

# Regional and territorial trends in the Danube Region

## Implications for cooperative approaches in European and national spatial and regional development policy

for the Federal Ministry of Agriculture, Forestry, Regions and Water Management (BML), Dept. III/6

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## TABLE OF CONTENTS

<b>1.</b>	<b>Introduction .....</b>	<b>1</b>
<b>2.</b>	<b>Economic stability and security.....</b>	<b>4</b>
2.1.	Economic development trends in the countries and regions of the Danube Region.....	4
2.2.	Population dynamics, migration and migration drivers .....	14
2.3.	Governance in the Danube Region .....	20
2.4.	Key findings and conclusions for the cooperation potential in the Danube Region.....	23
<b>3.</b>	<b>Globalisation and technological change.....</b>	<b>26</b>
3.1.	Foreign trade and foreign direct investment.....	26
3.2.	Value chains in the Danube Region .....	32
3.3.	Cooperation, border and infrastructure networks .....	34
3.4.	Innovation.....	35
3.5.	Digital transformation .....	39
3.6.	Industrial development .....	44
3.7.	Key findings and conclusions for the cooperation potential in the Danube Region.....	46
<b>4.</b>	<b>The green transition of the economy and society .....</b>	<b>49</b>
4.1.	Green energy transition.....	49
4.2.	Green transport .....	54
4.3.	The green transition and bioeconomy .....	58
4.4.	Key findings and conclusions for the cooperation potential in the Danube Region.....	62
<b>5.</b>	<b>Conclusions for a future Danube Region policy within the framework of EU Cohesion Policy 2027+.....</b>	<b>64</b>
	<b>References.....</b>	<b>67</b>

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## LIST OF FIGURES AND TABLES

Figure 1 / Danube Region GDP and population, in % of the EU27 .....	5
Figure 2 / GDP per capita at PPS, % of EU27 average.....	6
Figure 3 / Real GDP growth rates, pre-crisis (2010-2019), post-crisis (2020-2023) and outlook (2023-2026*), annual average growth rates in percent .....	7
Figure 4 / Regional GDP per capita, 2021, NUTS 3 regions*, in Euro and Purchasing Power Standards.9	
Figure 5 / Regional GDP growth 2010-2021, NUTS 3* regions, annual average growth rates in % .....	10
Figure 6 / Convergence across the regions in the Danube Region .....	11
Figure 7 / Regional inequality in the Danube Regions, Mean logarithmic deviation-index, NUTS-3 regional GDP per capita, 2010-2021 .....	12
Figure 8 / Regional GDP per capita at PPS, by groups of NUTS-3 regions according to their degree of urbanisation, 2021 .....	13
Figure 9 / Real GDP per capita growth, average of groups of regions by the degree of their urbanisation, annual average growth 2010-2021.....	13
Figure 10 / Change in population, average annual growth rate, 2010-2023 in %.....	15
Figure 11 / Population growth 2010-2022, NUTS-3 regions, annual average growth rates in % .....	16
Figure 12 / Average annual population growth 2010-2022, in percent, regions by their degree of urbanisation .....	17
Figure 13 / Migration rate, 2020-2022 .....	17
Figure 14 / Unemployment rates, population aged 15-74 years, in % 2011 & 2021 .....	18
Figure 15 / Unemployment rate, 2021, NUTS-2 regions, in % of the active labour force .....	19
Figure 16 / Poverty rates, 2013 & 2020 – Share of population with a disposable income less than 60% of the median income .....	20
Figure 17 / Voice and Accountability & Rule of Law: Percentile Rank.....	21
Figure 18 / Political Stability & Control of Corruption: Percentile Rank .....	22
Figure 19 / Total exports in percent of GDP, 2010 & 2023 .....	28
Figure 20 / Net exports in percent of GDP, 2010 & 2023 .....	29
Figure 21 / Foreign direct investment stocks, 2022, in % of GDP .....	31
Figure 22 / FDI by investing countries, 2022, in % of total FDI stocks .....	31
Figure 23 / Export structure, 2023, in % of total exports, goods trade aggregated by sectoral groups ....	33
Figure 24 / Import structure, 2023, in % of total imports, goods trade aggregated by sectoral groups ....	34
Figure 25 / R&D expenditures, in % of GDP 2011& 2021 .....	36
Figure 26 / Regional distribution of R&D expenditures – NUTS-2 regions, in % of GDP 2019 .....	37
Figure 27 / Number of patents per 1mn inhabitants, 2019, NUTS-2 regions.....	37
Figure 28 / Share of population with completed tertiary education, 2021, NUTS-2 regions, in % of total population aged 15-74 years .....	38
Figure 29 / Individuals' level of digital skills - Individuals with above basic overall digital skills, 2023 Percentage of individuals .....	41
Figure 30 / Households with a broadband internet connection, percentage of total households, 2021 ...	41
Figure 31 / E-government activities of individuals via websites, percentage of individuals .....	42
Figure 32 / Individuals used computers, laptops, other portable devices or computerised equipment or machinery such as those used in production lines, transportation or other services at work, percentage of individuals, 2018.....	43
Figure 33 / Percent of enterprises, grouped by their digital intensity index, 2018 .....	43
Figure 34 / Share of the manufacturing industry in total Gross Value Added, 2010&2021 .....	45

Figure 35 / Productivity growth 2014-2021, manufacturing industry and total economy, annual average growth rate .....	45
Figure 36 / Total greenhouse gas emissions per 1000 inhabitants, in Gg CO <sub>2</sub> equivalent <sup>1</sup> .....	51
Figure 37 / CO <sub>2</sub> emissions by sector, in % of total CO <sub>2</sub> emissions, 2022 .....	51
Figure 38 / Gross inland energy consumption per 1000 inhabitants, Thousand tonnes of oil equivalent	52
Figure 39 / Energy production, share of energy sources in total production, 2022 .....	53
Figure 40 / Share of renewable energy in gross inland energy consumption, 2014/2020 .....	53
Figure 41 / CO <sub>2</sub> Emissions from Transport, Million tonnes per 1mn inhabitants .....	55
Figure 42 / Modal split, freight transport, 2022 .....	56
Figure 43 / Change in modal split – freight transport, 2010-2022 in percentage points .....	57
Figure 44 / Modal split, passenger transport, 2022 .....	57
Figure 45 / Change in modal split – passenger transport, 2010-2022 in percentage points .....	58
Figure 46 / Circular material use rate, 2014/2022 .....	60
Figure 47 / Generation of waste, Kilograms per capita, 2012/2020 .....	60
Figure 48 / Treatment of waste by waste management operation, 2020, % of total waste treated .....	61
Table 1 / Imports by main trading partners, in % of total imports, by country, 2023 .....	29
Table 2 / Exports by main trading partners, in % of total exports, by country, 2023 .....	30

# 1. Introduction

The Danube Region, spanning 14 countries and connecting Central, Eastern, and Southeastern Europe, is defined by the catchment area of the vast Danube River, which flows from Germany's Black Forest to the Black Sea in Romania and Ukraine. This transnational region encompasses diverse landscapes, economies, and cultures, linking both EU and Accession countries, including Austria, Bulgaria, Croatia, Czechia, Germany (represented by the Länder Baden-Württemberg and Bavaria, Hungary, Romania, Slovakia and Slovenia, as well as Bosnia and Herzegovina, the Republic of Moldova, Montenegro, Serbia and the western regions of Ukraine. With more than 110 million residents, 24% of the EU27 population, the Danube Region plays a vital role in Europe's cultural heritage, environmental resources, and economic potential. Moreover, because it includes EU Member States and Accession countries, it is also a focal point of European political cohesion. However, the region also faces significant challenges from its unique geographic and socio-political complexity.

The Danube Region faces specific economic and social challenges, such as economic disparities, uneven access to infrastructure, distinct differences in the social situation of the population in the countries, differences in global competitiveness, labour markets, governance systems, innovation potential and preparedness for the digital and green transformation and more. This economic and social divide underscores broader regional disparities between and, notably, within countries, including access to public services, labour mobility, and industrial development, which affect the quality of life and economic prospects for many of the region's residents.

The diversity within the Danube Region highlights substantial territorial and regional differences that influence how policies and development strategies are implemented. While some areas experience rapid urbanisation, industrialisation, and strong economic growth, others remain predominantly rural, with limited access to infrastructure and investment. These regional disparities present challenges and opportunities for integration within the Danube Region and the European Union in the long run. Policy areas such as economic development, including industry and firm development, competitiveness, innovation, infrastructure, environmental management, energy and social cohesion, are deeply affected by the uneven spatial trends across the Danube Region, calling for targeted approaches to address each area's specific needs.

