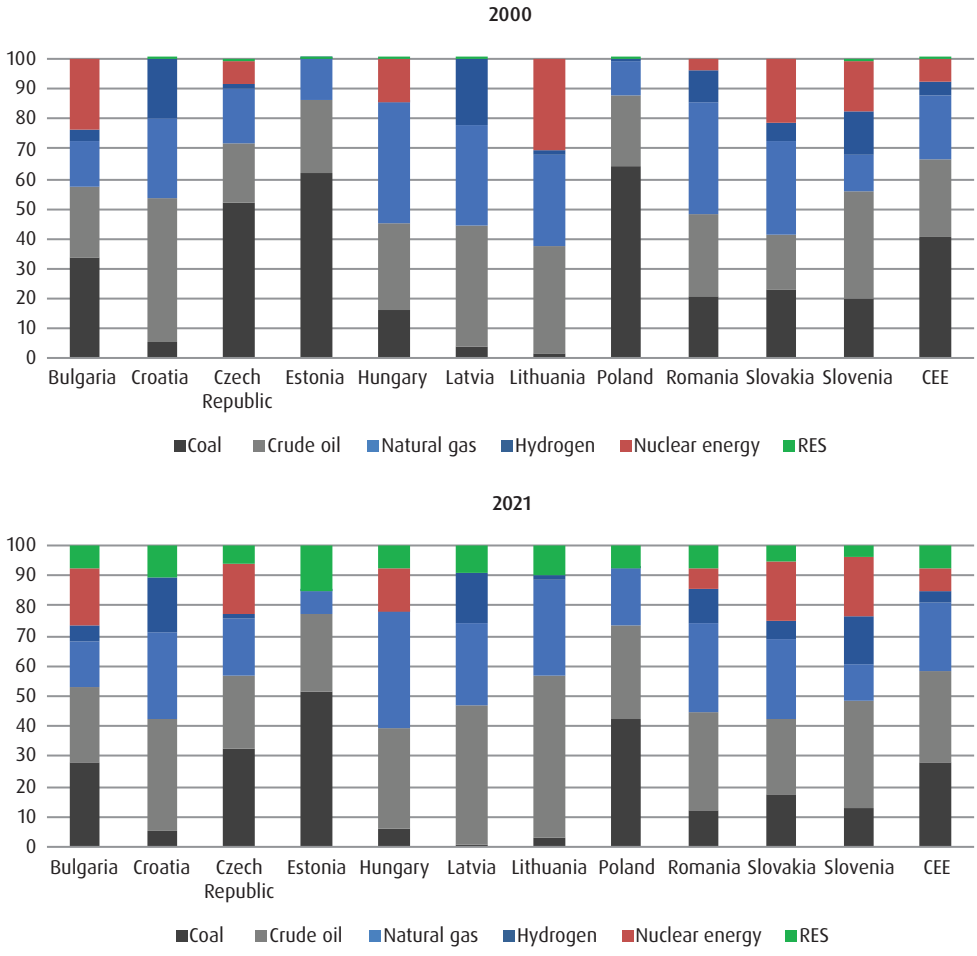
Figure 2. Evolution of the energy mix in the CEE region in the years 2000–2021 (primary energy, %)



Source: self-reported data.

At the beginning of the 21s t century three economies in the CEE region had an absolute dominance of coal in their energy mixes (Poland – 64%, Estonia – 62%, and the Czech Republic – 52%), while in 2021 this absolute, over 50-per cent dependence on coal was found only in Estonia (52%). At the same time, the highest, over 30-per cent reliance on crude oil in CEE countries in 2000 could be seen in four economies (Croatia – 48%, Latvia – 40%, Lithuania – 36%, and Slovenia – 36%), however in 2021 the dependence on the level of over 30% was observed already in seven economies of the region (Lithuania – 54%, Latvia – 46%, Croatia – 37%, Slovenia – 36%, Hungary – 34%, Romania – 32 %, and Poland – 31%). As far as the natural gas is concerned, the highest, over 30-per cent level of dependence in 2000 could be seen in five CEE economies (Hungary – 40%, Romania – 38%, Latvia – 34%, Lithuania – 31%, and Slovakia – 31%), whereas in 2021 the reliance of over 30% was observable only in two economies of the region (Hungary – 38%, and Lithuania – 32%). The use of water energy in CEE over the last two decades has not fluctuated significantly. In this period, water energy was applied in the energy mixes of four economies (in 2000: in Latvia – 22%, Croatia – 20%, Slovenia – 14%, and Romania – 10%; in 2021: in Latvia – 17%, Croatia – 19%, Slovenia – 16%, and Romania – 11%). Nuclear energy in that period was used in the energy mixes of five economies (in 2000: in Lithuania – 31%, Bulgaria – 24%, Slovakia – 21%, Slovenia – 17%, and Hungary – 14%; in 2021: in Slovakia – 20%, Slovenia – 19%, Bulgaria – 19%, the Czech Republic – 17%, and Hungary – 14%). Four countries (including Poland) did not possess nuclear power plants, and Lithuania stopped using this source of energy.

Figure 3. Energy mix of the CEE economies in 2000 and in 2021 (%)

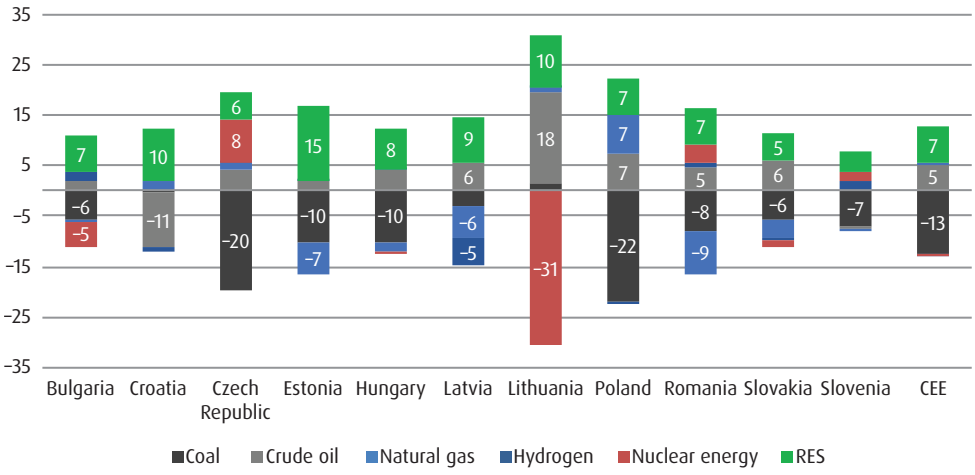


Source: self-reported data.

The most significant changes in the national energy mixes over the last two decades involved a decreased share of the nuclear energy in the Lithuanian economy (a decrease of 31 p.p. down to 0%), a lower share of coal in the energy mix of the Polish economy (a fall of 22 p.p. down to 42%) and the Czech economy (a fall of 20 p.p. down to 32%), an increased share of crude oil in the energy mix of the Lithuanian economy (a rise of 18 p.p. to the level of 54%), as well as an increased share of RES in the energy mix of the Estonian economy (a rise of 15 p.p. to the level of 15%). In an aggregate regional perspective, changes in the energy mix of CEE countries over the last two decades have consisted mainly in a diminishing share of coal (13 p.p.), replaced with RES (+7 p.p.)

and crude oil (+5 p.p.). Putting the changes in a binary perspective, dividing energy sources into fossil fuels and non-fossil fuels (including RES), changes in the regional energy mix in CEE caused a fall in the joint share of coal, crude oil and natural gas (7 p.p. as a resultant of the decrease in the share of coal of 13 p.p. and a rise in the share of crude oil of 5 p.p. and gas of 1 p.p.) replaced by RES (+7 p.p.).

Figure 4. Changes in the energy mixes of CEE economies in the years 2000 2021 (in p.p.)



Source: self-reported data.

A decreasing share of fossil fuels in the energy mix of CEE is a result of the shrinking share of these resources in the energy mixes of 10 out of 11 economies of the region (with the exception of Lithuania which has increased the share of fossil fuels in its energy mix).

The rate of change in the energy mix (decreasing role of fossil fuels) expressed as the compound annual growth rate (CAGR) accounts for 0.39% for the entire CEE region. A shrinking share of fossil fuels, particularly coal and crude oil, in the energy mix is a high-level reflection of the currently happening energy transition processes aimed at achieving zero-emission net energy mixes (decarbonisation of the energy sector and other sectors) and increasing the energy efficiency of economies where one of the key aspects will be the electrification of transport. Higher rate of fossil fuel reduction over the last two decades in the region has been achieved by Croatia, the Czech Republic, Estonia, Hungary, Romania and Slovenia. The process has been slower in Bulgaria, Latvia, Poland and Slovakia. Lithuania has been the only CEE country which has increased the share of fossil fuels in its energy mix in the last two decades.

Table 1. Rate of change in the energy mixes of CEE economies (share of fossil fuels in the entire energy mix)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	CAGR (%)
Bulgaria	0.73	0.73	0.71	0.75	0.75	0.73	0.73	0.80	0.78	0.75	0.73	0.76	0.73	0.71	0.70	0.71	0.71	0.73	0.69	0.69	0.67	0.68	−0.31
Croatia	0.80	0.79	0.83	0.85	0.80	0.81	0.82	0.88	0.85	0.80	0.76	0.84	0.83	0.73	0.72	0.77	0.76	0.80	0.73	0.76	0.74	0.71	−0.59
Czech Republic	0.90	0.90	0.87	0.85	0.85	0.85	0.85	0.84	0.84	0.82	0.82	0.80	0.79	0.77	0.77	0.79	0.80	0.79	0.78	0.77	0.75	0.76	−0.81
Estonia	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.97	0.95	0.95	0.94	0.95	0.94	0.93	0.94	0.93	0.92	0.90	0.85	0.85	−0.76
Hungary	0.85	0.86	0.86	0.89	0.88	0.86	0.86	0.85	0.83	0.81	0.81	0.81	0.80	0.79	0.78	0.79	0.79	0.80	0.80	0.79	0.78	0.78	−0.44
Latvia	0.78	0.79	0.82	0.83	0.80	0.79	0.82	0.83	0.80	0.77	0.79	0.80	0.75	0.77	0.80	0.80	0.78	0.69	0.77	0.79	0.74	0.74	−0.23
Lithuania	0.68	0.64	0.58	0.57	0.58	0.68	0.72	0.70	0.70	0.65	0.95	0.95	0.94	0.92	0.92	0.91	0.90	0.89	0.90	0.89	0.88	0.88	1.25
Poland	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.98	0.98	0.97	0.97	0.96	0.95	0.95	0.94	0.93	0.94	0.94	0.94	0.93	0.92	0.92	−0.35
Romania	0.86	0.86	0.86	0.88	0.86	0.84	0.86	0.85	0.82	0.81	0.78	0.81	0.81	0.76	0.74	0.73	0.73	0.75	0.74	0.75	0.73	0.74	−0.69
Slovakia	0.72	0.72	0.71	0.73	0.73	0.73	0.71	0.73	0.72	0.73	0.73	0.72	0.70	0.69	0.67	0.68	0.68	0.70	0.71	0.68	0.67	0.69	−0.21
Slovenia	0.68	0.68	0.69	0.71	0.68	0.69	0.70	0.71	0.69	0.66	0.67	0.67	0.67	0.65	0.58	0.64	0.64	0.65	0.64	0.63	0.59	0.61	−0.56
CEE	0.88	0.88	0.87	0.88	0.87	0.87	0.87	0.88	0.87	0.85	0.85	0.86	0.85	0.83	0.82	0.83	0.83	0.83	0.83	0.82	0.81	0.81	−0.39

Source: self-reported data.

Most important determinants of the changing energy mixes in CEE countries

A vital determinant of the changing energy mix in CEE is a technological progress which allows to significantly bring down the costs of energy production. It is estimated that in the years 2010–2020 the cost of producing one energy unit (in terms of the Levelised Cost of Electricity, LCOE) from solar energy in the photovoltaic technology fell by almost 85% (from 0.38 USD to 0.06 USD per kWh), and in the technology of the concentrated solar power, CSP, by 68% (from 0.34 USD to 0.11 USD per kWh). The cost of production of one energy unit from wind power has gone down in that period by about a half (from 0.09 USD to 0.04 USD per kWh for onshore wind farms, and from 0.16 USD to 0.08 USD per kWh for offshore wind farms [Winiewski, 2022].

An important determinant of the changing energy mix in CEE are also regulations provided for in the Paris Agreement of 2015. This is demonstrated in the regulatory costs arising from EU ETS charged on the conventional emissive energy production (fossil fuels) or the taxonomy adopted under the ordinance of the European Parliament and Council [2020/852] on establishing a framework for facilitating sustainable investments which may in the long term effectively divert the investment capital to zero-emissive and low-emissive technologies, including RES.

For CEE countries, determinants of the changing energy mix may be also found in energy security and resources security. After the Russian aggression on Ukraine and the related supply shock on energy markets, many EU countries intensified their activity aimed at becoming independent of the Russian energy resources. Importantly, the pace of change in the energy mix from the one dominated by imported energy resources to the mix comprising mostly local resources, including RES, may in CEE countries depend on inherent conditions of individual economies. Estonia, Lithuania or Poland have a structurally different historical dependence on the Russian energy resources than other European countries with a higher GDP per capita [Wiśniewski, 2023].

The process of energy transition and foundations of the EU low-emission strategy

The past rise in demand for fossil fuels observed in the global economy was accompanied by growing emissions of greenhouse gases triggering the climate change. Climate change, in turn, became a real threat and a global challenge which must be tackled by decarbonising the economy and its transition towards a net zero-emission economy. Energy transition is understood as a radical, fundamental and complex change in the

structure of functioning of modern economies. Source literature often points out that the process is particularly complex, also due to diverse approaches to the transition represented by various schools of economic thought and environmental economics[10] [Szablewski, 2021; Wiśniewski, 2022; Wojtkowska-Łodej, 2022a].

The transition involves major capital ventures, aimed at implementing new technologies and closing industries based on fossil energy carriers. Major challenges posed by the energy transition call for active government policies. The state may influence the processes of abandoning coal by preparing relevant regulations and offering public funds to support business entities as well as by encouraging private investments [Szablewski, 2021, p. 12].

At the start of the new millennium, the EU initiated actions aimed at reducing emissions of greenhouse gases under the project of the energy union: a road map until 2050 was created, the Paris Agreement was executed and in 2019 the strategy of switching to a climate-neutral and competitive economy, known as the European Green Deal (EGD), was adopted. The process of building a modern, resource-saving economy in which economic growth happens irrelevant of the degree of resource consumption requires joint and consistent changes in all sectors of the economy and in the social mindset. [Wojtkowska-Łodej, 2022b , pp. 51 73]. EGD combines an entire set of complex, mutually complementary tools and initiatives aimed at achieving neutrality and accounting for diversified energy mixes of member states, which also encourages social inclusion.

By passing the EU law on climate [Ordinance of the European Parliament and Council (EU) 2021/1119], the EU approved the goal of achieving climate neutrality in the entire economy by 2050. At the start of the third decade the package Fit for 55 was adopted which provides for a financial support to reconstruct member states' economies after the pandemic, [COM/2021/550 f inal].

The beginning of implementation of the EGD strategy converged with the occurrence of unpredictable local and regional circumstances, such as the COVID-19 pandemic with the resulting lockdowns and the conflict in Ukraine in February 2022.

[10] It may be expected that the complex nature of transformations under the energy transition will raise new research questions and pose new challenges, as well as require additional cognitive generalisations and conclusions for the energy and regulation policy.

Energy transition in the circumstances of a threatened security of fossil fuel supplies

The EU treaty goals of the energy and climate policy in the light of EGD and the undertaken actions are intertwined and mutually consequential. In the conditions of the economic crisis, particularly the war in Ukraine, and due to a high dependence of EU, including CEE countries, on the supplies of fossil energy carriers from Russia, the problem of energy security and ensuring supplies of resources from other regions of the world quickly gained prominence. Along with the rising prices of hydrocarbons, the economic and social aspects of energy security grew more important than the environmental concerns.

A vital need emerged to review the existing energy policy in terms of faster quitting of fossil energy carriers. In May 2022 the European Commission adopted a plan know as REPowerEU, aimed at a fast reduction in the dependence on Russian fossil fuels by accelerating the transition to clean energy and combining forces to achieve a more resilient energy system and a true energy union [European Commission, 2022, p. 1]. The REPowerEU strategy assumes the implementation of decisive measures to reduce energy use and to transform industrial processes so that natural gas, crude oil and coal can be replaced with renewable energy sources from other than fossil sources and with hydrogen. Actions provided for in this programme are related to the package Fit for 55. It means that the EU anti-crisis measures are included in the long term development strategy provided for under EGD.

Economic transition conditions in CEE countries

Conditions of the transformation process, except of these arising from the current crisis situation, are connected to the increasingly more restrictive EU requirements about decarbonisation in energy production, industrial production, agriculture, transport, construction and other sectors of the economy. At the same time, short term limitations in hard coal, crude oil and natural gas supplies from Russia, low supply elasticity versus demand or rising prices will keep exerting pressure on using local energy carriers, including RES, and taking pro-efficiency measures.

A breakthrough factor in the process and pace of transition to an emission-neutral economy with a higher use of RES and a higher energy security will be the technological progress [Szablewski, 2021, p. 35]. The process of energy transition and economic transformation will heavily depend on the strength of particular factors and their influence in CEE countries.

Summary

The purpose of the conducted study was to establish whether there occurred a causal relationship in Granger's sense for two types of correlations:

a) dynamics of the share of renewable energy sources in the energy mixes of CEE countries in relation to fossil fuel price volatility and ETS;
b) dynamics of the share of renewable energy sources in the energy mixes of CEE countries in relation to the dynamics of fossil fuel prices and ETS;

The correlation analysis was based on the data for the period from the beginning of 2006 to the end of 2021 in the previously mentioned 11 countries of the CEE region. The research used data from IEA bases (prices of energy resources), Reuters bases (prices of energy resources and prices of CO_2 emission permits) and the World Bank bases (GDP deflator). The study also accounted for benchmark prices of energy resources, i.e. of crude oil (USD/bbl), natural gas (USD/m^3), coal (USD/t), as well as the CO_2 emission permit prices (EUR/t) which in the studied period were equal for all countries surveyed.

At the first stage of the study the prices of particular resources from consecutive months of the study period had been updated. Based on them, variances for particular periods were established and medium-term averages for subsequent periods were drawn $t = 4, \ldots, T - 3$ (progressively, based on a moving 6-month window, i.e. consisting in each case of 7 observations: $t - 2$, $t - 1$, $\ldots, t + 1$, $t + 2$). This allowed to determine a series of six-month volatility coefficients for each of the prices (in the periods $t = 4$, $\ldots, T - 3$). Due to the annual granularity of the available data on the energy mix structure for each year of the study (2006–2021), a mid-year price volatility coefficient was outlined as an average of coefficients observable in consecutive months of a given year. These coefficients were then used as independent variables in studying the impact of resource price volatility on the structure of the energy mixes of CEE countries. Consequently, the updated annual prices of individual resources and ETS were used to determine price dynamics defined as a difference between the price at the end and at the beginning of a given year. These accruals were used as independent variables in the study of the impact of resource price dynamics on the structure of the energy mix. In both studies the role of a dependent variable was played by the relative change in the share of renewable energy sources in the energy mix, i.e.

$$\frac{share(t) - share(t-1)}{share(t-1)}.$$

In order to conclude that there existed a causal relationship (not merely a covariance) it was necessary to use a relevant causality test. The Dumitrescu Hurlin test was used in our study in order to verify the occurrence of the Granger type of causality.

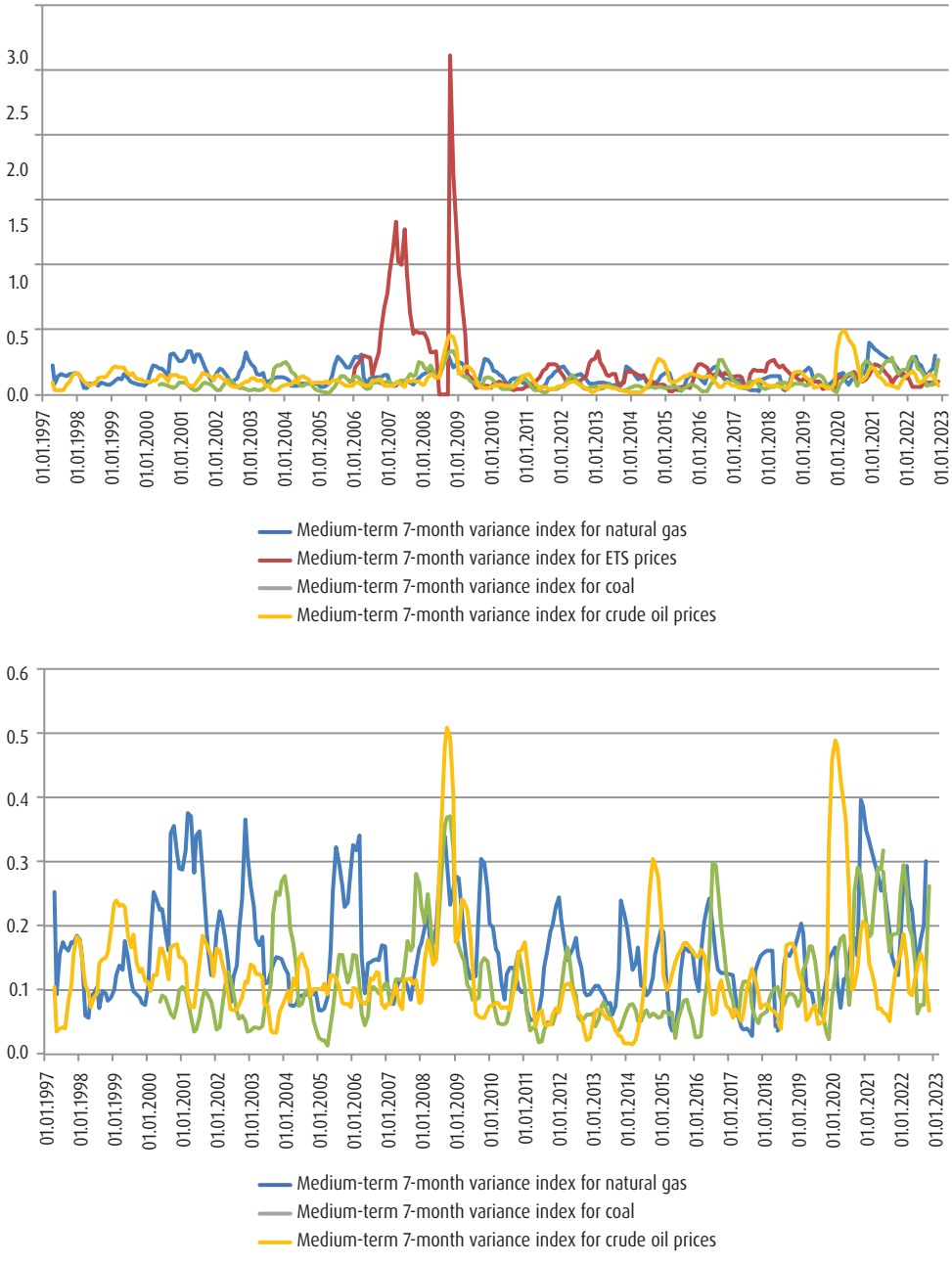
Dynamics of the share of renewable energy sources in the energy mixes of CEE countries in relation to fossil fuel price volatility and ETS

Among the studied independent variables, i.e. fossil fuel and ETS prices, CO_2 emission permits showed the greatest volatility, and this trend only increased significantly during the global financial crisis of 2007–2008 (Figure 5, top graph). However, it is assumed that this volatility grew so much mostly due to the turmoil on the global financial markets (in line with the increased volatility of other financial instruments), and ultimately was not caused by the energy markets situation. On the other hand, price volatility of all three studied energy resources was much lower than that of ETS prices, at the same time, both crude oil, natural gas and coal prices showed some instability in time, which may be justified by the changing market conditions (supply and demand, seasonality), geopolitical factors or shocks triggered by one-time events (such as the COVID-19 p andemic; Figure 5, bottom graph).

In the light of the conducted causality analyses it was found that the fossil fuel and ETS price volatility may determine changes in the energy mixes of CEE countries, at the same time also affecting the share of RES[11] . A special causal relationship was identified between coal price volatility and CO_2 emission permit prices, with the influence of ETS price volatility being high in a very short term perspective, the effects of coal price volatility, in turn, were felt only in a slightly longer time (Table 2). It was observed that this volatility had a major effect on the changes in the structure of energy production and consumption in CEE countries, as the prices of these variables constitute a particularly critical cost factor in these economies. It results from a large scale of energy production (mostly heat energy and electrical energy) obtained from coal and mandatory purchases of large quantities of ETS. These factors may therefore be a significant stimulant of renewable energy popularity among CEE countries and drive a change in the structure of energy production as well as consumption.

[11] The study did not account for nuclear energy production and large scale water energy objects due to a long-lasting process of planning and construction of such sites, which in the context of a relatively short study period made it infeasible to track potential causal relationships.

Figure 5. Crude oil, coal, natural gas and ETS price volatility



Source: self-reported data.

Table 2. Findings of the empirical analysis of changes in the energy mixes of CEE countries in relation to fossil fuel and ETS price volatility

Dependent variable	Independent variable	*Z*-bar	Value *p*	Optimum number of delays (in years)
Share of RES in the energy mix	crude oil	–0.7656	0.4439	1–3
	coal	6.7685	0.0000	3
	natural gas	–0.3538	0.7235	1
	ETS	9.7023	0.0000	1–3

Source: self-reported data.

Dynamics of the share of renewable energy sources in the energy mixes of CEE countries in relation to fossil fuel and ETS price dynamics

In the course of the study it was revealed that there existed a major statistical causal relationships, allowing to conclude in general that a simple price stimulus appears stronger than uncertainty (understood as the fossil fuel and ETS price volatility). It may be seen that markets respond by increasing the share of renewable energy in the energy mix mainly when energy resource and ETS prices go up (Table 3).

Table 3. Findings of the empirical analysis of changes in the energy mixes of CEE countries in relation to the real price dynamics of a given resource or ETS

Dependent variable	Independent variable	*Z*-bar	Value *p*	Optimum number of delays (in years)
Share of RES in the energy mix	crude oil	2.1550	0.0312	1
	coal	3.2089	0.0013	3
	natural gas	8.5994	0.0000	1
	ETS	3.2458	0.0012	1

Source: self-reported data.

Thus, it may be expected that a rise in fossil fuel prices and their volatility (even of a lower intensity) as well as the changing prices of CO_2 emission permits will in the near future affect the processes of decarbonisation and energy transition of CEE countries. The effects of energy price hikes may, on one hand, result in a lower competitiveness of companies in the region, and on the other, they may become a catalyst for changes geared towards saving energy and taking pro-efficiency measures, as well as encouraging RES investments.

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LABOUR DEMAND IN THE LIGHT OF NEW AND DESCENDING OCCUPATIONS AND THE STRUCTURE OF LABOUR SUPPLY IN THE LIGHT OF POPULATION AGEING

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DOI: 10.33119/978-83-8030-625-7.2023_225_242

Abstract

Labour demand undergoes dynamic changes due to technological, social, and globalisation processes. How these aspects affect labour demand in new and declining occupations in the light of population ageing remains an open question. The aim of this research is to address this question while accounting for labour force structure changes and changes in the population age structure. We have performed the analysis with respect to both the met labour demand (employment) and the unmet demand (vacancies).

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The structure of labour demand is going through a dynamic turnaround due to technological, social, civilisation and globalisation developments. A question arises what impact this change will have on employment in the light of the demographic ageing of populations.

The process of the demographic ageing of populations, expressed by a rising proportion of people aged 65 and over, is caused in the first place by a falling birth rate and an expanding life span. In many Central and Eastern European (CEE) countries this process has been accelerating as a result of labour migration, mostly to Western European countries. Migration decisions are made mostly by young people, thus the proportion of senior citizens in real terms is rising faster than it could follow from basic demographic forecasts.

The consequences of population ageing involve social and economic impacts, and most of all, various processes occurring on the labour market. Changing proportions between the pre-working, working and post-working age groups drive changes

in the labour supply and demand. It should be remembered that demographic transformations are accompanied by transformations in the social structure and functions of various social institutions, the family in particular. Fading of the economic and caring functions of the family, along with increasingly higher numbers of the elderly, puts public institutions in the position of providing support to families or even downright taking over those family functions.

Among numerous consequences of the ageing populations, attention should be paid to a rising proportion of people in need of various forms of support in actively running their households, or even performing simple chores of their daily routines. In the nearest 30 years a significantly higher demand for care and nursing services should be expected, as the number of one-person and single generation households is on the rise. It is not only about social services (the already mentioned care and nursing, educational and cultural services), but also about the living services aimed at facilitating the daily independent existence of senior citizens.

Many citizens of CEE countries are currently employed in the sector of care and nursing services in Western Europe. Thus, the prospects for increasing employment in the studied countries are limited. Paradoxically, it may drive innovation and implementation of new technologies.

The processes of globalisation may consequently shrink the role and significance of CEE economies as providers and consumers of traditional products. These processes may accelerate due to the falling numbers of the working age people in the region.

The purpose of this chapter is to study the labour supply and demand from the point of view of new and declining professions, in the context of population ageing. The paper consists of two main parts: the first one discusses the labour supply and the second one – changes in the labour demand. These two parts are wound up by a summary outlining conclusions which should be taken away from the main arguments.

Labour supply in the context of population ageing

The structure of the labour supply and its future shape are affected by negative demographic processes taking place also in CEE countries. They lead to changes in the size of active cohorts on the labour market (dwindling labour resources), and to shifts in the age structure (ageing) of potential employees. Europe is and will be not only the oldest continent demographically speaking, but also one with the largest deficit of the working age population. In CEE countries changes in the population volume, according to forecasts, will be deeper than in Western or Northern Europe, particularly starting from the end of the '20s of the 21s t century. The share of citizens of this

region in the entire population of the EU, comprising a total of 27 countries (EU-27), which at present accounts for 22.6%, will diminish to 20.7% in 2050, and in absolute numbers, will fall from over 102 million to less than 93 million in 2050.

Data presented in Table 1 indicate that the ageing of populations in CEE countries is not a uniform process, but the global trend looks very similar. After 2030, an acceleration in the population demographic ageing process may be expected, and additionally the process of the so called double ageing of populations will gain importance. It is demonstrated in a faster than average growth rate of the population aged 80 and over.

Table 1. Share of the population aged 65 and over in CEE countries until 2050 (%)

	2025	2030	2040	2050
Poland	20.2	21.9	24.3	29.1
Bulgaria	21.9	23.1	26.3	30.1
Croatia	23.6	25.5	27.7	30.0
Czech Republic	20.4	21.4	24.0	27.2
Estonia	20.7	22.1	24.4	27.1
Latvia	21.6	23.8	27.2	30.1
Lithuania	20.8	23.6	27.9	30.8
Romania	20.4	21.0	25.3	28.5
Slovakia	18.4	20.4	23.7	28.4
Slovenia	22.3	24.3	27.4	30.2
Hungary	20.8	20.9	23.5	26.8
CEE	21.8	23.7	27.0	29.0

Source: self-reported data based on EUROPOP2023 data (basic variant, excluding migration).

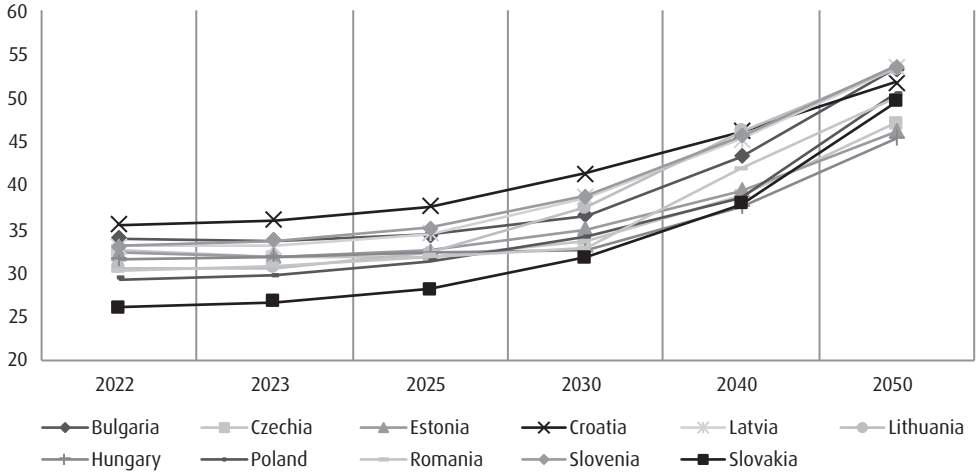
According to basic population projections by Eurostat EUROPO2023 the old-age dependency ratio (number of people aged 65 and over per 100 people at the age 15–64) will increase across all countries. Currently, this ratio in CEE countries ranges from 26.1 in Slovakia to 35.6 in Croatia, and according to forecasts will rise to 31.8 in Slovakia and 41.5 in Croatia in 2030 (Cf. Figure 1).

The factor which can partly mitigate the effects of demographic changes on the labour market is the gradually increasing ratio of elderly people's professional activity which, according to Eurostat projections, will keep growing in CEE countries in the future [EC, 2021].

In the perspective of the upcoming years, the impact of migration on the changes in the populations of CEE countries is unclear. People fleeing Ukraine in 2022 tended to stay in geographically close countries, mostly in Poland (974 thousand refugees)

[UNHCR, 2022], Germany (967 thousand) and the Czech Republic (432 thousand). Slightly fewer refugees emigrated to Bulgaria, Romania and Slovakia. In total, towards the end of 2022 in the EU there were 4.8 million refugees from Ukraine receiving temporary protection and benefiting from other EU programmes [UNHCR, 2022].

Figure 1. Forecasts of changes in the old-age dependency ratio



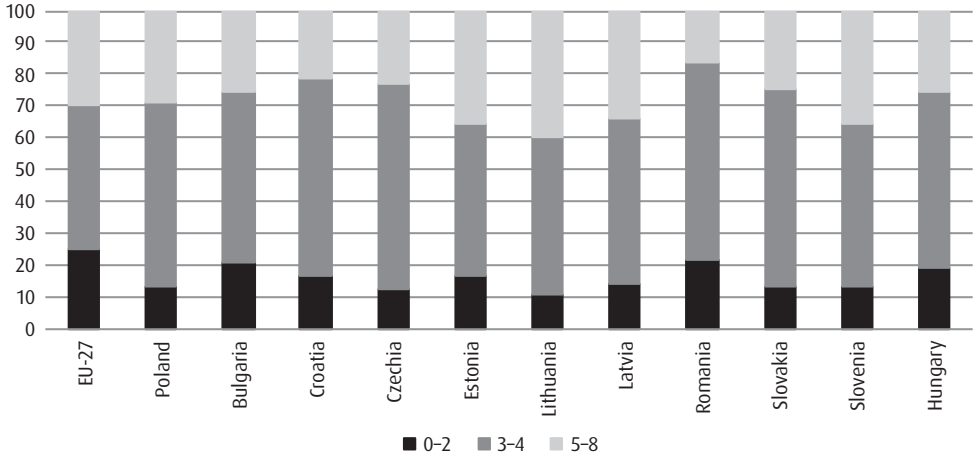
Source: self-reported data based on EUROPOP2023 data (basic variant, excluding migration).

Analysis of the education structure of the population indicates that in CEE countries in comparison to EU-27, a larger proportion of people aged 15–64 have secondary education, and a smaller fraction have elementary education. As for higher education, the situation is diversified (Cf. Figure 2). In Poland the proportion of people with elementary education in 2021 reached 13% (12 p.p. below average for EU-27). A lower share of people with elementary education in 2021 was observed in the Czech Republic and Lithuania. The highest proportion of people with secondary education was recorded in Romania, Slovakia, and the Czech Republic (62–65%), and the lowest in Estonia – 47%. In Poland, secondary education level was declared by 58% of people aged 15–64. As far as higher education is concerned, the highest proportion of people with such education was found in Lithuania (40%), and the lowest in Romania. In Poland in 2021 almost 30% of people aged 15–64 h ad higher education.

The level of education in different countries varies according to the age group. Data show that there is a higher potential of human resources in younger age groups. Comparing two age cohorts: ages 25–34 and 55–64, it may be seen that on average more young people have higher education (in Poland this proportion is 41% to 17%). The proportion of people with secondary education is lower among younger people

in comparison to the older age cohort (e.g. in Poland 52% to 73%). As far as elementary education is concerned, the situation varies, and often in the younger age cohorts more people have merely elementary education than among people aged 55–64.

Figure 2. People aged 15–64 ac cording to their education level in CEE countries and in the EU-27 in 2021 (%)



Note: 0–2 – incomplete elementary, elementary education, gymnasium level; 3–4 – post-gymnasium, post-secondary education; 5–8 – undergraduate university degree and other degrees, higher education.

Source: self-reported data based on Eurostat data [2023a].

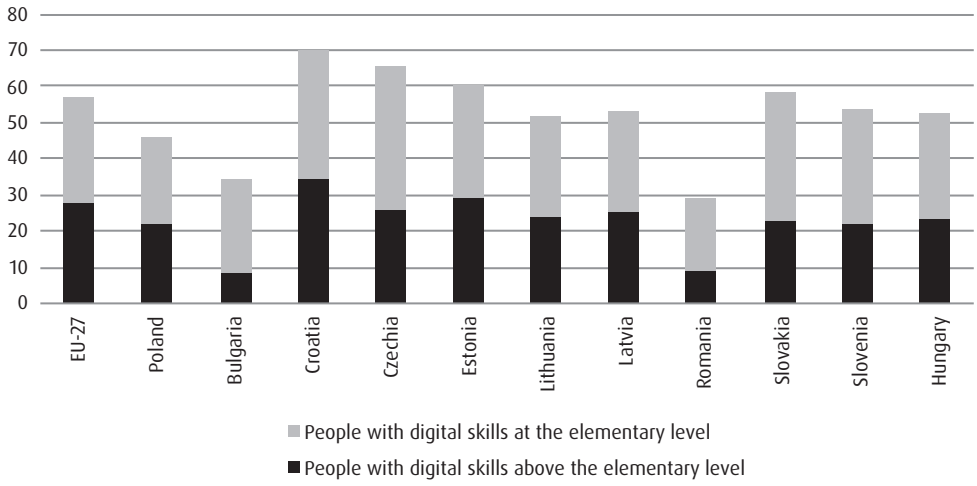
From the point of view of adjusting qualifications to the demands of the labour market it is of great importance that employees take part in professional training courses. In 2016 (most recent data available) participation in professional training courses in the last 12 months in CEE countries represented substantially differentiated values. It was the lowest in Romania, where only 4% of employees took part in any training, followed by Poland with 20%, while the level of 35–40% was reached in six countries, with Slovakia at the top, where in the last 12 months before the study, 42% of people aged 25–64 had participated in informal professional training courses. The EU-28 average amounted to 35%.

The study accounts also for the data on digital skills possessed by different population groups[1]. The newest Eurostat data refer to 2021 (Figure 3). Almost 57% of people aged 25–64 in EU-27 had digital skills at an elementary level or higher. Among 11

[1] This index involves five components related to computer and digital skills. The ability to use these skills indicates the scope of digital competencies, the level of which is later assessed. The presented index describes people who have elementary or higher than elementary skills in each of the fi e categories. Methodological details may be found on the Eurostat [2022] website.

CEE countries studied, four showed higher values, and the other four paralleled the EU result. The lowest values could be observed in Bulgaria and Romania, where only one in three people at the age of 25–64 had digital skills. In Poland this proportion amounted to 46% with different shares of the two groups defining the competence level as: elementary and higher than elementary. The biggest proportion of people having higher than elementary digital skills was seen in Croatia (34%), and the highest number of people with digital skills at an elementary level was identified in the Czech Republic (almost 40% of citizens aged 25–64).

Figure 3. People aged 25–64 according to their digital skills in CEE countries and in EU-27 in 2021 (%)



Source: self-reported data based on Eurostat data [2023a].

Particular tasks in digital skills represent various levels of difficulty. On one hand, it may be observed that an average of 57% of citizens of the 11 countries studied could copy files between folders, devices and the cloud. The highest proportion of people with this skill was found in the Czech Republic (almost 90%), and the lowest in Slovakia (35%). On the other hand, on average 46% of people used a text editor, 38% could handle a spreadsheet and 20% used advanced tools of the spreadsheet software to process and analyse data. Findings in this survey are largely diverse for different countries of the region: in many aspects the Czech Republic seems to stand out, with Slovakia and Poland on the other end of the spectrum.