Adding to all these challenges, Russia's war of aggression against Ukraine has raised broader concerns about the security of Europe, and in particular, the Danube Region, as it is directly affected by the blatant violation of international law and the rules-based order. Yet, at the same time, Russia's attack on Ukraine has also *'created a new huge momentum in terms of political, economic, humanitarian and military solidarity, commitments and support for Ukraine. It also further intensified the need for the continuation of solidarity, macro-regional cooperation and coordination in the Danube Region'*<sup>1</sup>.

Indeed, cooperation within the Danube Region has the potential to address many of these challenges and support integration and development through cross-border initiatives and shared policy frameworks. EU frameworks for cooperation have an important enabling function in this respect. Amongst those, the EU

<sup>1</sup> Austrian Presidency of the EU-Strategy for the Danube Region (EUSDR), 01.11.2023 – 31.12.2024, Shaping Transformation, Creating Opportunities: A Prosperous, Resilient and Secure Danube Region, [https://danube-region.eu/wp-content/uploads/2024/06/Programm\\_EUSDR\\_AT-VS\\_final\\_060624\\_revLogos.pdf](https://danube-region.eu/wp-content/uploads/2024/06/Programm_EUSDR_AT-VS_final_060624_revLogos.pdf).

Strategy for the Danube Region (EUSDR) is a highly recognised institutional setting for such cooperation and coordination. Launched in 2010/2011, EUSDR cooperation was based on the need to modernise transport networks, improve access to information technology, ensure the availability of safe and cheap energy, strengthen sustainable development, prevent environmental disasters, overcome inequalities in education and employment, and create prospects for research and innovation.

Many of these challenges have been addressed by the EUSDR, though through a lack of own funding, always in conjunction with – and dependence on – EU Cohesion Policy and national policy support. And yet, more than a decade later, many of these challenges remain, albeit perhaps in a modified form. While the economic and social disparities in the Danube Region were too significant to overcome in only 13 years, other challenges evolved, and new ones, such as globalisation and technological change, the transition to a climate-neutral economy and, sadly, Russia's war of aggression against Ukraine, emerged.

Being aware of the changing geopolitical context and of progressing transformations trends, these old and new challenges make cooperation and coordination in the Danube Region all the more critical. New opportunities for cooperation emerge e.g. in the wake of the preparation for EU enlargement ("gradual integration"). This is emphasised by the Programme underlying Austria's presidency of the EU Strategy for the Danube Region (EUSDR) in 2023-2024: *'As socio-economic disparities among and within these countries persist, there is a need for reinforced cooperation to address cross-border challenges, boost regional cohesion and to engage EUSDR to contribute to the European integration of accession countries in order to unlock the full potential of the whole Region'*<sup>2</sup>.

In this context, it is, firstly, the aim of this study to provide a comprehensive overview of the various challenges of the Danube Region, including topics addressing economic development and disparities between the Danube Region countries and regions, labour market developments, population dynamics and migration, competitiveness, foreign trade, foreign direct investment, the sectoral structure, the innovation potential, transport networks, the carbon-footprint of the Danube Region economies as well as their transition to climate neutrality. Secondly, cooperation potentials will be identified from the analysis to support the re-enforcing of the cooperation process in the Danube Region with a fact-based analysis and conclusions.

The structure of the study is aligned with the three thematic priorities of the Austrian EUSDR presidency 2023-2024:

- › Contributing to Stability and Security and a clear European Perspective for the whole Danube Region;
- › Fostering Innovation, Skills and Business Opportunities in the Danube Region;
- › Enhancing the Danube Region Ecosystem, Water and Green Transition Management.

Each thematic priority is awarded a separate chapter in the study, each providing an up-to-date overview of the most important topics relevant to the respective priority. Consequently, the study offers a bigger picture of the Danube Region and cooperation therein than other studies focusing on a specific or a limited number of topics (e.g. Zavorská, 2024). This also allows this study to highlight not only the many areas, apart from economic development, in which the Danube Region countries show significant differences but also that many of these areas are interdependent, with the intent to steer the readers' perspective to a more holistic view of the Danube Region's challenges and needs.

Still, the study has its limitations. The first limitation is due to the authors' affiliations to the Vienna Institute for International Economic Studies, i.e. an independent economic think tank or Rosinak & Partner, an

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<sup>2</sup> *ibid.* p.1

independent spatial planning company. It gears the study towards a more economic point of view so that, for example, stability and security are only covered in terms of economic stability, including governance aspects. In contrast, political stability or security issues in a military sense are not addressed because of a lack of in-depth expertise. Second, although the study covers a broad range of topics, not all potential issues can be covered, partly due to the lack of data availability and the need to keep the study comprehensive. Third, given the large number of topics, and since the study's purpose is to provide an overview, it cannot cover each topic in greater detail. This also affects the conclusions for cooperation potential in the Danube Region, which provide a more birds-eye, strategic perspective rather than highly detailed recommendations on specific cooperation measures. Nevertheless, the study's results will provide valuable insights into the most pressing needs and cooperation potentials, thus allowing us to investigate these further in subsequent specialised studies.

### **Outline of the study's structure and its methodology**

The study is split into four chapters, whereby the first chapter, 'Economic stability and security' focuses on the economic development trends in the countries and regions of the Danube Region, population dynamics, migration trends and drivers, as well as governance. The second chapter, 'Globalisation and technological change', covers foreign trade and foreign direct investment, technological and digital change, industry development and value chains, as well as cross-border infrastructure networks. The third chapter, 'Green Transition of the Economy and Society', focuses on transport, the energy transition and the green transition of the economy, including the bioeconomy.

Each chapter covers these topics from both literature and empirical perspectives. The literature overview is a qualitative analysis surveying the latest literature on regional development, EU Cohesion Policy and cooperation in the Danube region over the last 5-8 years. This results in citations and explanations that refer to information available during this period.

The analytical part provides the empirical background and complements and updates the literature analysis with a comprehensive analysis using the latest available data. This means that, where possible, we use data until the year 2023, though in many cases, this is rather the exception than the rule, as data for many topics are only available with some delay. To illustrate, EU regional accounts data, e.g. data on EU regional GDP, comes with a two to three years delay due to Eurostat's data delivery regulations<sup>3</sup>. Also, where possible, data for Germany and Ukraine refer to the respective country's regions that are part of the Danube Region, i.e. the Länder Baden-Württemberg and Bavaria in Germany and the oblasts Zakarpattya, Ivano-Frankivsk, Odesa and Chernivtsi. However, for many topics, data are only available at the country level so that, if not otherwise indicated, data for Germany and Ukraine refer to the whole country.

The concluding step in each chapter develops experts' conclusions on cooperation potentials and identifies the narratives that characterise the challenges and needs of the Danube Region.

Finally, in the last chapter, the study also considers a future Danube Region policy in light of the current and future EU Cohesion Policy.

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<sup>3</sup> For information see: <https://ec.europa.eu/eurostat/web/national-accounts/methodology/european-accounts/regional-accounts>

## 2. Economic stability and security

This chapter analyses **stability and security** from an economic perspective, claiming that economic stability and progress in the Danube Region is the fundament for political stability across and within the Danube Region countries and a cornerstone for the success of any attempts at their deeper integration within the region and with the EU in more general terms. Accordingly, this chapter is split into four sections. The first section analyses economic development trends at the country and regional level, the second population dynamics, migration and migration drivers, while the third section focuses on governance as it is not only one of the key determinants of economic and social progress but also an indicator of stability beyond the purely economic perspective. The last section develops conclusions about the cooperation potential in the Danube Region to strengthen (economic) stability and security in the region.

### 2.1. ECONOMIC DEVELOPMENT TRENDS IN THE COUNTRIES AND REGIONS OF THE DANUBE REGION

This section is divided into three parts. The first illustrates the Danube Region's economic position within Europe and analyses recent trends in economic development at the country level. The second looks at the impact of past and current crises, such as the COVID-19 pandemic and Russia's war of aggression against Ukraine. The third section analyses economic development from a regional perspective.

#### Existing Literature

According to the literature, the Danube Region comprises three distinct groups of countries. The Old (Germany and Austria), the New (Bulgaria, Croatia, Czech Republic, Hungary, Romania, Slovakia and Slovenia) Member States and the Accession countries (Bosnia and Herzegovina, Republic of Moldova, Montenegro, Serbia and Ukraine western region) each exhibit distinctive patterns of development, potentials for convergence and linkages to European policies (CESCI, 2019, p. 3). Due to the different starting conditions for integration into the European Union and its common market, considerable economic differences and social disparities exist, especially between the old Western EU countries, the Eastern countries that joined the EU in 2004 and 2007, and the Accession countries. (CESCI, 2019, p. 4).

As reported by the European Commission (European Commission, 2024a, p. xxvi), with a few exceptions (e.g. Greece, Portugal, ...), the eastern member states of the European Union are the most adversely affected by economic disparities in the EU. Most EU citizens living in regions with a GDP per capita of more than 75% below the EU average are from the eastern Member States (European Commission, 2024a, p. xxvi). Of these Member States, Bulgaria, the Czech Republic, Croatia, Hungary, Romania, Slovenia, and Slovakia are also members of the EUSDR. This East-West divide is not only part of the EU but also the Danube Region and is evident in several ways. For example, research, development and innovation activities are concentrated mainly in the western part of the Danube Region (CESCI: 2019, p.116), while the service sector remains underdeveloped in the eastern part (CESCI, 2019, p. 6).

Although the economic gap between East and West in the Danube Region has narrowed in recent decades, the slow pace of convergence (CESCI, 2019, p. 8) makes it unlikely that the gap will be closed in the near future. For the European Union, promoting framework conditions that enable sustainable



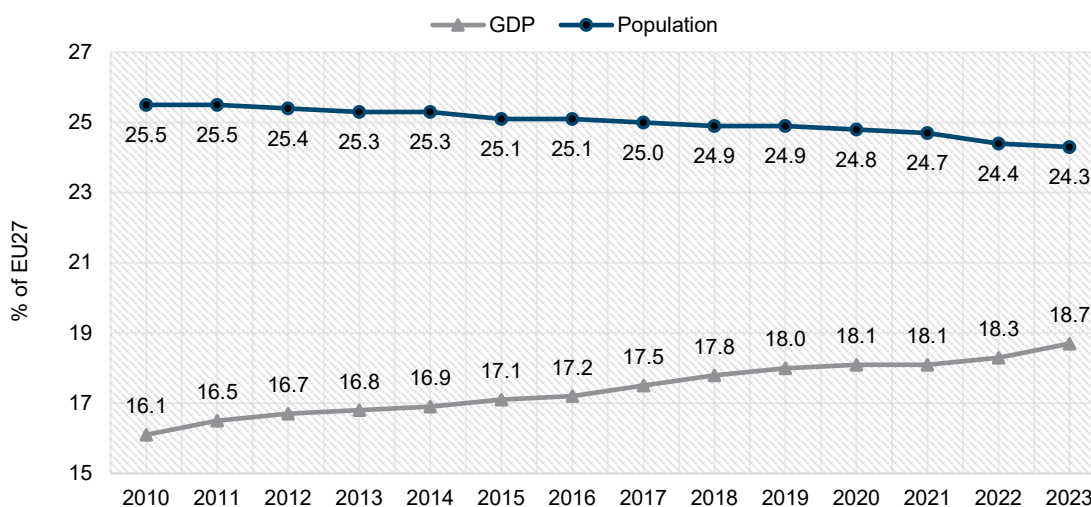
economic growth and prevent regions from being left behind remains a crucial priority of cohesion policy (European Commission, 2024a, p. 3) and would be equally important for the Danube Region.

Against these priorities of cohesion policy, the future economic landscape of the Danube region appears complex and challenging. According to the forecasts of the study "Territorial patterns and relations in the Danube basin", many regions of European countries in the Danube area are expected to continue to lag behind broader European economic development trends. In particular, the forecast suggests a widening gap between urban and non-urban areas, with urban centres more likely to follow general EU economic trends. In contrast, central and rural areas may fall further behind (ESPON ET2050, 2015, as cited in ESPON EGTC, 2021, p. 4).

### Empirical evidence

The data analysis complements the findings from the literature with empirical evidence. It briefly illustrates the Danube Region's position within Europe regarding economic power and population size and examines the disparities and their evolution within the region. In 2023, the Danube Region covered around 110 million inhabitants and had a total GDP of over 3 trillion Euros. This corresponds to over 24 per cent of the EU27 population and 18.7 per cent of the EU27 GDP (see Figure 1). Over time, the economic importance of the Danube Region is more or less continuously increasing, indicated by a growth of nominal GDP from 1.7 trillion Euro in 2010 to the over 3 trillion Euro mark in 2023, or an increase from 16.1 per cent of the EU27 GDP in 2010 to 18.7 per cent in 2023. Over the same period, the population of the Danube decreased by around 3 million people, i.e. from over 112 million inhabitants in 2010 to 109.5 million in 2023, which in terms of the EU27 population is a decline from 25.5 per cent in 2010 to slightly over 24% in 2023.

**Figure 1 / Danube Region GDP and population, in % of the EU27**

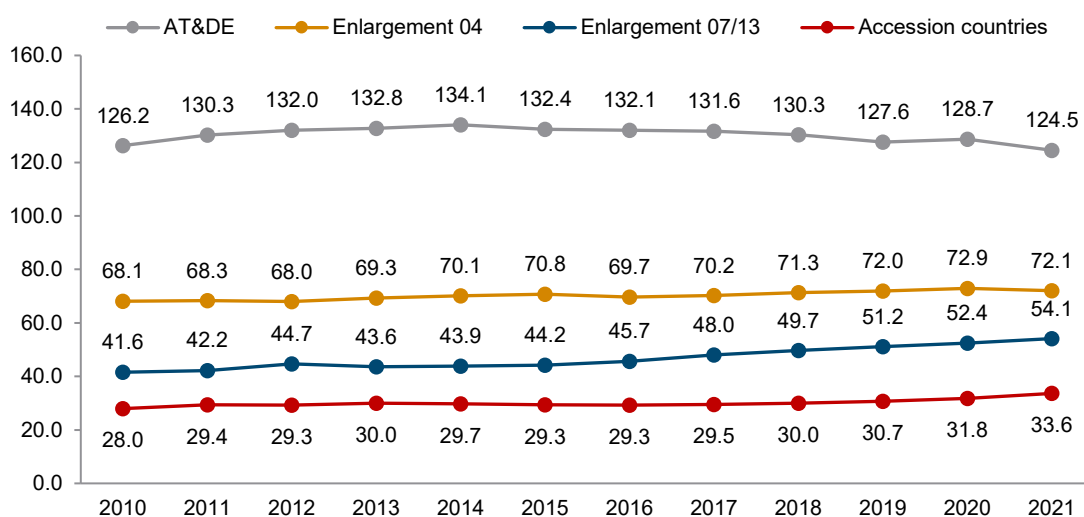


Source: Eurostat, wiiw

The Danube Region is a highly differentiated economic area. Using GDP per head in Purchasing Power Standards (PPS) to measure differences in levels of economic development shows that the Danube Region can be divided into four main areas, between which economic prosperity varies greatly. The first area consists of the regions in Austria and Germany, with an average GDP per head of over 124% of the

EU27 average in 2021 (see Figure 2). The second area consists of the regions in those countries that entered the EU in 2004, i.e. Czechia, Hungary, Slovakia and Slovenia; their GDP per head is, on average, around 72% of the EU average. By comparison, the average GDP per head of the regions in the third group of countries, i.e. Bulgaria, Croatia and Romania (entering the EU in 2007 and 2013), was around 54% of the EU average, while the average regional GDP per head in the Accession countries to the EU, i.e. Bosnia and Herzegovina, Republic of Moldova, Montenegro, Serbia and Ukraine, was around one-third of the EU average or around one-fourth of the Austrian and German average in 2021.

**Figure 2 / GDP per capita at PPS, % of EU27 average**



Source: Eurostat, wiiw

Over time, the economic disparities in the Danube Region are decreasing, with convergence, on the one hand, being driven by a relatively slow growth of Austria and Germany since 2014. Their average GDP per head declined from 134% to 124.5% compared to the EU average. At the same time, the average GDP of the other three areas in the Danube Region increased, in particular in the Enlargement 2007/2013 group, where, from 2010 to 2021, average GDP per head increased from 41.6 to over 54% of the EU27 average. The convergence was weaker in the Enlargement 2004 and the Accession countries groups. Here, GDP per capita increased by around five percentage points relative to the EU27 average over the same period.