Demand for labour in the perspective of new and declining professions

The employed and changes in the employment structure

Since 2004 when most CEE countries joined the EU, changes have been observed in the volume and structure of the met labour demand. The total number of the employed has undergone fluctuations due to cyclical factors (including decreased employment during the Great Recession and COVID-19 pandemic), however in most countries the level of employment in 2021 was higher than in 2004 (a significant rise in employment has been observed in Poland – a rise of 21%, in Slovakia – of 18%, and in Hungary – of 17%, with an exception of Latvia, Lithuania and Romania, where a slump in the level of employment could be seen of 11%, 7% and 13% accordingly). Studies conducted in compliance with the International Standard Classification of Occupations ISCO-08 in terms of major professional groups indicate a significant rise in the share of specialists and a moderate increase in services and sales workers, with a simultaneous drop in the proportion of skilled agricultural workers, as well as other major professional groups (Table 2). Naturally, these changes happened at a various pace in particular countries, which followed from the base effect and the pace of structural changes in the economy.

Changes in the volume and structure of the labour demand are strongly affected by technological advancements which in recent years have been demonstrated on the job market mostly in a rising use of digital technologies as well as a progressing work automation.

The most popular approach to the change in the structure of the labour demand is the concept of the *routinisation-biased technical change*, RBTC. It abandons the analysis of employment hinging on professional groups, for the sake of tasks performed by employees, clustered into groups of activities: non-routine analytical, non-routine personal, routine cognitive, routine manual and non-routine manual [Levy, Murnane, 2004]. Routine tasks are easier to describe by algorithms and due to this they are the first to be automated – as a result in highly developed economies the demand for employees performing routine tasks is dwindling and an increase (or levelling out) in the demand for employees doing non-routine jobs can be observed, with ambiguous indications in the demand for non-routine manual tasks [Author, Levy, Murnane, 2003].

Table 2. Structure of employment according to major professional groups of ISCO-08* in CEE countries in 2004 and 2021 (%)

	Representatives of public authorities, higher officials and managers		Specialists		Technicians and medium level personnel		Office workers		Service sector workers and shop assistants		Farmers, gardeners, foresters and fishermen		Industrial workers and craftsmen		Machine operators and fitters		Workers in simple jobs	
	2004	2021	2004	2021	2004	2021	2004	2021	2004	2021	2004	2021	2004	2021	2004	2021	2004	2021
EU-27	7.4	5.0	13.2	21.6	16.5	16.3	10.8	10.2	12.7	15.8	5.3	2.9	15.4	11.9	9.3	7.7	9.5	8.6
Bulgaria	7.3	5.0	11.3	18.6	11.7	9.8	6.5	6.0	14.6	19.1	6.6	3.2	14.5	12.8	14.8	13.6	12.8	11.8
Czech Republic	6.5	5.0	10.4	18.4	20.5	16.9	8.0	9.3	12.4	14.5	1.7	1.1	19.7	15.5	15.3	13.5	5.6	5.7
Estonia	13.4	8.8	12.9	23.7	13.6	16.4	4.0	5.8	13.0	12.8	1.9	1.1	14.8	13.5	15.0	10.8	11.4	7.1
Croatia	4.8	4.6	9.6	17.5	14.7	14.6	11.6	9.9	14.4	18.1	11.8	4.3	13.8	12.6	11.2	10.4	8.1	7.9
Latvia	10.0	10.8	11.4	19.8	11.7	14.7	6.4	5.1	14.5	13.5	7.7	3.1	14.8	11.9	10.5	9.1	12.9	12.0
Lithuania	7.5	9.1	16.3	26.2	8.7	10.2	3.9	4.8	11.3	12.3	13.1	3.2	18.7	13.8	9.5	10.7	11.0	9.7
Hungary	7.4	4.1	13.4	19.4	13.2	15.1	8.9	7.8	14.1	14.4	3.1	2.5	19.0	14.4	12.6	13.3	8.2	8.9
Poland	6.3	6.4	12.6	21.3	13.0	14.0	7.1	7.0	11.9	13.0	15.4	7.9	16.4	14.8	9.7	10.3	7.5	5.3
Romania	3.0	2.7	8.6	17.7	9.6	7.1	4.8	4.7	9.4	17.6	24.1	7.5	18.9	18.5	11.6	13.7	10.0	10.6
Slovenia	6.3	4.4	13.9	27.7	16.2	16.3	9.3	7.6	11.7	12.6	7.0	2.9	13.5	12.1	16.6	7.8	5.5	8.6
Slovakia	6.6	5.8	10.4	14.9	18.2	16.9	6.3	10.6	14.0	16.5	1.3	0.8	19.6	15.2	14.6	13.4	8.9	5.8

* The group of "Armed Forces Occupations" was not included. Due to the change in the methodology of the Labour Force Survey (LFS), 2021 data cannot be compared with the data of the earlier years.

Source: self-reported data based on Eurostat data [2023a].

It should be stressed that changes in the structure of labour demand resulting from RBTC in CEE countries happen with a delay in comparison to the highly developed countries and display some of their own specifics. It can be seen in the fact that the processes of digitalisation and automation have not led to a slump in the demand for employees performing routine cognitive tasks, and in some countries (Estonia, Latvia, Lithuania, Romania, and also Poland) a certain jump in demand for these jobs has been observed [Gajdos, Arendt, Balcerzak, Pietrzak, 2020; Hardy, Keister, Lewandowski, 2018]. In CEE countries, just like in more developed economies, a surge in demand for performers of non-routine analytical and personal tasks and a slumping demand for manual workers (both in routine and non-routine jobs).

A steady demand for employees performing routine cognitive tasks may be caused by a relatively low degree of automation in some CEE countries – particularly in terms of office processes, dynamic offshoring processes due to which most BPO (business process outsourcing) centres have moved to these countries, and in terms of an increasing scholarisation levels in societies [Arendt, Grabowski, 2019]. It should be noted that in CEE countries the levels of compensation and labour costs are lower than in more developed EU economies, which affects the relative cost of labour in terms of capital and makes the use of labour-intensive technologies still profitable.

Irrespective of these differences, it should be assumed that changes in the labour demand in CEE countries will continue to converge with the European and global trends. Taking a look at the professions of the future seems an interesting thing to do in that context. The World Economic Forum has named 10 professions of the future in the 2030 perspective, which include: a remote work facilitator, fitness advisor, intelligent home design manager, augmented reality experience advisor, work environment architect, algorithm bias auditor, data detective, cyber-security forecaster, water tide architect and manager for human cooperation with machines [WEF, 2021]. It is made very explicit that most of these jobs are connected to new technologies, dominated by non-routine tasks. At the same time, some of the professions most endangered by robotisation and Artificial Intelligence development according to Personnel Service experts are: cashiers and check-out till workers in retail stores, customer service employees and telemarketers, drivers of delivery cars, air traffic controllers, insurance agents, accountants and auditors or data analysts and statisticians [Jarco, 2023].

It should be remembered that although professions connected to caring for dependent and elderly persons did not appear in the table, demand for them, in the global perspective, including CEE countries, will keep rising due to the overlapping trends of population ageing and technological changes (care jobs involve both non-routine personal and manual tasks as well as routine manual tasks, which means that due to such diversity they are impossible to automate).

Simultaneously, research findings of selected countries (including OECD countries) demonstrate that the processes of population ageing accelerate automation. According to Acemoglu and Restrepo [2022], population ageing accounts for 35% of automation diversification between the studied countries, and more advanced ageing processes translate into a higher number of robots per 1000 employees. This observation means that also in Poland automation will accelerate and demand for employees doing routine, mostly manual jobs, will shrink in the future.

Job vacancies

Pan-European *Job vacancy statistics* [Eurostat, 2023 b] do not require member states to present a stratification of the job cross-section. Owing to that, the data are available only for very few countries (currently quarterly data are provided by Hungary, Romania, North Macedonia, and annual data from Bulgaria). It implies that a profession in official statistics is not a key variable, which also disturbs tracking structural changes on the labour market. Sectors in the NACE classification are believed to be more significant.

In the years 2010–2021 great changes took place in the structure of job vacancies in Poland. In CEE these shifts were much bigger than in the countries of Western Europe. The share of the manufacturing sector in job vacancies among the studied countries stayed unchanged. However, there occurred some discrepancies between countries. The share of this sector slumped most visibly in the countries with a lower number of job vacancies – in Lithuania, Latvia and Romania. It seems to be owed, particularly in the Baltic countries, to the transfer of employees from manufacturing to services which require a higher level of knowledge. Generally, in all studied countries, among different sections of the manufacturing sector, the share in job vacancies increased only slightly in the construction industry. Construction industry is quite "resilient" to technological changes and employees performing non-routine manual tasks play an important role in it.

In the traditional service sector in CEE (just like in Western Europe) we can see a relative fall in demand for employment in retail and financial institutions, with some increase in transport, tourism, information and communications. The falls are triggered by work automation, the increases, in turn, by infrastructural needs and changes in leisure habits. In Eastern Europe demand for employees in professional and support services is rising, which can arise from their dynamic development in all countries of the region. We can also observe a diminishing demand for employees of public administration as well as of cultural and entertainment institutions. Falling employment in education is due to demographic changes, the same trend in culture

and entertainment industry is caused by a growing use of computer-based entertainment, including computer games and software as well as applications and Internet websites used for recording amateur footage such as YouTube or Tik-Tok, the popularity of which is rocketing.

Population ageing drives a rise in demand for employees in care professions. In the field of healthcare and social help no major changes have been effected aimed at meeting the demand for health services supplied to the elderly. Only in two of the CEE countries an increased number of job vacancies in this area has been observed. These countries are: Latvia (increase of 4 p.p.) and Poland (increase of 2 p.p.).

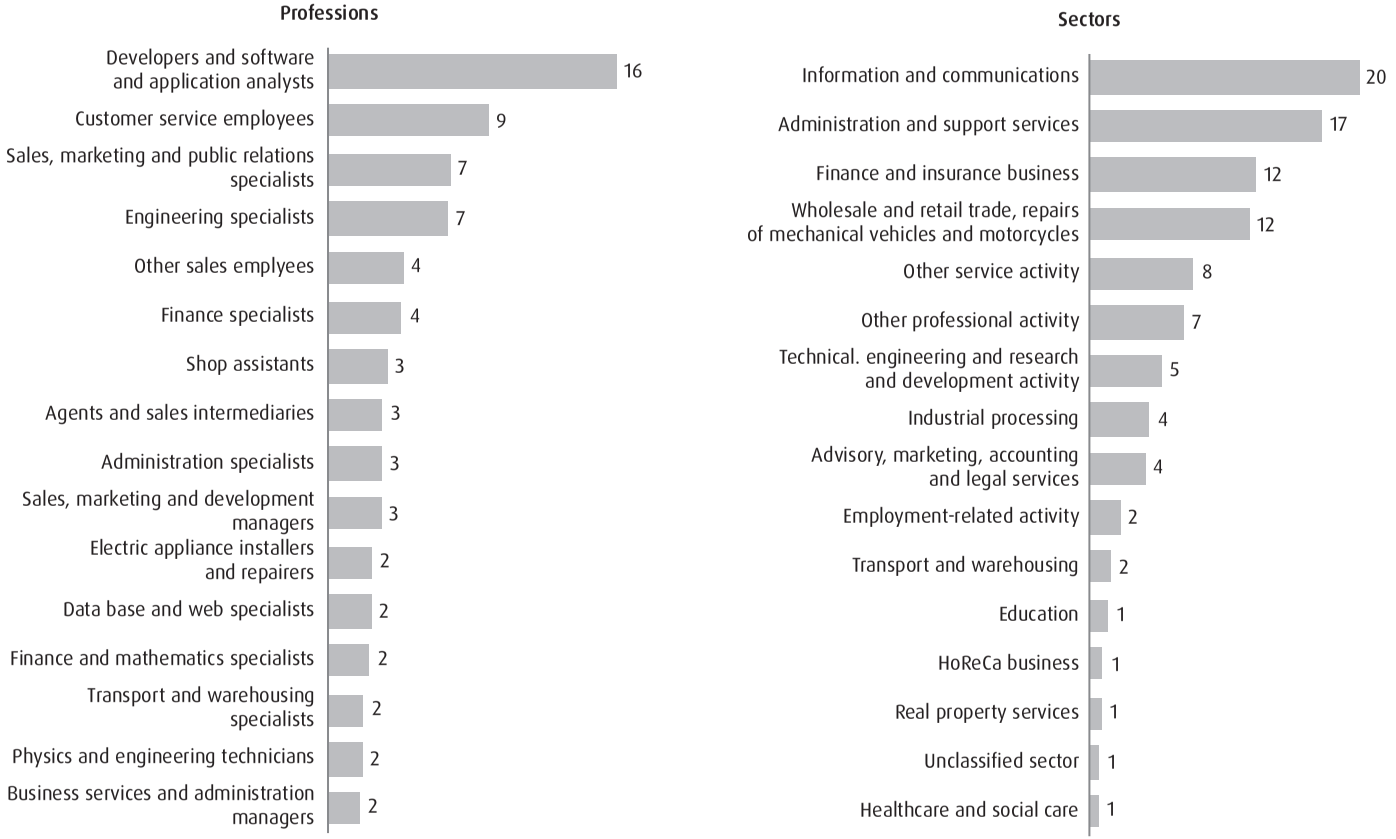
As these types of data are not available in official statistics, a valuable and increasingly more often applied source of specific data on professions and skills have become *Big Data* [see Beręsewicz, Pater, 2021]. Pan-European research in this field has been run by CEDEFOP [2019, 2023].

Traditionally, the highest numbers of job vacancy announcements have been addressed to shop assistants as the most popular job in most economies. Current trends in automation (self-service check-out tills) and online sales, the volume of which has been driven up by the COVID-19 pandemic, have led to the situation in which most job vacancies advertised on the Internet in EU countries are for specialists in information and communications technologies (ICT), then for engineers and transport workers, only later for shop assistants. In CEE countries the demand for shop assistants is still high, although no longer dominant (Cf. the left-hand side of Figure 4). Effects of population ageing in Western Europe have been visible for some time now. Consequently, demand for employees in the area of healthcare and social help is visibly more prioritised than in CEE countries, where the effects of the recent processes are only beginning to gain in importance (Cf. right-hand side of Figure 4).

These processes are being intensified and reviewed by exceptionally strong shocks. The COVID-19 pandemic accelerated the process of digitalisation and automation. It also underscored the importance of leisure and tourism as well as home entertainment. The pandemic also brought about and accelerated trends of the labour market growing more flexible, e.g. in the form of the GIG economy.

CEDEFOP [2023] data indicate that employers in CEE countries to a larger degree than in Western Europe expect a certain level of knowledge from their employees, focusing less on their attitude, professional values or command of foreign languages. Among the expected skills, the most important seem to be professional skills of developing software. Moreover, the skills of communication and using computers are also appreciated. These discrepancies may result from the fact that CEE is still mostly a beneficiary of the solutions developed in Western Europe.

Figure 4. Most popular professions in job announcements in CEE countries (left-hand column) and sectors offering the most job vacancies in CEE countries (right-hand column) in 2022 (%)



Source: CEDEFOP [2023].

The example of Poland – new professions in job advertisements

Structural transformations in labour demand are closely linked to the emerging and declining professions. There are relatively many publications describing professions of the future. Yet, they tend to have little scientific underpinning and mostly resort to speculation. Reliable empirical data allow to study the constantly changing expectations of employers towards the employees they seek. Below we have presented some findings from the research into new professions which analysed the frequency of appearance of certain phrases (so called tokens) in the titles of job announcements in Poland in 2016 and 2022. Consequently, we could establish how often and how many times certain phrases had been referred to. In the next step, the rise in the numbers and proportion of appearance of every phrase between 2016 and 2022 was calculated. Phrases with the highest frequency increase in this period have been set out in Table 3.

The first group of professions which have grown more popular in job offers over the last six years are the occupations related to the civilisation progress. Key areas in this progress are sustainable growth and civilisation diseases. These changes are brought about also by negative externalities in the form of exploitation of non-renewable energy sources. It causes a rising demand for employees in professions related to renewable energy sources and recycling. Increasingly more widespread use of feminine forms (feminatives) in the names of professions is becoming apparent.

Part of the increased demand for labour in CEE countries arises from the growing demand in Western Europe (nearshoring). It is a result of many existing circumstances, including antiglobalisation processes or supply chain disruptions.

The other changes are triggered mostly by technological trends of the present time. It is reflected in companies generally being oriented towards jobs in automation and digitalisation, as well as job announcements requiring specific skills in the most demanded professional areas. The common denominator for these are communications and information technologies. A rising demand for them is observable in particular fields of life and sectors of the economy, e.g. in finance, logistics or quality systems. Experts in those areas are also expected to be highly specialised and versatile, possessing additionally management skills. These requirements are particularly common in relation to executive positions. Most commonly searched specialists are required to perform the following tasks: data analytics and providing properly processed information, analysis of human behaviour and machine learning, using remote technologies, ensuring cybersecurity, analysis of cryptocurrencies and social media. Creating virtual reality is also a powerful upward trend that was initiated by video games, but presently is expanding onto other areas of life.

Table 3. Selected phrases with the highest frequency increase in job offers in 2016 and 2022

Entry	Interpretation
ESG, pharmacovigilance, organic	focus on sustainable growth: environment, sustainable growth, governance, healthy food, drugs supervision
psychotherapist	civilisation changes, including civilisation diseases
photovoltaics, heat pump, RES, thermal, wind energy, emissions	renewable energy sources (solar, earth, wind), installation and maintenance of relevant technologies, polluting emissions
analyst, sales assistant, teacher, director, journalist, technician, specialist [feminine forms of professions in Polish]	feminine forms of professions and job positions
nearshore	deglobalisation
digital, automation, robotisation	automation, digitalisation, robotisation
fintech, Qlik, Kubernetes, DevOps, Angular, software, developer, algorithms, application, interactive, microservices, fullstack	IT developer, IT specialist with a wide range of competencies (including management skills), businesss intelligence, process support applications (e.g. financial technologies, container applications), quality systems (particularly based on open source technologies), application architecture
data, analyst, Python, Kafka	data provision, information analysis, application, Big Data
artificial intelligence, NLP, deep learning, labelling, assessor	machine learning and deep learning, natural language processing, behaviour classification
remotely, online, cloud, frontend, backend, Nodejs, typescript, JVM, remote, cloud, Azure, AWS, marketplace	remote technologies, network, cloud, Java applications, GIG economy, internet platforms
CSIRT, cybersecurity, crime, privacy	cybersecurity
blockchain, cryptocurrency, NFT	cryptocurrencies
virtual reality, added reality, gaming	virtual reality
Facebook, YouYube, TikTok, content creator, digital content, monetisation	social media advertising

Note: the selection was made based on 100 phrases used in job offer titles with the highest absolute and relative growth between 2016 and 2022.

Source: self-reported data based on the data from pracuj.pl (access: 30.04.2023).

The identified changes may affect the condition and structure of employment in the circumstances of the demographic population ageing. Insufficient engagement in life-long learning could lead to elderly people not being technologically savvy and create a digital gap which might result in the rising scale of mismatches on the job market. In countries like Poland, where disproportions between digital skills of the young and the elderly are significant, a relatively small group of people pursuing life-long learning may become a major issue in the future when demand for relevant specialist jobs will have to be met. Consequently, demand for training will increase, also

in using the available technologies. It seems that the observable technological changes are aimed at a more efficient use of these technologies, better access to information and a more widespread employment of digital technologies in everyday life. It can be seen in a dynamic enhancement of communication methods between men and machines, such as low-code applications and transformer type neural networks (e.g. ChatGPT). As a result, the currently designed virtual realities may allow also the elderly to participate in them, despite their serious health condition or impaired movement ability. It may drive demand for additional services targeted at elderly people available on the Internet and social media.

Summary

There are numerous long term factors which affect labour demand. They give rise to the creation of new skills and qualifications and the resulting new professions, at the same time making some occupations disappear because they are no longer useful in the contemporary economy. These factors involve in the first place technological and social changes accompanying economic growth.

Technological advancements include mostly the development of Artificial Intelligence, automation and digitalisation. These cause far-reaching consequences such as machines replacing human labour, business operations and work shifting to the Internet and virtual reality becoming ever more widely used.

Demographic processes give rise to social changes. These affect the job market situation both in terms of supply and demand. Additionally, globalisation makes economies adjust quickly to the changes triggered by the processes, the effects of which reach beyond country borders. This leads to a growing significance of qualified and non-routine work with a simultaneous trend of making work more flexible. The following problems have risen to great prominence recently: sustainable development, environment conservation, food quality, investing in renewable energy sources, governance and equality on the labour market. Apart from long term factors, changes in the structure of labour demand are brought about by exceptionally turbulent economic shocks. The COVID-19 pandemic and the war in Ukraine have caused the consequences which will further entrench and boost deglobalisation trends. All of these occurrences have vital impacts on the societies in which a rising proportion of the elderly leads to the emergence of new professions and markets.

Structural shifts in labour demand keep progressing although they are not always clearly visible in official statistics. Data on the demand for professions and skills indicate that the recently observable trends and economic shocks may accelerate a transfor-

mation on the labour market, which will have a substantial impact on the population ageing. This calls for an adoption of solutions which are strongly oriented towards lifelong learning. Flexible work and access to remote technologies open up new opportunities for taking up professional activity by the less mobile age groups.

The future of the labour market will depend on the efficiency of policies aimed at boosting the professional activity of people aged 55 and above. A more comprehensive approach is needed which involves both the measures encouraging employers to hire older workers and the solutions addressed to employees themselves.

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TRANSFORMING CONSUMPTION FOR SUSTAINABLE QUALITY OF LIFE

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DOI: 10.33119/978-83-8030-625-7.2023_243_260

Abstract

This study aims to identify activities and factors that promote sustainable consumption, leading to a better quality of life. To achieve this, it is necessary to identify consumption channels compatible with sustainable development and barriers to sustainable consumption. The study also examines socio-economic inequalities as a significant barrier to sustainable consumption. To explain this relationship, the authors refer to existing economic, social, and political theories and research addressing unsustainable consumption. Regarding the Polish context, the study distinguishes between excessive and insufficient consumption. The authors use empirical data to illustrate this complex relationship, going beyond the standard inequality measures, such as the Gini index, and incorporating new aspects to explain the phenomenon.

Additionally, the study reviews investments in public goods, specifically flagship social programmes in Poland, regarding their impact on environmental and social dimensions of sustainability. Finally, the authors examine state aid programmes approved by the European Union and investigate the potential impact of revised government support in the wake of the COVID-19 pandemic on sustainable consumption. The study concludes that mass public aid for the private sector may create an unbalanced relationship between individuals and common spheres to the latter's detriment.

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In the era of global challenges such as climate crisis, biodiversity loss, environmental pollution, and depletion of natural resources, reflection on the concept of sustainable consumption becomes a key element in the pursuit of ensuring a sustainable quality of life. It is important to recognize the sources of unsustainable consumption, barriers that hinder a shift in consumption patterns, as well as the need to develop a new approach to responsible consumption. In this study, we aim to address questions that can help understand and achieve this goal. Based on a review of research and social assistance programmes carried out in response to the pandemic and Russia's aggression against Ukraine, we formulate recommendations for policymakers and society to promote responsible consumption that supports a sustainable quality of life. Due to the limited scope of this study, recommendations presented in the summary are of a general nature and serve only as indicators of directions for change. They should not be seen as comprehensive solutions for all specific cases or situations, but rather as a starting point for further, more detailed analysis and actions.

What is consumption supporting permanent quality of life?

Consumption supporting sustainable life quality versus sustainable consumption

Consumption supporting sustainable life quality refers to a broader approach to sustainable consumption. In a narrower sense it refers to consumption that is more efficient, uses less resources and produces less waste and pollution. In a broader sense, it is linked to a better quality of life, including improved health while simultaneously reducing the consumption of environmental resources [Grzega, 2020]. It also encompasses three dimensions of sustainability: economic, social, and environmental, which means it should allow for the most efficient fulfilment of needs, be inclusive, and minimize the negative impact of various factors on the society and the environment. For the purposes of this report, sustainable consumption is understood as consumption that allows to meet the needs supporting permanent quality of life with greater efficiency, while reducing the use of resources. Sustainable consumption

also involves selecting products and services that meet consumer needs in the most resource-efficient manner possible. It is not solely about seeking products and services to replace previously used goods, but also about considering whether the needs can be met in alternative ways.

It appears that the growing income in developed economies, including Poland, contributes to increased consumption by promoting lifestyles that favour unsustainable and excessive consumption, i.e., satisfying needs in an exceptionally non-sustainable manner. However, it is doubtful that excessive consumption leads to happiness or at least improvement in the quality of life. For example, research conducted by Maira, Druckman i Jacksona [2019] indicates that the quality of life falls as materialism rises, which is negatively correlated with environmental values and behaviour. Goodwin i in. [2018] also point out that increased consumption can contribute to adverse phenomena such as overeating, mental disorders resulting from certain types of excessive stimulation, and spiritual discomfort due to exclusive or excessive focus on material possessions. It becomes inevitable to not only improve energy efficiency through technological innovations but also to limit consumption and introduce far-reaching changes in lifestyles [Kalaniemi, Ottelin, Heinonen, Junnila, 2020].

Sustainable consumption, in a broader sense, aimed at improving the quality of life, is a kind of "straddle" between, on one hand, limited land resources and the consequences of resource consumption connected with climate change, and human needs on the other hand. This acrobatics poses difficulties for both individuals and the society. This study primarily aims to demonstrate the role that inequalities play in addressing this challenge. Do the inequalities contribute to the significant divergence between these two aspects of sustainable consumption to the point where the "straddle" becomes unattainable? Consequently, when assessing consumption in terms of its true sustainability, it should be considered not only fewer resources are used per unit of product compared to available alternatives, but also whether consumption contributes to the actual satisfaction of basic needs and is not merely an indulgence for temporary gratification. Predominance of the latter tendency, especially if adopted by developing countries, can have dramatic consequences for our civilization.

Types of unsustainable consumption

It is crucial to make a distinction between excessive consumption, insufficient consumption, and their mixed, non-eco-friendly form.

Insufficient consumption refers to consumption that does not allow for the fulfilment of needs either quantitatively or qualitatively. When defining basic needs, one can look at capabilities or try to make a list of such needs [see Nussbaum, 2003b].

The list may relate to material deprivation or a lack of basic goods necessary to satisfy essential needs. Sustainable Development Goals (SDGs) take into account this type of consumption. For example, SDG 10 monitors lack of certain household appliances, severely limited or low-value meals, or energy poverty, which refers to situations where households cannot afford sufficient heating for their living space.

Excessive consumption, on the other hand, involves excessive resources consumed to meet one's needs, thereby compromising the satisfaction of other individuals' needs or the needs of future generations. It also involves satisfying *wants*, which means consuming more than what is necessary to fulfil a given need. Currently, every level of consumption in developed countries is unsustainable, as it exceeds the Earth's limits, thereby preventing others from satisfying their needs. In highly developed countries, there is a tendency to meet needs by utilizing a significant amount of resources. Only now researchers are seeking ways to break this dependency.

Non-eco-friendly consumption is connected with low income. This type of consumption, in terms of resource intensity, falls under the category of *excessive* consumption, while in terms of meeting needs, it falls under the category of *insufficient* consumption. It often arises from low income, leading to satisfaction of needs through cheaper yet highly emission-intensive products [Zalega, 2019]. It also involves consumption of highly processed, harmful food with high entropy and large carbon footprint due to long-distance transportation. The desire to buy so-called green products is negatively correlated with income. Witek i Kuzniar [2021] note that the higher the economic accessibility, the greater the intention of consumers to purchase environmentally friendly products. The highest consumption of old and high-emission vehicles in the European Union (EU) is also associated with low income, particularly in Poland.

Consumption leading to improvement in quality of life

Consumption leading to improvement in quality of life takes on various forms. Some examples of types of such consumption and supporting actions, are:

1) Resource-efficient consumption – indicators used to measure it can be found on the websites of Eurostat, Polish Central Statistical Office (GUS), UN;
2) Forms of consumption that allow for its reduction – such as shared consumption, which involves using certain resources within neighbourhood cooperatives (e.g., shared laundry, shared use of gardening machinery and equipment), which still need to be popularised [Grzega, 2020; Klos, 2021];
3) Public/collective consumption – an example of this is public transportation, which can significantly improve quality of life, reduce traffic congestion, limit CO_2 emissions, and improve the situation of low-income individuals [see Xiong i in., 2021];

4) Consumption that meets the criteria of so-called *consumption corridors* [Defila, Di Giulio, 2020; Di Giulio, Fuchs, 2014], by which the society can counteract the process of increasing inequality and determine which type of consumption meets their needs, and which exceeds them, taking the form of wants. Consumption corridors are determined by *minima*, which enable each person to satisfy their protected needs, and *maxima*, which prevent the negative impact of individual consumption on the ability of others (living now and in the future) to satisfy their protected needs [Defila, Di Giulio, 2020, pp. 321–324]. This concept combines the complex nature of individual consumption with the notion of *good life* in the context of sustainable development, individual freedom, collective responsibility, assumptions of resource finitude and sensitivity, and justice, in order to develop public policies for sustainable consumption. This concept aligns with the so-called *strong sustainability*, which emphasizes the need to limit consumption, distinguished from *weak sustainability* typical for mainstream economics. Advocates of strong sustainability, such as Costanza, Cumberland, Daly, Goodland, and Norgaard, emphasize the need to embed the economy within physical and biological boundaries, taking into account factors such as resource scarcity, impact of population growth, environmental constraints, with the assumption that natural capital is non-substitutable [Diemer, 2020].

Why do inequalities hinder achieving sustainable consumption?

Income inequality can act as a barrier to sustainable consumption. This phenomenon can be attributed to policies based on the following beliefs:

1) Economic growth decreases inequality in developed countries – the Kuznets curve Kuznetsa [1955] suggests that economic growth eventually eliminates inequalities [Genevey, Pachauri, Tubiana, 2013].
2) Economic growth is a precondition for ensuring sustainable consumption by providing resources necessary for its implementation. This is indicated by the environmental Kuznets curve, which suggests that environmental pollution is only associated with the phase of rapid growth. Therefore, societies that reach a certain level of development will have the means to address these problems. Such an approach may encourage growth-oriented policies, arguing that an increase in per capita income contributes to a reduction in environmental degradation [Grossman, Krueger, 1995, 1996].

These two beliefs make it difficult to recognize that the relationships between various phenomena and processes can be entirely different. Firstly, economic growth,

even in developed countries, does not eliminate inequality but can actually increase it. Secondly, economic growth, even in high-income countries, leads to unsustainable consumption due to factors such as increased CO_2 emissions. Increased production translates into increased consumption, and resource efficiency alone does not solve the problem. Countries with higher incomes, despite more efficient energy use, have much higher levels of emissions and resource consumption than low-income countries. This is confirmed by a study conducted by Andrieu, Vidal, Le Boulzec, Delannoy, and Verzier [2022]. Thirdly, inequalities favour unsustainable consumption, reinforcing the aforementioned relationships and leading to increased consumption [Zubedi, Jianqiu, Ali, Memon, Zubedi, 2022]. This phenomenon is explained by theories of Veblen and Bourdieu, which focus on the social aspects of consumption. These theories are still utilized by contemporary researchers to analyse the relationship between inequality and excessive consumption [Wisman, 2011].

Veblen's reasoning [1 899] provides theoretical explanation why increasing inequality leads to waste, which is one of manifestations of excessive and unsustainable consumption. Two mechanisms underlie this. Firstly, inequalities lead to unsustainable consumption because consumer choices depend primarily on the social environment (social class and class relations), rather than individual preferences. Veblen attributes this to the behaviour of upper classes, who engage in conspicuous consumption and waste resources. He sees waste as a symbol of status that emphasizes the superiority of the upper class over the lower class [Veblen, 1994]. Some authors say that the mere existence of an upper class, referred to as the "leisure class," is inherently unsustainable [Trigg, 2001; Watkins, 2019; Wisman, 2009, 2011], and is a consequence of rising prosperity resulting from societies' ability to generate surpluses. An unsustainable lifestyle becomes a model for art, literature, culture, etc., thereby exacerbating existing inequalities. Secondly, inequalities increase the distance between social classes. In their pursuit of social advancement, people try to reduce this distance by adapting their consumption patterns to those of the upper class, resulting in unsustainable consumption behaviours. The greater the income and wealth inequalities, the higher the amounts that everyone below the wealthiest must consume to maintain or improve their relative status. This is a continuous, never-ending process, and even the poorest individuals are under pressure to engage in conspicuous consumption [Trigg, 2001].

1) Bourdieu [1984] also explains how inequalities impact unsustainable consumption, focusing not only on income, which, when spent, allows for achieving desired status (Veblen's idea), but he also emphasizes the significance of cultural, social, and symbolic capital in distinguishing one group from another. He introduces the concept of a *field* determined by the abundance of these forms of capital. The status obtained through these capitals translates into consumption patterns that are

particularly refined and distinctive among higher-income groups. Studies have shown that households in the upper quintile of income usually have significantly higher carbon footprint compared to households in the lowest income quintile. Unequal distribution of resources and opportunities leads to differences in lifestyle, tastes, and values, which, in turn, influence consumption patterns. Therefore, addressing inequalities is crucial for promoting sustainable consumption and protecting the environment. This requires adopting appropriate systemic solutions, including policies that reduce income and wealth inequalities, ensure access to education and employment opportunities, and shift towards more just and sustainable consumption patterns.

Promoting economic growth, regardless of its social and environmental costs, not only leads to a decline in the share of labour in the product but also contributes to income and capital inequalities, decreased work quality, precarious employment, and adoption of flexible employment forms that reduce the availability of public goods. Limiting expenditures on public goods further exacerbates inequalities, since individuals with lower incomes cannot compensate for the deficit by consumption of public goods.

Empirical research on the impact of inequalities on unsustainable consumption has resulted in the following observations:

1) Increasing inequalities reduce the willingness to pay for public goods. Economic inequality (income and property inequality) goes hand in hand with political inequality (in the distribution of political power). Consequently, the wealthy, who benefit the most from loosening environmental controls, are more capable of blocking such actions [Torras, Boyce, 1998] and supporting political solutions that harm the environment and restrict access to public goods. Political inequality can hinder the response of those whose interests would be most affected by environmental protection measures [Wisman, 2011].
2) Inequalities conceal the consequences of our actions. High-income countries, for example, export plastic and waste to low-income countries, which is particularly dangerous, especially considering that the latter have no appropriate infrastructure to dispose the waste [Barnes, 2019].
3) Income inequality has a negative impact on sustainable economic growth [Hussain et al., 2023] and hinders transition to sharing economy and collaborative consumption [Schor, Fitzmaurice, Carfagna, Attwood-Charles, Poteat, 2016; Schor, Fitzmaurice, 2015].

Why should we go beyond the Gini coefficient when identifying inequalities?

The issue of increasing inequalities correlates with other unfavourable phenomena mentioned by Mierzejewski [2019]. These include the rate of poverty, unemployment, employment volatility, and limited redistributive social policies of the state. The Gini coefficient is most commonly used to measure inequality, by determining the rate of income inequality after transfers. In the case of Poland, it stands at 26.8% (forecast for 2021) and shows a downward trend (from 30.8% in 2014, to 29.2% in 2017, to 27.2% in 2020), which seems low compared to the European average (30.1%). The Gini coefficient before transfers is also lower in Poland compared to Europe, standing at 44.7% (compared to 52.2%). However, the method of calculation is crucial, and although Szulc [2022] considers income inequalities in Poland to be moderate and falling, corrections made by Brzezinski, Myck, and Najsztub [2022], lead to the conclusion that inequalities in Poland are among the highest in Europe.

The problems related to calculating this indicator, however, run much deeper and refer to the following:

1) Distribution of inequalities: the Gini coefficient does not show how inequalities are distributed. To address this, a closer look at the share of income in different quintiles is needed. In Europe, the income share in the highest quintile is 38.2%, while in the lowest quintile it is 7.9% (almost five times lower). In Poland, these ratios are more balanced, with the income in the highest quintile being four times higher than in the lowest quintile. Among the countries in Central and Eastern Europe (CEE), Slovakia exhibits the most balanced income distribution, with only a three-fold difference and an exceptionally low Gini coefficient (20.9%) [Eurostat, 2022].
2) Exclusion of certain groups of population: household budget surveys do not cover specific groups of households, such as individuals residing in dormitories, military barracks, hospitals, hostels, shelters, refugee camps, special assistance centres, care homes, and orphanages, as well as homeless individuals living on the streets [Atkinson, 2017].
3) Need to compare income inequality with wealth inequality: statistics on income inequality should be considered alongside statistics on wealth inequality, since wealth is not only a source of income but also reduces the pressure on the available income, for example, through property ownership. In Poland and other CEE countries, there is a high concentration of wealth among the wealthiest segment of the population. Brzezinski et al. [2020] demonstrate that the richest 10% of society in CEE countries possess 49.6% of the total wealth, the richest 1% possess

20.3%, and the richest 0.1% possess 8.3%. This means that the distribution curve in the top decile is skewed upward. Chauvel, Hartung, Bar-Haim, Kerm, and Van [2019] observed that for households in the highest income quintile, indicators describing the relationship between wealth and overall income increase rapidly with income.

4) Lack of information about which population groups are at risk of poverty: statistics measuring inequality do not reflect the specific situation of certain population groups, and the costs of meeting their essential needs are much higher. These groups include people with disabilities [Burchardt, Zaidi, 2003] and individuals with illnesses, single parents, women, immigrants, and individuals below 18 years of age.
5) Lack of information about global inequality: it turns out that on a global scale, inequalities surpass European levels. For example, 1% of population possesses more wealth than 77% of population, 3.4 billion people live on less than USD 5.5 per day, and 100 million people worldwide fall into poverty each year because they have to pay for healthcare out of their own pockets. Additionally, one in five children does not attend school [Oxfam, 2023].
6) Lack of information about other aspects of inequality: the Gini coefficient does not measure problems associated with inequality that have significant implications for quality of life, such as health and its determinants (e.g., the environment in which someone lives, the type of work they do, etc.). As a result, the index overlooks a poverty cycle in which existing inequalities exacerbate one another. People living in worse-quality areas are more prone to health issues, leading to increased expenses and reduced income. In this context, we talk about environmental and health inequalities, as well as the "the poor pay more" phenomenon, which is intensified by inflation.

What are the conditions for sustainable consumption in CEE countries?

Transition of consumption patterns in CEE countries faces specific difficulties posed by the legacy of the previous socio-economic system. One of the main manifestations of this negative legacy is the inefficiency of social movements at the maturing stage of democracy. 44 years passed from the moment when the demand for the urban residents' inalienable right to the city was presented in Poland in the work *Urban theses* by the Urban Movements Congress [Kubicki, 2020] to the publication of Lefebvre's influential work *The Right to the City*, which criticized reducing the city perceived as a social process and space to issues related to capital flow [Costes, 2010].

Negative social effects of relatively young democratic structures in post-socialist countries in the face of strong neoliberal economic structures are described by Sagan [2016]. The political power of the private business sector collaborating with municipal authorities leads to neglecting the needs of collective consumption, manifested in the reduction of local authority housing, mass development of gated residential communities, revitalization of urban areas and ensuing gentrification, and commercialization of public spaces. As Sagan notes, civic movements are crucial for overall social and systemic changes, especially in the networked communication space, as they are less susceptible to absorption by ruling groups and corruption. The main goal of social mobilization is to create a counterbalance to the public sector's withdrawal from meeting the needs crucial for maintaining the stability of the socio-economic system.

Bouzarovski, Sýkora, and Matoušek [2016] use the example of the heating system in Liberec to illustrate how the legacy of the past in CEE countries, along with the abandonment of environmental and social goals in national reforms by public policy, combined with the regime of local authorities, has led to a deadlock preventing successful transformation. As a result, during periods of systemic change, new obstacles were arising that both combat and replace previous trajectories. On the example of transport policy and heritage sites protection in Prague, Horak [Smith, 2009] shows an institutional lock-in where civil society has little impact, resulting from the weakening of environmental protest after the political transformation, which before that had been a substitute for political opposition.

Among the challenges raised in social sciences regarding the likely economic, social, and political dynamics and the viability of market democracy in post-communist countries, critically compiled by Greskovits [2000], what stands out is the difficulty of simultaneously realizing the ideals of constitutional democracy, competitive markets, and the welfare state. A threat arises when market economy entails high costs and loss of social guarantees for the majority of citizens, which can lead to the rise of populist and authoritarian leaders. Ost [2018], on whose work Greskovits bases his analysis of post-communist market society, describes the turn of Polish workers towards populist movements that promise to protect people from capitalism.

Another barrier to sustainable consumption and transition to renewable energy sources are also high-emission models. The problem of tying up capital in electricity distribution systems, road networks, and dispersed urban settlements, as described by Gough [2014], is more significant in countries with less capital and higher-emission infrastructure. One example is Poland, with the highest share of solid fuels in the EU (44% of produced and imported fuels 2021) [Eurostat, 2023a]. Although Poland allocates the most fuel to the production of electricity and heat (solid fuels account for 84%), with 9 297 kilotons of oil equivalent (KTOE) more than Germany, the dif-

ference in favour of Germany in terms of produced electricity and heat between these two countries is 39 069 KTOE. The main reason for this is high losses, which consume 50% of the fuel. As a result, Poland ranks behind Germany, France, Italy, and Spain in terms of the amount of produced electricity and heat [Eurostat, 2023a].