### **The impact of current crises**

#### **Existing Literature**

The European Union has faced several crises in recent years, with the COVID-19 pandemic and Russia's war of aggression against Ukraine having a profound but uneven impact across regions and industries. These crises have exposed and deepened regional disparities in the European Union, particularly in peripheral and less developed areas. The pandemic initially hit tourism regions, cultural industries, and labour-intensive services hardest while disrupting industries integrated into global value chains (European Commission, 2024a, p. xix).

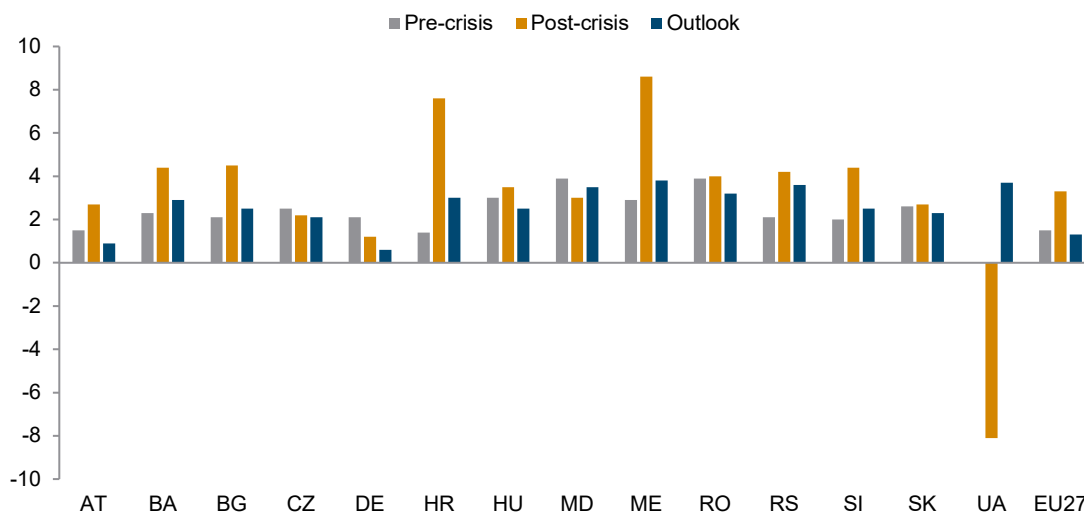
As Europe began to recover from the health crisis, it faced a new geopolitical challenge: Russia's invasion of Ukraine. This act of aggression has accelerated the economic decoupling between Europe and Russia (ESPON EGTC et al., 2022c, pp. 2, 10-11), with far-reaching consequences. The war has led to a decline in investment, trade flows and economic activity, particularly affecting energy-intensive industries and highly vulnerable border regions (European Commission, 2024a, p. xxxi). The geopolitical importance of the Black Sea basin has shifted from a bridge between East and West (as is highlighted by the Europe-Asia Connectivity Strategy and the Council Conclusions on EU's engagement) to a geopolitical security risk area (European Commission, 2024b, pp. 21, 24).

The impact of this crisis was expected to be particularly severe in Eastern Europe due to the proximity of the war and its economic consequences (ESPON EGTC et al., 2022c, p. 2). In addition, the Danube Region faces significant challenges in decoupling economically from Russia and reducing its dependence on insecure fossil fuels (CESCI, 2019, p. 4). However, the regions of the Eastern Member States of the European Union have benefited most from the Next Generation EU (NGEU) Reconstruction Fund (ESPON EGTC et al., 2022c, p. 2).

### Empirical evidence

From an empirical perspective, the crisis effects described in the literature had fewer economic effects than probably expected, as most economies in the Danube Region grew stronger after the 2019/2020 crisis, though they are likely to slow down in the near future, as suggested by Figure 3. The 2019/2020 pandemic had a strong negative economic impact in the Danube Region countries; this negative effect was not persistent as most countries grew stronger after the economic crisis than before. This was particularly the case in Croatia, Montenegro, Slovenia, Serbia, Bosnia and Herzegovina and Bulgaria. Other countries experienced a more moderate expansion, like Slovakia, Romania or Hungary, and only in a few countries, such as Germany, Czechia, the Republic of Moldova and in particular Ukraine (because of Russia's war of aggression) post-crisis growth was below the levels before the crisis.

**Figure 3 / Real GDP growth rates, pre-crisis (2010-2019), post-crisis (2020-2023) and outlook (2023-2026\*), annual average growth rates in percent**



Source: wiiw, Eurostat

However, the outlook for most Danube Region countries is less optimistic. Austria and Germany are expected to grow only slowly over the following years (see also European Commission, 2024c), while growth in the Enlargement 2004 countries will also slow down to around 2 per cent per year, due to their close ties to the German economy. However, they are still expected to grow above the EU average and thus continue to converge. Similar applies to the remaining countries in the Danube Region. They will grow above the EU average, Austria and Germany and will therefore converge. Yet, the growth rate differentials of most countries vis-à-vis the EU are relatively modest, indicating that catching up to the EU is a long-run process potentially taking several decades.

### **The regional perspective**

#### **Existing Literature**

The Danube Region is undergoing significant urban and rural transformations driven by complex socio-economic restructuring and re-dimensioning processes. Metropolitan regions, especially in the Eastern Member States, are emerging as catalysts for global developments and engines of growth (CESCI, 2019, p. 3). This trend is reshaping the spatial dynamics of the Danube Region, creating both opportunities and challenges.

Currently, the Danube Region is dominated by monocentric urban networks, with large urban centres benefiting disproportionately from unbalanced development processes (CESCI, 2019, p. 182). However, the region's many cities of international importance, many of which are transforming into smart cities, offer great potential for polycentric urban development. These urban areas are characterised by high concentrations of research, development and innovation activities (CESCI, 2019, p. 6).

While the growth of urban regions drives economic progress, the negative effects are increasing regional disparities. This is particularly evident in the eastern countries of the Danube Region, where capital regions are experiencing exceptionally high growth rates. As a result, rural areas face depopulation as people migrate to expanding urban centres, widening the gap between thriving cities and peripheral rural regions (CESCI, 2019, pp. 6-7). Moreover, extensive inner and outer peripheries struggle with inadequate infrastructure and weak urban-rural cooperation, leaving them poorly connected to central functions (CESCI, 2019, p. 13). The continuing loss of population and functions in villages, contrasted with the rapid growth of urban centres, threatens to deepen this divide further.

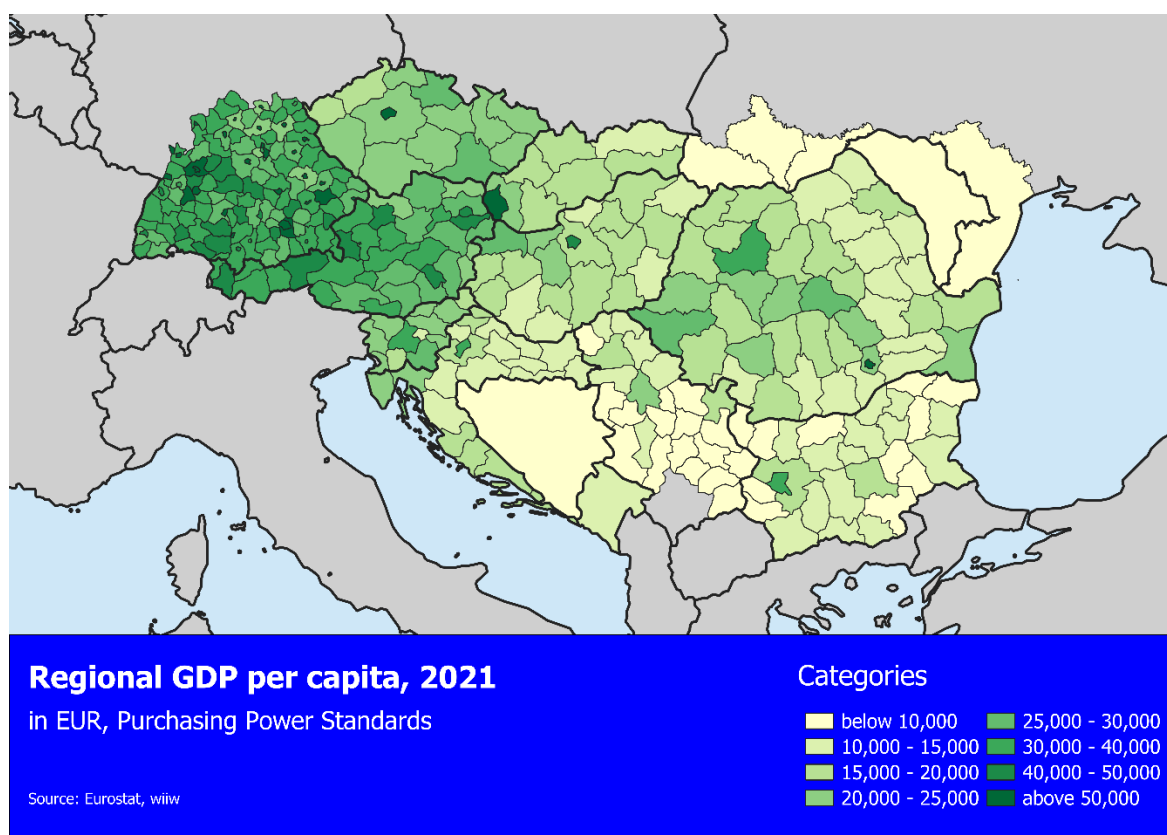
The widening gap between urban and rural areas goes beyond demographics and includes economic growth, employment opportunities and access to basic services. This widening gap is a significant challenge for balanced regional development. However, as highlighted in the EU's 9th Report on Economic, Social and Territorial Cohesion, inclusive growth is strongly emphasised. The report stresses that all regions should benefit from economic change and that no place should be left behind or forgotten (European Commission, 2024a, p. iii). As many of the regions the European Union refers to in this narrative are located in the Danube Region, this narrative should also be relevant to the EUSDR.

#### **Empirical evidence**

From an empirical perspective, the economic disparities in the Danube Region become even more apparent when looking at the regional level, as indicated in Figure 4, which shows the regional GDP per capita at the detailed regional NUTS 3 level (for EU countries and Serbia, while for other the other Danube Region countries the most detailed regional breakdown has been used that is publicly available). This figure illustrates the previously mentioned strong economic differences between the countries and

highlights the economic disparities within them. In all Danube Region countries (for which more detailed regional data are available), GDP per capita is highest in the urbanised areas (indicated by the darker green), which in the case of the Eastern European countries, except for Romania, are exclusively the capital cities, while in Germany and Austria, as well as Romania show a more polycentric pattern of economic development, as there are more highly urbanised regions than the capital cities that are centres of economic activities and high levels of GDP per capita. In comparison, non-urban regions have lower GDP per capita, though with some differentiation depending on their sectoral structure, as typically, more industrialised non-urban regions tend to have higher GDP per capita than agricultural regions.

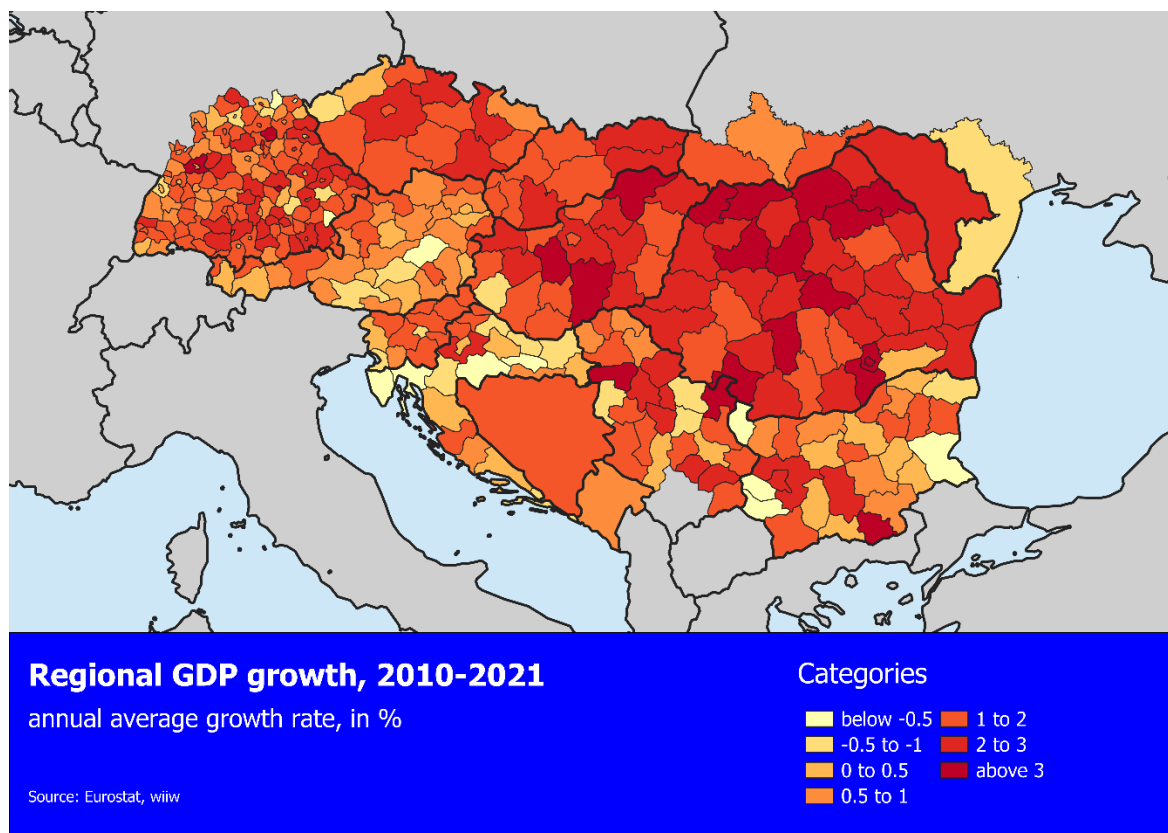
**Figure 4 / Regional GDP per capita, 2021, NUTS 3 regions\*, in Euro and Purchasing Power Standards**



\* NUTS 3 regions for EU countries and Serbia; for other countries, the regional breakdown depends on data availability  
Source: Eurostat, wiiw

Concerning the development over time, Figure 5 shows the regions' average GDP growth rate from 2010-2021. It illustrates that country growth rates often disguise a significant variation in growth performance at the regional level in all Danube Region countries. Interestingly enough, in many Danube Region countries, except Bulgaria, Romania and Serbia, it is not necessarily the capital cities that grow strongest, but rather other urbanised regions that grow slightly faster. However, a complete account of why certain regions in the Danube Region grow ahead of others requires a detailed analysis, which is beyond the scope of this study.

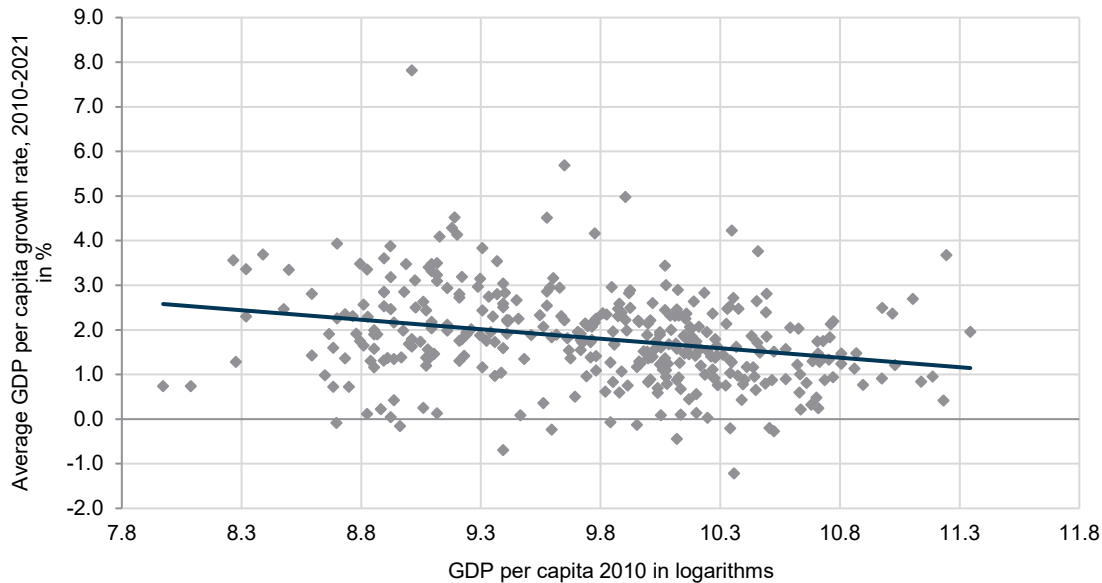
**Figure 5 / Regional GDP growth 2010-2021, NUTS 3\* regions, annual average growth rates in %**



\* NUTS 3 regions for EU countries and Serbia; for other countries, the regional breakdown depends on data availability  
Source: Eurostat, wiiw

These results suggest that regional economic development levels converged in the Danube Region, similar to the country level. To analyse this in more detail, Figure 6 combines the regions' level of economic development (i.e. GDP per capita) in 2010 with their 2010-2021 growth performance in a scatterplot. In this scatterplot, each region is represented by a dot, which on the horizontal axis indicates the size of its GDP per capita in 2010<sup>4</sup> and, on the vertical axis, its 2010-2021 growth rate. Since convergence means that less prosperous regions in 2010 grow stronger than more prosperous regions, this would show in the figure through high growth rates of the dots (i.e. regions) in the left part, while the regions more on the right (i.e. the more prosperous regions) should have lower growth rates. Therefore, a downward trend should be observed from left to right. The dark line in Figure 6 represents this trend, and since it has a downward slope, it suggests that the regions in the Danube Region tended to converge. However, as illustrated in the figure, this trend is not particularly strong, and many regions do not follow this trend, which suggests that this regional convergence trend was not necessarily pronounced.