According to Eurostat data [2020] on responsible production and consumption (SDG 12), there is insufficient progress across the EU in terms of most indicators related to environmentally decoupled growth. The greatest challenge, especially in CEE countries, is consumption of resources. In the five years before the pandemic, the highest rate of material footprint per capita, i.e., the consumption-driven use of materials for goods and services, was in Romania (49%), Hungary (30%), Cyprus (30%), Croatia (24%), Bulgaria (21%), Poland (21%), Latvia (20%), and Lithuania (20%) [Eurostat, 2023b]. This is primarily due to the development of construction, which is the main driving factor behind extraction of materials. While increased resource consumption as a trend among privileged groups is a negative phenomenon in the context of sustainable consumption, its overall assessment requires further in-depth research.

What is the significance of flagship social programs and temporary public assistance for sustainable consumption in Poland?

According to the established goals [MRiPS, 2023], major Polish social programmes have a direct impact on improving sustainable consumption to the extent that they improve the satisfaction of basic life and educational needs of children and increase the participation of older people in social life. Implementation of these goals is limited by eligibility criteria for benefits, i.e. two largest programmes, "Family 500+" and "Good Start" are universal, which means that assistance is provided regardless of family income, there is no link between benefit disbursement and achievement of the intended goals. This makes it impossible to avoid situations where benefits ultimately worsen the situation of children [see Wójcik, 2016]. The share of social assistance in Poland's GDP is among the highest in CEE countries, but lower than in the so-called old EU Member States, except for the Netherlands and Luxembourg [OECD, 2023].

Based on the available data, it is difficult to assess to what extent social programmes have improved consumption in terms of sustainability. It is challenging to attribute their social and environmental consequences to specific expenditure categories. This applies to all items, including food and clothing, education and extracurricular activities, and savings [see Rudke, 2004]. It can be stated that social programmes and state assistance have had a limited impact on eliminating extreme poverty, which has remained around the 2016 level in the past five years and currently affects mostly large

families, including children (8.3% of individuals in households with at least three people aged 0–17) [GUS, 2021]. According to OECD forecasts [2020], Poland faces the risk of increased poverty among older people due to the high share of fixed-term contracts and self-employed individuals with low social insurance contributions, as well as one of the lowest replacement rates in the EU.

Another element which has a positive impact on the social dimension of sustainable consumption are programmes launched in Poland as part of temporary public assistance allowed by the EU during the COVID-19 pandemic in 2020 and the geopolitical crisis following Russia's invasion of Ukraine in 2022, which support the incomes of people in difficult financial situations and aim to prevent deepening social inequalities. One of the measures aimed at combating economic effects of the pandemic is a furlough benefit for individuals working under civil law contracts and self-employed persons, introduced in 2020 and having the greatest impact on the state budget [Szypulewska-Porczyńska, 2022].

In Poland, there is an asymmetry between national and EU aid rules, the former being less supportive for the environmental dimension of sustainability. An example is the inclusion of climate and environmental sustainability actions in the EU's Recovery and Resilience Facility, which sets a spending target of 30% for climate goals in the EU budget [Regulation (EU) 2021/241 of the European Parliament and of the Council]. However, environmental protection requirements can be found neither in the criteria of the Polish COVID-19 Anti-Crisis Shield Fund [Dz.U. 2020, item 568], nor in the rules for granting public aid to entrepreneurs [Industrial Development Agency, 2020]. Another example of such discrepancies is the absence of environmental protection requirements in Polish programmes providing assistance in response to increases in natural gas and electricity prices [European Commission, 2023], despite the incentives outlined by the European Commission in the established EU framework for crisis support following Russia's aggression against Ukraine [European Commission, 2022a, 2022b]. The limited consideration of the environmental dimension of sustainability is also evident in strategic documents. In the Polish reform programme measures related to "responsible consumption and production" are understood as "modernization and acceleration of production processes, increased productivity through the use of modern technologies and knowledge" by "accelerating processes of robotization, digitalization, and innovation" [Council of Ministers of the Republic of Poland, 2022].

The exclusion of environmental criteria should be seen as a significant barrier to the transformation of consumption towards sustainability. The consequence of massive public assistance to the private sector is the deepening misbalance between the private and public spheres, to the detriment of the latter, as confirmed by available statistical data on wealthy countries [Chancel, Piketty, Saez, Zucman, 2021, p. 14]. For

example, in Germany, where the value of public wealth remained positive in 2020, its decline in the first year of the pandemic compared to the previous year amounted to 50%, while national income fell by 18%.

Summary and recommendations

On the path to achieving an adequate standard of living, it is crucial to counteract inequalities, also by creating a wider range of public goods. Based on the above analysis, the following recommendations for actions and measures can be formulated:

1) Limit wage growth in the highest quintile and adjust the minimum wage – in this case, actions are necessary not only to make consumption stop rising, but even to restrict it, especially if it does not meet basic needs.
2) Implement progressive taxation on income (higher taxes on high incomes) and wealth (e.g., inheritance taxes, counteracting income concentration in the top decile), with simultaneous measures to limit *excessive* consumption (see point 8).
3) Inclusion policies for people with disabilities and other groups threatened by exclusion (e.g., immigrants) in the labour market and improving access to public services for these groups.
4) Social transfers, housing subsidies, etc., to reduce exclusion and inadequate consumption, and increasing redistribution of these resources while considering recommendations provided in point 2.
5) Introduce consumption corridors supported by price instruments, which have been recognized by Pothen and Tovar Reaños [2018] as an effective tool for reducing the material footprint of luxury goods consumption, such as entertainment and private transportation, without imposing significant burdens on less affluent households; establishing maximum prices for essential goods.
6) Increase expenditure on public goods and services (education, healthcare, housing, food, and mobility) and improve their accessibility to contribute to income growth among individuals with the lowest and middle incomes, with simultaneously conducted awareness campaign to counter the tendency of Polish society to undervalue public goods.
7) Strengthen social movements, uphold democracy and the welfare state: in the CEE region, it is important to support civic and social movements that counter negative socio-economic phenomena and stimulate social change, thereby contributing to more sustainable and equitable development. To avoid a situation where introduction of market economy leads to a loss of social guarantees, the idea of the welfare state should be promoted to reinforce support for democracy.

Eligibility criteria for social programmes should be tailored to the needs of low-income families and those living in extreme poverty.

8) Counter gentrification and disregard for collective consumption needs, monitor wealth trends: authorities should strive to maintain public housing resources, limit the development of gated communities, and commercialize public spaces to address social needs. Monitoring trends concerning public and private wealth in the CEE countries will provide a better understanding of the impact of different policy dimensions on sustainable consumption and development, and this knowledge can be used to shape future strategies and assistance programs.
9) Promote sustainable energy and transportation policies and responsible consumption: solutions that support sustainable development in the energy and transportation sectors should be implemented to shift to renewable energy sources and reduce emissions. It is important to monitor resource consumption in the CEE countries, but further research is necessary to better understand the complex impact of increased resource consumption, taking into account the region's specific characteristics.
10) Integrate environmental dimension into assistance programs: implementing the concept of sustainable development requires incorporating environmental protection criteria into national assistance programs, such as the COVID-19 Counteracting Fund.

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A HIGHLY INFLATIONARY ECONOMY AS A CHALLENGE TO BUSINESSES AND MANAGERS

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DOI: 10.33119/978-83-8030-625-7.2023_261_290

Abstract

This article delves into the complex and ever-changing nature of inflation which is influenced by various factors and uniquely impacts the global economy, individual countries, and businesses. The inflation ratio, a straightforward measure of price trends, reveals the sustained decline in the value of money in financial markets due to the oversized financial sector and a widening gap between total liquidity and the real economy. The recent inflation surge can be attributed to the Coronavirus pandemic, EU energy policies, the Ukrainian conflict, and the rise in commodity prices. In Poland, efforts to control inflation are accompanied by attempt at maintaining economic growth and social welfare. Inflation can hamper competitiveness and trigger changes in the market structure, simultaneously weakening the position of the most vulnerable actors, causing a decline in trust, cooperation, loyalty, and other social capital elements. Unscrupulous actors may inflate prices, delay payments, pass on costs, and engage in illegal activities such as price collusion and speculation. The article emphasizes the importance of rational enterprise management in inflationary conditions, which necessitates the effective management of financial flows, advanced controlling, budgeting, and maintaining high financial discipline.

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Inflation is a crisis-generating monetary phenomenon which has an unfavourable impact on the situation of countries, businesses and households. Inflation has spread widely and was triggered by external circumstances such as the war in our neighbouring country, energy crisis and a massive turmoil on the global market of raw materials. These events occur simultaneously with some additional risk factors: disruptions on global financial markets, excess liquidity and debt, erosion of the global financial system and falling trust towards fiduciary money. Thus, there exists a significant threat of transferring these turbulences to other areas of the world economy, which may trigger an avalanche of hard to predict consequences known as the domino effect.

Significant efforts to curb inflation are also worth paying attention to. We can see an ongoing debate in the field of economic policy considering ways of stifling inflation sources, mitigating its impacts on the economy and providing some social protection to the lowest-income groups. Government opponents highlight in the media some alternative causes of inflation, criticise generous social programmes and efficiency of inflation relief packages, point out to slumping consumption and social impoverishment. It is frequently mentioned that the level of inflation at home is higher than abroad, some even recommend resorting to cryptocurrencies. Public unrest is also caused by worries around rising interest rates, depreciation of deposits, problematic safety of non-cash payments, sluggish economic growth and subdued employment. This dispute is like squirrels fighting over their nut supplies stored for winter, having gathered a sufficient stock of nuts, but disregarding its accessibility, import options or mild winter conditions. Little attention is paid to the economic and cyclical effects of inflation. Key problems are identifying independent monetary mechanisms in a wobbly economy, understanding the fiduciary nature of money and inflation transmission mechanisms, as well as risks posed by cryptocurrencies. A largely insufficient exchange of experiences in dealing with inflation and mitigating its negative conse-

quences seems the greatest problem. The ongoing dispute should expand our knowledge of the inflation sources and ways of reducing its burdens.

The main purposes of this paper are recognising a wider context of inflation and identifying methods of controlling price hikes. The above concerns present the greatest challenge to the National Bank of Poland (NBP), state administration and entities operating in the highly inflationary environment. The *Report* addressed to business units contains the findings of studies focusing on defining the causes of the current inflationary wave and the potential threats it poses to the economy, as well as seeking practical ways of reducing the burdens brought about by this situation and challenges facing business units such as:

- price volatility – high inflation results in constant changes in the prices of goods and services, which disrupts business planning and decision-making; companies must be able to adjust their pricing strategies to the constantly changing market conditions;
- financing difficulties – high inflation raises the costs of financing because eradicating its consequences necessitates raising interest rates; it may result in obstacles to raising capital, particularly for small and medium-sized companies;
- currency exchange risk – high inflation often leads to a decreased value of the domestic currency, which in turn increases the currency risk for companies trading in foreign currencies;
- higher costs of production – high inflation leads to increased costs of energy, raw materials and other production factors on the side of businesses;
- increased competition leading to company bankruptcies and business consolidation – high inflation changes the structure of revenue and expenditure at the operational level, thus making it difficult to maintain the selected EBIT strategy; companies must compete with other players which try to attract customers with lower prices; it may lead to lower margins for some businesses and often to high extraordinary profits for other.

Monetary nature of inflation

Inflation which is visible in the economy already at the first glance, demonstrates how the financial system problems can transfer onto the real economy, giving sleepless nights to government authorities, entrepreneurs and common consumers. Just like blood hypertension in a living organism, this condition requires an individual treatment which may not always succeed. The problem of inflation, which in its very nature affects trust towards currency, as well as money quantity and quality, exerts a major impact on the economy and is difficult to contain.

Inflation is defined as a rise in prices of consumer goods and services in an annual perspective. The level of inflation in a given country is expressed in per cent. The opposite phenomenon is called deflation, also known as negative inflation, causing a fall in prices of the consumer goods basket. The basic measure of inflation is the CPI index (Consumer Price Index) which represents a proportion of the average rise in market prices calculated based on the share of most important goods and services (a statistical basket of basic goods consumed by a given society) in households' spending.

The correlation between public spending and incomes of households translates into the criticism of the government or leads to blaming the central bank over excessive money supply or inadequate levels of interest rates. Political interpretation of this phenomenon is not empirically grounded and usually derives from overestimating the role of these institutions in an open free market economy. However, many cyclical causes of this problem should be kept in mind in the first place. These dependencies are non-linear and chaotic, therefore the inflation ratio should not give rise to too many far-reaching conclusions. Inflation may accompany a crisis or an economic boom, it may reflect a rise in income or a fall in demand, the society growing rich or poor, additionally enhanced by capital flows, population migration and money transfers.

The level of inflation may be highly diverse – from a double-digit rampant inflation to a negative value of deflation. Inflation measures provide formal, detailed and specific information. In order to interpret inflation and its causes, as well as search proper solutions, it is necessary to know the empirical context of a given economy's consumer expenditure, standards of living, professional activity, economic policy, economic growth dynamics, savings, investments, unemployment, etc.

Any linear approach to this dynamic phenomenon or any form of averaging inflation for a group of countries should be approached with suspicion. It should be noted that the inflation ratio differs in countries which use the same currency, but have independent economies with diverse circumstances, various population and economic potentials, households' incomes and spending as well as different consumption models. For instance, inflation in Greece is usually higher than in Germany, due to a more generous basket composition and slower price rises of luxury goods which are more frequently purchased in affluent societies, but also because of some other factors like attitudes to money and budget management.

Discrepancies in inflation levels are also caused by the monetary and real economy, climate, diet, affluence of the society, housing conditions, heating costs volatility, etc. For instance, in Portugal inflation is strongly boosted by rising prices of flats which are bought by British retirees who flee their country's high costs of services, food and heating. According to the media information, inflation in Germany or Canada (below 10%) is met with resentment, although its level in Poland is much higher (14.7%).

The reasons for discontent are not so much the rising costs of consumer spending, but a depreciation of savings and amounts kept in individual pension fund accounts to which the inflation index does not apply.

Thus, some inflation-related notions, like depreciation of money, leading to a loss of its purchasing power should be remembered. The opposite of depreciation is appreciation which is defined as the increasing purchasing power of money. Depreciation or appreciation dynamics reflect a slump or rise in the purchasing power of money in a particular time period, which is expressed in per cent; it indicates a change in the ability to purchase larger or smaller quantities of a certain good, gold, silver or foreign currencies. In this context, adjusting incomes, salaries or nominal benefits based on the inflation ratio may evoke the feelings of harm and resentment among numerous groups, including entrepreneurs, as depending on incomes, consumer spending constitutes a variable proportion of households expenditure and it does not account for the other expenses, savings, thinning reserves or abandoned investments.

It should be noted that, contrary to a common belief, money depreciation is not a direct consequence of inflation which causes an oversupply of money in consumers' hands, or increased welfare benefits for less affluent groups. Aggregate macroeconomic data indicate that the loss in money value generally results from disruptions in credit creation outside of the central bank and in the pace of money circulation in relation to the value of goods supply, including trade exchanges with abroad.

The reason for this disequilibrium may be fluctuations in the money supply in circulation, business activity, increased incomes and society affluence, change in preferences, widespread use of credit in purchases, payment bottlenecks, expanding product ranges on the market, including easy access to imported goods. Money supply in the economy may also depend on a rising consumption propensity, developing entrepreneurship, foreign transfers, credit money creation by banks, flow of foreign investments, as well as on the accelerated cash circulation, improved rating or the use of electronic money. The above mentioned factors have a diverse effect on inflation.

Depreciation or appreciation of money as a currency of a given country may be affected by the change in this currency's exchange rate against other convertible currencies. The current exchange rate is the price of currency exchange resulting from the supply of and demand for a given currency in the conditions of convertibility and floating exchange rates. High level of inflation, which means a rising price of the basket of goods and services on the domestic market changes the terms of trade in exchanges with abroad, putting pressure on higher imports and reducing the profitability of exports. If trade with foreign countries is important to a given economy, the occurrence of inflation will lead immediately to an upset balance of trade and balance of payments.

Trade deficit in foreign operations ecerts pressure on diminishing the exchange rate of the domestic currency against other currencies. A good example may be the increasing value of the Swiss franc, leading to increased costs of buying Swiss cheese, as well as other financial and non-financial assets, including mortgage loans denominated in this currency. In the case of the dollar or the euro, the scale of economic ties with abroad may be so strong that decision-makers will more often react to the fluctuating currency exchange rate than to inflation. This causes the effect of anchoring in a stronger foreign currency, which diminishes the dependency of the domestic currency exchange rate on domestic price fluctuations. Through this channel, inflation will be imported from abroad.

Systemic and structural causes of inflation

In the market economy inflation is explained with the quantity theory of money. In an outline, it is believed that inflation is caused by an upset balance between the money supply in circulation and the quantity of goods purchased in the economy. Increased money supply and a higher purchasing power of the society creates inflationary pressure, however, attempts at reducing the money supply and diminishing the purchasing power of the society may slow down demand and lead to deflation, bringing about a slump in retail prices. In real life, there occur numerous factors which boost inflation and affect its nature at any one time, thus they can also indicate ways of mitigating its consequences. Inflation causes may be demand- or supply-related or mixed, as there usually exists a set of factors with multi-dimensional influences.

The current inflation wave reveals much more profound and permanent inflation causes which are deeply rooted in the economic system. New conditions for boosting the supply of fiduciary money appeared after **the system of Bretton Woods** had been rejected, after abandoning gold convertibility, spreading liberal economic conceptions, opening economies and establishing a common currency convertibility in the western world [Bartkowiak, Ostaszewski, Polański, 2022]. As a result of these changes, new opportunities emerged which encouraged a global expansion of the financial sector based on the doctrine of **monetarism** introduced in 1981 by the US president Ronald Reagan, giving rise to a new four-decade long economic epoch. At its prime, in the '90 s of the previous century, monetarism energised entrepreneurial processes based on liberal principles of the capital market and a global deregulation. Monetarist economic thinking boils down to the belief that economic growth is achieved by boosting the economy with monetary policy instruments. Money supply leads to increased consumer spending and investment, which in turn boosts GDP and

results in increased demand and higher spending, translating into better standards of living. It is enough to stimulate the financial markets in order for the real economy to bounce back to balance. This system shifts attention to chasing profit, solidifies the philosophy of "money makes the world go round" and "real money is made on the stock exchange".

Monetarism glorified greed and instigated the passion for getting rich, reflected in the commercialisation of education, healthcare, social care, security, the prison system, etc., which deteriorated the social meaning of these areas of life. A common underlying rationale behind monetarism is reducing government intervention in the economy, a strong belief in the efficiency of market forces and the special role of financial processes. Monetarism as an ideology of radical capitalism is inherently contradictory to the principles of social market economy, the idea of solidarity and balance between the public and private interests, underpinning the European tradition [Komorowski, 2015].

The link between monetarism and inflation results from deepening disproportions between the financial and non-financial sectors and from a growing money supply in the long term. In figures and proportions we can see a complete dominance of the financial sector over the non-financial sphere, with a growing role of financial markets and institutions, and an atrophy of the real economy, known also as **"financialisation"** of the economy and society, observable in the accumulation of debt and living at the expense of future generations [Dembiński, 2009].

Monetary policy relies on an appropriate correlation of the rising money supply with the economic growth generated by an expanding financial sector. The current understanding of monetarism diverges from its original assumptions, which is a consequence of the recent economic policy experiences, financial markets regulation and supervision of financial institutions. The experience of different countries shows that monetary policy may come in various forms, ranging from the conservative and frugal variety geared towards the effect of a "strong currency" (Switzerland), to the one actively boosting the economy through *quantitative easing*, QE, observed in the US, EU and Japan. Highly leveraged banks provide capital to corporations which in turn strive to ensure the highest possible rate of return. The ultimate goal remains to increase asset capitalisation and maintain such interest rates which allow to continue investing and which can boost demand on the capital market. Maintaining interest rates which are attractive to investors and borrowers is of paramount importance, as they activate capital and encourage investment [Ostaszewski, 2013, pp. 72–74].

According to Deutsche Bank, boosting money supply to dozens and hundreds of billions every month using QE in the last ten years or so, has only slightly increased demand and investments in the real economy, it does not provide the multiplier effect

in the EU and is hard to halt [Durden, 2014]. Additional money turns into assets on the financial market which, just like a black hole, sucks in foreign capital. A long term trend of boosting money supply against GDP shows a downward trend, capital efficiency is falling, costs of debt service are rising, an uncontrolled debt accumulation takes place. Who can predict the consequences of creating empty money, inflated capitalisation and shattered relations in the real economy, when systematically more money goes to the financial sector or wealthy individuals holding assets whose prices are surging due to the QE policy, irrelevant of operational performance [Koijen, Koulischer, Nguyen, Yogo, 2021]?

Owing to the fact that domestic prices and GDP dynamics are difficult to compare between particular countries, it is worth looking at the biggest world economy which is the American economy. It is estimated that in the period since 2007, i.e. before the credit crunch in US, until now, liquidity measured by the quantity of money M1 has increased 30-fold – from about 700 bn USD up to 21 trn USD in 2022, which has been revised to 18 920 USD recently [Trading Economics, 2023]. Irrelevant of the monetary positions classified as the most liquid components of M1 aggregate, this growth is incomparably more dynamic than the economic growth[1]. According to statistics, in the same period US GDP grew at a 2–3% rate annually and reached 26.47 trn USD [BEA, 2023]. It should be stated that the Polish GDP has recently exceeded 3 trn PLN, which accounts for 750 bn USD.

The process of increasing money supply is under way also in non-banking sectors, where money is created under capital operations conducted by the same investment funds. In this situation share value increases in companies owned by the same investment group are added, irrelevant of operational performance. Increased capitalisation of global banks and non-banking institutions may look stunning. The biggest investment fund, Black Rock, which manages about 10.4 trn USD in assets, controls assets worth about 30 trn USD, the second biggest fund, Vanguard Group has assets worth 8.4 trn USD, which exceeds a joint capitalisation of all US stock exchanges [Lemke, 2022].

Trade in cryptocurrencies estimated at 3 trn USD concentrated in the biggest banks is an excess liquidity generator which winds up inflation. Moreover, the bitcoin, ethernum and several dozen less popular cryptocurrencies have been awarded a status of fiduciary money and their valuations are accepted on par with other financial instruments, ignoring their lack of supervision and low security levels, irrelevant of the fact that their value creation mechanism is very much like any Ponzi scheme.

[1] Notably, M1 aggregate has been extended with new forms of assets of the highest liquidity, on-demand deposits, traveller's cheques and other items.

Interdependence of the cryptocurrency market and inflation is very apparent. A fast rise in cryptocurrency capitalisations treated as financial assets boosts investor profits paid out in real money, which stimulates the creation of real credit and allows to avoid real taxation. The most appalling thing is that the financial supervision, rating companies and audit firms accept banks' engagement in this speculation. No wonder SVB bank collapsed within days of the supervisory body's positive recommendation.

Credibility of inflation ratios versus ways of measuring them

Inflation is measured in reference to the representative basket of consumer goods and services in a given country. Surveys of the changes in prices of goods and services conducted by the Central Statistical Office (GUS) in Poland are aimed at estimating the scale of price shifts in the economy. The output information is an aggregate price change index which is commonly interpreted as an inflation measure. In compliance with the applicable methodology, the index is created based on two sources of data. These involve the so called inflation basket, including households' spending on the purchase of consumer goods and services, established based on the studies of household budgets and laying a foundation for the system of weights.

The other stream of information involves the prices of consumer goods and services recorded crosswise, starting from the data obtained by statistical office pollsters at retail outlets, to the data collected remotely or coming from retail chains and intermediaries and their information systems. Prices are recorded on a monthly basis and they account for such features as: quality, capacity, ingredients, brand, type, model or manufacturer, which allows to eliminate marketing manipulation of price and product and helps cover legal changes and protection measures, in compliance with the standards followed by international statistical institutions [GUS, 2023b].

Apart from the average basket of household expenses, GUS studies statistical spending of employees, farmers, the self-employed, pensioners, social assistance beneficiaries and individuals engaged in non-commercial operations. For each group of consumers, purchase structure weights are created, based on the information obtained in the preceding year. As part of public statistics, a wide range of metrics is used involving the prices of particular product groups, such as agricultural produce, raw materials, construction materials, flats, etc. [GUS, 2023b].

Inflation ratios are elements of the integrated system of retail price statistics. They account for changes in trade like the development of retail chains and e-commerce. They also make use of modern information technologies to automatically retrieve and process information sources. This methodology constitutes an implementation

of the project conducted by a scientific consortium of GUS, PAN [Polish Academy of Sciences] and SGH [GUS, 2022].

A list of goods and services whose prices are subject to scrutiny is drawn up in such a way that the sample stays representative and changes in consumer behaviour are accounted for, including online purchases, the structure of retail sales, as well as the changing qualities and representativeness of products which lose or capture market share. For instance, in 2023 the scope of data used in calculating price indices in the segment of reimbursable drugs was extended. Data obtained from retail chains and through web scraping are highly detailed in terms of price indices of food products, cleaning products for home and personal hygiene products [GUS, 2023a].

Sometimes, emotions speak louder than statistical data, particularly when blatant price rises and speculation paint a subjective picture of the reality. In such circumstances, most people tend to question the official data. Yet, challenging the credibility of statistical data leads us astray, and drawing conclusions from mistaken judgements about reality is a dead-end street. The methodology and standardisation of inflation metrics used by GUS is fully reliable, objective and credible and it guarantees the comparability of findings. The only reservation is that findings are presented in relative numbers, mostly in per cent, which does not fully reveal the scale of the presented phenomena and makes it impossible to see true proportions.

Dynamics of the current inflation wave in Poland

Price indices of consumer goods and services grew in February this year as compared against the analogical period of last year by 18.4%, reaching the highest level during the current inflation wave, with prices of goods rising by 29.2% and those of services by 13.3%. In the following month of March the general inflation ratio fell to 16.2%, and in April to 14.7% [NBP, 2023a]. In the opinion of NBP experts, inflation will keep shrinking at a rate dependent on external circumstances, particularly on the rate of price falls in energy resources, supply chain stabilisation and inflation levels abroad.

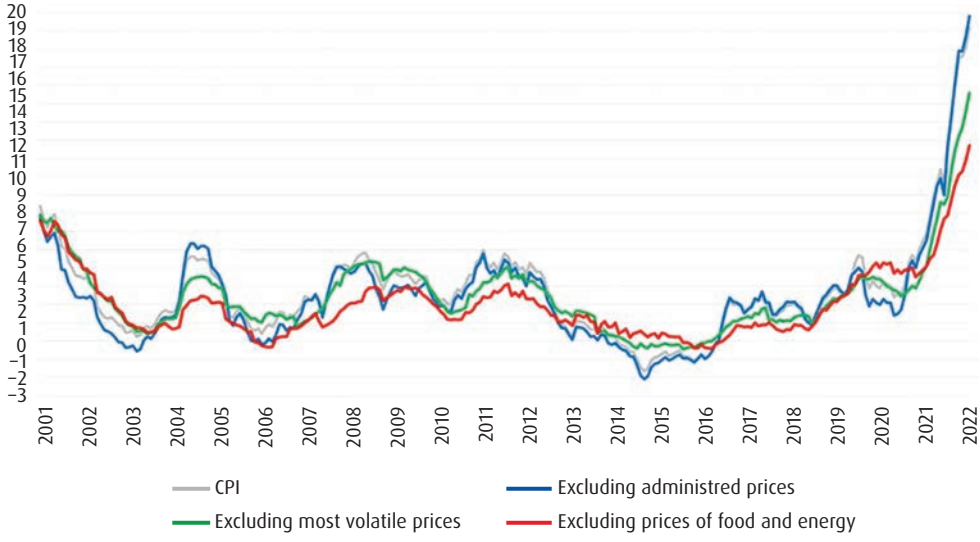
According to mainstream projections in Q1 this year inflation will reach 17.2% y/y, in Q2 it will drop to 12.8%, and in Q3 it will be down to 10.0%, only to hit 7.6% y/y in Q4. GDP projections show that this year inflation will amount to 11.9%, next year to 5.7%, and in 2025 to 3.5% y/y. According to NBP Polish GDP will increase by 0.9% this year, by 2.1% next year, and by 3.1% in 2025. Underlying inflation will keep falling at a slower pace, as it depends on financial processes and does not directly account for food and energy prices. Underlying inflation will reach 11.8% y/y in Q1 this year, in Q2 it will go down to 11.1%, to further shrink in Q3 to 10.0% and in Q4

to 8.4% y/y. The most serious premise of optimistic forecasts is a low level of government indebtedness, steady export dynamics and influx of foreign direct investments [NBP, 2023b]. One of the most vital internal inflation inhibitors is the falling demand which causes a negative output gap and gradually falling costs of labour. Some of the other inflation inhibitors may be expected as well, they include lower dynamics of the nominal pay, rise in real GDP or productivity, which will lead to lower dynamics of individual labour costs. The process is slow, but it may be stimulated by slashing interest rates. NBP assumptions in the context of EU and IMF forecasts are cautious projections [NBP, 2023b].

Direct causes of the current wave of inflation in Poland

In the last two decades Poland has been effectively controlling **internal inflation sources**, it has kept inflation low, which is believed to be a factor stimulating the growth of the domestic market, affecting also economic growth. After joining the EU our economy started to achieve a higher than regular economic growth rate. Budget discipline and assistance funds allowed to implement development programmes within the constraints of financial discipline and kept public debt under control. The cost-benefit analysis allows to state that infrastructural and social programmes, such as "Family 500+", have proved a success and have boosted the domestic market.

Figure 1. Inflation level in Poland in the years 2001–2022 (y/y, %)



Source: Kolany [2023].

The graph in Figure 1 presents elements affecting the scope of inflation structure. CPI index was marked in grey, inflation without administered prices was shown in blue, inflation excluding the most volatile prices came in green, and red was used for the inflation excluding the prices of food and energy. In the most general sense, it is believed that inflation is caused by the state of disequilibrium between supply and demand on the money market. The phenomenon is thus demand-driven because surplus demand for goods, including demand for money, leads to higher prices and higher cost of money, i.e. higher interest rates. An altogether different nature is that of the supply-driven inflation which is caused by rising costs, leading to rising prices of goods and services. The rising costs of raw materials, energy, wages, production etc. exceed the dynamics of rising labour efficiency. Practically speaking, there usually are mixed sources of inflation, both demand- and supply-driven, causing a structural inflation which involves simultaneous, mixed-intensity changes in the structure of demand and supply, triggering hard to predict retail price hikes on the market.

In stable conditions, positive extraordinary dynamics of trade exchanges, rising positions of capital flows and balance of trade with abroad boost business activity, tighten cooperation ties, increase exports and imports as well as investments. The resulting increase in wages and individual income translates into improved standard of living indices, nearing those of EU levels. This results in a longer life span, larger home spaces, higher number of cars, foreign trips, etc., which entails shifts in the prices of the basket of goods and services comprising in this situation a group of premium, luxury, imported goods. In the circumstances of a dynamic economic growth in Poland, increased consumption, investment programmes, demand for credit, and flow of foreign capital are the factors of boosting money supply in circulation and thus increasing the risk of inflation.

The general inflation level in Poland is affected by external and internal factors, also these not directly connected to money processes, and financial factors reaching our country by way of transmission, which proves that the economy is increasingly more dependent on the situation of the global financial markets. Due to an interdependence of these factors, it is difficult to characterise the impacts of specific factors on the process of inflation, yet the sequence of events triggering inflation may be precisely tracked, allowing to comprehend the dynamics of this phenomenon.

The situation of the current inflation as a serious and growing economic problem is owed to numerous non-financial factors. COVID-19 pandemic was a strong impulse for the inflation wave in Poland and worldwide. The pandemic which broke out at the end of 2019 quickly spread onto all continents. More than 700 million people were diagnosed with COVID-19 and over a dozen million died. It is estimated that since the beginning of the pandemic in Poland about 6 million people have been infected. In most countries the pandemic brought about an economic slow-down (of

about 3% of GDP) [Bogaczyk, 2022]. Business activity in many industries was frozen. The greatest losses were borne by the air transport, tourism, hospitality and catering industries. According to IMF the costs of the pandemic exceeded 12.6 bn USD [Stasiuk, 2022]. Falling budget revenue was accompanied by a significant rise in government spending on healthcare and social care, as well as subsidies and compensations for the incurred losses. This rampant inflation on a global scale quickly shifted onto other areas, starting from untapped production resources to the increase in global raw materials prices, exchange rates and prices of services.

Another strong inflationary impulse was the energy crisis. The depth of the crisis causing a deficit in energy sources is a result of several factors. Disruptions on the energy market were triggered by the policy of energy restructuring oriented towards zero emissions by 2050, including a reduction in fossil fuels, increased share of green energy from renewable energy sources (RES) and the development of electromobility. Implementation of EU energy restructuring programmes requires high outlays on developing renewable energy sources, reduction of hard coal and other fossil fuels.

The strength of the inflationary impulse was additionally enhanced by a short perspective of the programme implementation and acute costs of emission trading for industrial production. Trade in emission permits is speculative in nature, which affects the cost of the consumed energy. Investment outlays in the energy sector, resulting from coal mine shut-downs and abandoning fossil fuels, intensify the inflationary pressure. In Polish conditions, ensuring energy security requires the development of nuclear energy based on a cluster of large nuclear power plants and a network of small reactors. Generally, the EU programme is characterised by an unequal division of profits and costs received and borne by particular member states, it boosts inflation and poses numerous particularly harmful risks to the Polish economy in terms of growth dynamics and indebtedness.

An additional stimulus of increased inflation was the Russian aggression on Ukraine which started on 24 February 2022. Sanctions caused by this event led to a severe reduction in the imports of natural gas, coal and other resources and a termination of the economic cooperation with Russia, which caused a massive surge in the global prices of energy resources and disrupted trade exchanges in the following months of the continued war. This military conflict increased our country's expenditure on providing both military and economic assistance to Ukraine. It should be noted that we have seen an influx of millions of refugees who were granted accommodation, financial and material assistance, healthcare, education and social benefits at the levels enjoyed by Polish citizens.

Inflation was further amplified by a jittery reaction of demand after coal supply chains had been disrupted and Nordstream 1 gas pipe closed down, as well as by

a speculative behaviour in resources supply, causing disturbances on many commodity markets. Energy prices constitute a direct and major component winding up inflation ratios in Poland. They triggered a chain reaction of price hikes in the remaining consumer products and services. Internal pro-inflationary factors involve: rising costs of food and additional costs of imports of energy resources including indirect costs which result from using more expensive energy, ensuring the continuity of energy supplies and reserves as well as their sufficient levels in the economy. Stabilisation of the world demand and currently continuing price slumps of particular resources and consumer goods on global markets will expectedly lead to lowering inflation ratios.

Impacts of global inflationary factors

In an open economy there exist many channels of transmitting inflation from abroad onto the domestic market. During an international crisis they may negatively affect the national economy, triggering inflationary pressures and other unfavourable occurrences such as interest rate rises, lower the dynamics of investments, exports and employment, followed by higher government spending and debt.

The reason for anchoring internal sources of inflation, and at the same time its transfer channel, was the structure of economic links with abroad during the COVID-19 pandemic, which significantly halted exchange processes worldwide, as well as triggered a wave of public spending to cover direct costs of rescuing the economy and providing social protection. The other strong exogenous inflationary impulse was the energy crisis caused by a surge in the prices of coal, natural gas and other resources. Although both of these factors brought about profound consequences in the world economy, no multilateral actions were taken to curb inflation. The most important sources of inflation related to the functioning of the global financial system are as follows:

1) dominance of over three decades of monetarist thinking reflected in the financialisation of economic processes;
2) replacing the inflation goal paradigm in monetary policy with the paradigm of a sustainable eco-growth of highly developed economies;
3) effects of the financial system stability policy, leading to increased public debt;
4) widespread use of quantitative easing as a tool of monetary policy of central banks;
5) money creation, irrelevant of the assets held and the operational performance of non-bank financial institutions in capital groups and international investment funds;
6) high consolidation on the financial markets, affecting the financial asset valuation by market forces;

7) speculation markets, including cryptocurrency markets, boosting non-productive financial assets, and increasing speculation risks and joint capital costs.

An economy which is highly dependent on the market environment is more sensitive to cyclical trends in global markets. These threats should be anticipated as accompanying factors of financial relations and accounted for as elements in the network of mutual connections which determine the structure of cash and capital flows at home and abroad. Therefore, the policy of sustainable growth, diversification of economic connections and financial system stability and security serves the purpose of increasing the economic dependence on abroad and reducing the transfer of cyclical sources of inflation.

Even in an open economy the transition of inflation does not happen directly. Due to the nature and strength of connections, it flows through different channels, from dominant countries to the smaller, more dependent economies. There is a channel of transmission related to current trade settlements and currency exchange rates, and the channel of transmission connected to capital flows, including short term flows of speculative capital. As a consequence, inflation imported from abroad affects all entries on a given country's balance of payments via currency exchange rates. Strong financial flows between the Polish economy and abroad, including the euro zone countries and the America dollar areas, create a unique structure of economic links affecting the domestic currency's exchange rate, at the same time having impact on the pace of inflation transmission.

The pace at which inflation spreads results from the power of economic ties and patency of transmission channels. Market segmentation, product substitution, communication distance, just like all costs and administrative barriers constrain to some degree the flow of factors spreading inflation. **The anchoring effect** means that the exchange rate of the domestic currency may stay at a stable level if the internal inflation dynamics do not disrupt the structure of trade commitments towards foreign entities. This correlation is confirmed by an astonishing phenomenon of a relative stability of the Polish currency exchange rate, despite high internal inflation. It may be concluded thus that the anchoring effect, as a sum of all supply-and-demand factors determining the material structure of the exchange with abroad, stabilises the internal currency exchange rate in relation to leading foreign currencies, i.e. the euro and the American dollar, as well as against the other less prominent currencies.

It also implies a particular **inflationary gap** which prevents the money supply on the domestic market from rising, allowing for a stable zloty exchange rate until internal inflation does not shake up the structure of ties with abroad. For instance, the increase in wages in Poland, much lower than that in Germany or US, will not lower the zloty exchange rate until rising wages and individual incomes do not cause a slump

in productivity and competitiveness of Polish exporters. Further increase in money supply in relation to the productivity growth rate will weaken the anchoring effect of the currency exchange rate, fostering inflation transmission from the related countries and will activate foreign currency outflow channels, leading to the zloty depreciation and increase in domestic market prices.

Growing liquidity in the global circulation is confronted with the quality of the function of **fiduciary money** which relies on trust and is detached from commodity markets. A particularly high increase in liquidity could be observed after the COVID-19 pandemic had broken out, and then in reaction to the energy crisis caused by Russia's aggression on Ukraine. Most developed countries affected by the pandemic had implemented many financial rescue programmes in the form of tax reliefs, subsidies and bail-outs aimed at minimising losses and protecting the economy and the social sphere. It should be noted that the government intervention in that situation injected substantial rescue funds addressed at various social groups, aimed at helping them survive and limiting individual losses, thus not subject to efficiency assessment, which to date had not always prompted any inflationary effects. During the time of the pandemic, many instances of falling prices, sluggish demand and growing savings could be observed. Therefore, the direction of inflation transmission is determined by **the inflationary potential** which is measured by the ratio of money in circulation to GDP value.

In a global perspective the world money supply in January 2023 grew to 165 trn USD, and the global GDP to 95 trn USD. Irrelevant of any reservations about the methodology of creating this aggregate, global liquidity significantly exceeds global productivity. These are the dynamics that greatly outpace the estimated increase in the global GDP [Geever, 2023]. In a similar way, the money supply in OECD countries was growing in relation to GDP. The analysis of the above mentioned proportions reflecting the inflationary potential indicates that the economic situation in Poland looks very optimistic. The phenomenon of a faster rise in money supply in relation to GDP is a result of central banks using **quantitative easing** to boost the economic situation. It proves the priority of the economic stability paradigm over the paradigm of the inflation target and money supply stability as applied in decisions concerning the economic policy of a country, while selecting the tools of such a policy implementation. Expansive QE policy, going beyond the inflationary gap, gradually leads to an excessive level of public debt and reveals the weakness of the financial system based on fiduciary money which loses the monopoly of conducting settlements on the territory of a given country, and at the same time is treated as an instrument of external expansion. All of that gives rise to the process of currency depreciation and loss of trust towards this currency, which in consequence leads to searching substitutes for particular money functions.