<sup>4</sup> Expressed in logarithms for a more concise graphic illustration

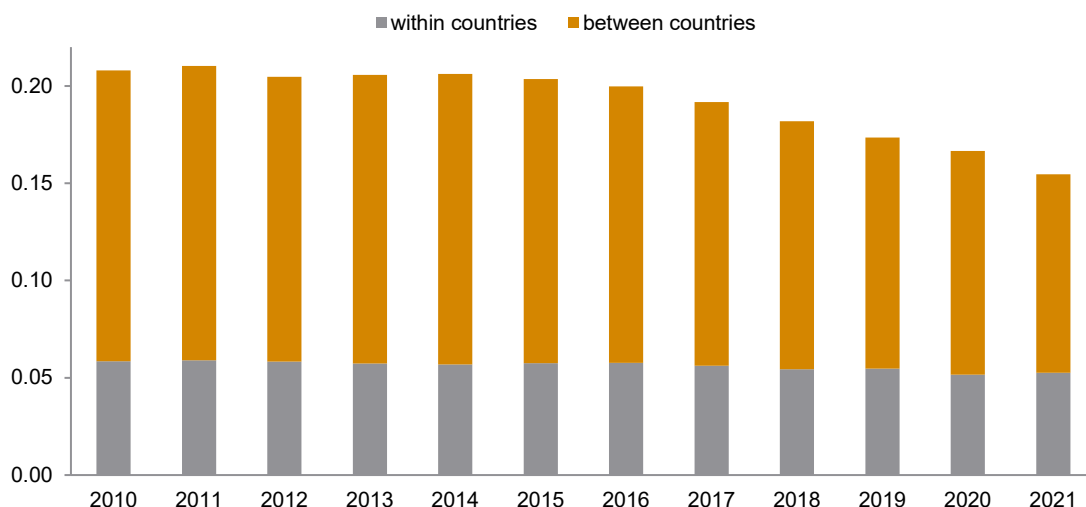
**Figure 6 / Convergence across the regions in the Danube Region**

Source: Eurostat, wiiw, own calculations

This slight convergence at the (above shown) country and regional level can also be interpreted as a decline in regional inequalities in the Danube Region. This is shown in Figure 7, using the mean logarithmic deviation of the regions' GDP per head as an indicator. This indicator has the interesting feature of splitting the total change in regional inequality into two components, with the first showing the change in total inequality due to the changes in inequality across the regions within a country. In contrast, the second component indicates the change in inequality due to changes between the countries of the Danube Region. Based on this, the figure shows that since 2010, regional inequality in the Danube Region has almost continuously declined. However, this is primarily due to changes between countries, as the less prosperous countries in the Danube Region catch up with the more prosperous ones.

As far as the regional disparities are concerned, it is instructive to group the regions by their degree of urbanisation into urban, intermediate, and rural regions. This sheds a more nuanced light on their development and growth performance differences. Grouping the regions in such a way reveals an urban-rural divide, similar to the literature, and confirms that urban areas in the Danube Region are growth and development centres. This is illustrated by the differences in the level of economic development measured in GDP per capita (see Figure 8) and economic growth (Figure 9).

**Figure 7 / Regional inequality in the Danube Regions, Mean logarithmic deviation-index, NUTS-3 regional GDP per capita, 2010-2021**



Source: Eurostat, wiiw

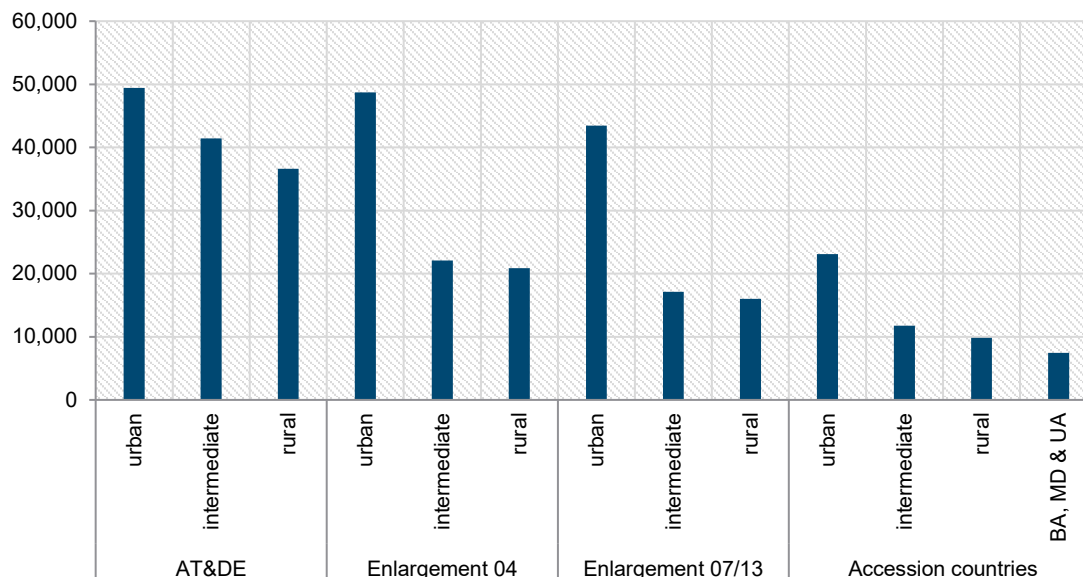
Note: \* Austria, Germany and the EU: Outlook 2023-2025

Thus, urban regions, especially capital cities, have much higher GDP per capita, reflecting concentrated economic activity, investment, and knowledge-intensive services in these regions. Intermediate regions, often peri-urban or regions with smaller cities, show moderate GDP per capita. They frequently benefit from proximity to major urban centres but do not have the same attractiveness for business or innovation, infrastructure or economic activity as core cities. Rural regions tend to have the lowest GDP per head, often reflecting a reliance on agriculture combined with limited infrastructure and competitiveness. These structural differences apply to all four country groups within the Danube Region. However, the differences between urban regions on the one hand and intermediate and rural regions on the other are much smaller in Austria and Germany than in the other Danube Region countries.

The differences in the growth performance of the types of regions partly reflect these differences in levels of economic development. In particular, in the EU-Enlargement 2007/2013 and Accession countries, urban regions, i.e. the capital cities, are the main drivers of economic growth, indicating significant differences in the economic potential between them and the intermediate and rural regions. By comparison, growth differences between the different types of regions are smaller in the EU-Enlargement 2004 countries, while in Austria and Germany, urban regions, on average, grow slower than intermediate and rural areas in terms of GDP per capita, which is partly due to the high population growth in the urban regions. Thus, for the latter two groups of countries, the results indicate a more polycentric development, while in the EU-Enlargement 2007/2013 and Accession countries, economic growth is mainly focussed on the capital cities, so their urbanisation is a crucial driver of economic prosperity in, with urban areas significantly outperforming rural regions.