Fighting inflation in the economic policy of the country

Inflation poses a challenge to the central bank and government administration which tend to prioritise curbing inflation and minimising its impact on social and economic processes. The level of inflation, due to its negative consequences, raises the importance of this problem in the economic policy of the country. The sources and results of this situation affect the choice of anti-inflationary policy instruments. Fighting inflation is one of the many, often contradictory, priorities in the economic policy of the state and it relies on the belief that preserving economic growth dynamics, continuing investment programmes, maintaining a growing consumption with high employment enhance the balance and help reduce this negative phenomenon. Anti-inflationary policy is based on a separation of the real economy from the financial system and correctly assumes that the development of the real economy will reduce disruptions in the monetary processes which are caused mostly by external circumstances. The current anti-inflationary policy is completely different than that of the '90s, due to diverse causes and circumstances of the inflationary situation. The period of the radical systemic transformation of the '90s was the time of switching to the market economy and establishing democratic state institutions in extremely adverse circumstances of rampant inflation, deep economic crisis and zero competitiveness, unemployment and lack of experience in management and conducting the economic policy of a free market economy. Currently, the economy operates in fundamentally different conditions and is largely dependent on external factors.

Important tools for fighting inflation are subsequent updates of the anti-crisis shield of 2020, accounting originally for 212 bn PLN, earmarked to protect the social and economic sphere in five key areas, comprising a package of selective instruments aimed at minimising negative consequences of COVID-19, later extended to cover the consequences of rising prices of coal, gas and electric energy, as well as the consequences of a downward trend in many industries, including problems in agriculture caused by the prices of fertilisers and imports of agricultural produce from Ukraine. As estimated by the Ministry of Finance, the component of the anti-crisis shield, only due to the zero VAT on food products, slashed each family's expenditure by an average of 518 PLN in 2022. These solutions, just like tax reliefs, are anti-inflationary and pro-growth and were met with approval due to the fast and determined government reaction, if needed they may be extended till the end of 2023 [Business Insider, 2023].

Company management in the conditions of inflation

When faced with a currency erosion, companies naturally seek to steer clear of the problem. Efficient business administration is about achieving goals, keeping operations stable and boosting resilience to inflation. The simplest solution seems to be focusing on refining products and streamlining business operations which will lead to increased sales, larger margins, improved bottom line and reduced costs.

As a matter of fact, inflation is in some way related to the crisis mechanism in the real economy. In favourable conditions, just like during a crisis, inflation keeps expanding its reach to affect ever new industries of the economy. The inflation wave is provoked by various price impulses which make consumers and entrepreneurs respond pre-emptively in order to limit own losses by quickly raising the prices of goods and services. In the perspective of the entire economy, this may lead to payment bottlenecks and liquidity disruptions, which disarrays the trade exchange process. Deteriorating financial performance lowers credit ratings and raises financing costs. As a consequence, the inflationary spiral winds up the economic crisis. The costs of crisis and recovery are borne both by the economy and the society.

Entrepreneurs tend to treat inflation as an objective circumstance, expedient and temporary, focusing on searching ways of cutting costs and other expenditure. First, marketing activities are undertaken in sales and procurement, looking for cheaper substitutes, negotiating better deals with suppliers, juggling payment dates, etc. It should be noted that these efforts do not halt inflation, but constitute a way of passing the inflation burden onto others. This causes spiralling prices, with everyone shifting up to higher price levels, and leads to inflation consolidating and expanding its reach, which leads to a turbulence on the market. In order to encourage companies to try and limit the negative impacts of inflation, one must understand that for business units inflation is in principle an external circumstance.

Business actions aimed at increasing resilience to inflation

These are some of the most vital steps companies can take to counter inflation impacts:

- price reviews accounting for increased costs of goods and services and allowing to maintain margins;
- financial discipline, reserve activation, cutting fixed and direct costs, liquidity management;
- focus on increasing efficiency and asset productivity;
- pre-emptive actions and diversifying operations, sources of income and supply;

- reducing dependence on consolidated suppliers and recipients;
- use of clearing, swap deals and mutual commitment compensations to achieve lower monetary engagement;
- stabilising liquidity through various forms of long term cooperation and use of futures contracts, options and derivative instruments;
- focusing on product development and market diversification through investments, innovation and encouraging employee initiative and creativity;
- cooperating with the public sector and administration to fight inflation, employing various instruments to mitigate inflation impacts;
- reducing the costs of energy impacts by using photovoltaics and heat pumps.

As costs of manufacturing and supply prices keep going up, entrepreneurs review operating performance and raise product prices in an attempt to shield their margins. They look for ways of cutting costs by negotiating better terms of trade with suppliers, streamlining operations or automating processes. They hope these measures will help them maintain targets and financial stability, and consequently continue operations and avoid dropping out of the market. Pre-empting inflation impacts creates room for **speculation** and profiteering. In recent months, speculation was observed in the prices of butter, sugar, meat, oil, mayonnaise, as well as coal, cement, artificial fertilisers, etc. For instance the retail price of sugar in 2022 increased to 9–10 PLN/kilogramme with the cost of production amounting to 1.3–1.6 PLN/kilogramme and overproduction reaching high levels. Annual sugar production in recent years has hesitated between 2.1 and 2.3 million tonnes. Domestic sugar consumption is at 1.1 million tonnes and is also complemented by exports of this commodity reaching 0.6 million tonnes. Every year there remains a surplus stock of 0.5 million tonnes [Money.pl, 2022; Szymańska, 2022]. In this situation, speculation which disturbs the market and escalates prices may be recognised as a form of economic hooliganism, offering short term profits to its initiators, but a serious image harm to sellers and market intermediaries. Another example of operations which wind up the inflationary spiral may be the retail price of raspberries (announced as promotional) at 6.99 PLN per 125 grammes, which adds up to 55.92 PLN/kilogramme, when the purchase price stood at 5 PLN/kilogramme. Greed in seeking profit seriously undermines the declared social responsibility of business, shatters distributor credibility, tarnishes customer trust and loyalty, shrinks the market potential, as well as diminishes other factors of social capital[2].

[2] The promotional price offer for raspberries at popular discount retailers in July 2023 indicates that the so called regular retail price is even higher.

There are three key types of strategies applied by businesses which want to mitigate negative impacts of inflationary processes.

The first type is a strategy of a direct response to inflationary processes and limiting their negative impacts. The approach involves actions geared towards minimising negative impacts on businesses by managing money resources, thus it is quite superficial and short term, producing immediate and limited effects. In this strategy the main goal is to mitigate the risk of losing financial liquidity resulting from the upset balance of short term settlements of current liabilities, which in extreme cases may cause a company to go bust. Therefore, during the time of inflationary threats business entities try to focus on building a solid cash reserve which may help them wither throughout the price turbulences, economic slowdown or unexpected expenses due to higher costs of procurement. The main tool employed for this approach is managing cash flows.

Large companies, running diversified operations on multiple markets, in order to enhance their position may employ financial engineering instruments such as futures contracts, options and derivative instruments which offer some shield against inflation. The strategy calls for great reliability of managers as it directly affects relations with the company's stakeholders. It should be noted, though, that this widely accepted and appreciated way of responding to inflation in reality boils down to passing the cost burden onto business partners, suppliers, subcontractors, intermediaries etc., and ultimately affects clients and the entire society, which encourages acceleration, entrenching and spreading of inflation in other areas. A visible sign of employing this market strategy may be **speculation** on commodity markets.

The second type of strategy is meeting the challenge of conducting deeper changes which may neutralise the inflationary impacts on businesses. These involve a programme of increasing productivity and efficiency by streamlining business organisation processes, innovation and adopting appropriate market strategies to match what is necessary and suitable in a given market situation of the company. The inflationary rise in the cost of labour may become an impulse driving business process optimisation and automation. This is a strategy of neutralising market price rises by generating value added in companies. It allows companies to survive, retain their market positions and mitigate the effects of inflation on their falling value, at the same time helping curb inflation at a macroeconomic level. Important instruments in this type of strategy are, on one hand, refining internal business management using the method of flexible budgeting, and on the other, empowering organisational business units with the method of profit centres.

The third type of strategy involves striving for market expansion and competing for the market leader position in terms of product appeal, market share and financial

performance. This strategy can ensure a relatively high resilience to inflationary processes which are treated as secondary and extrinsic circumstances. A strong market position, diversified operations and sustainable growth offer market leaders this kind of competitive advantage which allows them to wither through difficult times on the market and withstand various financial turbulences. Entrepreneurs can then focus on boosting efficiency and productivity of their companies, investing in new technologies, training employees and refining their management practices. Their dominant position helps them make it through the inflation periods unscathed, which will protect the generated margins at an operational level, and at the same time allows to adjust EBIT sharing at the corporate level, so that they can continue implementing investment programmes and spending on research and development also in an inflationary environment.

The best tool to support management is flexible adaptive budgeting which accommodates inflation understood as an imperfect form of money. Budgeting helps managers plan, manage, control processes and settle payments in the material sense. The method also allows managers to identify inflation-sensitive areas in the manufacturing process and to search most efficient solutions. The process of budgeting, when supported by information technology, allows to use procedures governed by the flexible strategy and high discipline of centralised expenditure as well as by a tight control of receivables and payables. The cycle of budgeting divided into short periods, irrelevant of inflationary processes, allows managers to track real efficiency versus tasks set, avoid tensions, maintain planned productivity, etc. Budgeting serves the purpose of identifying divergence and rectifying errors, which improves overall control of the use of resources and company's finance. In general, flexible budgeting ensures real time company adaptation, target review and task updates according to the changing conditions.

In **adaptive budgeting** which uses risk assessment and non-linear co-dependencies between variables, an important role is played by analysts responsible for flexible management processes, thanks to whom costs may be brought down, cycles made shorter and general business performance is enhanced. Flexible budgeting combined with profit centres takes employee activity and management quality to new levels. Profit centres are not merely about enforcing accountability and assessing results at lower ranks of the company hierarchy. The most important aspect is delegating decision-making and teamwork participation, which boosts engagement, creativity and the sense of pursuing meaningful tasks which matter to everyone. In the management area which is made into a separate profit centre, the functions of internal sales, flow management and work time management are activated. These factors, optimised with a view to obtaining a particular margin, constitute the strongest premise of higher efficiency and arriving at the expected outcomes. It is vital that at the operational level,

in profit centres, a joint margin can be worked out which covers the components of **EBIT** provided for at the corporate strategy level. Through better precision, pace and efficiency as well as employment of advanced technologies, modern budgeting helps managers anticipate risks and assess the real situation, provides better development opportunities, ensures technological and organisational progress and expansion, as well as reduces negative impacts of inflation.

Cash flows as a tool of mitigating inflation impacts on business

Inflation is usually observed in a short term perspective. When inflation exceeds the level recognised as natural for a given economy, such as is the case now, its further rise or fall triggers immediate adaptive reactions which put the entire economy on a new track. Financial liquidity is commonly understood as the ability of a business to generate financial flows of such amounts which allow for a smooth settlement of this business's liabilities. Inflation, as an external occurrence, bringing about the erosion of the money function, can seriously disrupt any company's liquidity management. The purchasing power of revenue changes, there occur unexpected expenses, receivables come delayed, deficit in expected receivables increases, prices, as well as costs of procurement and financing rise. Disrupted liquidity affects the real sphere of business operations, further messing up supplies, causing a loss of goods, increased costs, work stoppages, contract cancellations, etc.

A company is known to be financially liquid when it, without major trouble and disruption, can make the necessary payments and meet its contractual commitments in time, as well as is able to cover unexpected cash expenses related to the current business operations. A financially liquid company settles its accounts without delay and without incurring additional costs and losses which could occur, should the company appear unable to timely meet its liabilities.

In the practice of corporate finance management, the problems of financial liquidity are usually considered in their narrower sense. In principle, it is believed that the mechanism of creating cash flows is an instrument of managing company liquidity, including the management of monetary assets and other types of financial assets characterised by a high level of liquidity. Consequently, this area is the responsibility of the company's accounting department and deals mostly with managing monetary assets, i.e. cash.

Financial liquidity is a prerequisite of the company's survival. It is a fairly obvious statement, as a company is unable to continue doing business if it cannot generate a sufficient revenue to cover its operational expenses. A company, just like any other entity or a household, cannot operate smoothly if it is unable to pay its bills in time,

settle tax liabilities, pay rent or lease, settle energy bills and other payables. If a company does not meet its commitments, any creditors who do not receive their amounts in time may apply to the court to order such a company to file for bankruptcy. This remains also a duty of the management board.

Liquidity problems can seriously harm the company's ability to do business, increase financial costs and prevent independent decision-making as well as make it impossible to grab convenient business opportunities as they present themselves. The main management goal here is to control the liquidity risk, shortening the financial cycle and maintaining the ability to meet short term liabilities at the time they are due [Journal of Laws 1994 N o.121, item 591, Art. 45.2.3, and more].

A more thorough financial liquidity analysis requires selecting appropriate indicators and evaluating the following:

1) detailed characteristics of free cash,
2) increase in current assets,
3) dynamics and relation of receivables to payables,
4) creditworthiness and debt service characteristics,
5) increase in own working capital,
6) rotation of stock and the settlement the cycle of payables and receivables (the financing cycle).

A company derives many benefits from its payment liquidity, in particular it enjoys a free choice of optimal solutions and does not incur any additional costs, it has the ability to accommodate external circumstances and grab opportunities, as well as take advantage of a stronger bargaining position. Thanks to a free choice of payment terms it can minimise financing costs and settle liabilities before their due dates to enhance financial performance, which at the end of the day builds the reputation of a reliable business partner and customer.

Deterioration or loss of liquidity may result in:

- reducing the freedom of rational choices and autonomy in decision-making;
- stepping-down payment terms, including requests for upfront payments, guarantees or cash payments;
- having to apply for delayed settlements of liabilities;
- difficulty acquiring additional, increasingly more expensive sources of finance;
- necessity of selling assets in order to obtain cash;
- making the company exposed to a loss of credibility;
- higher dependency on other entities which may lead to insolvency and consequently to bankruptcy.

Maintaining financial liquidity is about coordinating the structure of monetary revenue and expenditure in time. The company must adjust the volume of its expenditure

to the level of its revenue. If there is no difficulty maintaining the necessary level of liquidity, it may be assumed that the company enjoys a freedom of making financial decisions which are the decisions resulting in an inflow or outflow of money in the conducted transactions. These decisions, resulting from rational choices uninhibited by the ability to pay, may be called autonomous. Inflation may lead to a necessity of replenishing funds from other sources, which makes companies dependent on other external entities and may result in limiting its freedom of choice. Using the information on short term cash flows can help determine monetary amounts necessary to ensure the continuity of business operations. It involves the analysis of the most urgent cash requirements according to the cash flow forecast based on the record of expected expenses and a short term sales projection [Bielawska, 2009, p. 74].

Managing corporate liquidity in the inflationary environment

Next to rising purchasing prices and costs of labour, inflation may lead to a jeopardised financial liquidity of companies through an accumulation of **payment bottlenecks**, i.e. financing with liabilities towards trade partners and delaying settlement dates. Companies frequently become not just victims, but also perpetrators of payment bottlenecks in the situation of a limited financial liquidity and expensive bank credit. These negative occurrences are caused by delayed payments, extortion of trade credit or forced extension of settlement dates in the situation of high inflation, falling liquidity or high cost of money on the market. Deterioration of the business environment may be caused by banks reducing the availability of credit or the existing administrative constraints. As a consequence of high interest rates, companies are incurring additional costs of financing related to maintaining liquidity, dealing with higher interests, incurring losses resulting from overdue settlements or additional costs of debt enforcement procedures. Low level of liquidity, just like a limited access to capital, is of high significance to the company's rational decisions and competitive potential as it hampers its freedom of managing own assets and tapping into the available business opportunities. Inflation and major price and cost fluctuations in particular may be used by some entities to accumulate the surplus of monetary assets which are insufficiently utilised by the inefficient financial system [Wreston, Brigham, 1997, p. 792].

This effect of inflation encourages liquidity management modelling which concerns managing short term money supplies as well as receivables and payables in the context of a given industry. The first step to the practical application of certain regularities in this area of business operations is appointing a team of specialists or an organised multi-layer service group to manage financial liquidity, expenditure discipline, dates of payment, etc. in connection with liquidity reserves so that a potential surge

in operational and financial risk can be countered. The team may participate in sharing the achieved surplus. Managing a company's liquidity is virtually about managing the working capital as a valuable, absolute measure of financial liquidity complemented by liquidity ratios expressed as relative measures. It specifies the amount being the liquidity limit, the level up to which a company conducting business operations may increase its current liabilities, without harming its liquidity. Due to the possibility of replacing current assets with cash, the amount of working capital[3] is determined by the scope of substitution and complementarity of its components allowing to maintain the intended level of liquidity. This category may be represented by the following formula:

working capital = current assets – short term liabilities.

What matters most is pragmatism in setting business goals. Company management which does not have clearly defined tasks and an effective strategy is unable to manage an international corporation. Goals which account for inflation allow to develop a realistic strategy aimed at maintaining a balance ensuring the optimal level of performance, at the same time retaining control over efficiency and profitability.

There is a close correlation between achieving business goals and maintaining balance which can reduce the financial and operational risk, protecting against overinvestment and loss of liquidity. A balanced business is more efficient, can make better use of the resources and eliminate less productive decisions. As the main purpose of a business is to make profit, which is facilitated by efficient cost management and production optimisation, watching and maintaining business balance is of utmost importance.

Employing profit centres in business can help streamline business administration, flexibility and efficiency in the inflationary environment, allowing to include lower managerial ranks in the decision-making. **Profit centres** are elements of creating organisations and allow to segment activities in separate units to be better managed through allocating selective goals to their employees and management in the context of engaging funds, financial performance and reducing non-profitable operations. This also helps organise efficient controlling, implement self-organisation and adopt accountability for costs and time of implementing tasks.

Budgeting a company is a foundation of management which comprises all result-oriented areas of operations. The system of budgeting supported with infor-

3 Working capital is understood as a difference between the value of monetary assets, receivables and inventory and short term liabilities.

mation technology integrates the procedures in all areas related to decision-making. It assumes companies should be steered using a few variables encompassing tasks, revenue and expenditure, task timetables linked to cash flows, accounting and motivational systems. Repeated cyclical stages of planning, implementation and control aimed at updating and reviewing tasks in the changing business environment are used to adjust spending to the current needs and potential of the company. It allows to focus on plans and details of their implementation at an operational level, which calls for collaboration at every stage of the budgeting process and helps communicate in the inflationary environment.

Recommendations for SMEs operating in the inflationary environment

The most important recommendations for the SME sector business units operating in the inflationary environment may be summarised in the following points:

- tap into the opportunities offered by public help;
- evaluate the possibility of improving sales and boosting revenue;
- analyse the financial indices of reserves and areas of risk;
- take steps allowing to retain the existing customers and win new ones, start collaborating;
- consider flexible changes in the organisation, use the Internet and automation;
- conduct a cost review, cut operational expenses, maintain margins;
- search diversification options;
- protect your cash, delay spending, use credit options offered by suppliers;
- control debt and tap into rescue packages offered by public assistance.

There are many ways in which entrepreneurs can minimise negative impacts of inflation on business performance. In the case of larger companies some protection against inflation and its consequences may be offered by: the purchase of real property, currency protection, asset securitisation, inflation-indexed bonds, futures contracts and derivative instruments. However, at any one time the inflationary burdens may be replaced by other forms of risk. The safest solutions to be applied for that are:

- diversification of the product offer and areas of operations aimed at reducing the dependence on certain situations in a given market by expanding into new industries or sectors;
- product differentiation and creating new channels of distribution to extend the business range and win new clients;
- shortening the financing cycle and diminishing the engagement of current assets through high discipline of settlements as well as developing swap deals and clearing.

It is also vital to invest in soft assets of the company, i.e. training, developing skills, creativity, partnership and employee accountability, as well as in digitalisation which will lead to higher quality of management, more flexibility and an improved bottom line. Inflation, thus, requires increased discipline and readiness to manage a company in the conditions of a crisis. Perfecting liquidity management, controlling and budget discipline with a view to eradicating negative consequences of inflation are key. It is about making sure that inflation which disturbs business operations anyway, will have a minimum possible stifling effect on the companies' development opportunities.

Summary

Inflation is perceived as a situation of rising prices caused by the excess money supply. Less frequently it is viewed through the lens of long term processes of depreciation and money function erosion, which result in economic imbalances. Information about inflation is not sufficient to pass a judgement about the economic situation, it is only by observing the global financial markets that the structural sources of inflation can be better understood.

Special measures are needed for companies to comprehend inflation fully and be able to mitigate its negative impacts. Clashing interests of particular groups of entities are the source of numerous tensions. There are also many beneficiaries of inflation. Postulates of bringing inflation down in a short term by raising interest rates, lowering wages, rescue packages and social spending, in reality cater to the interests of the financial sector, ignoring the social costs of such policies.

Freezing public spending, raising interest rates, reducing credit action, etc. are all measures which are hard to accept and basically ineffective, particularly when the inflationary stream is external, systemic and long term. In such circumstances prioritising the goal of curbing inflation at any cost may translate into slumping economic growth dynamics and surging unemployment.

Irrelevant of the intensity and sources of inflation, effective ways of fighting it involve a collaboration between the central bank, the government and the other stakeholders as well as a confrontation with external sources of inflation, transmitted through the channels of product and service exchange with abroad.

When the ability to control external sources of inflation is limited, the focus should go to the factors of competitiveness and economic growth. Acceptance of the current inflation indicates that the paradigm of sustainable growth is given priority over meeting the inflation target. In this situation, what seems paramount is the

stability of the financial system, ensuring economic growth and maintaining a high level of employment.

Anti-inflationary policy should be based on an external equilibrium, i.e. on domestic growth-neutral factors, liquidity of settlements, exports dynamics and capital flows with the environment. This will allow to continue economic trends and minimise economic losses due to lower transmission of external inflation sources.

Conclusions addressed to business entities, mostly to large companies in CEE, are mostly relevant and up-to-date owing to their economies' structural similarities and may be implemented in this region. They relate to the following aspects:

1) monitoring the economic consequences and threats caused by lingering inflation, surging prices of energy, goods and services, rising costs of labour and credit, limited liquidity, widespread high prices and payment bottlenecks;
2) impact of inflation on sales volumes, revenue, financial settlements, assets and capitals of companies;
3) assessment of the rationality of adaptive practices of companies in their operating, investment and financing activities in the inflationary environment;
4) review of ways of mitigating negative inflation impacts on business relations and performance, including cash flow management, collaboration inside industries, monitoring free resources, using settlements as compensations, swap deals, clearing, adjusting investment projects to new conditions, etc.;
5) set of procedures in decision-making, building business relations and financial discipline in disrupted business circumstances caused by inflation.

An adequate solution which can bring about ant-inflationary effects is the implementation of an anti-crisis shield along with a wide range of economic policy instruments – not just fiscal and budget policies, but also these geared towards supporting businesses by offering investment incentives and technological transfers. Economic growth, including investments and infrastructure modernisation, energy sector consolidation, supporting exports, innovation and energy transformation, small entrepreneurship and individual home construction, boosting entrepreneurship and developing individual industrial, agricultural and construction initiatives are all efficient ways of fighting inflation.

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SUSTAINABLE DEVELOPMENT AND ESG – CONDITIONS, CHALLENGES, GOOD PRACTICES

DOI: 10.33119/978-83-8030-625-7.2023_291_324

Abstract

The aim of the paper is to provide the representatives of business, administration, and science with an easily accessible compendium of knowledge about the implementation of sustainable development in social and business practice as well as in ESG (*environmental*, *social*, *governance*) reporting. The paper presents the most important aspects of non-financial reporting, climate policy, sustainable financing, supply chain management, green competencies, social and environmental aspects of green transformation, and corporate/organisational governance. What is more, it describes the current conditions of sustainable development in Central and Eastern European (CEE) countries as well as outlines the challenges to making sustainability really happen. Additionally, the paper presents some good practices in ESG implementation. A significant part of the paper is constituted by a tabular summary in which crucial conclusions and recommendations are set out in brief. Despite its relative complexity, the topic is dealt with concisely, due to the publication limits and a business-like form of the paper. Therefore, to get a deeper insight into the sustainability problems and ESG, the reader is encouraged to use the extensive bibliography provided at the end as a reference for further study.

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Sustainable development and ESG (*environmental*, *social*, *governance*) are nowadays some of the most popular concepts of the social and economic life. Although sustainable development rests on high ideals and addresses real existential threats to the global community, it frequently gives rise to many misunderstandings and is sometimes treated merely as a marketing stunt (see: *greenwashing* or *warwashing*). In the light of the above this paper aims to:

- provide a reliable compendium of ESG knowledge to the representatives of administration, science and business;
- outline key aspects of ESG which should be noted by every participant of social and economic life;

- summarise key challenges facing Polish business in terms of sustainable development reporting;
- present good practices of ESG implementation in Poland and other CEE countries.

Sustainable development reporting

Non-financial reporting (sustainable development reporting, sustainable reporting, currently – ESG reporting) means companies communicating and acknowledging their accountability for the impacts they bring to the environment, economy and people [GRI, 2013]. The idea of sustainable reporting started to grow dynamically towards the end of the 20th century, but it reached CEE countries a little later. In Poland the idea caught on at the beginning of the 21s t century – the first such report prepared in accordance with international guidelines of the Global Reporting Initiative (GRI)[1] was published in 2006 by the Polish Telecommunications. Significant changes have been observed in this area over the last 20 years, both in terms of the number and quality of the reports published on sustainable development. The changes have taken place in response to the rising market expectations concerning ESG data disclosure, as well as increasingly stricter regulations.

GRI guidelines, due to their pioneering nature, comprehensiveness and regular updates have become the most recognised and most frequently chosen standards of sustainable reporting. At the same time, a rising number of report publications on the market have been accompanied by more available guidelines, standards and regulations. The paper *Carrots and Sticks. Sustainability Reporting Policy: Global Trends in Disclosure as the ESG Agenda Goes Mainstream* of 2020 studied 600 law provisions from 84 countries referring to sustainable development reporting, both mandatory and voluntary. The highest number of regulations, over 20, were created in Great Britain [Lugt, Wijs, Petrovics, 2020]. As a result, the market got a bit chaotic with many different ways of sustainable reporting, posing a challenge not only to the reporting entities, but equally to the recipients of these materials. The following aspects were ambiguous:

- **using a different range of problems in particular standards and guidelines** or diverse classifications of problem areas, which made it impossible or very difficult to compare results between standards;
- **adopting various measures and/or indicators** disclosed in accordance with the corresponding standards, which made it only possible to analyse results in time

[1] Cf. GRI [2023].

just for one organisation, simultaneously making it impossible or highly difficult to compare results between organisations employing different standards;

- **discrepancies in the reporting process, mostly in terms of defining the data** included in the report, resulting in the disclosed data scope, even for companies of a similar scale of operations in the same industry, being finally diverse.

One of the trends in sustainable reporting was integrated reporting which started in 2013 (following the guidelines of the International Integrated Reporting Council, IIRC) and focused on the investor perspective by indicating how the organisations collaborated with their environments and used various types of capital to create, retain or reduce value over a short, medium and long term [IR, 2013]. On the other hand, the trend of climate reporting which originally developed through soft guidelines (according to the recommendations of Task Force on Climate-Related Financial Disclosures, TCFD) responded to the growing understanding of the climate crisis as a key global threat [Edelman, 2023] and was finally incorporated into the framework of hard EU regulations (CSRD and ESRS).

The EU law-making in terms of sustainable development reporting was initiated by the Non-Financial Reporting Directive, NFRD, of 2014. Soon it became apparent that the directive provisions were insufficient (the reporting obligation was applied to too few companies; regulation provisions were overgeneralised and did not include any indices; no external verification of reports was required). What is more, contrary to market expectations, NFRD did not significantly affect the number of reports published as well as the quality of the disclosed data. Overgeneralised regulatory provisions along with a lack of external verification had caused many companies to focus merely on meeting basic reporting criteria and publish a minimum scope of data (in some cases NFRD led to a decreased report quality).

Therefore, NFRD had been replaced with a more demanding Corporate Sustainability Reporting Directive, CSRD, adopted in December 2022. The directive is accompanied by the European Sustainability Reporting Standards, ESRS, which include a precise scope of quality and quantity disclosures, and together with other provisions such as the independent external verification obligation, constitute a response to the previously identified weaknesses of NFRD.

In 2019 the Sustainable Finance Disclosure Regulation, SFDR, was adopted, which imposed the obligation of transparency on financial market players and financial advisors concerning potential threats to sustainable development by encouraging sustainable investments, which indirectly motivated other non-financial sector entities to disclose their ESG data.

Table 1 presents a synthetic comparison of key guidelines and regulations on ESG disclosures.

Table 1. Comparison of key standards and guidelines for ESG disclosures

	GRI standards	IIRC guidelines	NFRD directive (2014/95)	TCFD recommendations	SFDR ordinance (2019/2088)	CSRD directive (2022/2464)	ESRS
Type of document	standards	guidelines	regulation	guidelines	regulation	regulation	standards
Effective date	first version of guidelines (G1) – 2000, standards last revised in 2021*	2013 (revised in 2021)	2017	2017	2021	2024	2024 (publication)
Addresees	each organisation interested in sustainable reporting, guidelines mainly directed at business representatives	companies willing to demonstrate their integrated approach to management and reporting to stakeholders, particularly to investors	large public trust entities, large listed companies	each company wishing to present climate disclosures	financial market players and financial advisors	large public trust entities, as of 2025 all companies employing over 250 workers, as of 2026 listed SME employing over 10 workers	in compliance with CSRD
Obligation to apply (number of entities included)	voluntary	voluntary	obligatory (EU: ca. 11–12 thous and; PL: ca. 200–300)	voluntary	no data available	obligatory (EU: ca. 40–50 thousand, PL: ca. 3500)	obligatory (in compliance with CSRD)
Scope of ESG disclosures	"E" (materials, energy, water and sewage, biodiversity, emissions, waste, environmental score of suppliers); "S" (employment, work relations, work safety, training, diversity, non-discrimination, freedom of association, child labour, forced labour, endogenous people, local communities, social score of suppliers, public policy, health and safety of customers, marketing and labelling, customer privacy); "G" (governance, ethics, corruption prevention)	"E" (natural capital); "S" (human capital, social and relational capital, intellectual capital)	"E" (environmental concerns, policies and risks); "S" (social and labour issues, human rights, diversity policy, policies and risks); "G" (corruption prevention)	"E" (climate)	"E" (environmental concerns); "S" (social and labour issues, human rights); "G" (corruption prevention)	"E" (environmental factors, climate); "S" (social and labour issues, human rights, diversity policy); "G" (management factors, governance)	"E" (climate change, pollution, water and sea resources, biodiversity and ecosystems, use of resources and circular economy); "S" (employment, employees in the supply chain, social environment, consumers and end users); "G" (business practices)

* Until 2016 GRI had published guidelines on sustainable development reporting. In 2016 the fir t version of GRI standards was published.
Note: mandatory regulations are marked in grey; SME – small and medium-sized enterprises.

Source: self-reported data.

Sustainable development reporting in the CEE region

NFRD publication was a breakthrough moment in the history of sustainable development reporting in the EU, as it was the first time such a regulation had been extended to all member states. However, the analysis of non-financial reports published in the years 2016–2020 in CEE countries (excluding Montenegro) maintained in the Corporate Register[2] does not account for the rising trend of sustainable reporting (Table 2).

Table 2. Number of non-financial reports (including those subject to external verification) published in the years 2016–2020 in CEE countries available in the Corporate Register*

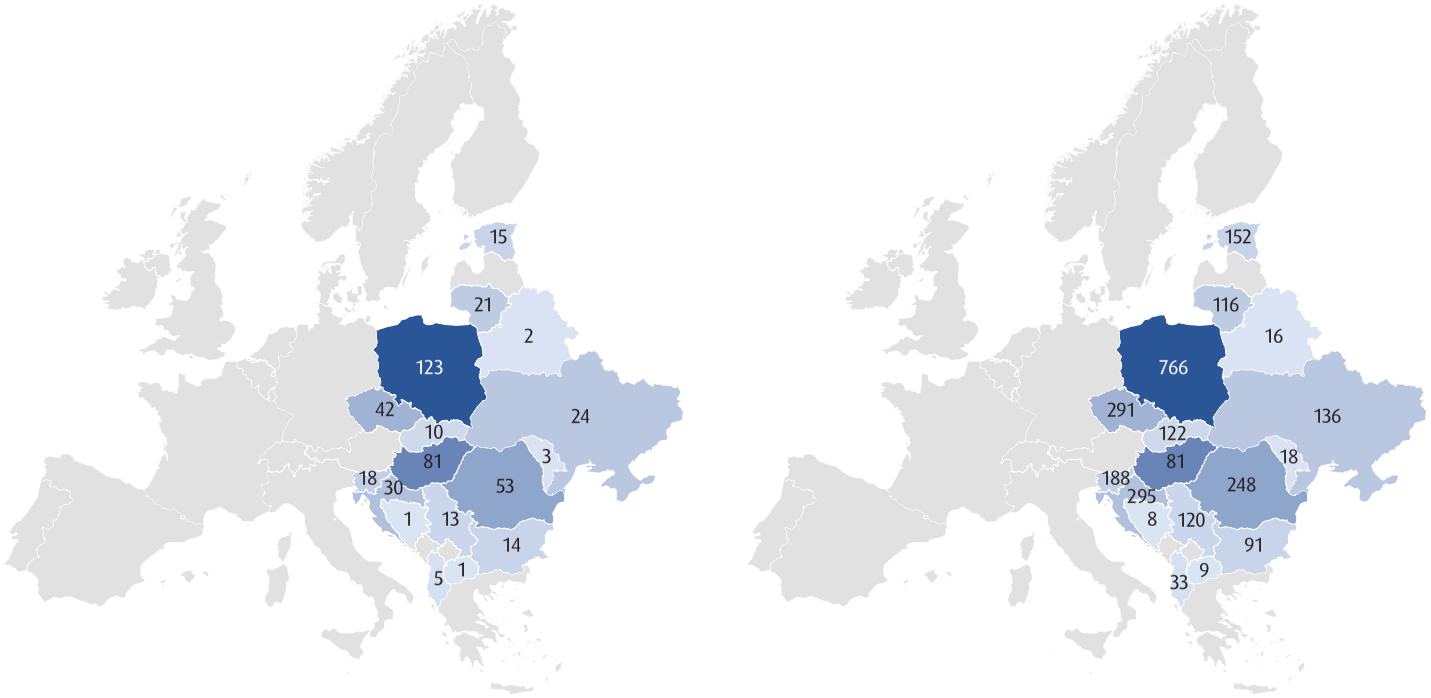
	2016	2017	2018	2019	2020
Albania	4 (2)	3 (1)	2 (1)	2 (1)	1 (1)
Belarus	2 (0)	0 (0)	2 (0)	1 (0)	3 (0)
Bosnia and Herzegovina	0 (0)	0 (0)	1 (0)	1 (0)	1 (0)
Bulgaria	7 (0)	6 (0)	6 (0)	6 (1)	8 (1)
Croatia	20 (1)	16 (1)	19 (1)	19 (2)	20 (2)
Czech Republic	15 (1)	17 (2)	17 (1)	19 (1)	17 (1)
Estonia	10 (2)	11 (3)	14 (2)	12 (2)	15 (1)
Lithuania	9 (0)	9 (0)	11 (1)	12 (0)	9 (0)
Latvia	3 (1)	4 (1)	8 (1)	8 (1)	8 (1)
North Macedonia	1 (0)	1 (1)	1 (1)	1 (1)	1 (0)
Moldova	1 (0)	2 (0)	1 (0)	1 (0)	0 (0)
Poland	47 (15)	51 (9)	63 (11)	53 (10)	67 (11)
Romania	12 (0)	15 (0)	25 (3)	25 (3)	26 (1)
Serbia	12 (3)	10 (3)	11 (4)	9 (4)	10 (3)
Slovakia	7 (1)	6 (1)	7 (0)	9 (0)	6 (0)
Slovenia	12 (1)	14 (2)	13 (2)	12 (2)	10 (2)
Ukraine	9 (1)	14 (1)	10 (1)	10 (0)	10 (0)
Hungary	22 (8)	20 (5)	18 (8)	18 (6)	22 (9)

* The eports subject to external verific tion have been presented in brackets.

Source: self-reported data based on the Corporate Register data [2021].

[2] Corporate Register is a global non-fi ancial report base; in its free-of-charge version it does not currently offer many data search options which used to be available a few years ago.

Figure 1. Number of organisations publishing non-financial reports (on the left-hand side) and the number of reports published by them (on the right-hand side) in CEE countries available in the Corporate Register (as at 26.03.2023)



Source: self-reported data based on the Corporate Register data [2021].

Nevertheless, the data kept in the Register indicate explicitly to Poland as a regional leader in sustainable development reporting[3] both in terms of the number of reports and the reporting organisations (Figure 1). This finding should not come as a surprise as Poland is also the biggest of the EU countries studied.

In 2019, one year after the obligation of reporting of non-financial data had been implemented, the Ministry of Finance in Poland prepared a summary report on good and bad reporting practices. A team of experts studied non-financial statements and reports of companies to which the reporting obligation did not apply. In 48 cases good practices in presenting business models were identified, and in relation to18 entities some critical remarks were formulated. Only 46 reports (out of 116 analysed) contained key non-financial performance indicators. Descriptions of policies and their results, particularly in terms of human rights and social problems, were perceived as challenges. In the reports of over 10 companies no reporting policies were found, yet no grounds were given to explain the state of affairs [Ministry of Finance, 2019].

In 2021 a disclosure analysis of climate problems among 60 companies from WIG20 and mWIG40 indices in Poland conducted by UNEP GRID and GoResponsible company revealed both good practices and loopholes in their reporting. Slightly over a half of the studied companies (31) report greenhouse gas emissions and climate risk management, only 17 companies disclose climate goals, and a mere one in five companies (12) accounts for TCFD guidelines [UNEP, GRID, 2021; GoResponsible, 2021, Cf. GEM, 2022].

The observable good practices of non-financial reporting include: implementing solutions which integrate the scattered ESG data sources, creating joint indicator definitions for all units in the group, using recognised reporting standards, adopting own ESG strategies to define the company's direction [Błaszczak, 2022].

EU climate policy

Actions aimed at reducing global warming and its negative consequences are one of the sustainable development goals of the UN. The significance and urgency of such actions is justified by the Intergovernmental Panel on Climate Change [IPCC, 2023] which has indicated that the existing and declared actions undertaken by the global community are insufficient to meet the goals of the Paris Agreement. It should be

[3] It should also be noted that the number of reports from Poland available in the global Corporate Register (766) is significantl higher than the number of reports published in the domestic bases: the report library of the contest „Raporty Zrównoważonego Rozwoju" [Sustainable Development Reports] (559) and CSRinfo base (508).

thus expected that the bar for climate policy will be raised even higher and its tools will become increasingly more vital determinants of our activity. It may be clearly seen in EU initiatives, when by announcing the *European Green Deal*, the EU pledged to achieve climate neutrality by 2050. A good measure of the pace and scope of EU's climate policy is the package of legislative solutions known as *Fit for 55* , encompassing a wide range of instruments allowing for a 55% reduction in greenhouse gas emissions in the EU in 2030 (versus 1990).

The main tool of the EU climate policy remains the EU Emissions Trading System (EU ETS), involving the highest emitting and energy-consuming sectors of the economy as well as the sea and air transport. The solution relies on the conception of *carbon pricing* – the idea of imposing charges reflecting the cost of greenhouse gas emissions, which is believed by its authors to be the most effective stimulus for achieving emission reductions. The package of *Fit for 55* provides for extending the mechanism to more areas and applying the emission trading system to road transport and buildings (the BRT ETS system). A similar approach, although not as ambitious as that of the EU, has been developed in other countries and regions of the world, the result of which are over 71 operating systems of emission trading and emission taxes [World Bank, 2022].

The package of *Fit for 55* offers much more than just an emission trading system. It comprises regulations on: energy efficiency, developing renewable energy sources, taxing energy, the Carbon Border Adjustment Mechanism (CBAM), tightening norms for car emissions or increasing the potential for CO_2 emission absorption in the area of land use and forestry (aimed at achieving net climate neutrality through compensating the emissions which cannot be avoided). Due to the scope of the challenge, including the costs of climate policies as well as differences in the potentials of member states and timelines for particular actions, some help mechanisms have been created within the framework of the existing policy such as the Modernisation Fund and Innovation Fund under the EU ETS, or the proposed Social Climate Fund and the just transition mechanism, all of them aimed at ensuring additional support to the more feeble groups and entities.

The latest study by the Centre for Climate and Energy Analyses (CAKE) [Pyrka et al., 2023] outlines the scope of challenges facing Poland and EU in the upcoming years and the economic consequences of EU climate policies. Simulations of implementing the package of *Fit for 55* show that the marginal costs of reducing emissions in the EU ETS system may rise to 180 EUR/t CO_2 equivalent in 2030 and up to 440 EUR/t CO_2 equivalent in 2050, which will naturally translate into price hikes. These rises should be also expected in the areas which will successively be engaging in emission trading systems and those directly affected by the consequences of implement-

ing the mechanism. The above mentioned analysis implies that the marginal costs of reducing emissions in the areas newly included in the emission trading systems will be even higher than in the existing EU ETS system. Simultaneously, the conducted simulations indicate that this ambitious climate policy, through increased efficiency, changes in the structure of producing electrical energy or mechanisms of support and protection offered to entities on the territory of EU, has a scarce effect on macroeconomic indicators. Various effects of a regional scope may be expected in this respect. For instance, in a long term perspective, one of the key beneficiaries of the emission trading system will be Southern Europe, whereas in Poland the consumption will be lower until the end of the present decade, only to increase by 2040.