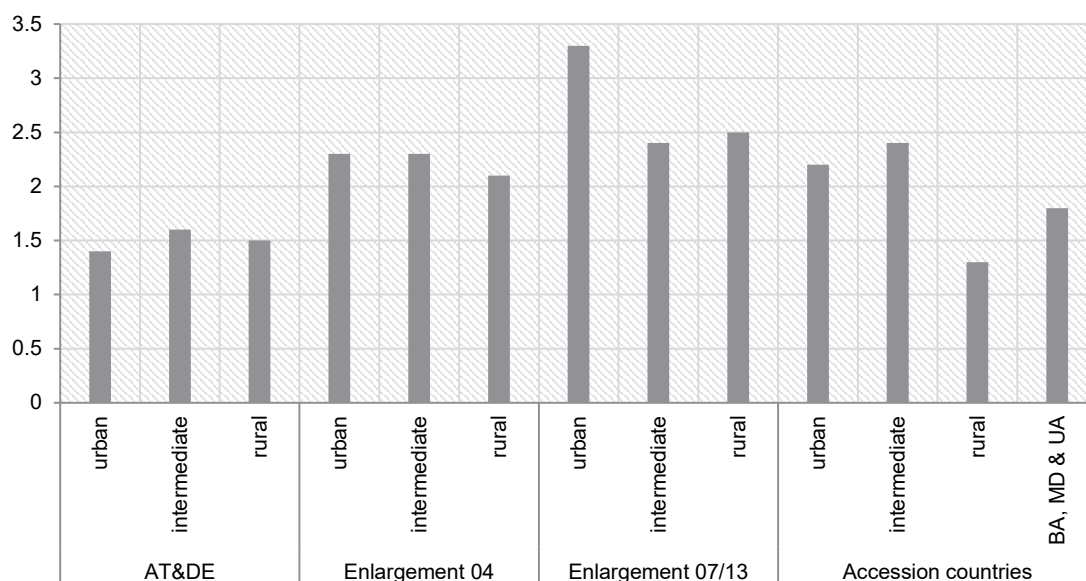
**Figure 8 / Regional GDP per capita at PPS, by groups of NUTS-3 regions according to their degree of urbanisation, 2021**



Note: For Bosnia & Herzegovina, Republic of Moldova and Ukraine regions no regional division by urbanisation was available. Therefore these regions have been put in a separate group for comparison reasons.

Source: Eurostat, wiiw

**Figure 9 / Real GDP per capita growth, average of groups of regions by the degree of their urbanisation, annual average growth 2010-2021**



Note: For Bosnia & Herzegovina, Republic of Moldova and Ukraine regions no regional division by urbanisation was available. Therefore these regions have been put in a separate group for comparison reasons.

Source: Eurostat, wiiw

## 2.2. POPULATION DYNAMICS, MIGRATION AND MIGRATION DRIVERS

### Existing Literature

The Danube Region, encompassing Eastern and Western EU Member States and Accession countries, represents a complex tapestry of socio-economic development marked by progress and persistent challenges. Over the last decade, EU Cohesion Policy has played a crucial role in closing the gap between the Eastern EU Member States and the EU average, especially in terms of employment, moving closer to the EU average (poverty rate of 21%) and social inclusion (European Commission, 2024a, p. xxi).

Despite this progress in the Eastern EU Member States, most of which are also members of the EUSDR, there is still a clear east-west divide in various aspects of development in the Danube region. This divide is particularly pronounced when looking at poverty risk rates. While Western countries such as Germany, the Czech Republic, and Austria show homogeneously low-risk rates, Eastern countries such as Romania and Bulgaria, as well as Accession countries, show significant regional disparities, with poverty risk affecting more than one in four people in some regions (ESPON database, 2020, as cited in ESPON EGTC, 2021, p. 23).

The Danube Region also continues to struggle with significant disparities in the educational structure and low levels of vocational qualifications (CESCI, 2019, p. 6). The educational gap directly translates into higher poverty risks and income inequalities, particularly affecting specific groups such as the unemployed and Roma communities, whose low social mobility remains a pressing issue (CESCI, 2019, p. 29).

The labour market in the region represents a shifting challenge. While unemployment was once the main concern, the current problem is a labour shortage, which significantly hampers the Danube Region's growth potential (CESCI, 2019, p. 4). This shortage is exacerbated by the significant emigration from the Eastern Member States of the Danube Region over the last two decades, leading to a brain drain effect (CESCI, 2019, p. 117).

The population dynamics in the region further illustrate the east-west divide. While capital cities in the Danube Region are experiencing strong population growth, non-urban areas face significant population decline, especially in the eastern part. Countries such as Croatia, Hungary, Romania and Bulgaria are experiencing some of the highest rates of population decline in Europe (Eurostat, 2020, as cited in ESPON EGTC, 2021, p. 3). This trend is driven by natural decline and net migration, with the eastern part of the EU experiencing continuous population decline in recent decades (CESCI, 2019, pp. 144-148). Migration creates 'winning' and 'losing' regions within these countries, with more developed urban areas attracting populations from less developed and rural areas. Eastern and rural regions face depopulation due to low birth rates, an ageing population and emigration (CESCI, 2019, p. 6).

The challenges of integration further complicate this picture. Throughout the Danube Region, the integration of migrants, national minorities, and Roma populations is progressing slowly (CESCI, 2019, p. 3). However, successful integration has the potential to rebalance labour supply and mitigate population decline.

### Empirical evidence

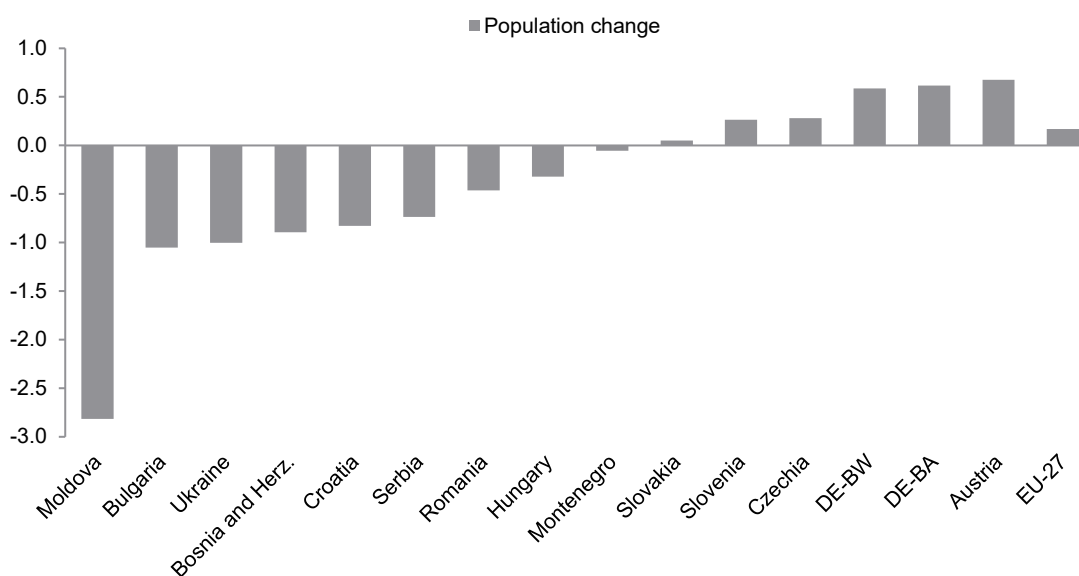
The socio-economic and migration challenges in the Danube Region identified in the literature are fully reflected by the empirical evidence. This section gives a brief overview of the population dynamics in the Danube Region, looks at regional migration, and discusses two factors determining the propensity to migrate: the labour market situation (unemployment) and poverty.

Figure 10 shows the annual average population growth rates across Danube Region countries from 2010 to 2023. Population dynamics vary significantly within the Danube Region, with the less economically developed countries experiencing population declines, likely due to migration, low birth rates, or other demographic factors. In contrast, economically robust countries and regions show more stability or moderate growth.

Population decline is most substantial in Republic of Moldova, where the population declined by 2.8% per year from 2010 to 2023, i.e. by over 1 million inhabitants in absolute terms or 31% of its 2010 population in relative terms. Population decline was also substantial in Bulgaria (minus 13% of the 2010 population), the Ukrainian Danube Region areas (minus 12% of the 2010 population), Bosnia and Herzegovina (minus 11% of the 2010 population), Croatia (minus 10% of the 2010 population), Serbia (minus 9% of the 2010 population) and Romania (minus 6% of the 2010 population and over 1 million inhabitants in absolute terms).

By contrast, the population increased strongly in Bavaria (over 1 million inhabitants since 2010), Baden-Württemberg (830 thousand inhabitants), Austria (760 thousand inhabitants), and Czechia (390 thousand inhabitants).