Governance – its significance in terms of the "E" and "S" dimensions

Looking through the lens of ESG has become an integral part of every process performed by organisations. Accountability of each of them is equally important and depends on the practices employed in governance. Although the management of dimensions delineated by **"E"** (***environmental***) and **"S"** (***social***) is underpinned with corporate governance referred to as **"G"** (***governance***), also known as management governance, its significance may not be as obvious as that of the environmental (E) and social (S) issues..

Governance refers to the principles and practices adopted by a business unit aimed at resolving the problem which in the agency theory is known as building relations between the company owners (principals) and the company management appointed to handle the business (agents). The theory of agency states that agents and principals have clashing interests, which may encourage the agent (management board) to prefer own profit at the expense of the principal (owner). **Establishing governance** aims to implement mechanisms which can encourage the management board to carry out its duties efficiently and be held accountable for them in front of the business owners.

The imperative of sustainable development makes business owners – aware of the necessity of combining financial goals with environmental and social concerns – expect the same attitude from management boards of their companies. Changes in the investment philosophy towards socially responsible investing frequently put the existing **corporate governance systems to test, imposing the need for a review and adjustment to meet modern business priorities**. There are basically two types of activities in this area: governance practices referring to management boards and those relating to shareholders.

In terms of **the management board governance** three aspects should be paid particular attention to:

1) ensuring efficiency of the management board supervision requires the supervisory boards or boards of directors to be composed of the persons who are qualified, independent, well-informed, diverse, engaged, and able to effectively prevent any external intervention into the monitoring and supervisory functions;
2) performing the supervisory function may be supported by dedicated committees, appointed for particular types of tasks of overseeing certain vital areas of company operations; such bodies will then become an integral part of the company's governance system;
3) compensation for the management board members may depend on meeting the interests of company owners by using incentives such as a performance-related pay.

On the other hand, actions undertaken in terms of **the shareholder governance** should focus mostly on two types of practices:

1) those referring to shareholders exercising their right of vote;
2) those giving shareholders a possibility of communicating and collaborating with the supervisory board or the board of directors.

All in all, without the "G" dimension, companies would be unable to efficiently manage the aspects of "E" and "S", thus the way these three areas are intertwined in any company tips the scales of creating the governance system. Beyond any doubt, the aspect of "G" remains strongly bound to shareholder rights, as the power and significance of shareholders in governance are *sine qua non* conditions of implementing social and environmental policies. A long-term nature of the investors' relationship with the company has also some bearing on maintaining and verifying governance solutions.

Detailed and comprehensive reports included in the bibliography [OECD, 2011a, 2011b , 201 2a, 201 2b, 2013 , 2014, 201 5, 2018 , 2021a , 2021b , 202 2] are good sources of macroeconomic data presenting Poland in terms of governance, as compared against 36 OECD member states (including CEE countries); they cover important problem areas of governance: flexibility and proportionality in governance, risk management in governance, supervision and action enforcement in governance, appointing board members and election functions, transactions with associated entities and minority shareholder rights, the role of institutional investors in promoting governance, management practices (incentives and risk management).

Taking into account the fact that mandatory – for some entities – governance reporting should be done according to ESRS G1 Business Conduct standards[4], it is

4 ESRS G1 Business Conduct is one of 12 standards developed by EFRAG in connection with the CSRD directive.

necessary to focus on the problems which are tightly connected to the practice of managing a business unit (Table 3).

Table 3. Vital areas of governance according to ESRS G1 Business Conduct standards

Area of governance	Aspects studied
(G1) Corporate culture	▪ How are the administrative, management and supervisory bodies engaged in building, monitoring, promoting and evaluating company culture? ▪ Is the entity able to mitigate negative effects and enhance positive effects of business operations? ▪ Does the company monitor such risks and how does it manage them? ▪ Has the company implemented mechanisms of identifying, reporting, and investigating concerns of unlawful behaviour or behaviour violating the code of ethics or any other such documents? ▪ Does the company follow any policy of preventing corruption, and if not, then when is it planning to implement it? ▪ How are irregularities reported in the company, are whistleblowers and other employees who refuse to act unethically protected? What solutions are being employed to prevent retaliatory action towards them? ▪ If relevant for a given business unit, does the company have a policy on animal wellbeing? ▪ What is the company's training strategy? ▪ Does the company identify functions and processes which are most exposed to corruption?
(G2) Managing customer relations	▪ What is the company's strategy in terms of its relations with suppliers, particularly in terms of supply chain risks and sustainable development? ▪ Does the company account for social and environmental criteria while selecting business partners? Which way? ▪ How does the company support its key business partners to encourage their commitment to social and environmental goals?
(G3) Preventing and disclosing corruption	▪ Does the company have practical procedures of preventing, disclosing and responding to instances or allegations of corruption? ▪ Are the investigating bodies or commissions truly independent, unbiased and disengaged from the cases handled? ▪ Is the process of reporting instances of corruption and other fraud cases to the administrative, managing or supervisory bodies transparent? ▪ How does the company communicate regulations to the relevant people who are responsible for ensuring accessibility of the policy and proper understanding of its consequences? ▪ Does the company organise training courses (what kind and scope of the training) on corruption prevention? ▪ Who are they addressed to?
(G4) Corruption disclosures	▪ Does the company ensure transparency while disclosing information about the confirmed cases of corruption? ▪ Is their number and nature communicated? ▪ Does the company provide information about conviction cases and amounts of fines for infringing on anti-corruption regulations? ▪ Does it reveal detailed information about public corruption court cases instigated against companies and their employees, as well as inform about court rulings in such cases, and whether employees in such cases were dismissed or punished with disciplinary measures? ▪ Does the company inform about confirmed incidents of contracts with suppliers which were terminated or were not extended due to corruption violations? ▪ How does the company protect persons who reveal corruption or other wrongdoing (whistleblowers)?

cont. Table 3

Area of governance	Aspects studied
(G5) Company engagement in exerting political influence, including lobbying	▪ What actions does the company take in this area? ▪ What are their goals and costs? ▪ In administrative, management and supervisory bodies, who is responsible for an oversight of such actions? ▪ What is the financial and material political engagement of the company and who and where is the beneficiary of such actions? ▪ Which problems are subject to lobbying and what is the position of the company on that? ▪ Is the company recorded in the EU or domestic transparency register?
(G6) Payment practices, in particular in relation to small and medium-sized companies	▪ What payment policy (contractual commitments versus practical delivery) does the company adopt in relations to SME? ▪ What are the standard terms of payment required by the company (number of days) from different categories of suppliers? ▪ What is the average, real trade credit period (number of days)? ▪ What portion of the company payments is practically compliant with standard terms? ▪ Are there any court procedures pending due to outstanding payments in the company?

Source: self-reported data based on EFRAG [2022]; Cf. CFA Society Poland [2020].

The meaning of some aspects specified in the above mentioned standards should be viewed both in the perspective of an external stakeholder and in terms of management practices. The standard outlines particularly sensitive areas of the management board's decisions and actions which, as criteria of socially responsible investing, will have and important impact on the company performance assessment and, as such, constitute a crucial element in the management governance of a business unit.

Raising finance in the light of sustainable development or ESG

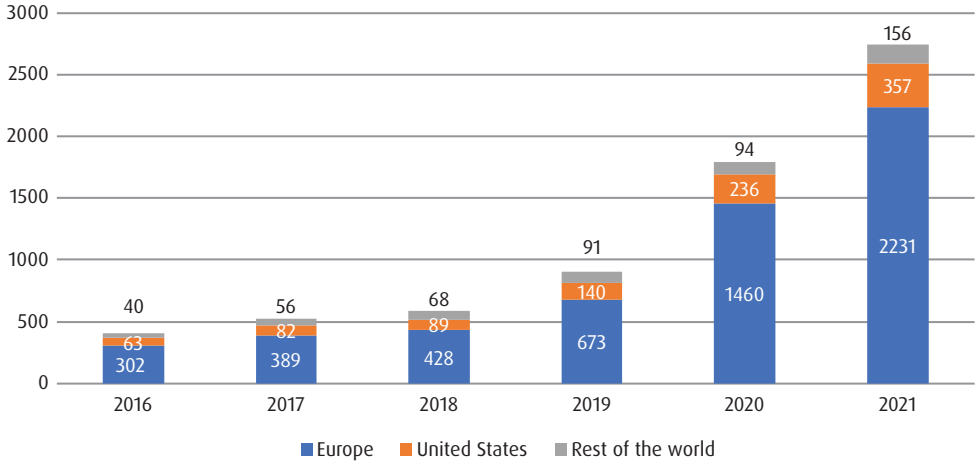
Adjusting to the new ESG reporting regulations involves significant investments which require raising substantial funding, particularly for green transition, in the form of both equity and debt capital. Increased value of the capital associated with the concept of sustainable development in Europe is a result of the EU decision on climate neutrality taken in 2019 [Fierla, Węgrzyn, Wierzbicka, 2021]. In the years 2021–2027, EU intends to allocate 100 bn EUR to deliver on the goals of the *European Green Deal* [European Parliament, 2023].

In the case of equity financing, there is a rising interest of institutional investors in the securities of valuable entities which in their business operations, as well as investments, adhere to the principles of sustainable development. According to the data of the United Nations Conference on Trade and Development (UNCTAD), the value of sustainable financial products at the end of 2021 amounted globally to 5.2 trn USD, which constitutes a growth of 63% on 2020. The position was dominated by sus-

tainable funds with assets accounting for 2.7 trn USD of the said amount (a rise of 53%, y/y) [UNCTD, 2022].

Europe played a vital role, as the assets of the European sustainable funds accounted in 2021 for 81% of all such assets globally (Figure 2).

Figure 2. Value of assets of sustainable funds in the years 2016–2021 (in bn USD)



Source: self-reported data based on UNCTAD [2022] data.

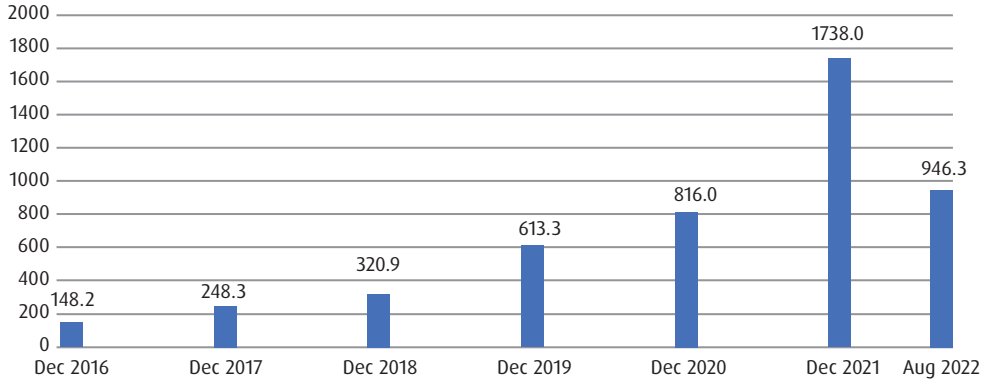
The role of the financial sector is to provide financial opportunities and tools for economic transformation as well as to shift financing cash flows to the investments and activities supporting sustainable development.

It should be noted that ESG factors are frequently included in the infrastructure of the public capital market by stock exchanges. For instance, the number of stock exchanges using written guidelines on disclosing ESG information by share issuers had increased from 13 in 2015 to 63 at the end of 2021, including both the leading exchanges in Europe and in CEE countries [UNCTAD, 2022]. Also an increasing number of training courses in ESG for issuers and investors reflects a growing interest in sustainable development.

The financial sector in Europe, particularly in the eurozone, is well-established, which may be seen in its assets to GDP ratio amounting to 570%. At the same time, in CEE countries such as Poland, the Czech Republic, Hungary and Slovakia financial systems are less developed with the assets to GDP ratios amounting to 150% [NBP, 2022]. It means that their potential for providing funds to finance the transformation is also lower.

In terms of debt financing, a significant rise has been seen in recent years. In a global perspective, the value of sustainable debt grew from 148.2 bn USD at the end of 2016 to 1783.0 bn USD at the end of 2021 (Fig ure 3).

Figure 3. Value of sustainable debt from December 2016 t o August 2022 (in bn USD)



Source: self-reported data based on Business Research and Insights data [2022].

As shown in Figure 3, during the first eight months of 2022, 946.3 bn USD worth of sustainable debt was incurred, which was 12.6% less than in the same period of 2021 – the financing raised in this way amounted then to 1082.8 bn USD. The fall was caused mainly by higher interest rates observed in financial markets (which in turn triggered higher costs of debt), the economic slowdown and an increased risk. Yet, a recovery may be expected in the upcoming years.

In product terms, sustainable debt capital includes:

- financing obtained from the capital market – in the form of a special purpose debt instrument issue (e.g. green bonds, transformation bonds, social bonds, sustainable bonds) as well as a general corporate debt instruments issue (e.g. sustainability linked bonds);
- bank financing – in the form of bank loans for a specific purpose related to sustainable development (e.g. green loans, sustainable loans) and for general corporate purposes (e.g. loans related to sustainable development – sustainability linked loans).

Figure 3 presents mostly green bonds and sustainability linked loans. These instruments accounted in the studied period of 2022 for about 40% and 28% of the incurred debt, accordingly [Business Research and Insights, 2022]. High significance of Western Europe in this respect can be observed as well. In CEE countries issuing bonds or taking out loans to finance sustainable development is not so common, yet some upward trend may already be seen. Currently, mostly single large-

amount transactions oriented towards obtaining financing from foreign investors may be observed.

According to Climate Bonds Initiative data, the value of sustainability linked debt instruments issued in CEE countries (including the issues by companies and financial institutions, as well as those by the treasury) at the end of June 2022 was at a significantly lower level than in Western Europe. In Poland their total value amounted jointly to 6483 m USD, in Hungary – 2587 m USD, and in Slovakia – 121 m USD. By comparison, in France this value reached 159 779 m USD, in Germany – 148 451 m USD, in Spain – 56 820 m USD, and in Ireland – 11 366 m USD [Climate Bonds Initiative, 2023]. The above data are a good reflection of major discrepancies in this respect.

Although sustainable financing is increasingly more often used in CEE countries, their markets development level, the level of knowledge of their market players and proper infrastructure development, as well as the level of demand, are significantly lower than in Western Europe, which plays a particularly vital role in the global perspective. We may expect the proportion of such financing to increase in the next years, due to the growing scale of EU regulations related to the economic transformation aimed at sustainable development, as well as higher expectations of equity and debt financing providers. It may be assumed that this type of financing will soon become a must-have for many decades.

The "S" dimension – the role of the social aspect in ESG reporting

Social factors represented by ESG allow to assess what impact organisations and their business operations have on the social environment – employees, customers, suppliers and the local community. Although relations between organisations and their social environments remain a particularly vital aspect of business operations, the tools for measuring this impact are relatively underdeveloped in comparison to the other ESG dimensions.

The currently developed social reporting standards, particularly those relating to managing employees, diversity, workplace inclusiveness, or employee rights standards and human rights in general, are underpinned by the entire heritage of the human rights protection system, its fundamental liberties, democratic norms and principles. They were codified in the *European Convention on Human Rights (ECHR)*, the *European Social Charter* and *the EU Charter of Fundamental Rights*, as well as in the *International Charter of Human Rights* and in other framework documents of UN on human rights, including the *UN Convention on the Rights of Persons with Disabilities*, the *UN Declaration on the Rights of Indigenous Peoples* and the *UN Convention on the Rights of the Child*.

However, there are not enough metrics to verify these actions in practice, and social reporting usually boils down to the presentation of companies' engagement in local communities, charity organisations and philanthropic initiatives.

It seems necessary to adopt certain minimum indicators which can be used as reference points for developing comparable and objective reporting principles. The Warsaw Stock Exchange (GPW), with an intent of meeting these challenges and unifying the approach to all aspect of ESG reporting in listed companies, has created the *Guidelines for ESG Reporting. A Guide for Companies Listed on GPW* [GPW, EBOR, 2021]. As presented in the guide, the social reporting dimension consists of three main aspects: diversity, employment and human rights. These comprise a total of seven indicators which should be reported by companies listed on the Warsaw Stock Exchange:

- **diversity:** [Polish: R.1] – diversity in supervisory bodies (proportion of women employed in executive posts), [Polish: R.2] – pay equality indicator (a percentage difference between the average pay for women and men);
- **employment:** [Polish: Z.1] – employee turnover (a percentage of employees leaving the company on a voluntary or compulsory basis versus the total number of employees), [Polish: Z.2] – freedom of association (a percentage of active employees in collective agreements or a description of actions taken by the company to exercise the right of association), [Polish: Z.3] – work safety (a description of procedures adopted in order to protect employees and prevent workplace accidents);
- **ethics and employee rights**[5] (human rights): [Polish: P.1] – the policy of human/employee rights (a description of actions aimed at obeying human rights), [Polish: P.2] – procedures of due diligence in human/employee rights (a description of procedures allowing to monitor the risk of infringements and whistleblowing possibilities).

The reports prepared by entities included in the key GPW index, WIG20, were studied with a view to identifying certain practices in reporting and adjusting them to the adopted guidelines and standards (Table 4). WIG20 gathers 20 leading companies which are subject to mandatory non-financial reporting.

As many as 19 studied companies have provided basic information on the composition of their management boards and their gender structure, in most cases presenting also the structure of employment in lower ranks of their organisations (R.1). Despite the adoption of GRI reporting standards and GPW guidelines, seven companies in WIG20 index do not inform of the existing gender pay gap in equivalent positions

5 In 2022 GRI standards which constituted a foundation for social reporting categories were altered. Currently, work is under way to change the way human rights are accounted for in this methodology. This will affect most reports, as GRI is a leading reporting standard for stock-listed companies.

(R.2). Information gaps happen also in the field of employment, as four companies have not reported their employee turnover data (Z.1). The situation about reporting activities which support the freedom of association, trade unions and collective agreements looks better (Z.2). Three companies have not provided any clear information on their activities in the field of work safety (Z.3). As far as ethics and employee rights are concerned, as many as five companies have not presented any commitments resulting from following the relevant conventions and procedures (P.1) and they have not implemented any systems of monitoring infringements (P.2).

Table 4. Identification of indicators and information in the "S" dimension of non-financial reports produced by WIG20 companies

Company[2] (WIG20 index of 31.03.2023)	Since when has the company reported in the field of ESG/non-financial	Standard applied in the report	Diversity		Employment			Human rights	
			R.1	R.2	Z.1.	Z.2	Z.3	P.1	P.2
Alior	2017	GRI	+	+	–	+	–	–	+
Allegro	2017 (separate ESG Report)	GRI, SDGs, TCFD, SFDR, own KPIs	+	+	+	+	+	+	+
Asseco Poland	2018 (separate ESG Report)	GRI, SIN	–	–	–	+	–	–	–
CD PROJEKT	2021 (separate ESG Report)	GRI, SASB	+	–	+	+	+	+	+
Cyfrowy Polsat	2012	GRI, SDGs	+	+	+	+	+	+	+
Dino Polska	2016	own KPIs	+	–	–	–	+	–	–
Grupa Kęty	2015	GRI	+	+	+	+	+	+	+
JSW	2017	GRI	+	–	+	+	+	–	+
KGHM	2011	GRI	+	–	+	+	+	+	–
Kruk	2014	GRI	+	+	+	+	+	+	+
LPP	2017	GRI	+	+	+	+	+	+	+
mBank	2014	GRI	+	+	+	+	+	+	+
Orange PL	2007	GRI, SDGs, TCFD, own KPIs	+	+	+	+	+	+	+
Pekao	2017	GRI	+	+	+	+	+	+	+
Pepco Group	2021 (IPO)	own KPIs	+	–	–	–	–	–	–
PGE	2013	GRI, SDGs	+	–	+	+	+	+	–
PKN Orlen	2002	GRI, SDGs, TCFD, IIRC	+	+	+	+	+	+	+
PKO BP	2016	GRI	+	+	+	+	+	+	+
PZU	2010	GRI, IIRC	+	+	+	+	+	+	+
Santander	–	GRI	+	+	+	+	+	+	+

Source: self-reported data based on the information contained in social, environmental and CSR reports and integrated reports of the studied companies.

Adopting even such a scarce approach which accounted for a mere fraction of social commitments, appeared too much to implement by companies obliged to deliver their non-financial reports. Thus, it seems necessary to work out some more adequate indicators which will allow to treat the social responsibility of business in a more comprehensive way, not only in relation to employees.

Green job places

Transforming the economic model into a more eco-friendly one is both a challenge and an opportunity for the job market, also in the context of acquiring the necessary skills which, in turn, are the key factors of green growth. The European Commission suggests that green job places include "all job places which depend on the natural environment or are created, replaced or redefined in the process of a transformation to a greener economy" [European Commission, 2015].

According to the International Labour Organization, ILO, green job places constitute a decent employment [ILO, 2019] which encourages the preservation, reconstruction or improvement of the natural environment quality. They may be practised both in traditional sectors such as: manufacturing, construction, agriculture, and the newly created green sectors, like the renewable energy industry.

It should be noted that green job places allow to:

- improve the efficient use of energy and raw materials;
- reduce greenhouse gas emissions;
- minimise waste and pollution;
- protect and rebuild ecosystems and biodiversity;
- accommodate the consequences of climate change.

An actual assessment of how much a given job can be identified as "green" should account for the following four aspects:

1) business operations outputs – if the supplied products or services are "green";
2) profession – if the tasks and activities performed by an employee are compatible with the idea of sustainable development;
3) style of work – if the conditions of work promote a sustainable lifestyle for employees;
4) outputs efficiency – how resource-efficient the production process is.

In the context of sustainable development, two categories of professions may be distinguished:

1) **green professions**, their goals and required skills help measure, prevent, control and rectify negative environmental impacts and damage;

2) **greening professions**, they are not connected to environmental goals, but can integrate new skills which, to a large and measurable degree, help account for the environmental dimension in business.

Notably, the green economy transformation has created demand for professional skills through three aspects:

- **green restructuring** which is about shifting activities and employment in the economy from the environment-polluting sector to the low carbon emission sector (e.g. reducing road transport for the sake of rail transport) – it is a quantitative change;
- **creation of new professions** through the development of new technologies;
- **making the existing job places more eco-friendly**, which causes many jobs to adjust to the context of new regulations (e.g. car mechanics nowadays must know how to repair an electric car) – it is a qualitative change.

Green competencies comprise a number of dimensions [Cabral, Lochan, 2019]:

- green knowledge – general knowledge about the natural environment;
- green skills – professional and general skills necessary in green jobs and the jobs affected by the green transformation; they are the abilities to perform tasks accounting for their environmental impacts, simultaneously mitigating their negative effects on the ecosystem;
- green awareness – the awareness of the human activity impacts on the environment, e.g. through the carbon footprint;
- green attitudes – understanding the importance of environment protection;
- green talents – crucial for self-development and boosting the green economy efficiency;
- green behaviours – supporting the natural environment equilibrium.

Table 5 outlines the findings of research into green work in CEE countries. For the purpose of this study, green work was defined as all actions related directly to the information, technologies or materials which maintain or recover the environment quality. It requires specialist skills, knowledge, training and experience (e.g. of verifying compliance with environment protection regulations, monitoring the efficiency of resources use in companies or promoting green products and services).

Poland has set a rather demeaning example among other CEE countries in terms of the proportion of employees who do not have any knowledge of environment conservation – almost one third of employees do not possess sufficient competencies in this respect (Table 5). At the same time, Poland is positioned right behind the Czech Republic, Croatia and Slovenia in terms of the number of environmental initiatives undertaken by companies.

Table 5. Proportion of companies employing the practices of efficient resource management which have no specialist knowledge of environment protection and the number of employees in green posts in CEE countries (%)

Country	Lack of knowledge about environment conservation	Measures taken				Employment in green jobs		
		many	several	few	none	0	1–5	6+
Bulgaria	11.1	9.4	23.2	33.1	34.3	73.5	20.0	6.5
Croatia	13.2	26.2	39.3	25.0	9.5	36.5	58.4	5.2
Czech Republic	21.8	30.5	34.7	21.2	13.5	77.2	18.7	4.1
Estonia	0.0	2.9	5.9	38.2	52.9	85.3	14.7	0.0
Lithuania	7.1	5.9	23.5	37.6	32.9	81.0	14.3	4.7
Latvia	14.6	17.0	32.1	28.3	22.6	30.0	58.0	12.0
Poland	27.7	24.3	31.8	27.3	16.7	58.5	34.7	6.8
Romania	17.3	8.5	17.7	37.9	35.9	62.3	28.5	9.2
Slovakia	7.9	21.8	27.7	36.8	13.6	38.8	52.6	8.6
Slovenia	17.5	26.0	27.4	24.7	21.9	72.9	25.7	1.4
Hungary	11.0	16.3	27.6	38.2	18.0	76.8	16.9	6.3

Source: self-reported data based on: Bassi, Guidolin [2021].

Companies have been classified according to the type of activities in efficient resource management (efficiencies in water and energy use, employing renewable energy, economical use of materials, minimising waste, selling scrap-metal, recycling, designing easy-to-repair products) – those already performed and those planned in the next two years, as well as according to the quantity (many, several, few, none) of such initiatives. The information about green employment refers to the number of full-time employees in green posts and the opinion expressed by respondents that additional green skills could increase resource efficiency.

Supply chain management

Effectiveness of the sustainable economy transformation and ESG management calls for the adoption of a systemic perspective and process approach pertaining to the supply chain management. There are some challenges posed by designing and redesigning structures, processes and business relations, as well as by selecting management components in supply chains. The role of supply chain management is fundamental in terms of meeting the end goal which is the transition to a safer, more environmentally neutral, climate resilient and resource-efficient circular

economy. Changes in the supply chain management in the context of ESG requirements may become **a potential source of building the competitive advantage** or boosting the performance and value for companies. The risk of failing to meet ESG criteria may, on the other hand, pose a potential threat to sustainable financing and investment, and as a result, jeopardise business growth. Currently, regulatory restrictions and crisis trends in the business environment, as well as stakeholder expectations, including the ambitions of business owners and executive boards, stimulate the transformation of supply chains towards sustainable development and meeting ESG requirements.

In the light of the study *Quality of ESG management and the resilience to crises. Companies – financial institutions – local government units* conducted by the Collegium of Business Administration of SGH in 2022, ensuring consistency and integrity of changes in supply chain management, including ESG aspects, is a prerequisite of sustainable growth of the economy and companies. A perfect sustainable transformation is based on incorporating ESG aspects in the designed strategies and their efficient execution in managing supply chains with a view to maximising stakeholder value. A company strategy that accounts for ESG goals constitutes a prelude for the sustainable transformation and a determinant of change in supply chain management. Leading companies in Poland are those listed in the WIG-ESG index of the Warsaw Stock Exchange [GPW, 2023]. They can play a major role in meeting ESG criteria by supply chains through the transfer of management practices and enhancing positive ESG effects in the form of B2B cooperation.

Managing particular aspects of ESG requires transparent structures in supply chains and the use of cutting-edge technologies of Industry 4.0 and 5.0. Exposure to the risk of failing to meet particular ESG criteria increases significantly in complex, multi-level, international hierarchies and global supply chains. Circular economy offers great opportunities for designing processes and relations oriented towards implementing ESG in supply chains, as it encourages systemic solutions, addressing the challenges posed by climate change and helping eliminate waste and pollution, ensure product and material circularity as well as resources regeneration [Ellen MacArthur Foundation, 2022].

At a macroeconomic level, the circularity index reflects aggregate efficiency of circular supply chains at a country level, specifying the proportion of materials subject to recycling and reuse in the total material consumption (Cf. Table 6). Higher circularity index translates into lower production and use of primary raw materials, thus affecting resource efficiency of national economies.

Circularity index in EU in 2021 amounted to 11.7%. EU leaders in this category are the Netherlands (33.8%), Belgium (20.5%), France (19.8%) and Italy (18.4%). Among

CEE countries the lowest values of this index are represented by Romania (1.4%), Lithuania (4.0%) and Bulgaria (4.9%), the highest belong to Estonia (15.1%), the Czech Republic (11.4%) and Slovenia (11.0%). There are some clearly visible discrepancies between European circularity leaders and CEE countries. Intensifying supply chain practices oriented towards circularity should be recommended in order to strategically strengthen the resilience of economies and companies to the problems of rising raw materials prices and their scarcity.

Table 6. Circularity index in CEE countries (%)

Country	2015	2016	2017	2018	2019	2020	2021
Bulgaria	3.1	4.4	3.5	2.5	2.3	5.9	4.9
Croatia	4.6	4.6	5.2	5.0	5.2	5.7	5.7
Czech Republic	6.9	7.5	9.1	10.5	11.3	11.6	11.4
Estonia	11.3	11.6	12.4	13.5	15.6	15.6	15.1
Lithuania	4.1	4.6	4.5	4.3	3.9	3.7	4.0
Latvia	5.3	6.5	5.4	4.7	4.3	5.1	6.2
Poland	11.6	10.2	9.9	9.8	10.3	7.5	9.1
Romania	1.7	1.7	1.7	1.5	1.3	1.5	1.4
Slovakia	5.1	5.3	5.0	4.9	6.4	10.5	8.3
Slovenia	8.6	8.7	9.8	10.0	11.4	9.9	11.0
Hungary	5.8	6.5	6.9	7.0	7.3	5.2	6.8

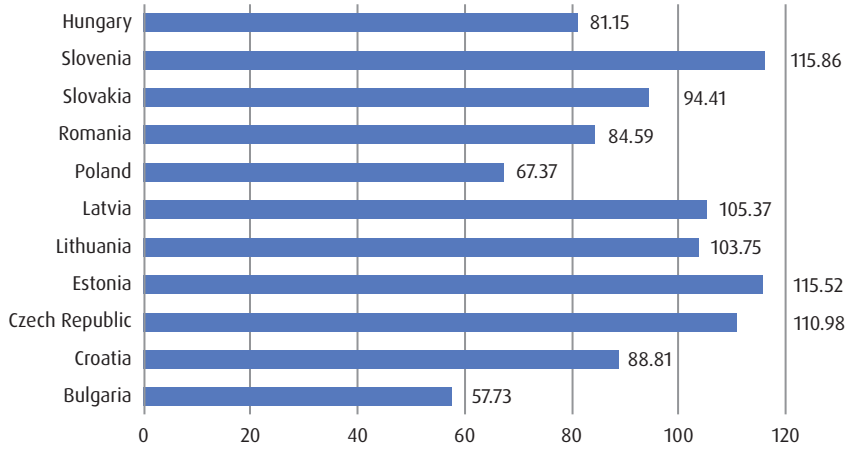
Source: Eurostat [2022].

Managing supply chains in the context of ESG determines the development of environmental innovations (eco-innovations) and social innovations [Accenture, 2022]. These processes of sustainable transformation are increasingly more open and are implemented based on collaboration between companies and stakeholders. Availability of social innovations is particularly important while developing sector and industry solutions in the circular economy, despite the fact that benefits derived from them are still underexplored. Eco-innovation potential is being utilised in supply chains by developing product and packaging eco-design, logistical eco-practices, the energy transformation of production plants and processes, modern technological solutions in distribution and order processing, or the most environmentally friendly ways of closing product life cycles. Eco-innovativeness in EU countries is measured with the eco-innovativeness index. Figure 4 presents the value of this index for CEE countries.

A medium-level eco-innovativeness index is observed in the following CEE countries: the Czech Republic, Estonia, Lithuania, Latvia and Slovenia. Countries which

are still catching up with eco-innovativeness are: Bulgaria, Croatia, Poland, Romania, Slovakia and Hungary. Enhancing eco-innovativeness is one of the key challenges facing entities in the private and public sectors of countries in the region. None of the CEE countries belongs to eco-innovativeness leaders represented in Europe by Austria (173.86%), Finland (178.01%) and Luxembourg (179.02%). The average eco-innovativeness index in EU in 2022 reached 121.47%.

Figure 4. Eco-innovativeness index in CEE countries in 2022



Source: European Commission [2022].

Lean management as a support to ESG reporting

Lean management and ESG are rarely contrasted and discussed together, both by scientists and practitioners. Taking a closer look allows to identify overlapping features and interrelations of both conceptions, such as striving for perfection and exerting impact on sustainable development.

Lean management is a management concept which, through identifying and eliminating wasteful behaviours (overproduction, superfluous movement, waiting, redundant transport, excessive stock, defects, unnecessary processing, unused talent), streamlining operations, optimising value, and a simultaneous adoption of cost reductions, affects social, environmental and governance aspects which constitute key dimensions of the ESG idea [Womack et al., 1990; Womack, Jones, 1994]. Sample tools of *lean management* and their significance for the ESG concept have been presented in Table 7.

Based on the analysis of the information presented in Table 7, it may be stated that *lean management* fits into the concept of ESG. The described tools are mutually influential and complementary, thus generating environmental, social, economic and governance benefits.

Table 7. Sample tools of *lean management* and their significance to the ESG concept

Tools	Tool description	Significance to the ESG concept
5S/6S Method	In involves the following consecutive steps: 1S – sorting, also called selection (Jap. *seiri*), i.e. removing unnecessary, distracting objects and tools; 2S – systematic arrangement (Jap. *seiton*) of objects in the work station; 3S – cleaning (Jap. *seiso*), i.e. removing any dirt from the work station; 4S – standardisation (Jap. *seiketsu*), aimed at maintaining the obtained effects; 5S – self-discipline (Jap. *shitsuke*), providing for continuous improvement and seeking solutions. The standard 5S method is often supplemented with 6S (*safety*), aimed at identifying threats and establishing preventive checks to ensure employee safety.	▪ organising an optimal, clean, ergonomic and safe work station
Just-in-Time	Assumes production according to the current demand, in the exactly required amount (meeting customer demand).	▪ work harmonisation ▪ stock reduction ▪ cutting production costs ▪ improved efficiency
Heijunka	Allows for production levelling, striving to achieve a steady production rhythm by properly managing orders.	▪ evenly spread work load ▪ improved quality
Jidoka	Combines production process automation with the use of human resources. A process is stopped when the product does not comply with specifications.	▪ high quality of products ▪ elimination of human error ▪ increased efficiency, employee safety ▪ lower costs
Visual Management	Processes are presented in a clear, understandable and explicit way both for employees and the management; three key functions are met: 1) information function; 2) imaging function, allows to easily notice all divergences from norm; 3) goal setting and tracking function (degree of implementation of goals).	▪ easier elimination of errors caused by employees, resulting from inadequate communication and misunderstanding
Kanban	Agile work flow management method which allows to visualise organisation's business processes. *Kanban* means elimination of: shortages, delays, stock, stoppages, idleness, unnecessary technological and control operations, relocation.	▪ work and process optimisation ▪ maximising efficiency ▪ minimising waste
SMED (*Single Minute Exchange of Die*)	Fast machinery set-ups (below 10 minutes) by dividing actions into two categories: internal (actions which require switching off machines) and external (all actions that can be performed before or after the machines are stopped).	▪ shorter time of products passing through the company's value stream ▪ cost-cutting ▪ better control of the set-up process, leading to higher labour, process safety and work comfort standards while setting up production lines

Tools	Tool description	Significance to the ESG concept
VSM (*Value Stream Mapping*)	Allows to present the flows of materials and information in the production or service delivery process by identifying elements which constitute added value and those which do not add value. Added value in lean management are these actions and procedures which the customer is ready to pay for. VSM involves three stages: 1) value stream analysis, *VSA* – analysis of the current value stream; 2) value stream design, VSD – building the target value stream; 3) value stream work plan, VSP – a plan of refining and implementing solutions.	▪ spotting waste sources ▪ identifying operations which do not provide added value ▪ establishing optimal stock levels ▪ optimising production processes ▪ cost reduction

Source: self-reported data based on: Tiwari, Singh [2016, pp. 1617–1621]; Sundareshan [2015, pp. 73–81]; Czerska [2009]; Shingo [1985], Sardanelli et al. [2022].

Implementing ESG in a public institution – good practices

Many business entities, both public and private, consider implementing ESG practices. Let us present below the case of implementing principles of sustainable development in a public institution of SGH Warsaw School of Economics.

Most of the specified actions are low-investment, thanks to which it is easy to apply them in a wide range of other contexts. The actions have already been implemented or are being put into practice at the moment, which delivers on one of the adopted goals in SGH development strategy. Following the adopted vision of university campus management, the practices set out in this part of the paper will focus on activities promoting environment conservation.

In terms of protecting natural environment, the most vital aspect are the university utilities allowing to smoothly operate its institutional infrastructure. A top priority action in this respect is **optimising the demand for electrical energy and its use,** leading to a sustainable energy consumption. In older university buildings, the first simple step, yet with far-reaching consequences, may be replacing the lighting with LED light sources, both outside and inside of the buildings – in passageways, offices and other premises. In common areas and passageways it is recommended to employ microwave sensors to control the lighting, and in offices it is best to implement regulations on the automatic computer and screen shutdowns, whenever the equipment is left unused. Consequently, the application of renewable energy sources in the form of PV installations should be considered.

Another top priority action should be **optimising the use of heat energy**. First, central heating and hot water nodes should be modernised, to be followed by a thermomodernisation of central heating systems using pipe insulation covers. Modernisation

of nodes should include a start-up of telemetric systems, e.g. a cloud platform allowing to monitor the installation and manage its functions remotely.

The nodes may be managed by implementing a heat demand reduction schedule in less busy time windows of a day, on non-business days or during holiday breaks. Further on, the introduction of renewable energy sources should be considered in this area, also by mounting solar collectors. These measures should be complemented by replacing bathroom fittings in toilets and social rooms with sensor panels, as well as mounting faucet and hand shower aerators. In older buildings, attention should be paid to replacing or sealing windows, putting thermo-insulation on roofs, walls, the building envelope and replacing exterior doors.

In managing **green areas,** the installation of drip irrigation lines, spray nozzles as well as rainwater tanks should be considered. Beyond utilities optimisation, it is worth remembering about composters for biodegradable waste, regular tree and bush care, making new plantings and installing nesting boxes for birds and bats. There were some additional actions taken on SGH campus such as setting up Rector Gardens, installing a roof apiary and creating a wildflower meadow for bees. Greenery has become also an integral part of some lecture rooms and passageways by installing green plant walls in selected places. Passageways have been equipped with sources of drinking water.

Apart from utilities, one of the priority areas is also **waste management optimisation**. On top of the natural waste sorting and organising e-waste containers which are collected by a specialist company, the university might consider purchasing a waste press machine to reduce the capacity of the generated waste. Toilet paper and towel use in bathrooms and social rooms may be optimised by replacing traditional dispensers with automatic ones. The same goals may be indirectly achieved by digitalising document flows, wider use of the qualified electronic signature (QES), and in educational institutions – quitting the obligation of submitting diploma theses print-outs, as well as adjusting the electric infrastructure in lecture halls to conducting mass exams with the use of laptops (*paperless exams*).

Implementing **sustainable rules for carrying out investments and repairs** remains an equally vital consideration. Special effort should be put into minimising the embodied energy of buildings and ensuring their long-life design – using durable, highly recyclable materials which do not require repairs or renovation and are available on the local market, at the same time avoiding materials which generate troublesome waste. A good example may be eliminating the use of oil paints, glues, paint thinners and varnishes by replacing them with water-based materials.

A more comprehensive approach to achieve the above mentioned goals is **by adopting a sustainable purchasing policy for the entire organisation:** prioritising the purchase of products which are biodegradable, recycled or second-hand (e.g.

introducing a principle of buying used furniture or computers first), choosing energy-saving equipment, purchasing low-harm materials. This policy requires suppliers to provide a *life cycle cost assessment*, LCCA, as well as to present an analysis of a given material's environmental impacts throughout its entire life cycle (*life cycle assessment*, LCA). Purchasing processes should also account for the requirements of accessibility and other social aspects, such as whether suppliers offer contracts of employment, also to candidates over 50 years of age. The procurement policy should also take care of purchase aggregation allowing for a reduction in the employed means of transport, implementing fleet cards and slashing the number of paper documents used in the process.

For a university which must provide its academic community with an easy access to catering services, an important room for improvement are its relations **with leaseholders of restaurant spaces and catering companies**. Responsible operations in this area mean conducting sustainable policies while making deals with the suppliers of the above mentioned services. Important elements of sustainability involve procurement processes, sourcing of ingredients and organising supplies outside of peak hours (car emission reduction), meal preparation processes and optimisation of the use of food components, ways of serving meals (including a reduction in plastic packaging which should be replaced with non-disposable dishes or biodegradable packaging), as well as handling meal left-overs and waste.

A good practice in encouraging pro-environmental attitudes among employees **in terms of commuting to work and business trips** may be installing bicycle sheds to promote cycling to work or university, establishing an own bicycle network for employees and students, providing employees with personal lockers, which can boost mobility and encourage them to choose cycling or public transport as a way of commuting. At the same time, it may be useful to provide the facility of charging stations to the users of electric cars. In reference to business trips, a system of vehicle registration allowing for recording the energy and CO_2 consumption seems a good idea.

The presented initiatives and good practices do not exhaust the repertoire of sustainable development measures available to public institutions. However, they can serve as a sample catalogue of the most necessary and effective actions which can be employed incurring relatively low investment outlays.

Summary

This paper has strived to address such non-financial aspects of the organisation's operations which seem vital in the context of efforts undertaken by contemporary governments and societies to ensure sound living conditions to the future generations.

Table 8. Conclusions and recommendations on the implementation of the ESG concept in CEE countries

Conclusions	Recommendations
▪ EU CSRD directive of 2022 unifies standards of non-financial reporting in terms of ESG, expands the scope of data to be collected and focuses on the quality of the reported data. It also increases the number of entities subject to reporting. The directive raises the bar for non-financial reporting, which is a great challenge for many organisations. ▪ Poland and CEE countries are less advanced in "green" transformation and "green" financing, high aspirations of governments and their high expectations in terms of climate policy and the resulting emission constraints will keep stimulating growth in terms of the "green" transformation and sustainable financing. ▪ ESG actions, widely speaking, should be perceived not only as additional costs resulting from regulations and social expectations, but as investments producing substantial profits in the long and short term. ▪ Transformation of the economic model into the ecological model is both a labour market challenge and an opportunity. New job places will be created, some professions will be replaced or will disappear, others will be redefined. Gaining new skills will become necessary to match the green transformation situation. ▪ Changes in the supply chains, accounting for ESG guidelines, will become a necessity demanded not just by regulations, but by the market itself. It will also require ensuring transparency of the supply chain structures – the more complex (multi-layer) and international the supply chains, the more difficult ESG implementation gets. ▪ Striving for green supply chains requires effective communication with all partners at every stage of the supply chain. ▪ Looking through the lens of environmental impacts of business operations ("E" dimension) will gradually become an integral part of every process performer by organisations and all stakeholders. ▪ Social pressure on companies delivering on the social aspect of "S" dimension will keep growing, despite current difficulty creating appropriate metrics. ▪ Lack of systemic approach to governance ("G" dimension) may significantly raise economic risks, company management which ignores "E" and "S" assumptions puts the organistion at risk of a shattered reputation or even bankruptcy.	▪ Companies which will be subject to the CSRD regulation should start preparing for its implementation, focusing on the quality of the data collection process and the quality of disclosures themselves (including climate-related disclosures) which will undergo an independent external verification. ▪ GRI-compliant reporting allows to prepare for the implementation of new regulatory obligations concerning reporting, as ESRS are largely similar to GRI standards. In terms of climate disclosures TCFD recommendations are used which are convergent with ESRS. ▪ Irrelevant of whether currently a company is subject to obligatory ESG reporting or not, it is very important to include sustainable development idea and good practices in the company's strategic management. Lean management tools may prove highly useful for that purpose. ▪ It is worth checking more information on green financing on the websites: of the Ministry of Development Funds and Regional Policy (or analogical CEE countries' institutions), European Investment Bank, European Investment Fund and United Nations Global Compact Network (https://ungc.org./). ▪ Employees should be educated in the context of green knowledge to boost their motivation to gain green skills which can increase their competitiveness on the labour market. ▪ In the supply chain an audit should be conducted and uniform methods of measuring ESG disclosures. It is recommended to develop innovations in supply chains to achieve sustainable development effects. The potential of new technologies of Industry 4.0 and 5.0 in managing supply chains should be employed. ▪ A good starting point for change in the "E" dimension is running a sustainability audit in infrastructure and energy parameters of all buildings (a mandatory requirement now), at the same time increasing the green awareness of employees. ▪ A good starting point for change in the "S" dimension is obeying basic ethical norms as well as reading documents such as *Wytyczne do raportowania ESG. Przewodnik dla spółek notowanych na GPW* [Guidelines for ESG Reporting. A Guide for Listed Companies] [GPW, EBOR, 2021]. ▪ It is recommended to devote some time to building sound governance ("G" dimension) – as it is a key condition for effective project implementation and applying measures which help meet environmental and social challenges.

Source: self-reported data.

Table 8 outlines a joint set of conclusions relating to sustainable development, as well as several recommendations for readers of the *Report* aimed at supporting the implementation of the presented knowledge and promoting the idea of sustainability.

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START-UP SUPPORT SYSTEMS IN THE COUNTRIES OF CENTRAL AND EASTERN EUROPE

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DOI: 10.33119/978-83-8030-625-7.2023_325_356

Abstract

The study fills the theoretical knowledge gap about support provided to start-ups by the countries of Central and Eastern Europe. It gives an in-depth description of the development of factors comprising start-up support systems and identifies the region's leaders. The study continues and deepens the work of the research team in the years 2019, 2020, 2021 and 2022. The present results are based on the last available reporting period data from 2022. To achieve the research goal, numerous methods and techniques were used, including reference literature analysis, secondary data and documents analysis, electronic review of official internet websites of enterprises and institutions, statistical analysis and a panel of experts carried out with a Delphi method and binary comparison. This way it was found that Estonia is the leading provider of start-up support systems in CEE, followed by Lithuania, Latvia, Poland and Czechia, whose systems are becoming more and more mature. The research results carry many practical implications in terms of start-up support systems evolution, data identification and transfer of institutional best practices that impact the success of CEE countries. The study continues to fill the theoretical gap in the synthesised description of start-up support systems in CEE countries, based on data from the recent reporting periods.

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Central and Eastern Europe (CEE) has become an attractive place for start-up founders in recent years. The region has a thriving technology sector with many innovative companies and has been home to numerous organizations and initiatives supporting start-ups. Start-up support systems have been the subject of research and rankings, not only at the national level but also internationally. This

study covers also state public policies directed towards entrepreneurship and innovation, as well as systems of factors supporting start-ups at all development stages.

CEE countries were defined by the Organisation for Economic Cooperation and Development [OECD, 2020] as a group of 12 countries (Albania, Bulgaria, Croatia, Czech Republic, Estonia, Lithuania, Latvia, Poland, Romania, Slovakia, Slovenia, Hungary). For the sake of this study, the group also includes Ukraine, and, under the common name of CEE used further in the article, it is subject to an in-depth, systematic analysis of start-up support systems. The authors of this study have identified a research gap, especially in respect of the number of publications comprehensively covering the geographical region defined in this way. International research on start-up support systems is somewhat diversified, both in respect of the analysed factors and the analysed countries. A list presenting the current state of research and a proposal of extending it with additional elements is presented in Table 1.

Table 1. Review of selected factors of start-up support systems and geographical scope of studies

Institution, study title, year of publication	Selected analysed factors of start-up support systems	Does the study cover all the 12 CEE countries and Ukraine?
European Startup Network, *Report on the Survey of EU Startups and the COVID-19 Pandemic*, 2023	Assessment of local public assistance during COVID-19 pandemic, recommendations and challenges	Cross-section, no CEE context
Startup Genome, *Global Startup Ecosystem Report*, 2022	Local networks, global networks	No (5 of 13)
European Commission, *European Innovation Scoreboard*, 2022	Human resources, attractiveness of research and development system, intangible assets, business environment, financing business activities, private investments	Yes (13 of 13)
European Commission, *Science, Research and Innovation Performance of the EU*, 2022	Demographic potential, economy productivity, economic growth, institutions, additionally in this edition: COVID-19 pandemic and Russian invasion of Ukraine	No (12 of 13), without Ukraine
World Intellectual Property Organization, *Global Innovation Index*, 2022	Institutions (policy, regulations, business environment), human capital (including education), infrastructure (IT), market, innovation network, knowledge creation, knowledge absorption, knowledge diffusion	Yes (13 of 13)
European Startups, *The Past, Present and Future of European Tech*, 2021	Recommendations for start-ups and EU Member States in different fields of activity (e.g. financing, talent acquisition, legal solutions)	Cross-section, CEE analysed as a whole
European Startup Network, *European Startup Monitor*, 2020/2021	Profile of start-up founders, funding sources, challenges for the system and its assessment, additionally in this edition: COVID-19 pandemic and impact of EU grants and subsidies	Cross-section, no CEE context

Source: self-reported data based on: Startup Genome [2022]; European Commission [2022a, 2022c]; WIPO [2022]; European Startups [2021]; European Startup Network [2020/2021, 2023].

Therefore, the main objective of this study is to fill the theoretical knowledge gap by answering the question on how CEE countries support their start-ups. The specific objectives are: to establish the current development stage of particular factors comprising start-up support systems in CEE, and to indicate which of the CEE countries have reached the highest development level in creating start-up support systems. First, research methodology is described, along with methods and techniques used to achieve the specific objectives described above, as well as time and geographical scope of the research. In the following sections the authors present particular factors of start-up support systems in CEE countries. Then an empirical part of the study evaluates and rates support systems in the Central and Eastern Europe and in Ukraine. The summary provides conclusions and recommendations referring to the start-up support theory and economic practice.

The key context of this year's study is internationalisation of start-ups from the CEE region. The work comprises case studies of start-ups from the region that operate successfully in international markets.

Methodology of research on start-up support systems in CEE countries

In recent years CEE countries have undertaken multiple measures to improve their start-up support systems. They were supposed to make the systems more entrepreneur- and investor-friendly and to ensure them robust growth, so that start-ups supported by them can expand internationally and be successful on a global scale.

In order to systematize the way the research on start-up support systems is done, the research team decided to analyse, as a part of a panel of experts consisting of entrepreneurship and innovation researchers, factors that comprise start-up support systems typical for CEE countries. The key elements are:

- social and economic development;
- tax system;
- intellectual property protection;
- academic entrepreneurship;
- government agencies;
- start-up accelerators;
- regulatory sandboxes;
- clusters and network organisations uniting start-ups;
- venture capital funds (VC);
- success stories of start-ups and their significance from the perspective of their visibility and recognisability for the start-up support system stakeholders.

In order to establish the development stage of individual factors comprising start-up support systems in CEE, reference literature published by international organisations was reviewed. Additionally, the authors analysed source documents and data, including legal acts of individual CEE countries, reviewed information available on official websites of institutions related to the research area, analysed data in the form of time series and conducted statistical analyses.

To identify which CEE countries are most advanced in terms of building start-up support systems, the research team conducted a panel of experts using the Delphi method. First, binary comparison was applied to establish weights of the 10 factors comprising state start-up support systems (with total value of weights being 100%). Next, the research experts responsible for studies dedicated to individual factors of start-up support systems rated them from 1 (very low development rate) to 5 (very high development rate) for each of the 13 analysed countries. The results of the panel of experts conducted using the Delphi method are presented in the form of a ranking, showing the leaders of start-up support systems in CEE. Additionally, the case study method was applied for the factor reflecting start-up success, which allowed to present aspects explaining the mechanisms of reaching success by businesses from CEE. The intention of the research team was to use the most recent available sources of data enabling international comparison of factors of start-up support system operating in CEE on an international scale, also on the basis of data from 2022. As mentioned before, geographically the research covers countries from the CEE region (Albania, Bulgaria, Croatia, Czechia, Estonia, Lithuania, Latvia, Poland, Romania, Slovakia, Slovenia, and Hungary), extended by Ukraine in this year's edition of the *Report*. The research was conducted from 15 F ebruary to 30 April 2023.

Factors of start-up support systems in CEE countries

Further sections of the article present factors comprising the analysed start-up support system in CEE countries, such as social and economic development, tax system, intellectual property protection, academic entrepreneurship, government agencies, start-up accelerators, regulatory sandboxes, clusters, VC funds and start-up success, perceived also as a factor affecting the start-up support system in a given country. The next part of the study describes ranks assigned to individual solutions, juxtaposed with all the analysed factors, as well as both detailed and general evaluations of countries.

Social and economic development of CEE countries

The rate of economic development is an important element of business environment and definitely may not only strongly affect investment attractiveness of individual countries, but also stimulate establishment and growth of start-up companies. CEE countries are important partners in the European integration process, but unfortunately their economic development in many aspects is poorer than that of the other European Union members. The differences in the rate of regional development were analysed using Eurostat data. Changes in GDP per capita that have been observed in Member States since 2009 relative to the EU average are presented in Table 2.

Table 2. GDP *per capita* of CEE countries compared to the EU in 2009–2022

PKB *per capita* (PPP, 2020 = 100)	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Albania	28	29	30	30	29	30	30	30	30	30	30	31	32	n/a
Bulgaria	44	45	46	47	46	47	48	49	50	52	53	55	57	59
Croatia	63	61	61	61	61	60	61	62	64	65	67	65	70	73
Czech Republic	87	84	84	84	86	88	89	89	91	92	93	93	92	91
Estonia	64	66	71	74	76	78	76	77	79	82	82	86	89	87
Lithuania	57	61	66	71	74	76	75	76	79	81	84	88	89	90
Latvia	53	54	56	61	63	64	65	66	67	69	69	72	72	74
Poland	60	63	65	67	67	67	69	69	69	71	73	76	77	79
Romania	52	52	55	57	55	56	57	59	63	66	70	73	74	77
Slovakia	72	76	76	77	78	78	79	73	71	70	71	72	69	67
Slovenia	86	85	84	83	83	83	83	84	86	87	89	89	90	92
Hungary	65	66	67	67	68	69	70	69	69	71	73	75	75	77

Source: own work on the basis of data of Eurostat.

The analysis of average pace of changes in these rates shows that the highest average growth rate in the years 2009–2022 was observed Lithuania (annual average +3.58%) and Romania (+3.07%). Table 3 presents detailed results.

Most regions (NUTS2) of the analysed countries will be eligible for advantageous financing conditions under cohesion funds in the 2021–2027 financial perspective. This will allow to maintain advantageous conditions of start-up development support financed by European funds.

Undoubtedly a major challenge for economic development was the outbreak of COVID-19 pandemic, whose impact is still felt today in various fields of functioning of the state. Apart from catastrophic consequences for human life and health all over

the world, it also affected the economy by slowing down the GDP growth, and even causing recession. In the context of start-ups development it is evident that the situation then created unique development opportunities for certain fields of economy, at the same disrupting business models and consumer behaviour observed so far. Protection schemes launched by many states, also in the CEE region, often even encouraged entrepreneurs to initiate or try new business models.

Table 3. Average growth rate of GDP *per capita* of CEE countries, compared to the EU in 2009–2022

Country	AGR*	Country	AGR*
Albania	101.12	Latvia	102.60
Bulgaria	102.28	Poland	102.14
Croatia	101.14	Romania	103.07
Czech Republic	100.35	Slovakia	99.45
Estonia	102.39	Slovenia	100.52
Lithuania	103.58	Hungary	101.31

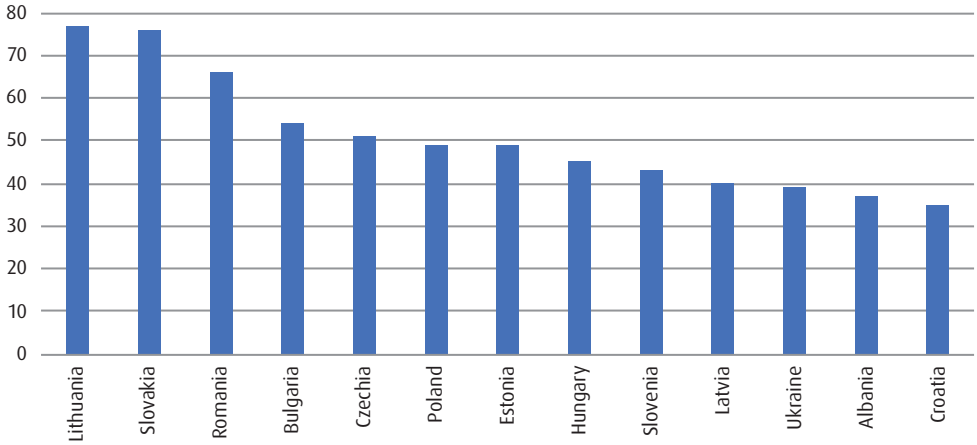
* Average growth rate calculated as a geometric mean of chain base index numbers.

Source: own calculation based on data of Eurostat.

CEE countries covered by this study had relatively low rate of economic intervention during the COVID-19 pandemic and ensuing restrictions. Measures undertaken by governments included income support, loan repayment holiday and debt relief, as well as fiscal policy and financial aid for other states. Average value of economic support index (ESI) in the analysed period (27 January 2020–31 December 2022) for CEE was 52.79, compared to 35.91 for the whole sample covering 264 countries all over the world. According to data presented in Figure 1, the highest index in the analysed group of countries was recorded for Lithuania ($ESI_{LTU} = 76.05$), Slovakia ($ESI_{SVK} = 75.30$) and Romania ($ESI_{ROU} = 65.89$), the lowest was found in Latvia ($ESI_{LVA} = 39.90$), Ukraine ($ESI_{UKR} = 39.53$) and Albania ($ESI_{ALB} = 36.45$).

The country that intervened the earliest was Estonia, while those that provided support for the longest period were Ukraine, Lithuania, and Romania. Support measures of individual countries varied over successive periods. The greatest stability of support was found in Ukraine, while the biggest and most frequent changes were observed in Poland. It is worth noting that in 2022, most of the analysed countries began to phase out their economic assistance, to eventually discontinue support in the case of Albania, Bulgaria, Czech Republic, Latvia, Slovakia, Slovenia, Poland, and Hungary.

Figure 1. Economic support index (ESI) of state governments due to the COVID-19 pandemic



Source: self-reported data based on Blavatnik School of Government [2022].

Legal regulations and fiscal systems supporting start-ups in CEE countries

To facilitate establishing new businesses and to create jobs for Ukrainian refugees, Lithuania launched a programme of cheaper loans for innovative business activities for Ukrainian SMEs founded after 24 February 2022.

Ensuring a conducive environment for the development of start-ups and other businesses requires CEE countries to improve business environment, support investments and innovation, and streamline research implementation programmes [European Commission, 2022b]. Unfortunately, only Latvia has a comprehensive start-up support system. Poland introduced a new flexible form of business activity called a simple joint-stock company from 1 July 2021, to support start-ups and their founders. The share capital of such company is PLN 1, and shares can be acquired for work or services. It can be established with a single-person management board without creating a supervisory board, and it can also have a single body – a board of directors. Moreover, the simple joint-stock company includes mechanisms to protect the interests of company creditors, such as ban on payments threatening the company's solvency [MRiT, 2021].

Table 4 presents selected legal regulations adopted in CEE countries that may influence creation of new start-ups and support their further development. Unfortunately, Poland and Hungary are the only countries in the region that have not received any funds under the European Union's Recovery and Resilience Facility (RFF), which they could use for investments supporting digital transformation or competitiveness of

national enterprises. Both countries have also failed to undertake the required reforms, such as improving investment climate, which may negatively affect the number of start-ups emerging within their borders. CEE countries introduced changes in their tax systems mostly in 2022, except for Poland (reduction of PIT from 17% to 12%), primarily involving lower VAT rates or excise duties on fuels, electricity, and gas prices.

Table 4. Selected legal regulations of CEE countries and support for start-ups

Country	Changes in tax system in 2022	Recovery and Resilience Facility (RFF)
Albania	Temporary tax relief on income (for all) and crude oil (for farmers), extending protection shield against energy prices for businesses.	not applicable
Bulgaria	Reduction of VAT to 9% for gas and heating.	Yes, support in the form of EUR 6.27 billion subsidy for investments in public administration digitisation and provision of digital public services in key areas such as judiciary, postal services, healthcare, employment, and social protection; support for digitisation of enterprises, as well as transport and energy sectors.
Croatia	Reduction of VAT from 25% to 13% for heating, introduction of price cap for fuel in some months; businesses received de minimis aid for gas purchase.	Yes, the plan covers 146 investments and 76 reforms totalling EUR 739 million, which will be dedicated to the improvement of business environment by reducing administrative burden, reducing regulatory requirements for services provided by independent professionals, and raising availability of financing for enterprises; the plan also provides for EUR 200 million support for increasing effectiveness of the public sector and judiciary.
Czechia	No changes in the tax system, however the government limited electricity and gas prices for households and small companies from October 2022 to December 2023.	Yes, the plan includes 91 investments and 33 reforms, which will be supported by grants totalling EUR 7 billion; it also includes investment of EUR 650 million in digital transformation of enterprises, digital innovation hubs, and high-capacity networks, including 5G networks.
Estonia	Cutting excise duty for special-purpose diesel oil and reducing VAT rate on press publications in order to support the media.	Yes, the plan covers 25 investments and 16 reforms, which will be supported by grants of EUR 969.3 million; the support is intended for digitising businesses (EUR 83 million), digitising public administration (EUR 97 million), raising competitiveness of Estonian companies (EUR 33 million) through measures aimed at developing regional and national export strategies and promoting Estonian companies at international events; development of innovative business centres in key foreign markets.
Lithuania	No changes in tax system, special-purpose aid for energy-intensive enterprises in the form of subsidies.	Yes, the plan covers 30 actions involving investments and reforms, which will be supported by grants of EUR 2.22 billion; the plan includes reforms and investments aimed at tax compliance and expanding the tax base, strengthening budget frameworks, and improving human resource management in the public sector (EUR 65 million).
Latvia	No changes in tax system, special-purpose aid for energy-intensive enterprises in the form of subsidies	Yes, the plan includes 60 investments and 25 reforms. They will be supported by grants of EUR 1.8 billion, the investments will support, for example, digital transformation of enterprises and create a better environment for research and innovation through measures improving the digitisation of SMEs (EUR 125 million).

cont. Table 4

Country	Changes in tax system in 2022	Recovery and Resilience Facility (RFF)
Poland	Reduction of PIT from 17% to 12% and cutting VAT rates from 23% to 8% for fuel, from 23% to 0% for gas, and from 23% to 5% for electricity.	No, the plan includes 49 reforms and 53 investments; they will be supported by estimated EUR 23.9 billion in subsidies and EUR 11.5 billion in loans; a series of reforms is planned to improve the investment climate in Poland.
Romania	No changes in tax system, public aid available for some industries (e.g. construction or agriculture) particularly affected by high prices of electricity, gas, and fuels.	Yes, the plan includes 107 investments and 64 reforms; they will be supported by an estimated EUR 14.24 billion in subsidies and EUR 14.94 billion in loans; fiscal stability will be supported through strengthened budget frameworks, better expenditure control, tax reviews, and pension system reform.
Slovakia	No changes in tax system, however, industry was excluded from gas consumption cuts compulsory in the whole EU and exempted from the Russian oil embargo until a relevant alternative is found.	Yes, the plan will be supported by grants totalling EUR 6.3 billion; an investment of approximately EUR 102 million will facilitate digitisation for enterprises through digital innovation hub networks; additionally, investments will be made in developing a new Slovak supercomputer and participating in other cross-border EU projects; to support innovation potential, the plan aims to reform the management of R&D and invest of around EUR 738 million in programmes to mobilise researchers, support public-private research cooperation, inject new capital and micro-loans for enterprises, and provide innovation vouchers for SMEs.
Slovenia	Cutting VAT on heating	Yes, the plan covers 55 investments and 33 reforms; they will be supported by EUR 1.8 billion in subsidies and EUR 0.7 billion in loans, including EUR 305 million to increase productivity and innovation in business, including funding research projects for environmental and digital transformation; accompanying these investments are reforms aimed at improving business environment, access to financing, and collaboration in research commissioned by public and private entities.
Ukraine	No changes in tax system.	not applicable
Hungary	No changes in tax system, but cap on fuel prices.	No, the plan covers 54 reforms and 31 investments totalling EUR 5.8 billion, subject to achieving key milestones in the area of the rule of law.

Source: self-reported data based on EBRD [2022] and European Commission [2022b].

Case study

Poland: Red Deer Games

A Polish start-up based in Warsaw, which, by combining experience of dedicated and passionate designers, artists, musicians, programmers, and producers, creates captivating indie games (short for "independent games"). RDG employs over 50 people, with some working at the main headquarters in Warsaw, and others in offices in Szczecin and Barcelona.

The idea of indie games revolves around their creation by individual creators or small developer studios, targeting players seeking innovative approaches and tired of mainstream games.

RDG is an independent game development studio, present in the global gaming market since 2018. They are not only producers but also publishers of their own indie games and games by other creators. Their

products are sold worldwide through digital distribution models, on dedicated platforms of major game and app distributors such as Nintendo eShop, Microsoft Store, and STEAM.
The year 2022 was a breakthrough for RDG. After initial years of running business, the start-up moved beyond the indie sector and expanded its game production to the AAA segment, which requires substantial financial investments. Furthermore, they established a team responsible for implementing NFTs (non-fungible tokens) in blockchain-based games. Using NFTs, players can possess virtual items such as graphics or skins – external appearances of game objects, characters, or items that can be changed. NFT technology ensures that the purchased asset cannot be duplicated, and the player can be confident that they remain the sole owner.
The company was featured in the latest *Central and Eastern European Start-ups* report. According to experts, RDG is among nine most promising gaming start-ups in CEE. RDG also received recognition from Acquisition International Magazine as the fastest-growing company in Central Europe, made it to the *Top 10 Nintendo Global Publisher* list, was nominated for the *Best Indie Publishers 2022* award, and was acknowledged by Forbes experts, earning a spot on the *Top 50 Forbes Game Producers* list.
Since its inception, RDG has been focused on expanding into the global market. The success is attributed to the team's hard work and strategy, about which Michał M. Lisiecki, the company co-founder, and CEO, says " (...) the main challenge is (...) to stay ahead of our time, acting as a bridge between the game creator and all the add-ons and the user who expects technology to enhance their experience with virtual entertainment."

Source: self-reported data based on Red Deer Games [2023], Kipiela [2022], Winkler, Pawelak [2022].

Intellectual property protection in CEE countries

This section looks at activities related to the protection of intellectual property rights in CEE countries, based on data from organizations such as the European Patent Office (EPO), European Union Intellectual Property Office (EUIPO), and World Intellectual Property Office (WIPO).

In 2022, the highest rate of European patent applications per 1 million inhabitants was recorded in Slovenia, Estonia, and the Czech Republic, while the lowest was in Romania, Bulgaria, and Croatia. As for EU trademarks, the highest numbers of applications were made by entities from Poland, Czech Republic, and Bulgaria, while the fewest came from companies in Albania, Latvia, and Slovakia. Businesses most actively filing for EU industrial designs were those from Poland, Bulgaria, and the Czech Republic, while the least active entities were from Albania, Latvia, and Croatia. In terms of European patent applications, it can be observed that Poland experienced the highest absolute increase in the number of applications between 2021 and 2022.

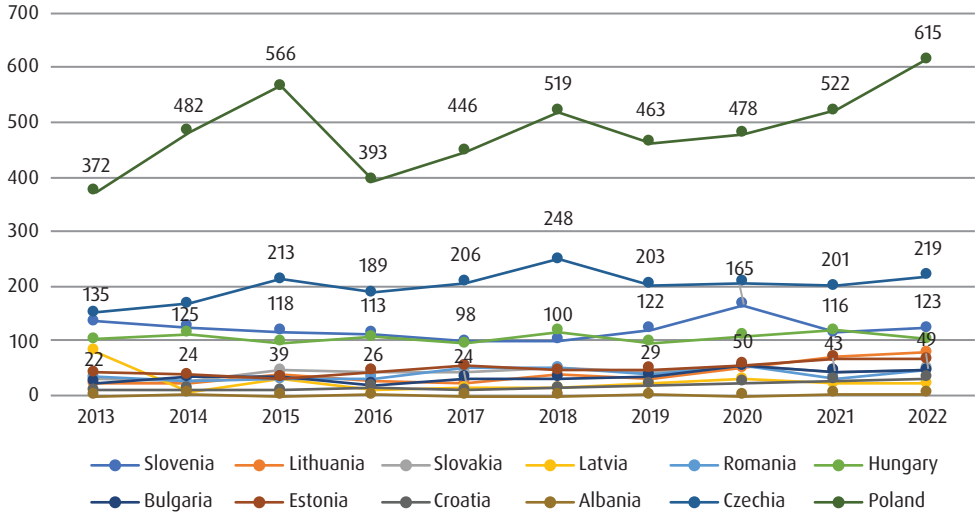
Poland also achieved the best results in terms of both the number of filed (44%) and granted (39%) European patents in 2022, among all the surveyed CEE countries.

Table 5. Intellectual property protection in CEE countries

	Country	Losses caused by intellectual property right violations in 2020 (EUR million)	Population in 2022 (million)	Filed European patent applications in 2022	Number of filed European patent applications per 1 million citizens in 2022	Granted European patents in 2022	Number of granted European patents per 1 million citizens in 2022	Filed national and international industrial design applications in 2021	Filed national and international trademark applications in 2021	Filed EU industrial design applications in 2022	Filed EU trademark applications in 2022
1	Bulgaria	377	6.83	45	6.58	22	3.22	3545	41606	1021	1293
2	Czech Republic	464	10.51	219	20.82	85	8.09	8630	63602	816	1742
3	Estonia	66	1.33	66	49.56	13	9.77	2658	27174	162	854
4	Lithuania	142	2.8	78	27.8	20	7.14	2713	30802	159	962
5	Latvia	105	1.87	22	11.73	9	4.81	1654	11669	83	358
6	Poland	2038	37.65	615	16.33	188	4.99	45573	188900	5407	6056
7	Romania	1040	19.03	46	2.42	16	0.84	5382	49517	513	1718
9	Slovenia	126	2.1	123	58.37	46	21.90	n/a	n/a	229	621
8	Slovakia	367	5.43	49	9.02	17	3.13	2403	22052	118	612
10	Hungary	547	9.68	102	10.53	54	5.58	1837	31160	202	856
11	Albania	n/a	n/a	n/a	n/a	n/a	n/a	47	1293	28	6
12	Croatia	232	3.87	32	8.25	13	3.36	1974	11949	133	339
Source of data		EUIPO	EPO					WIPO		EUIPO	

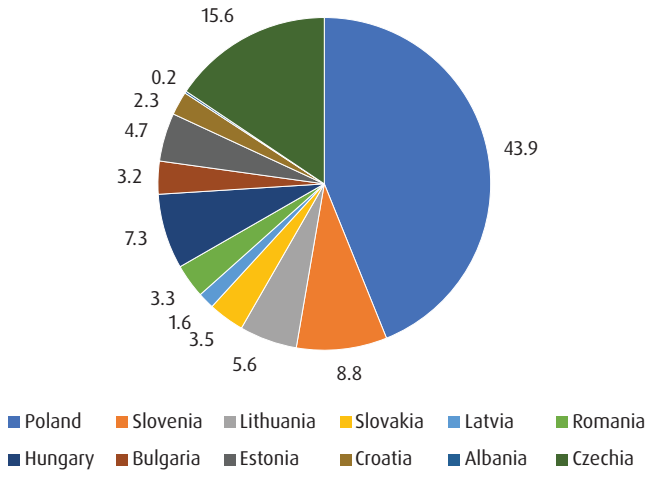
Source: self-reported data based on EPO [2022], EUIPO [2023a, 2023b], WIPO [2022, 2023].

Figure 2. European patent applications in the years 2013–2022 (%)



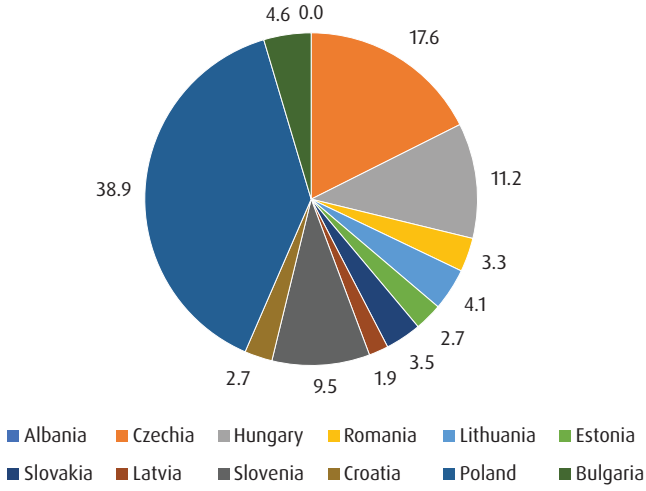
Source: self-reported data based on EPO [2022].

Figure 3. Percentage of filed EU patent applications in CEE countries in 2022 (%)



Source: self-reported data based on EPO [2022].

Figure 4. Percentage of granted EU patents in CEE countries in 2022 (%)



Source: self-reported data based on EPO [2022].

Academic entrepreneurship in CEE

Universities, technical universities, and higher education institutions are considered key partners in the transfer of knowledge, innovation, and technology to business practice. Through initiatives aimed at utilizing scientific findings in business, knowledge accumulated by researchers is applied in actual operations of enterprises and state institutions. The mechanism of commercializing scientific *know-how* by universities is referred to as academic entrepreneurship. It is manifested by measures supporting development of entrepreneurial attitudes among students and academic staff. The process is contributed to by educational programmes, mentoring, and direct involvement of universities in financing and organizational advice. Academic entrepreneurship is seen as a significant component of transformation of our society into a knowledge-based society.

The emergence and functioning of start-ups are conditioned by the rate of development of the local start-up ecosystem. Universities can support it by providing knowledge and competencies, funding, and appropriate infrastructure. There is a correlation between the place of location of the most important academic centres and the presence of top start-up ecosystems. However, according to Startup Genome [2023], with rapid advancement of digitisation driven by the COVID-19 pandemic, connection of investments to specific locations is losing significance. As a result, leading start-up ecosystems, such as Silicon Valley or Cambridge City in Boston, are not only compet-

ing with one other but also with smaller, geographically dispersed centres with unique competitive advantages related to legal, economic, and social systems they operate in.

Academic entrepreneurship in CEE countries is continuously evolving. The ongoing digitisation and implementation of new technologies in science and business, such as the increasing use of artificial intelligence, is both an opportunity and a challenge for universities. Technology transfer centres operating within universities and technical universities play a significant role in facilitating the digitisation processes and adaptation to new standards. Moreover, the concept of digital academic entrepreneurship is becoming increasingly popular in literature. This emerging approach emphasizes the importance of utilizing technological solutions at universities as tools to support:

a) Entrepreneurship education,
b) Establishing university makerspaces,
c) Identifying new business opportunities,
d) Acquisition of entrepreneurial skills by local start-up ecosystems.

This part of the report presents an assessment of involvement of leading universities from the CEE region [QS, 2023] in the development of academic entrepreneurship. This phenomenon was measured with a tool used in previous editions of the study. The data set was generated from information gathered from interviews with university staff and audits of websites of these institutions. According to the previously employed model, four levels of university involvement in actions aimed at stimulating academic entrepreneurship were distinguished. Each subsequent level involves increasingly advanced mechanisms supporting the start-up ecosystem in which they operate. Some institutions may not exhibit such initiatives at all, possibly due to external conditions. For example, this is the case with V.N. Karazin Kharkiv National University in Ukraine, which operates in areas affected by military conflict.

Table 6. Description of levels of university involvement in stimulating academic entrepreneurship

<table>
<tr><th>Level 1</th><th>Level 2</th><th>Level 3</th><th>Level 4</th></tr>
<tr><td colspan="2">(entrepreneurship education and business consulting)</td><td colspan="2">(infrastructure and complex entrepreneurship support tools)</td></tr>
<tr><td>Idea conceptualisation</td><td>Idea specification</td><td>Start-up phase</td><td>Enterprise development</td></tr>
<tr><td colspan="4">Education schemes, inspiration meetings, competitions, and promotion of best projects</td></tr>
<tr><td></td><td colspan="3">Pre-incubation, training and consulting, networking, co-working (workspaces), autonomous university entity responsible for academic entrepreneurship or separate special-purpose entity</td></tr>
<tr><td colspan="2"></td><td colspan="2">Incubator, seed funds, provision of legal personality, mentoring</td></tr>
<tr><td colspan="3"></td><td>Investment by a special-purpose entity or a spin-off</td></tr>
</table>

Source: self-reported data.

Table 7. Level of university involvement in the development of academic entrepreneurship

Country	University	Rate of
Bulgaria	Sofia University "St. Kliment Ohridski"	3
Czech Republic	Masaryk University in Brno	3
	Palacký University Olomouc	4
	Czech Technical University in Prague	3
	Charles University in Prague	4
	Brno University of Technology	3
Estonia	Tallinn University	4
	Tallinn University of Technology	4
	University of Tartu	4
Lithuania	Vilnius University	4
	Kaunas University of Technology	4
	Vilnius Gediminas Technical University	2
	Klaipėda University	3
	Vytautas Magnus University	4
	Mykolas Romeris University	2
Latvia	University of Latvia	4
	Riga Technical University	4
	Riga Stradiņš University	3
Poland	Adam Mickiewicz University	3
	Warsaw University of Technology	4
	Jagiellonian University	4
	AGH University of Science and Technology in Krakow	4
	University of Warsaw	4
	Krakow University of Technology	4
	University of Wrocław	4
	Gdańsk University of Technology	4
Romania	Babeș-Bolyai University	3
	Politehnica University of Bucharest	3
	Alexandru Ioan Cuza University	2
	University of Bucharest	1
	Lucian Blaga University of Sibiu	2
Slovakia	Pavol Jozef Šafárik University in Košice	3
	Slovak University of Technology in Bratislava	4
	Kaunas University of Technology	4
	Comenius University in Bratislava	4
	University of Žilina	4

Country	University	Rate of
Hungary	University of Debrecen	3
	Eötvös Loránd University	2
	University of Szeged	2
	University of Pécs	3
	Budapest University of Technology and Economics	3
	Széchenyi István University of Győr	2
Croatia	University of Split	2
	University of Rijeka	2
	University of Zagreb	2
	Josip Juraj Strossmayer University of Osijek	2
Albania	University of Tirana	0
	Epoka University	0
Slovenia	University of Maribor	3
	University of Ljubljana	4
	University of Primorska	3
	University of Nova Gorica	3
Ukraine	Taras Shevchenko National University of Kyiv	1
	Vasily Karazin Kharkiv National University	0
	National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"	4
	Lviv Polytechnic National University	3

Source: self-reported data.

Based on the global university ranking [QS, 2023] it was suggested to extend the list of academic centres included in the assessment by eight more institutions. A comparative analysis of this year's study and previous editions of the report shows that each year universities and technical universities offer the same or broader support for academic entrepreneurship.

Academic entrepreneurship is becoming an increasingly significant element in the strategies of universities in the CEE region. Countries that stand out particularly positively compared to others have been and still are Estonia, Czechia, Lithuania, Latvia, Poland, and Slovakia. Development of start-up ecosystems in these countries is supported by various educational programmes, inter-university collaboration, science and technology parks, and incubation programmes operating by universities. Slovak University of Technology in Bratislava serves as an example of an institution that is highly engaged in stimulating academic entrepreneurship. It has established University Science Park (USP) in collaboration with business partners, and its University Technology Incubator (InQb) has helped to establish 42 start-ups and six spin-off companies.

However, even among universities in the CEE region that have received high ratings, there is room for improvement, particularly in providing assistance to start-ups that need capital at their early stages of development. Only a small number of academic centres (such as Tallinn University and the University of Tartu) run venture capital funds and actively promote them.

Among universities in the CEE region, Romanian academic centres deserve attention for implementing increasingly sophisticated tools to support academic entrepreneurship. Notably, the launch of the UBB Student-i-Lab Incubator at Babeș-Bolyai University in Cluj-Napoca in February 2023 is worthy of recognition. Among the 56 universities included in the study, only three did not have independent units functioning as technology transfer centres. This was observed, for instance, at the University of Tirana and Epoka University in Albania, where knowledge transfer is still perceived only in terms of preparing scientific publications. There are no measures to support entrepreneurial attitudes among students and academic staff.

In the era of advancing digitisation, support for academic entrepreneurship is more and more commonly provided in virtual form. This allows for deeper inter-university cooperation, as exemplified by the *Digitalni Inovacijski Inkubator* project organized by the University of Rijeka. Involvement of Croatian universities in the development of academic entrepreneurship remains one of the poorest in the CEE region. Such programmes play a significant role in activating students and academic staff at institutions that do not offer this type of support. Additionally, it is worth noting that inter-university cooperation does not have to be national only. For all academic centres in the CEE region, there is an opportunity to collaborate with top foreign universities oriented towards the start-up environment, such as Stanford University or RWTH Aachen University. Valuable know-how can be acquired through initiatives like the Stanford Technology Ventures Program (STVP), which aims to support universities worldwide in developing entrepreneurship education programmes and projects.

Case study

Czechia: Flowpay

Flowpay is a Czech technology company operating in the fintech industry, providing financing to SMEs (small and medium-sized enterprises). The start-up founders, Daniel Hastík and William Jalloul, want to make intelligent financing available with a single click, using real-time data obtained from customers. Daniel Hastík is a former founder of Futurelytics, and he currently works as a partner at Nextech Ventures fund. He has also been involved in predictive analytics for over ten years. The second co-founder, William Jalloul, grew up in a family engaged in Czech art glass production, which led him to establish his own VC office, WJ Ventures, and invest in start-ups, fintech and e-sport industries, and cryptocurrencies.

Flowpay independently assesses creditworthiness of companies and based on this assessment provides loans up to one million Czech crowns for a maximum period of one year. The start-up was established in 2021 to offer short- and medium-term financing options to small and medium-sized businesses.
As a B2B platform, Flowpay offers an integrated financial solution. By connecting with e-commerce platforms, cash register systems, and payment gateways, it provides its customers with financing in the form of short- or medium-term loans. The platforms provide data about their end customers, who are predominantly SMEs. Flowpay enables companies to have more transparent cash flow management, helping them better understand and track customer actions and supporting development of alternative sources of income.
Flowpay is expanding into new markets, currently operating in three CEE countries. The company is also in talks with potential partners – platforms with thousands to tens of thousands of SME customers. By collaborating with multiple entities in one place, they can quickly reach tens of thousands of customers in the CEE region. Similar platforms focusing on short-term financing for e-commerce businesses include Lemonero (also from Czechia), Wayflyer (from the UK), and Banxware (from Germany).

Source: self-reported data based on Crunchbase [2023], Flowpay [2023], Fintech Cowboys [2023].

Government agencies and start-up support systems in CEE countries

This section presents an assessment of government agencies in CEE countries involved in start-up support systems. For this purpose, the authors reviewed official websites of public institutions responsible for economic policy in individual states.

The analysis covers information on the measures exercised by public administration bodies engaged in start-up support systems with their financial, infrastructure, and education resources, international expansion, and attracting foreign start-ups. Their detailed list is presented in table 8.

Table 8. Measures implemented by government agencies as a part of start-up support systems in 2022

Areas of activities	Common measures
Financing	Grants and competitions for financing enterprises establishment and development
	Capital investments and loans provided directly by government agencies (e.g. state venture capital fund) to existing enterprises
	Running a fund of funds, or an institution stimulating business angels and venture capital funds in the country by leveraging their capital
Stimulating start-up environment	Educational and monitoring programmes that popularise entrepreneurial attitude and knowledge on establishing and running start-ups
	Establishing and supporting incubators and accelerators
	Running a website with comprehensive up-to-date information on start-up events, ecosystem participants, and statistical data

cont. Table 8

Areas of activities	Common measures
Internationalisation of national start-ups	Supporting relations of domestic start-ups at the initial stage with international partners, e.g. through foreign visits, financing participation in start-up competitions, incubation, and acceleration programmes
	Programmes supporting scaling start-ups internationally, e.g. loan guarantees, promotion support
Attracting foreign start-ups	Administrative facilitations for foreign start-up founders (Start-up Visa)
	Administrative facilitations for employing foreign experts by start-ups (Start-up Employee Visa)
	website with information for foreign start-up founders considering relocation to a given country

Source: self-reported data based on the review of offi al websites of government agencies of CEE countries (1–3 April 2023).

Review of the collected information made it possible to assess the engagement of government agencies in CEE countries in the development of start-up ecosystems, broken down by identified areas of support. Table 9 presents detailed results.

Table 9. Assessment of engagement of government agencies in start-up support systems identified in 2022.

	Areas of activities				**Average score***
	financial support	stimulating start-up environment	internationalisation of national start-ups	attracting foreign start-ups	
Albania	1	1	1	1	**1.00**
Bulgaria	2	1	1	3	**1.75**
Croatia	1	1	1	1	**1.00**
Czech Republic	2	3	3	4	**3.00**
Estonia	4	5	3	5	**4.25**
Lithuania	4	4	2	5	**3.75**
Latvia	3	5	2	5	**3.75**
Poland	5	5	4	2	**4.00**
Romania	1	1	1	1	**1.00**
Slovakia	3	1	1	1	**1.50**
Slovenia	4	4	4	2	**3.50**
Ukraine	1	1	1	1	**1.00**
Hungary	5	1	1	1	**2.00**

Score from 1 to 5, where: 1 means no measures taken in a given area, 5 means comprehensive and consistent implementation of measures.

Source: self-reported data based on the review of offi al websites of government agencies of CEE countries (1–3 April 2023).

The most engaged were public institutions in Estonia, Poland, Lithuania, and Latvia (average score 3.75–4.25). They were followed by Slovenia and Czechia (average score 3.00–3.50). In the remaining countries activities of government agencies rated poorly (from 1 to 2).

An analysis of profiles of countries with the most engaged institutions may identify model measures of support for start-up ecosystems. For the Baltic states it is typical to focus on attracting start-ups and start-up founders from abroad and to develop financial support system. The example of Poland shows advanced measures in the first three areas and relatively small activity in the area of attracting foreign start-ups (no Start-up Visa and Start-up Employee Visa programmes). A similar approach, albeit with less involvement, is observed for government agencies in Slovenia. In Czechia, government agencies' programmes of financial support for start-ups are rated the lowest among leaders, while their measures to attract foreign start-ups stand out (e.g. Start-up Visa programme). Among countries taking the lowest positions in the ranking Hungary and Bulgaria are interesting cases. In Hungary government agencies provide broad financial support to start-ups. Bulgaria launched their Start-up Visa programme at the end of 2022.

Start-up accelerators and clusters in CEE countries

Western Europe continues to lead in start-up rankings and, compared to Eastern European countries, it has better entrepreneurial environment conditions. The prestigious Global Startup Ecosystem Index Report 2022 presents changes that occurred in the start-up market in 2022. The trends observed in this area between 2020 and 2021 were to some extent influenced by the COVID-19 pandemic. In 2022, the war in Ukraine caused drastic changes in the economic and political situation, particularly in the CEE countries, which, due to their geographical proximity, became places of safety and support for many refugees fleeing the war. These changes are also reflected in the comparative table of start-up accelerators (Table 10) below.

The analysis shows that in 2022, the number of accelerators grew in Poland, Estonia, Romania, Czech Republic, Bulgaria, Albania, Hungary, Slovakia, Lithuania, and Latvia. The first accelerator in 2022 was created in Croatia in Zagreb. Despite the growing number of accelerators in Ukraine, the country fell from 16th to 50th place in the *Global Startup Rankings*, and cities located near the front lines, such as Odessa, Kharkiv, and Dnipro, disappeared from the list of locations.

Table 10. Start-up accelerators in CEE countries according to Startup Blink

	Position in Global Startup ranking				Number of accelerators according to Startup Blink				Best ranked accelerators by Startup Blink in 2022	Places with the largest number of accelerators in 2022
	2019	2020	2021	2022	2019	2020	2021	2022		
Poland	20	27	30	33	10*	10*	10*	20	Climate-KIC Accelerator Programme, Founder Institute Warsaw, MIT Enterprise Forum CEE, Kogifi, Huge Thing	Warsaw, Krakow, Wrocław, Poznań, Gdańsk
Estonia	13	11	13	13	5	9	11	16	Startup Wise Guys, Superangel, Tartu Science Park, Storytek	Tallinn, Tartu
Romania	38	45	41	39	5	5	5	9	Spherik Accelerator, Alpha Hub, Techcelerator	Bucharest, Kluj-Napoca, Jassy, Timisoara
Hungary	39	37	49	51	4	8	7	16	CEU InnovationsLab, MKB Fintechlab, OXO Labs, Hiventures, PortfoLion, ACME Labs	Budapest, Debrecen, Miskolc
Slovakia	49	51	56	58	3	3	3	5	USP Technicom, CEED Tech, Launcher	Bratislava, Košice
Czech Republic	22	26	32	32	3	6	5	10	StartupYard, AI Startup Incubator, VSEM Accelerator, JIC, OPIFER	Prague, Brno, Ostrava, Plzeň
Ukraine	31	29	34	50	15	12	12	19	BERRY, FoodTech accelerator by LvBS, YEP!, Jooble Venture Lab, Valle Impacta, Carrot	Kyiv, Lviv
Bulgaria	35	32	35	36	2	6	6	9	Start It Smart, Eleven Accelerator Venture Fund, Climate-KIC Accelerator Bulgaria, LaunchHub Ventures	Sofia, Varna, Plovdiv
Lithuania	18	15	16	17	3	6	18	24	Hostinger, Tesonet, Baltic Sandbox, Kaunas STP, Startup It, TechHub, Tesonet, Bridgio	Vilnius, Kaunas, Klaipėda
Slovenia	48	35	46	47	2	2	2	2	Hekovnik Startup School, ABC Accelerator	Ljubljana, Maribor
Croatia	50	39	37	45	N/A	N/A	N/A	1	Invento	Zagreb
Latvia	45	36	42	43	N/A	2	2	4	Startup Wise Guys, TechHub Riga, Overkill Ventures	Riga
Albania	85	72	78	75	N/A	1	1	9	Oficina, Triple City, Epoka University	Tirana, Shkodër, Vlorë

* The authors of this study consider that the number of accelerators in Poland given in the quoted Startup Blink report is underestimated. Reference literature lacks studies dedicated to detailed analysis of Polish accelerators. More research is therefore required in this field.

Source: self-reported data based on Startup Blink [2023a].

Table 11 presents the number of clusters in CEE countries in the years 2019–2022. The highest number of clusters without changes in the examined periods was observed in Poland and Romania, while the lowest was in Albania. Comparing the data from the last three years, it can be noted that the number of clusters has been steadily increasing in most countries, such as Poland, Bulgaria, Romania, Czech Republic, Slovakia, Croatia, Hungary, and Latvia. Estonia, Croatia, Latvia, Albania, Slovakia, and Slovenia maintained the same number of clusters as in the previous year.

Table 11. Number of clusters in CEE countries in the years 2019–2022

	Poland	Romania	Bulgaria	Lithuania	Hungary	Ukraine	Czechia	Croatia	Estonia	Latvia	Albania	Slovakia	Slovenia
2019	67	51	26	24	23	23	18	13	11	11	2	4	17
2020	71	52	26	28	25	14	20	14	14	13	2	15	17
2021	76	59	29	27	26	14	21	15	14	14	2	25	19
2022	79	63	31	29	28	16	22	15	14	14	2	25	19

Source: self-reported data based on the data of European Cluster Collaboration Platform [2023].

Estonia remains the leader among the surveyed countries, taking 13 th position in the global ranking by Startup Blink. Poland, which ranked 33 rd in this classification, dropped three positions in 2022 compared to the previous year, continuing the downward trend that began in 2019 . However, Ukraine experienced the largest decline, ranking 50th. The war had a very negative impact on the promising and impressive potential of the Ukrainian start-up ecosystem. Croatia also experienced a deterioration in its position despite the establishment of the first accelerator in the capital city. The years 2020–2022 in Europe were undoubtedly marked by a sense of great uncertainty and threat, which was also felt in the start-up ecosystem.

Case study

Estonia: Change Invest

Change Invest is an Estonian start-up based in Tallinn, aiming to simplify the investment process and increase its popularity. They have developed a mobile application for investment services, offering low fees and technical and informational support to novice investors. Users have access to a variety of cryptocurrencies and can invest in them, earning interest on their holdings. Change also offers Visa payment card linked to cryptocurrency balances, allowing users to spend them in the real world.

It was founded in 2016 by Krystjan Kangro, an entrepreneur and former CFO of Expara, one of the oldest VC firms in Singapore, and Gustav Liblik, who had eight years of experience in the cryptocurrency industry, running First Meta, one of the world's first virtual currency exchanges and service providers. Liblik was also a board member of the Estonian Cryptocurrency Association from 2017 to 2021. Kangro, working in a VC fund investing in hugely profitable world-changing enterprises, kept meeting the same group of wealthy investors, who could afford to collaborate with Expara. This led to the emergence of Change Invest, providing access to exciting investments for everyone in the market. From the start, Change has been a start-up operating in multiple European countries.

According to the founders, the future of finance is open and inclusive, and the strength and value of rapidly developing Change Invest lie in its team. The team consists of young individuals from 20 countries who believe in a friendlier world where everyone can invest, and their goal is to build a space where everyone has equal access to financial services.

Change's cryptocurrency services are authorized by the Estonian Financial Intelligence Unit and the Dutch Authority for the Financial Markets. They are currently available in 31 countries within the European Economic Area (EEA), and the start-up boasts over 125 000 clients who have conducted transactions totalling more than EUR 170 million. The evidence of success of Change Invest are also its reviews on the APP Store (*Number 1 app for trading cryptocurrencies*) and Google Play (*Great app and wallet!*).

Source: self-reported data based on Change Invest [2023], Denysiuk [2023], Fintech Dealroom [2023], Startup Day [2020].

The role of regulatory sandboxes in supporting technology start-ups in CEE

A regulatory sandbox is a mechanism that allows innovative companies and start-ups to test and develop new products, services, or business models in a controlled environment. In the CEE region, several countries have already implemented this solution, and others are preparing to introduce it in the near future.

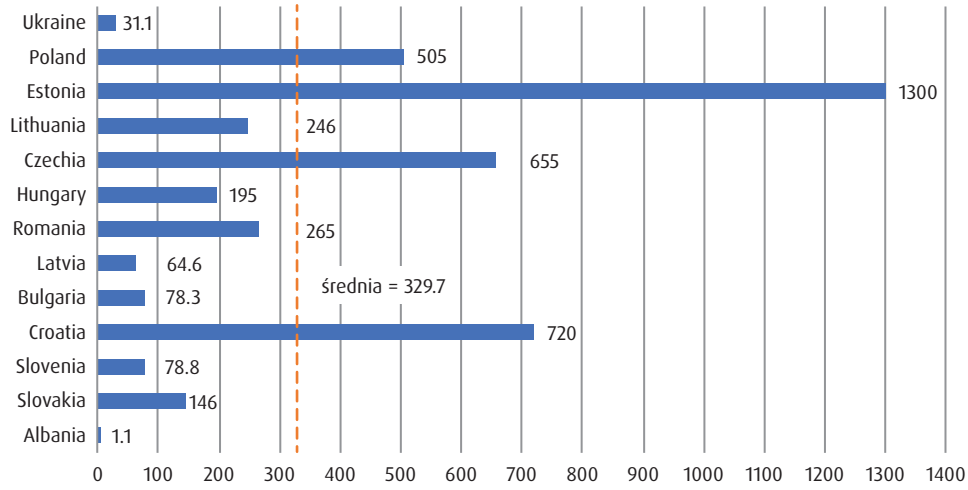
- Polish Financial Supervision Authority (KNF) launched a regulatory sandbox in 2018. Its aim is to provide a controlled environment for fintech start-ups to test their products and services in real-market conditions [KNF, 2021].
- Estonian Financial Supervisory Authority has set up a regulatory sandbox for fintech start-ups. It allows companies to test new products and services no need to comply fully with existing regulations. The sandbox is open to both local and foreign companies [EBRD, 2019].
- A sandbox launched by the Bank of Lithuania in 2019 is intended for both fintech companies and traditional financial institutions. It provides a secure environment for companies to test new products and services before introducing them to the market [Bank of Lithuania, 2023].
- The Central Bank of Hungary has also launched a regulatory sandbox. Its purpose is to provide a controlled environment for fintech start-ups to test their products and services [Magyar Nemzeti Bank, 2023].

Similar initiatives are also emerging in Bulgaria, Croatia, Czechia, Latvia, Romania, Slovenia, and Slovakia. Regulatory sandboxes are becoming increasingly popular in the CEE region as a way to support innovation and development in the fintech sector. Each country's sandbox has its specific rules and conditions, but all aim to provide companies with a secure space to test new ideas.

Activities of venture capital funds in CEE countries and support for start-ups

This section describes the activities of venture capital funds in CEE in 2022. Data used in the research were obtained from the digital investment platform Dealroom based in Amsterdam, founded in 2013. The authors continue the research cooperation with the platform initiated in previous years. As of the date of the research (24 January 2023), Dealroom has aggregated data from 1 666 823 tech-enterprises (start-ups and scale-ups); 164 600 investors, including VC funds; 185 752 corporate partners, and results of 441 872 financing rounds. The 2022 research additionally covers Ukraine.

Figure 5. Cumulative value of VC investments in 2022 (USD billion)



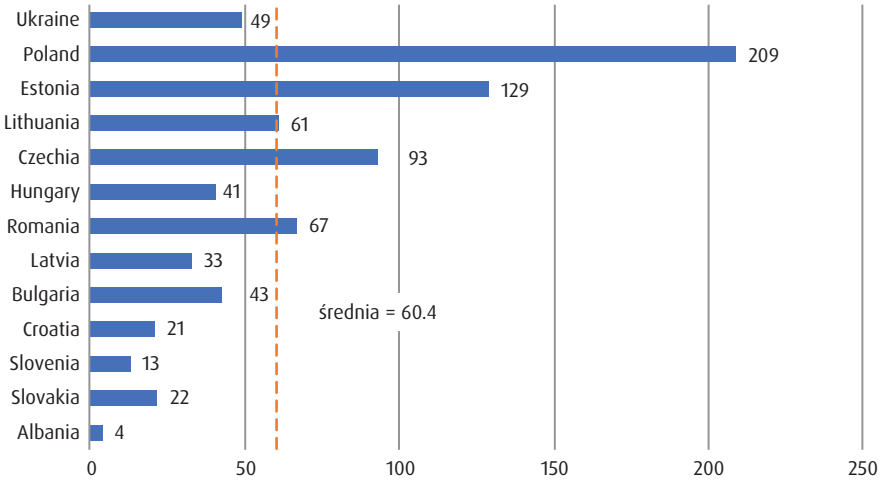
Source: self-reported data based on Dealroom [2023].

The total value of VC fund investments in 2022 in all analysed CEE countries amounted to a combined USD 4.3 trillion and was higher than in 2021. Meanwhile, the average total value of VC fund investments in the study period reached USD 329.7 million per country. Estonia, the Czech Republic, and Croatia accounted for

62% of the total volume of all VC fund investments in the region. The volume of VC investments in 2022 was USD 505 million and was lower than the year before. The cumulative number of VC financing rounds in 2022 in all CEE countries was 785. The highest number of financing rounds provided by VC funds was found for Poland, which was responsible for 27% of investment rounds in the entire region. Average value of a single investment round in Poland was USD 2.4 million, while in Estonia, where the biggest volume of investment was recorded last year, it was USD 10 million.

In 2022, countries with the highest value of realized transactions were Estonia, Czechia, Croatia, followed by Poland and Romania. The highest increase in investment value compared to 2021 was observed in Estonia, Croatia, Slovenia, Romania, Hungary, and Slovakia, while the largest decrease was in Bulgaria, Ukraine, Lithuania, and Poland.

Figure 6. Cumulative number of VC financing rounds in 2022.



Source: self-reported data based on Dealroom [2023].

Synthesised assessment and ranking of start-up support systems in CEE countries

In order to evaluate the development of a CEE country in terms of its start-up support system, the research team used the technique of weighted scoring, where each criterion was given a score from 1 (very low) to 5 (very high) by an expert responsible for research on that factor. Then each researcher scored individual countries based on the defined scale. Weights for the weighted scoring were determined in last year's

research by binary comparison. This way a factor was compared with each other factor and a simple majority vote of experts decided about its weight.

During the study using binary comparison technique, the following weights for the factors (adding up to 1 00%) constituting the start-up support systems in CEE countries were established: socio-economic development – 15.45%, tax systems – 10%, intellectual property protection – 5.45%, academic entrepreneurship – 6.36%, government agencies – 6.36%, start-up accelerators – 14.55%, regulatory sandboxes – 1.82%, clusters – 13.64%, venture capital funds – 18.18%, and the visibility of start-ups based on their achievements in individual countries – 4.55%.

By adopting a synthetic measure, which is the sum of weighted assessments for each factor, it was possible to identify the most developed start-up support systems in the CEE region. The research team adopted three grades corresponding to their development rate:

1) leader – total score of possible points on a scale from 1 to 5 is at least 80% (4.00 or more points);
2) rising star – total score of possible points on a scale from 1 to 5 falls within the range of 60.00–79.99% (3.00–3.995 points);
3) developing system – total score of possible points on a scale from 1 to 5 is at least 60% (less than 3.00 points).

As a result of the analysis, one start-up support system was identified as a *leader* (Estonia), four systems qualified as *rising stars* (Lithuania, Latvia, Poland, Czech Republic), and eight systems fell into the *developing system* category (Slovenia, Slovakia, Bulgaria, Hungary, Croatia, Romania, Bulgaria, and Ukraine).

Table 12 presents a ranking and overall assessment of individual CEE countries, while Table 13 lists assessments of ten distinguished factors constituting the start-up support systems in each of them.

Table 12. Ranking of start-up support systems in CEE

Position	Country	Total score	Category	Change in the total score as compared to 2022	Position in the 2021 ranking
1	Estonia	4.61	leader	0.02	1
2	Lithuania	3.79	rising star	–0.25	2
3	Latvia	3.27	rising star	0.09	6
4	Poland	3.24	rising star	–0.63	4
5	Czech Republic	3.17	rising star	–0.76	3
6	Slovenia	2.96	developing system	–0.39	5
7	Slovakia	2.73	developing system	–0.17	7
8	Bulgaria	2.60	developing system	–0.21	8

cont. Table 12

Position	Country	Total score	Category	Change in the total score as compared to 2022	Position in the 2021 ranking
9	Hungary	2.42	developing system	–0.03	9
10	Croatia	2.38	developing system	0.31	11
11	Romania	2.36	developing system	0.01	10
12	Albania	1.53	developing system	–0.04	13
13	Ukraine	1.29	developing system	–0.65	12

Source: self-reported data.

Table 13. Detailed evaluation of factors comprising start-up support systems in CEE countries and aggregate score of each country compared to the entire region*

Criterion	Weight (%)	Albania	Bulgaria	Croatia	Czech Republic	Estonia	Lithuania	Latvia	Poland	Romania	Slovakia	Slovenia	Ukraine	Hungary
Development	15.45	0.46	0.62	0.31	0.31	0.62	0.77	0.46	0.62	0.62	0.31	0.31	0.15	0.46
Taxes	10.00	0.10	0.40	0.30	0.30	0.40	0.40	0.40	0.20	0.30	0.30	0.40	0.10	0.20
Intellectual property	5.45	0.05	0.05	0.05	0.11	0.25	0.14	0.11	0.08	0.05	0.05	0.27	0.11	0.11
Academic entrepreneurship	10.00	0.10	0.30	0.20	0.40	0.50	0.40	0.50	0.50	0.30	0.50	0.30	0.20	0.30
Government agencies	6.36	0.06	0.10	0.06	0.20	0.27	0.24	0.24	0.25	0.06	0.10	0.22	0.06	0.13
Accelerators	14.55	0.36	0.43	0.15	0.58	0.73	0.73	0.73	0.51	0.29	0.51	0.58	0.15	0.44
Regulatory sandboxes	1.82	0.02	0.05	0.04	0.05	0.07	0.07	0.05	0.07	0.05	0.05	0.05	0.02	0.05
Clusters	13.64	0.14	0.41	0.55	0.55	0.68	0.68	0.55	0.55	0.41	0.68	0.55	0.27	0.41
Venture capital	18.18	0.18	0.18	0.55	0.55	0.91	0.18	0.18	0.36	0.18	0.18	0.18	0.18	0.18
Recognition of start--ups based on their success	4.55	0.05	0.05	0.18	0.14	0.18	0.18	0.05	0.09	0.09	0.05	0.09	0.05	0.14
Total score	**100**	**1.53**	**2.60**	**2.38**	**3.17**	**4.61**	**3.79**	**3.27**	**3.23**	**2.36**	**2.73**	**2.96**	**1.29**	**2.42**

* Panel of experts used studies presented in the section dedicated to start-up support system factors in CEE. The research was conducted at SGH Warsaw School of Economics on 03 April 2022 (binary comparison).

Source: self-reported data collected to establish the weight of each criterion in the group of factors comprising the start-up support systems in CEE.

Internationalisation of start-ups

The start-up ecosystem in Poland and other CEE countries continues to evolve. However, as research conducted regularly at the Warsaw School of Economics shows, there are still some differences among individual countries in the region. This should not be perceived as a fundamental weakness or flaw that needs to be eliminated. It

may result from more or less informed political decisions that prioritize different economic policy objectives.

One dimension characterizing the start-up ecosystems of individual countries is their internationalisation, understood as openness to the world and the ambition for start-ups to achieve significant success on the international stage. Sometimes, this development direction is quite natural and obvious, especially when it concerns countries with small land area and population. Larger countries, such as Poland, constitute a considerable market themselves, as a result of which their entrepreneurs focus primarily on local activities.

In the context of modern technology entrepreneurship, regardless of the abovementioned factors, it is evident that start-ups should aim to build economic value, which can be achieved through global scalability. This is particularly feasible when a start-up operates as a remotely accessible application (software). Such action by many start-ups, assuming a universal nature of the product that can be accepted by consumers in practically any region of the global economy, is an ideal and economically desirable situation.

A simplified measure of start-up internationalisation in the CEE region can be available data on unicorn populations. According to CB Insights [2023], as of 7 April 2023, the unicorn population worldwide covered 120 7 start-ups, including 653 start-ups from the United States, 169 start-ups from China, 70 start-ups from India, 48 from the United Kingdom, and 29 from Germany. The database includes companies from a total of 50 countries around the world.

In the CEE region, the following unicorns are currently active:

- Two from Estonia: Bolt (latest valuation: USD 8.4 billion, market segment: auto and transportation) and Veriff (latest valuation: USD 1.5 billion, market segment: artificial intelligence).
- Two from Lithuania: Vinted (latest valuation: USD 4.53 billion, market segment: e-commerce and direct-to-customer) and Nord Security (latest valuation: USD 1.6 billion, market segment: cybersecurity).
- Two from Croatia: Rimac Automobili (latest valuation: USD 2 billion, market segment: auto and transportation) and Infobip (latest valuation: USD 1 million, market segment: mobile and telecommunications).
- One from the Czech Republic: Rohlik Group (latest valuation: USD 1.2 billion, market segment: supply chain, logistics, and delivery).

In the other countries of the region, namely Slovakia, Romania, Latvia, Slovenia, Bulgaria, Albania, Poland, Hungary, and Ukraine, there are currently no unicorns. Additionally, an indication of the region's strength from an international perspective can be determined by data on investment exits, i.e. situations where a start-up

successfully undergoes an IPO (initial public offering), is acquired, or merges with another entity. So far, Romanian UiPath and Ukrainian GitLab have achieved this.

The business world is recovering from the COVID-19 pandemic while grappling with uncertainty of growing political tensions exacerbated by Russia's aggression on Ukraine. The situation is further complicated by the problem of global inflation, which seems to date back to the quantitative easing related to the 2007–2008 financial crisis. Despite all these troubles and challenges, international economic exchange is intensifying. A very illustrative example indicating a fairly high level of optimism about the future is the visibly increasing demand for air transport, both passenger and cargo. There is no doubt that the world will continue to integrate economically. Therefore, it is worth to support the multinational development of CEE start-ups and contribute to their higher valuation.

Summary

The results of the research presented in the study, as well as practical examples, demonstrate how individual CEE countries support start-ups. The study also presents a synthesized description of start-up support systems in the CEE countries, made on the basis of international comparison, taking into account available source data. An expert panel that was conducted with the Delphi method managed to identify the most advanced CEE countries in respect of their start-up support systems. It was accomplished by translating the total scores of the countries into the classification of leaders, rising stars and developing systems.

Identification of developed start-up support systems in CEE countries allows the authors to conclude that it is important to popularise relevant knowledge and experience and to make repeated attempts to exercise institutional transfer of best practices to other countries of the region.

In this year's report the authors focused on the issues of enterprise internationalisation and described a few start-ups from different CEE countries that actively run their business and are successful on international markets.

The authors exercised due diligence to identify, analyse and interpret data used in the research and to prepare a synthesized assessment of individual systems. The results also prove that further in-depth research is necessary, based on standardized, comparable data and a unified time series of the research, as well as testing and piloting target solutions before their implementation in the economic practice.

According to the authors, further stages of the research could develop towards a broader analysis of efficiency of the support systems. The states, as social and eco-

nomic entities, should manage public funds in a targeted and rational way. The team maintains its view expressed in the previous edition of the report that it is not difficult to build a sophisticated and complex support system. A challenge, however, for them is to be conducive to creating big, recognizable technology companies with a global recognition.

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UPGRADING THE BUSINESS MODEL: ARE CENTRAL AND EASTERN EUROPEAN FIRMS INVESTING ENOUGH?[1]

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Introduction

As the European economy rebounds from the series of shocks it has encountered in the recent years, it is not yet out of the woods. The 2022/2023 EIB Investment Report shows that European firms still face strong headwinds from high energy costs, labour market conditions (lack of skills), tightening of financial conditions and general uncertainty. In many respects, these challenges are aggravated in Central and Eastern Europe (CEE)[2] due to its proximity to the war in Ukraine, high share of fossil fuels in the energy mix, and the ongoing transformation to a new technology-driven growth model.

This contribution is based on the EIB Group Survey on Investment (EIBIS), which has been administered every year since 2016, and which is a unique, annual survey of some 12,500 firms across all European Union Member States and a sample of firms in the United States. The survey collects data on firm characteristics and performance, past investment activities and future plans, sources of finance, financing issues and

1 This contribution draws heavily from M. Ferrazzi, J. Schanz, M. Wolski, J. Delanote and F. de Novais e Silva *EIB Investment Survey 2022: CESEE Overview*, 2022. For the full version of the report and for further information on the EIB's activities, please visit our website (www.eib.org).

2 The classific tion of CEE countries covers: Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia.

other challenges that firms face, such as climate change and digital transformation. For the purpose of this publication, we present carefully selected results, which we believe are essential to guide the discussion on future competitiveness, investment needs and growth of firms in CEE.

Overall, the investment gaps in the CEE region remain wider than in the EU or the US, with some 77% of firms in CEE declaring broadly adequate investment levels over the recent years (80% in the EU and 81% in the US). Nonetheless, investment is recovering, as firms try to break with the old capital-intensive growth model and look for new opportunities, in particular linked to technology and innovation. While firms in CEE invested in intangible assets (R&D, software, training and business processes) less than the EU average (24% vs 37%), the share of firms intending to prioritise innovation in new products and service was larger for those operating in CEE (27%) than in the EU (24%) and in the US (21%). Innovation is a particularly important investment priority for manufacturing firms and large firms. Among firms in CEE, those in Slovenia and in the Czech Republic are most likely to prioritise innovation.

Firms in CEE on average are as innovative as their EU peers, but invest less in research and development (R&D). Over a third of firms in CEE developed or introduced new products, processes or services as part of their investment activities in the recent past. In addition, firms appear to use advanced technologies (including AI and big data, Internet of Things, platforms, 3D Printing and drones) as much as their peers in the rest of the EU, suggesting that their production technologies are on average similar to those in the EU. However, active innovators – that is, firms that invested significantly in research and development and introduced a new product, process or service – are a little more sparsely spread in CEE than in the EU.

Looking at long-term impediments to investment, uncertainty and skills continue to play an important role, with 87% and 82% of firms respectively mentioning those as constraints. Compared to previous survey run, there is a surge in the share of firms reporting energy costs as a constraint to investment (87%), especially those viewing it as a major barrier (63%).

At the same time, climate change is not anymore a distant reality, but its effects become increasingly visible. Around half of the firms in CEE are reporting that climate change is having an impact on their business (a "major impact" for one out of ten firms), lower than in EU (57%). Firms in CEE are investing to protect themselves from climate change with around a third having already developed or invested in measures to build resilience to the physical risks caused by climate change, similar to the EU.

The share of firms in CEE seeing the transition to stricter climate standards as a risk is higher than the proportion that see it as an opportunity (36% and 18%, respectively). This is in contrast to the EU as a whole, where there is a fairly even balance. Almost

90% of firms in CEE have already taken some actions in order to reduce Greenhouse Gas (GHG) Emissions, similar to the EU average. The share of firms in CEE investing in measures to improve energy efficiency in is 39%, similar to the EU average.

Internal financing accounts for the largest share of finance for CEE firms in 2022 (70%), followed by external sources (25%). Only 4% of investment is financed from within the corporate group. Just under half of firms in CEE that invested in the last financial year had financed at least some of their investment through external finance. As in the EU, this share has declined significantly, in particular among large firms (down from 59% to 46%) and among firms in the manufacturing sector (down from 56% to 43%). About a third of firms in CEE using external finance received grants, much more than the EU average (21%). The share of financially constrained firms in CEE (9%) has remained stable during the last years, but is higher than the EU average (6%).

This contribution discusses in more detail the main messages laid out above. First it describes the investment landscape in the region, the main investment trends, including existing investment gaps and investment obstacles reported by firms, as well as innovation potential of firms in the region. Then it refers to investments in climate adaptation and. Finally, the last part concludes with an overview of investment finance and financial constraints.

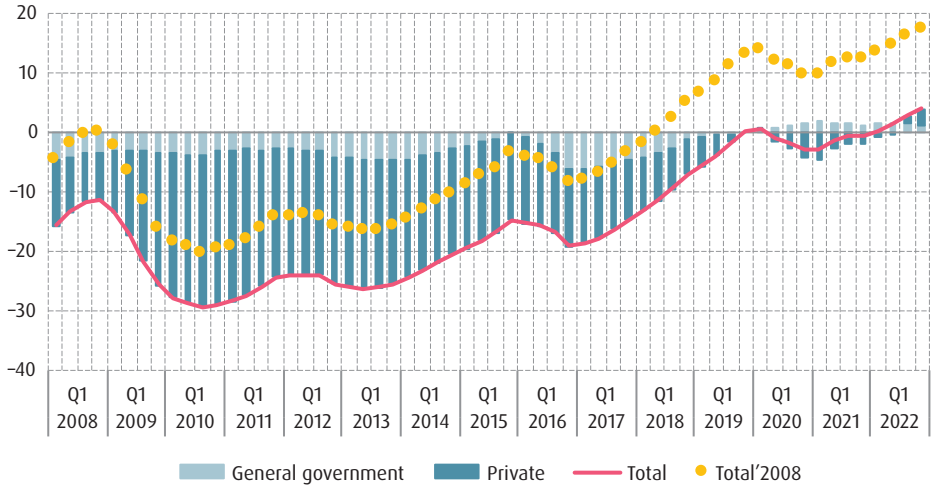
Sustainability of capital-driven model

The fact that CEE was able to smoothly roll out and accelerate the European digital and green agenda was only possible because of its unparalleled economic progress observed over the last three decades. Since the beginning of the transformation in the early 90s, the region observed a rapid convergence across a range of indicators, including output per capita, productivity growth, technological progress and the quality of life and living standards among others. Arguably, the pace and the scope of convergence have been predominantly driven by the capital accumulation channel, whereby capital inflows, in the form of tangible Foreign Direct Investments (FDIs), brought the necessary resources and technology to boost the output, and accelerated the transition to market-based economy. The global financial crisis put a break on this channel, however. The annual real investment level at the end of 2010 was more than 20% lower than it was two years before and remained subdued in the decade after the global financial crisis (Figure 1).

In 2019, when it appeared that investment recovered to the pre-2008 levels, the subsequent COVID-19 shock put yet another obstacle for capital flows. While its severity seemed to have been lower than that of previous shocks, being partially

offset by a sizeable government capital and current spending, the investment growth seems to have decelerated, from around 7.5% between 2017 and 2019 to some 4.5% in 2022 (Figure 2).

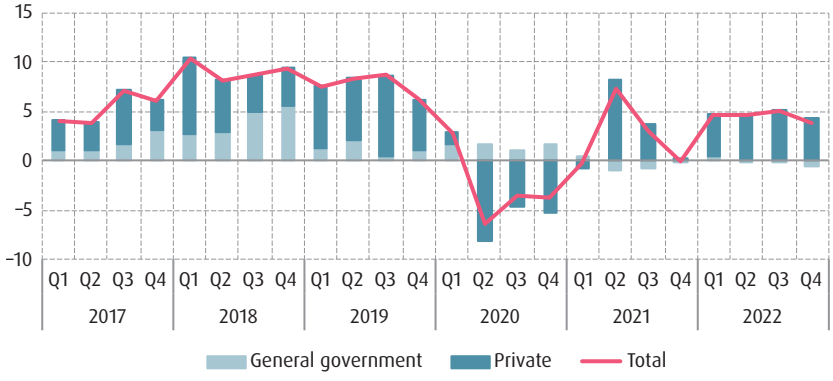
Figure 1. Cumulative growth in investment by sector (%)



Notes: The nominal GFCF source data for all CEE countries is non-seasonally and non-calendar adjusted. It was transformed into four-quarter sums and deflated using the implicit deflator for total GFCF (2015 = EUR 100). The four-quarter sums of total real GFCF in Q4 2019 and Q4 2008 are normalized to 0 and plotted accordingly.

Source: authors own calculation based on Eurostat.

Figure 2. Annual growth in investment by sector (%)

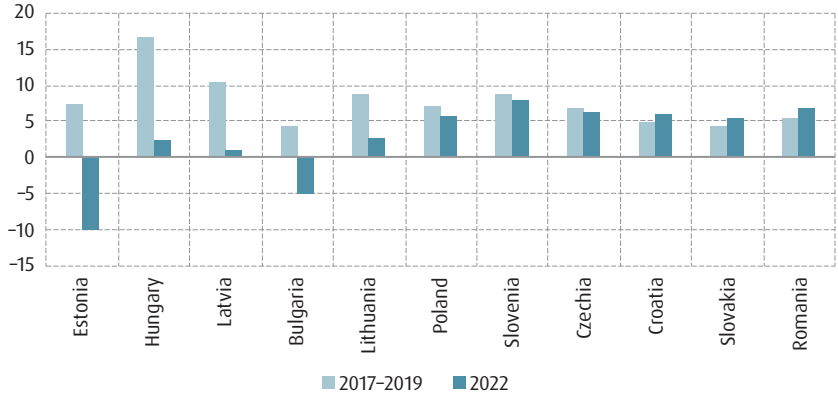


Notes: Year-on-year growth fi ures based on the nominal GFCF source data for all CEE countries, non-seasonally and non-calendar adjusted but defl ted using the implicit defl tor for total GFCF (2015 = EUR 100).

Source: authors own calculation based on Eurostat.

The aggregate picture hides however important cross-country heterogeneity. In Estonia and Bulgaria, the average investment growth throughout 2022 was still negative. In fact, only in 3 countries in the region the average investment growth in 2022 was higher than the 2017–2019 average, and in each of them by a rather thin margin (Figure 3). Overall, the evidence points to a meagre capital accumulation in the region recently and hence puts in question the sustainability of capital-driven growth model. To better understand the reasons and to inform the policy debate on the investment strategies going forward, we take a closer look at investment dynamics and investment obstacles at the firm level using the 2022 EIBIS results.

Figure 3. Average annual investment growth rate by country (%)



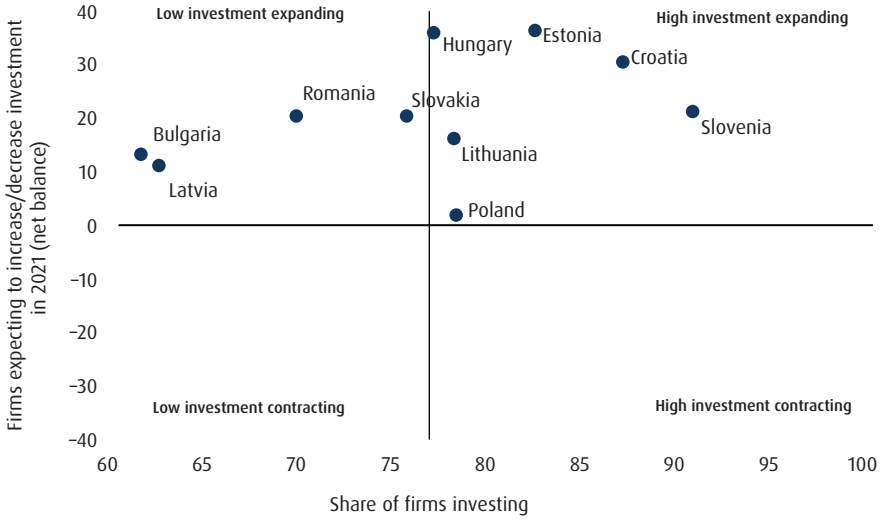
Notes: Average year-on-year growth fi ures based on the nominal GFCF source data for all CEE countries, non-seasonally and non-calendar adjusted but defl ted using the implicit defl tor for total GFCF (2015 = EUR 100).

Source: authors own calculation based on Eurostat.

A shift towards technology-driven growth

The macro picture appears to be confirmed by the micro evidence collected in EIBIS 2022. Firms planned to increase investment in 2022 across the countries in CEE, albeit at a lower scale than in the previous year (down from 18% to 9%). All the countries are placed in the upper quadrants of the investment cycle yet the share of already investing firms ranges from 61% in Bulgaria to 90% in Slovenia (Figure 4). Overall, 77% of firms in CEE were investing in 2022, a somewhat smaller share than in the EU. This share depends on the sector and the country in which firms are operating. The share of manufacturing firms (83%), and of large firms (85%), was substantially higher than that of service sector firms (67%) and of SMEs (69%).

Figure 4. Investment cycle and evolution of investment expectations by country (%)



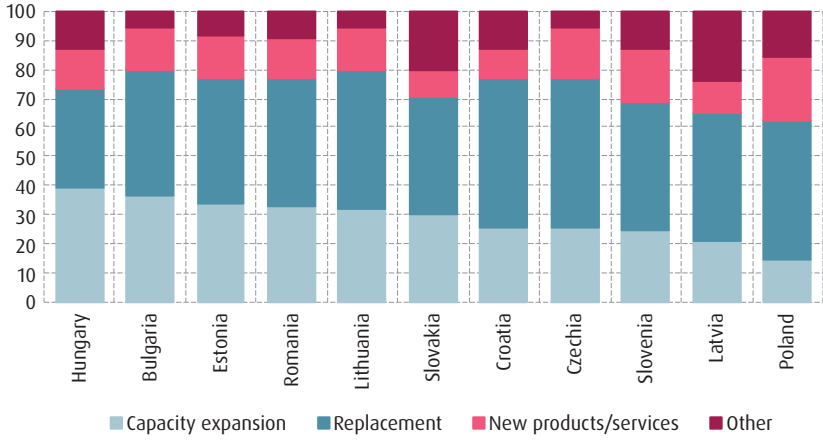
Notes: Share of firms investing shows the percentage of firms with investment per employee greater than EUR 500. The y-axis line crosses the x-axis on the CEE average for EIBIS 2022. Base for share of firms investing: All firms (excluding don't know/refused responses). Base for expected change: All firms

Source: EIB Investment Survey.

The main purpose of investment of CEE firms remained the replacement of capacity, being the same as the EU average (46% of firms in CEE and the EU). Replacement was followed by capacity expansion (25% in CEE) and innovation (17%). These shares fall in line with the previously observed trends. Firms in manufacturing (20%) and firms that are large (18%) invested relatively more in innovation. Firms in Poland (22%), Slovenia (19%) and in the Czech Republic (17%) allocated the highest share of investment to innovation, by dedicating the highest shares of investment to develop new products of services (Figure 5).

The capital-intensive growth model of the past is still echoed in firms' investment areas today, being dominated by tangible production assets, on balance. Relative to firms in the EU and in the US, firms in the CEE region dedicated a larger share of their investment in machinery and equipment (53% vs 49% in the EU, 47% in the US) and a smaller share in intangible assets (24% vs 37% in the EU and 33% in the US). Machinery and equipment dominated the investment spending in particular of firms in manufacturing (60% of their investment spending) and construction (59%), whereas firms in the services sector invested relatively more in digital technologies (18%). The share of investment in intangible assets was the highest in Latvia, Slovakia, Slovenia and the Czech Republic (Figure 6).

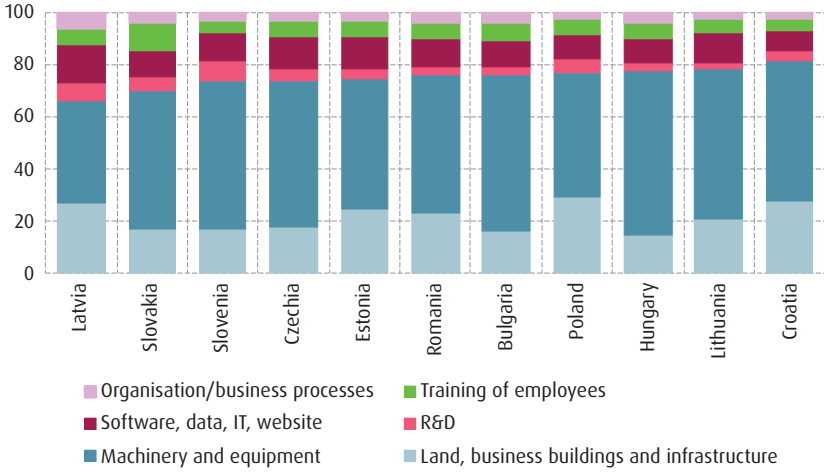
Figure 5. Purpose of investment in last financial year by country (%)



Question: What proportion of total investment was for (a) replacing capacity (including existing buildings, machinery, equipment, IT) (b) expanding capacity for existing products/services (c) developing or introducing new products, processes, services? Base: All firms who have invested in the last fi ancial year (excluding don't know/ refused responses).

Source: EIB Investment Survey.

Figure 6. Investment areas by country (%)



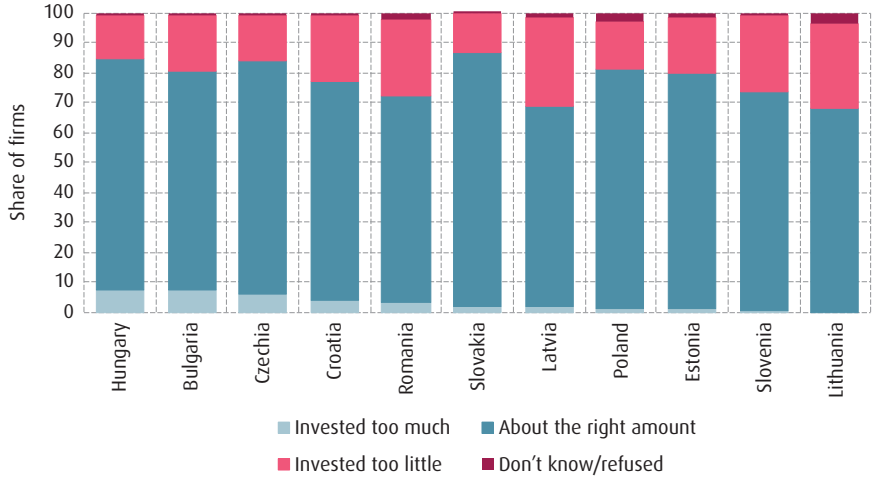
Question: In the last fi ancial year, how much did your business invest in each of the following with the intention of maintaining or increasing your company's future earnings? Base: All firms who have invested in the last fi ancial year (excluding don't know/ refused responses).

Source: EIB Investment Survey.

The survey results point to important investment gaps. Fewer firms than in the EU as a whole and in the US believe they invested about the right amount over the past

three years (77% in CEE, 80% in the EU and the 81% in the US). Instead, an important share of firms – at least 10%, up to 30% depending on the country – perceive they have not invested enough to face the current challenges. Infrastructure firms (22%) are somewhat more likely to invest too little than firms operating in other sectors. The same is true for SMEs (21%) relative to large firms (15%). Firms in Lithuania (28%) and Latvia (30%) were the most likely to think that they invested too little in the last three years (Figure 7). The share of firms believing they invested too much w the highest (but still small) in Hungary (7%), Bulgaria (7%) and the Czech Republic (6%).

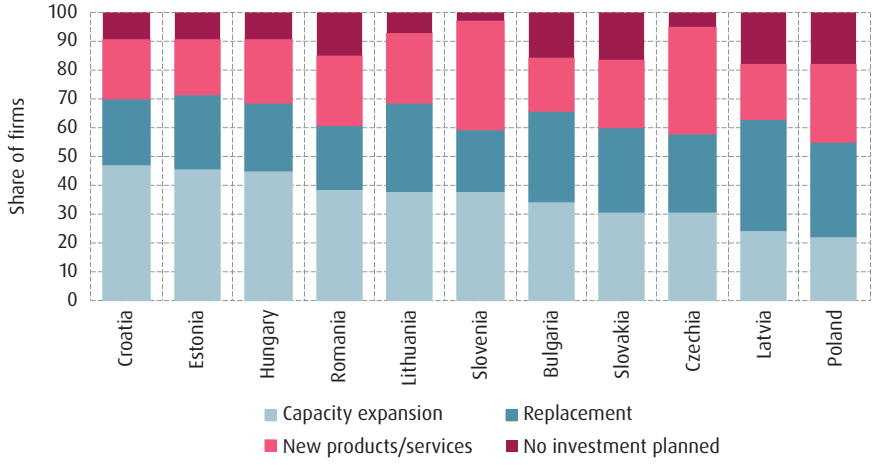
Figure 7. Perceived investment gap by country (%)



Question: Looking back at your investment over the last three years, was it too much, too little, or about the right amount? Base: All firms who have invested in the last fi ancial year (excluding don't know/ refused responses).
Source: EIB Investment Survey.

To close these investment gaps, firms in the region intend to explore technology-driven growth opportunities more than their peers in the EU and the US. The share of firms intending to prioritise capacity expansion over the next three years was considerably smaller in CEE (31%) and the rest of the EU (30%) than in the US (41%). Instead, the share of firms intending to prioritise innovation in new products and service was larger for those operating in CEE (27%) than in EU (24%) and in the US (21%). Innovation was a particularly important investment priority for manufacturing firms (36%) and large firms (31%). Among firms in CEE, those in Slovenia (38%) and in the Czech Republic (37%) were most likely to prioritise innovation (Figure 8). Capacity expansion was most often quoted as the investment priority by firms in Croatia (47%), Estonia (46%), and Hungary (45%).

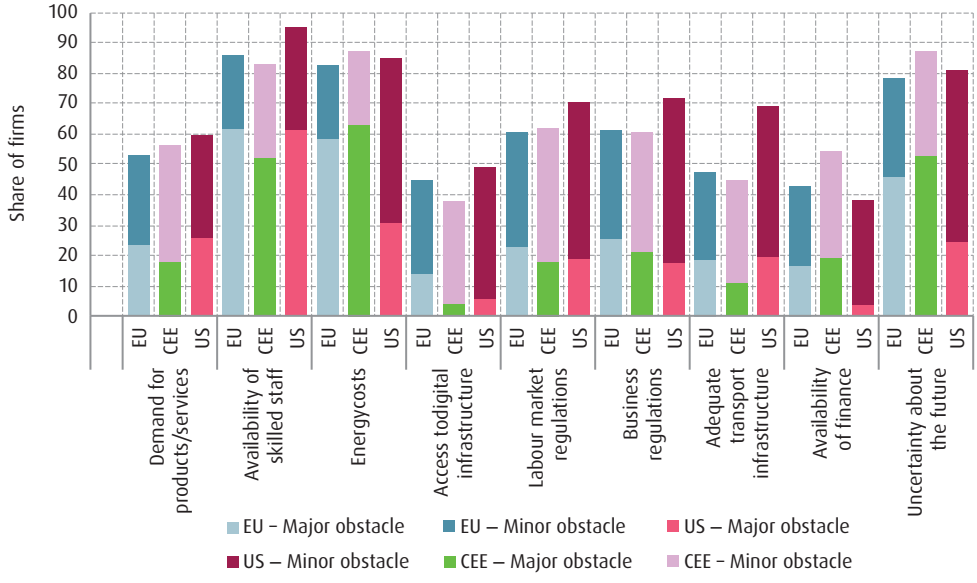
Figure 8. Future investment priorities by country (%)



Question: Looking ahead to the next three years, which is your investment priority (a) replacing capacity (including existing buildings, machinery, equipment, IT) (b) expanding capacity for existing products/services (c) developing or introducing new products, processes, services? Base: All firms who have invested in the last fi cial year (excluding don't know/ refused responses).

Source: EIB Investment Survey.

Figure 9. Long-term barriers to investment (%)



Question: Thinki g about your investment activities, to what extent is each of the following an obstacle? Is it a major obstacle, a minor obstacle or not an obstacle at all? Base: All firms (data not shown for those who said not an obstacle at all/don't know/refused).

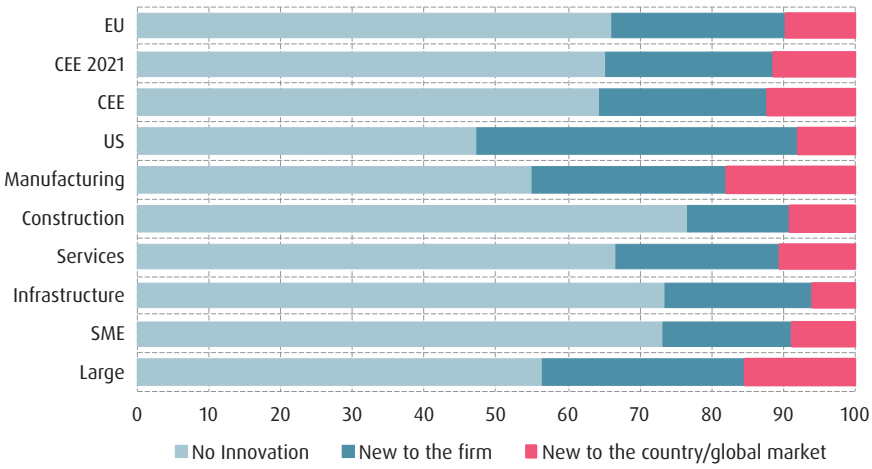
Source: EIB Investment Survey.

Overcoming the existing obstacles will be essential to bridge the investment gaps. The most frequently mentioned long-term barriers to investment in CEE are uncertainty about the future (87%), energy costs (87%) and the availability of skilled staff (82%). These results are similar to the EU averages (Figure 9). In CEE, large firms are more likely than SMEs to report facing several obstacles, including energy costs, access to digital infrastructure, labor market regulations and inadequate transport infrastructure.

Innovation potential

On average, CEE firms are just as innovative as their peers in the rest of the EU. Both fall behind firms in the US, where firms report much more rarely that they did not innovate (Figure 10). In CEE Just over a third (35%) of firms in CEE developed or introduced new products, processes, or services as part of their investment activities in 2021, in line with the current EU average. 12% of firms in CEE report the development/ introduction of products, processes or services that were new to either the country or global market in EIBIS 2022, mainly driven by firms in the manufacturing sector (18%). Moreover, this type of innovation was more common among large firms (15%) than among SMEs (9%). These patterns are also typical for other regions in the EU.

Figure 10. Innovation activity by region, sector, and size (%)



Question: What proportion of total investment was for developing or introducing new products, processes, services? Were the products, processes or services new to the company, new to the country, new to the global market? Base: All firms who have invested in the last fi ancial year (excluding don't know/ refused responses).

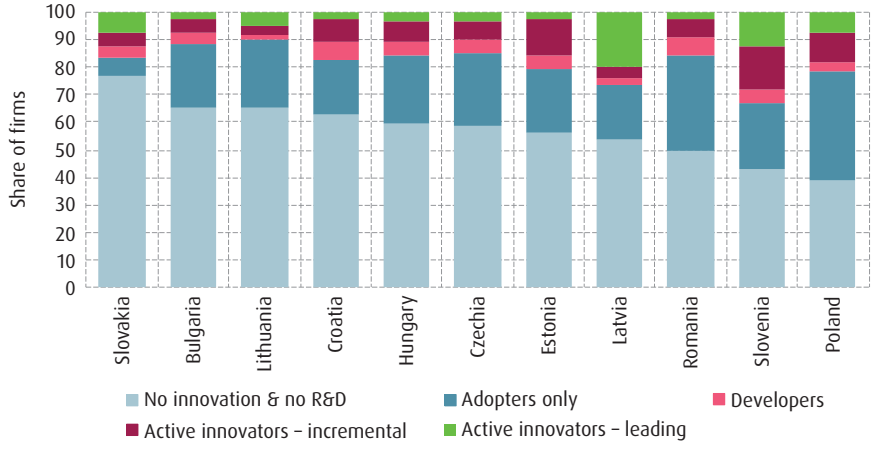
Source: EIB Investment Survey.

Within CEE, levels of innovation were highest among firms in Slovenia (48%) and Poland (44%), while levels of innovation were lowest in Slovakia (14%). However, at the country level, firms' assessments of their innovation can vary substantially from year to year. For example, in Slovakia, only 14% of firms reported to have introduced new products, processes, or services in 2021. In contrast, for 2020, 39% of firms reported that they innovated. The large extent of innovation in 2020 may have reflected the need to respond to the pandemic. However, on average across the region, results are more stable.

Relative to the EU, however, CEE firms invest less in research and development. By combining a measure of firms' investment in innovation (their R&D expenditures) with a measure of innovation outcomes (changes to products, processes, or services) we can draw a more encompassing picture of firms' innovation capacity. Active innovators – that is, firms that invested significantly in research and development and introduced a new product, process or service – are a little more sparsely spread in CEE than in the EU. Conversely, the share of firms that are adopting innovation without investing in own R& is higher in CEE than on average in the EU.

Differences across countries are large, but should be treated with care, as results are volatile across years at the country level. In 2021, the proportion of active innovators was higher in Slovenia (28%) and Latvia (24%) than in other CEE countries (Figure 11).

Figure 11. Innovation profile by country (%)



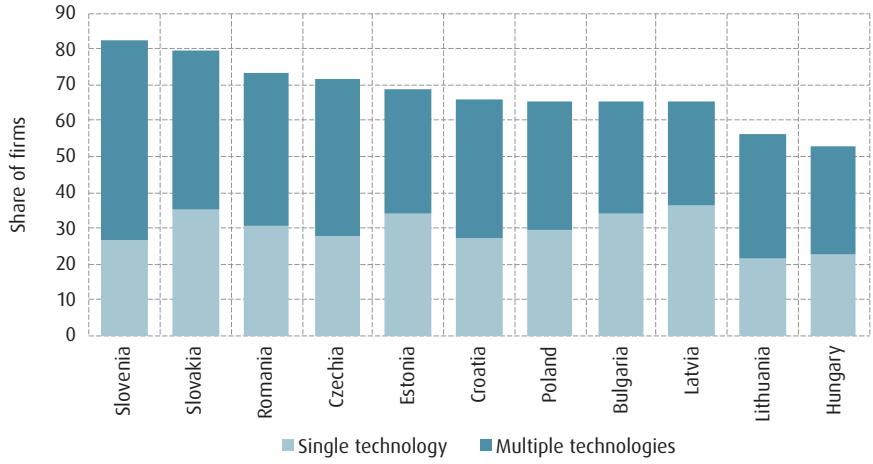
Question: What proportion of total investment was for developing or introducing new products, processes, services? Were the products, processes or services new to the company, new to the country, new to the global market? In the last fi ancial year, how much did your business invest in Research and Development (including the acquisition of intellectual property) with the intention of maintaining or increasing your company's future earnings? Base: All firms who have invested in the last fi ancial year (excluding don't know/ refused responses).

Source: EIB Investment Survey.

CEE firms use advanced technologies as much as their peers in the rest of the EU. We classify firms according to the number of advanced technologies that they use in production to measure how close they are to the production frontier. To that effect we provide firms with a list of technologies, such as Artificial Intelligence, 3-D printing, or drones, specific to the sector in which they are operating.

Overall, 67% of firms in CEE used at least one advanced digital technology, in line with the current EU average (69%). Firms in the manufacturing sector are the most likely to have adopted multiple digital technologies (47%), with construction firms the least likely (14%). Large firms are more likely than SMEs to implement multiple technologies at the same time (49% versus 27%). CEE firms are strong in the implementation of robotics (49%), the Internet of things (42%) and platforms (38%). The share of firms using at least one advanced technology is the highest in Slovenia (83%) and Slovakia (79%), and the lowest in Lithuania (56%) and Hungary (53%), respectively (see Figure 12).

Figure 12. Use of advanced digital technologies by country (%)



Question: To what extent, if at all, are each of the following digital technologies used within your business? Please say if you do not use the technology within your business? Base: All firms who have invested in the last fi ancial year (excluding don't know/ refused responses).

Source: EIB Investment Survey.

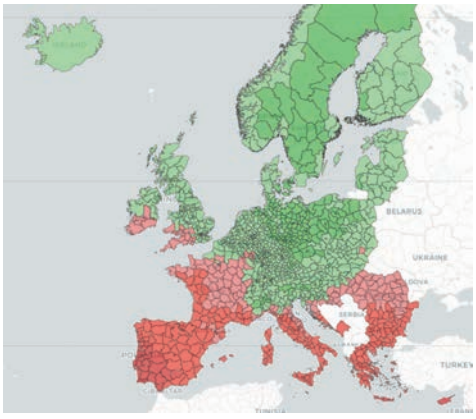
Climate change is not anymore a distant reality

Climate change is more and more visible in the everyday life of firms operating in Europe. It is not any more an abstract concept but a tangible reality, with around half of firms in CEE reporting that climate change is having an impact on their busi-

ness. Despite relevant, and despite many of the countries in the region already experiencing the effects of climate change, like changes in the number of consecutive dry days or increasing temperatures (Figure 13), the perception of the impact of climate change is less relevant than in EU (57%). Firms in the infrastructure sector and large firms in CEE are more exposed and are the most likely to report that weather events are impacting their business (57% and 56% respectively). In CEE, the highest share of firms reporting impacts from weather events are in Romania (69%) and Croatia (59%), while Latvia and Bulgaria have the lowest share (but still relatively high, at 41% and 44% respectively, see Figure 14).

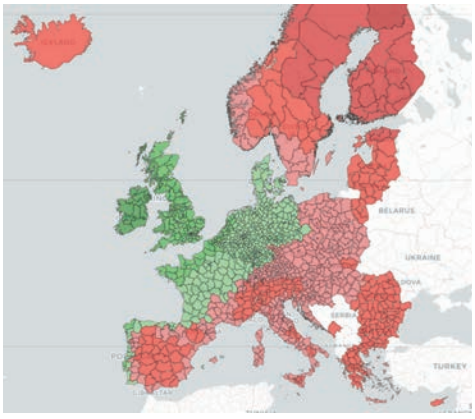
Figure 13. Exposure to climate hazards in Europe

Change in consecutive dry days



Consecutive dry days: the difference between the 1981– 2010 period (observed baseline) and the 2036–2065 period (future projection) in the number of consecutive dry days with precipitation less than 1 mm) under RCP 8.5 scenario.

Change in mean temperatures



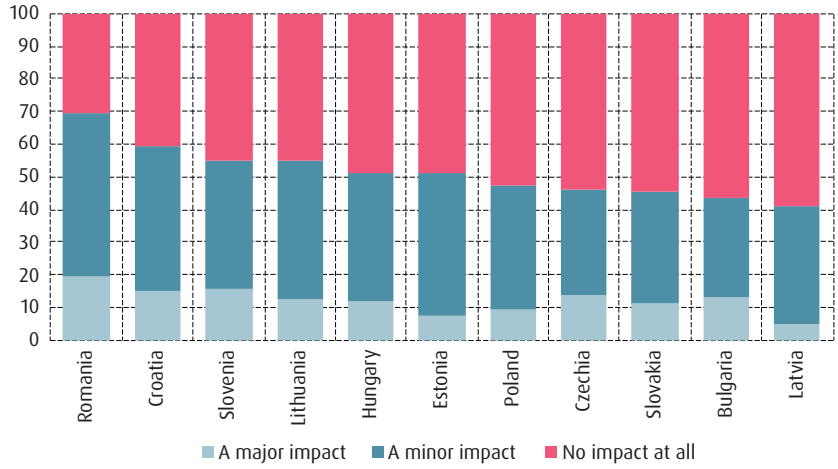
Mean temperature: the difference in daily mean temperature between the 1981–2010 period (observed baseline) and the 2036–2065 period (future projection) under RCP 8.5 scenario.

Source: *European Climate Risk Typology*, http://european-crt.org/map.html; NUTS3 regions ('small regions' with a population between 150,000 and 800 ,000 people).

Transition risk is of particular concern for firms in the region. Transition risk is generated by the actions taken towards a lower carbon economy, which make firms to change their businesses of production methods. Due to high shares of fossil fuels in power generation in CEE, and due to energy-intensive production methods, firms in the region are particularly exposed to this kind of risk. As a result, the share of firms in CEE seeing the transition to stricter climate standards and regulations as a risk is higher than the proportion that see it as an opportunity (36% and 18%, respectively). This is in contrast to the EU as a whole, where there is a fairly even balance (32% risk,

29% opportunity). Firms in the infrastructure sector are the most likely to see the transition to a net zero emission economy over the next five years as a risk (41%), while services firms are the most likely to think there will be no impact on their company (53%). Large firms are significantly more likely than SMEs to see the transition as an opportunity (22% versus 14%). In CEE, Lithuanian firms are most likely to see the transition to a net zero emission economy as a risk (43%,) while firms in Romania are most likely to see this as an opportunity (28%, see Figure 15).

Figure 14. Share of firms affected by the impact of climate change – physical risk by country (%)

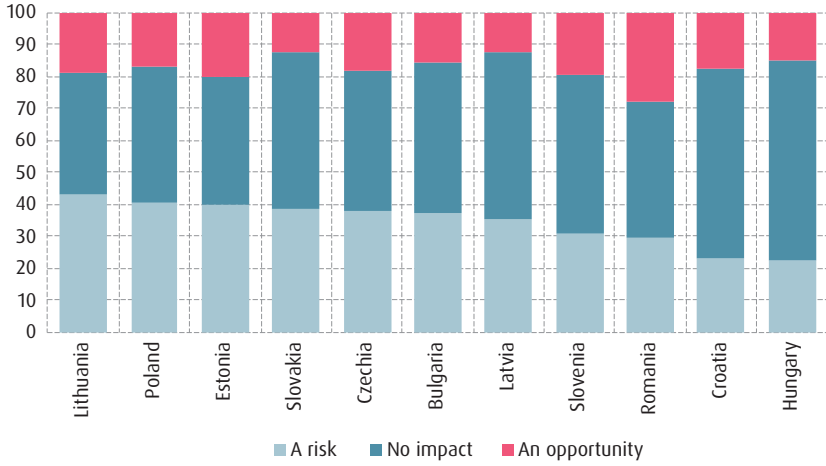


Question: Thinki g about the impact of climate change on your company, such as losses due to extreme climate events, including droughts, floodi g, wildfi es or storms or changes in weather patterns due to progressively increasing temperature and rainfall. What is the impact, also called physical risk, of this on your company? Base: All firms (excluding don't know/refused responses).

Source: EIB Investment Survey.

CEE firms are taking action to bridge their economies and firms towards a greener business model. More specifically, almost 90% of firms in CEE take actions in order to reduce Greenhouse Gas (GHG) Emissions, similar to the EU average. The main actions in CEE are waste minimization and recycling (67%) and investments in energy efficiency (55%), which proved to be a very profitable investment during the last years. Compared to the EU average, firms in CEE were less likely to be investing in or implementing sustainable transport options (32% versus 43%). Across CEE, firms in Romania (93%) and Poland (90%) were most likely to take action, while firms in Bulgaria (70%) were the least likely to do so (Figure 16).

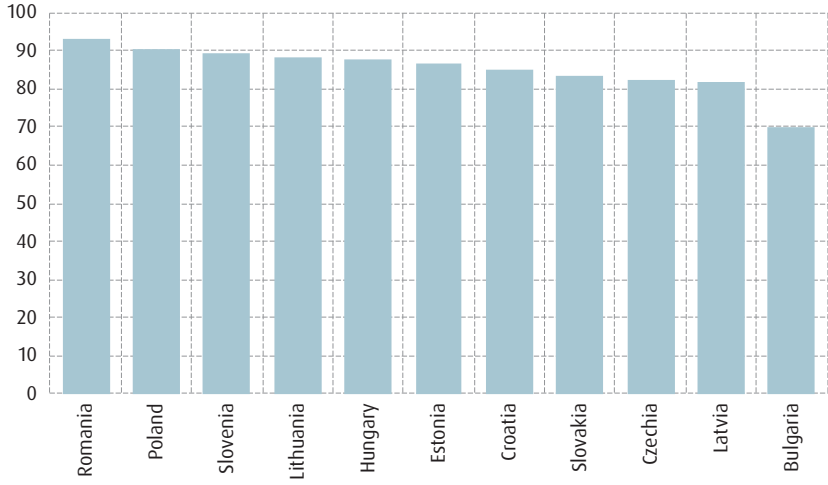
Figure 15. Share of firms affected by the impact of climate change – transition risk by country (%)



Question: Thinking about your company, what impact do you expect this transition to stricter climate standards and regulations will have on your company over the next fi e years? Base: All firms (excluding don't know/refused responses).

Source: EIB Investment Survey.

Figure 16. Share of firms taking actions to reduce GHG emissions by country (%)



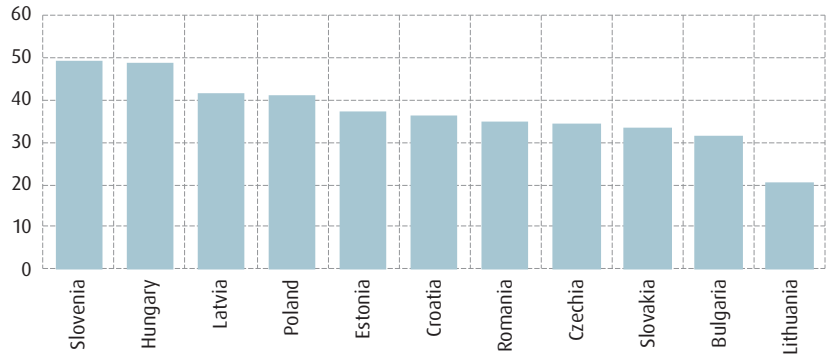
Question: Is your company investing or implementing any of the following, to reduce Greenhouse Gas (GHG) emissions? Base: All firms excluding don't know/refused responses).

Source: EIB Investment Survey.

The share of firms in CEE investing in measures to improve energy efficiency (almost 40%) is similar to EU average, despite the CEE business model is more energy-intensive. Among firms in CEE, those in the manufacturing sector (48%) and large

firms (50%) were the most likely to be investing in energy efficiency. In CEE, Slovenia and Hungary (both 49%) have the largest share of firms that invested in energy efficiency, while Lithuania (20%) has the lowest share (Figure 17).

Figure 17. Share of firms investing in measures to improve energy efficiency by country (%)



Question: What proportion of the total investment in the last fi ancial year was primarily for measures to improve energy efficie y in your organisation? Base: All firms excluding don't know/refused responses).

Source: EIB Investment Survey.

Financing investments: intra-group, banks or internal finance?

The banking sector in Central Eastern Europe is dominated for a large part by few big international cross-border banking groups, which controls more than 50% of total banking assets of the region. In most of the countries, with the only exception of Hungary and Poland, the share of foreign banks is between 70% and 95%.

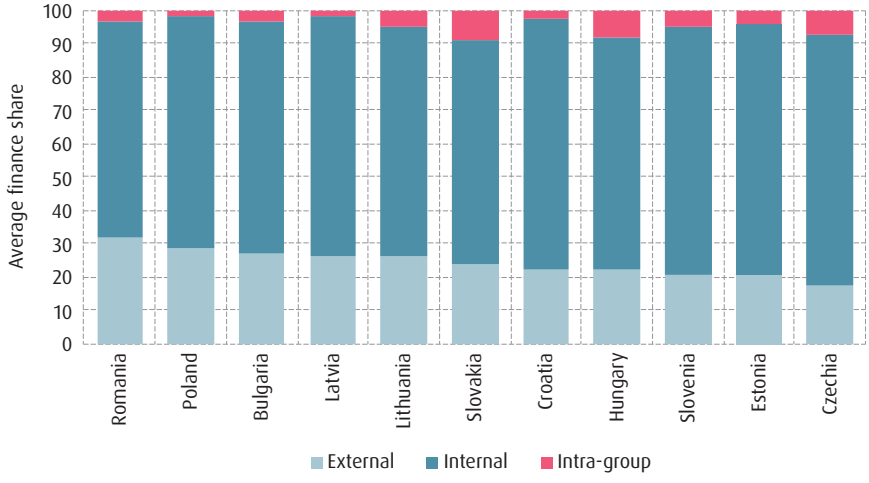
The CEE banking sector is well developed, and has been liquid, stable and profitable during the last years, following the harsh turbulences of the Global Financial crisis and the subsequent years. Loans to deposit ratios stabilized, on average, between 70% and 80%, significantly lower than in the past. In particular, abundant liquidity from local deposits made CEE banking markets more resilient and not any more dependent on foreign funding from headquarters of mother banks. Return on equity remained above 10% for most of the years during the last decade (exceptions were 2014 and 2020). Financial inclusion is close to the levels of high income countries.

The stability has not been threatened even in 2022–2023, despite the banking crisis of US regional banks and Credit Suisse, and the presence of some cross-border international banking group in the Russian market (and in Ukraine and Belarus). During this period banks benefitted from a traditional and solid business model, with high

interest margins generated by higher lending rates (and relatively stable and low rates on sticky deposit accounts).

While the role of commercial banks is relevant in financing firms in the region, internal finance remains dominant. Internal financing accounts for the largest share of finance for CEE firms (70%, see Figure 18), followed by external sources (25%). The use of intra-group financing represents, on average, 4% of the overall corporate investment in CEE, despite the role of foreign direct investments in most of the CEE countries (the mother company is often financing, despite less than in the past, its CEE subsidiary). The share of external finance in CEE is at 25%. Internal finance accounted for a larger share in CEE than in the EU overall (70% versus 65%). Sources of finance differ across firm size. Large firms finance a higher proportion of their investment through intra-group funding than SMEs (6% compared with 2%) and a lower proportion through internal finance (68% vs 74%). The share of firms using external finance is highest in Romania (32%) and lowest in the Czech Republic (18%).

Figure 18. Source of investment finance by country (%)



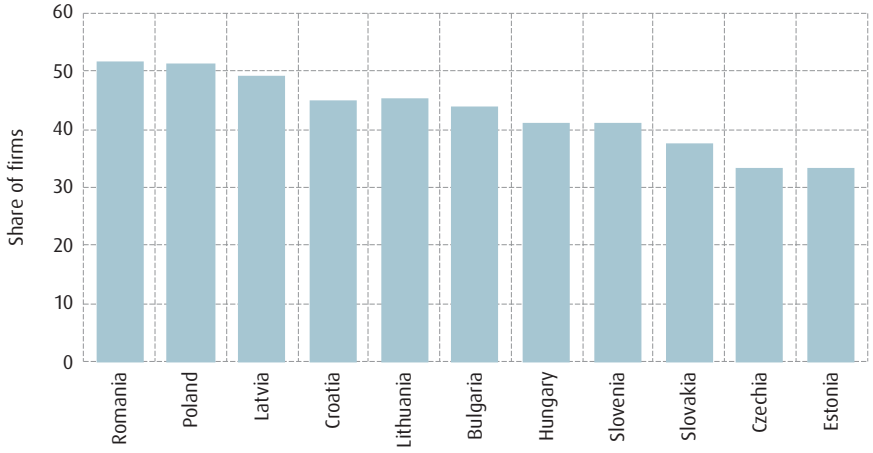
Question: What proportion of your investment was fi anced by each of the following? Base: All firms who invested in the last fi ancial year (excluding don't know/refused responses).

Source: EIB Investment Survey.

Just under half of firms in CEE (45%) that invested in the last financial year, had financed at least some of their investment through external finance, in line with the EU overall (45%). The decline since EIBIS 2021 is particularly strong among large firms (down from 59% to 46%) and among firms in the manufacturing sector (down

from 56% to 43%). More than half of firms in Romania (52%) and Poland (51%) had financed at least some of their investment through external finance (Figure 19).

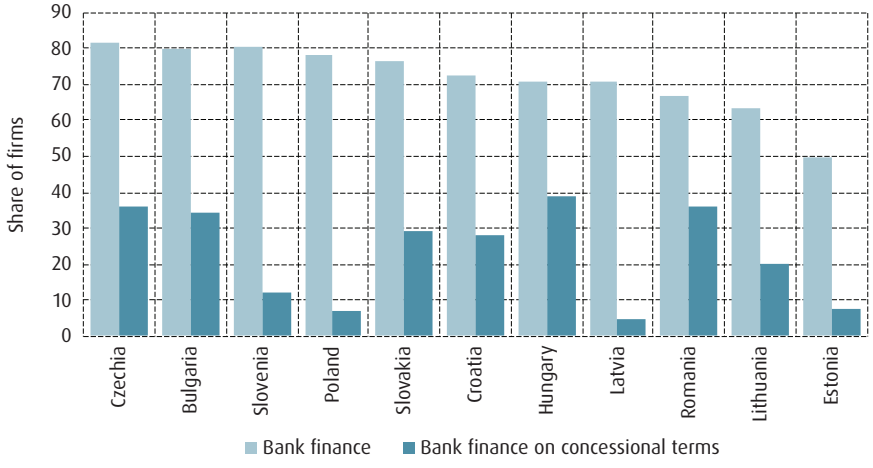
Figure 19. Use of external finance by country (%)



Question: Approximately what proportion of your investment in the last fi ancial year was fi anced by each of the following? Base: All firms who invested in the last fi ancial year (excluding don't know/refused responses).

Source: EIB Investment Survey.

Figure 20. Access to bank finance and conditions by country (%)



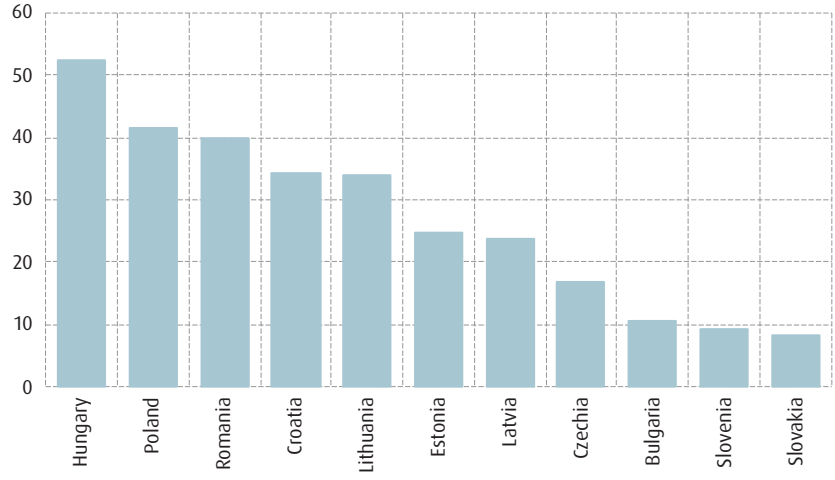
Question: Which of the following types of external fi ance did you use for your investment activities in the last fi ancial year? Was any of the bank fi ance you received on concessional terms (e.g. subsidised interest rates, longer grace period to make debt payments)? Base: All firms usi g external fi ance (excluding don't know/refused).

Source: EIB Investment Survey

Three-quarters (75%) of firms which declare to use external finance, report having access to bank finance in the last financial year (Figure 20). About one in five firms in CEE using external finance (21%) received bank finance on concessional terms. There are large differences across CEE countries, with firms in Hungary (39%), the Czech Republic (36%) and Romania (36%) being most likely to receive bank finance on concessional terms and firms in Latvia (5%), Poland (7%) and Estonia (8%) the least likely.

About a third (34%) of firms in CEE using external finance received grants. This is related to the use of EU funds, vehiculated via the banking sectors in various forms (lending, guarantees, grants). This is significantly higher than the EU average (21%). Firms receiving grants in CEE finance 37% of their investment in this way. Firms in the infrastructure sector are the most likely to receive grants (63%), with the lowest proportion among manufacturing firms (19%). There are large differences across CEE countries. The proportion that received grants as part of their external financing ranged from 53% in Hungary to 8% in Slovakia (Figure 21).

Figure 21. Share of firms with finance from grants by country (%)

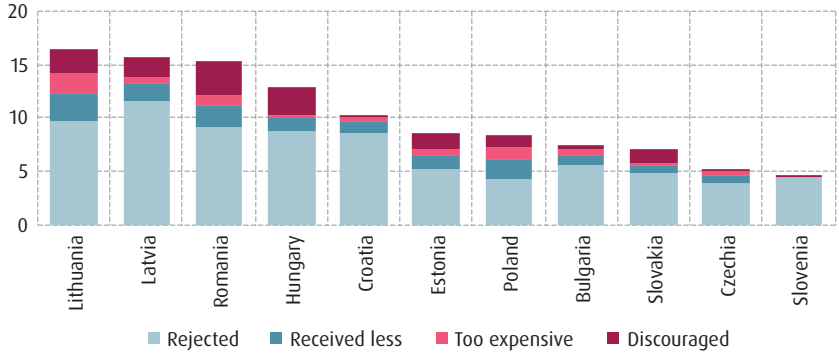


Question: What proportion of your total investment in your last fi ancial year was fi anced by grants? Base: All firms that received grants (excluding don't know/refused responses).

Source: EIB Investment Survey.

The share of financially constrained firms in CEE (9.2%) is higher than the EU average (6.2%). The main constraint reported by firms in CEE is rejection of loan applications (5.8%). SMEs are more likely than large firms to be finance constrained (11.8% versus 6.8%). In CEE, Lithuania, Latvia and Romania report the largest shares of financially constrained firms, while Czech Republic and Slovenia the lowest (Figure 22).

Figure 22. Share of finance-constrained firms by country (%)



Finance-constrained firms include: those dissatisfi d with the amount of fi ance obtained (received less), firms that sought external fi ance but did not receive it (rejected) and those who did not seek external fi ance because they thought borrowing costs would be too high (too expensive) or they would be turned down (discouraged). Base: All firms excluding don't know/refused responses).

Source: EIB Investment Survey.

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ISBN 978-83-8030-625-7

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