**Figure 10 / Change in population, average annual growth rate, 2010-2023 in %**



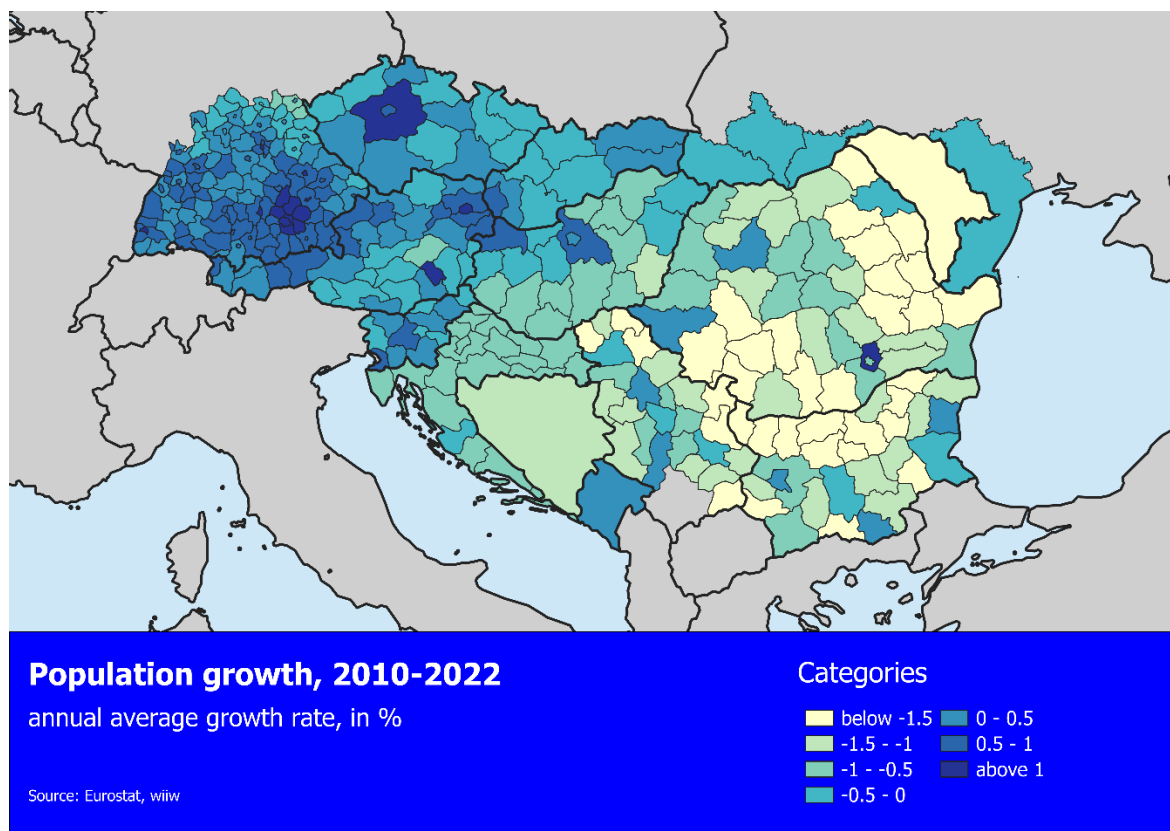
Source: Eurostat, wiiw

Breaking down population growth trends by regions shows highly differentiated developments depending on the region type, as illustrated in Figure 11 for the NUTS-3 regions and Figure 12 for the regions grouped by their degree of urbanisation and geographic areas. Both figures demonstrate that urban regions of the Danube Region show higher population growth rates in all four country groups than intermediate or rural regions<sup>5</sup>. This indicates a trend of urbanisation where more people are moving to urban areas, likely for economic opportunities, while rural regions experience slower growth or even population decline. The decrease in population is substantial in the rural and intermediate regions of Bulgaria, Croatia, and Romania, as well as in Montenegro and Serbia. At the same time, comparable data for Bosnia and

<sup>5</sup> In the map the regions with darker blue colour, i.e. those with population growth, are typically urban or metropolitan regions, the latter referring to regions close to major urban centres, e.g. the regions around Prague or Bucharest.

Herzegovina, the Republic of Moldova, and Ukraine are unavailable. By comparison, population decline in the rural and intermediate regions in the EU-Enlargement 2004 countries is much weaker, while in Austria and the two German Danube parts, these regions experienced an increase in population, though at a lower rate than the urban centres.

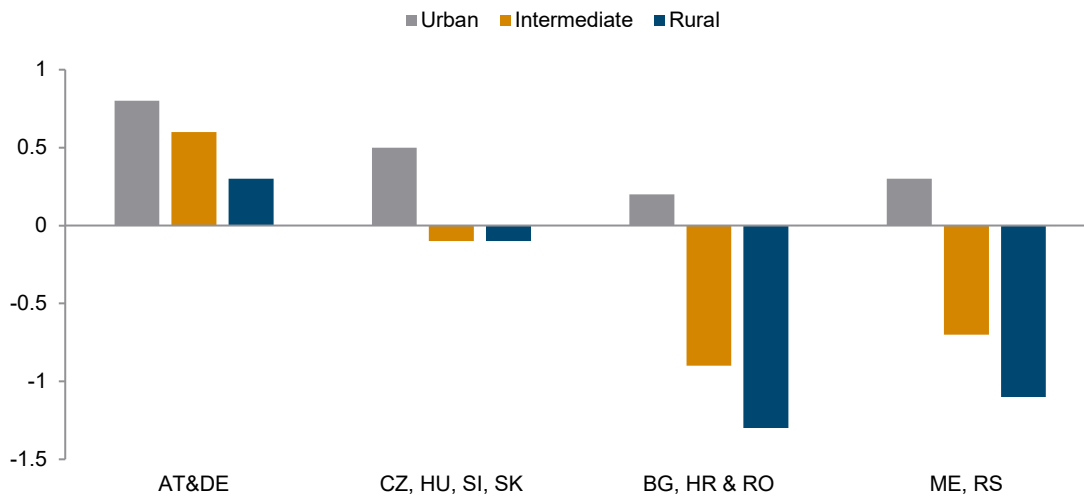
**Figure 11 / Population growth 2010-2022, NUTS-3 regions, annual average growth rates in %**



Source: Eurostat, wiiw

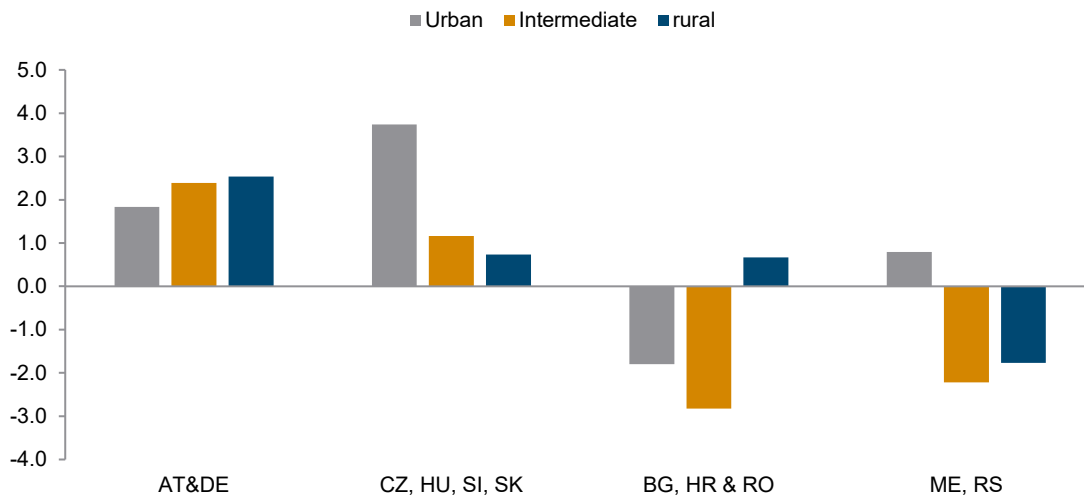
Besides the natural population changes, migration is a factor behind these migration trends. The analysis has shown that migration data (from Eurostat) at the country level is complex and does not allow reliable insights. Also, at the regional level, migration data is not of the best quality, as regional migration is estimated by the residual between the total change or the population minus the natural population change, i.e. the total number of births minus the total number of deaths within a year. Though being estimated, the regional migration data provides plausible insights into the migration trends in the regions, with the limitation that migration flows from one region to another cannot be determined.

**Figure 12 / Average annual population growth 2010-2022, in percent, regions by their degree of urbanisation**



Source: Eurostat

**Figure 13 / Migration rate, 2020-2022**



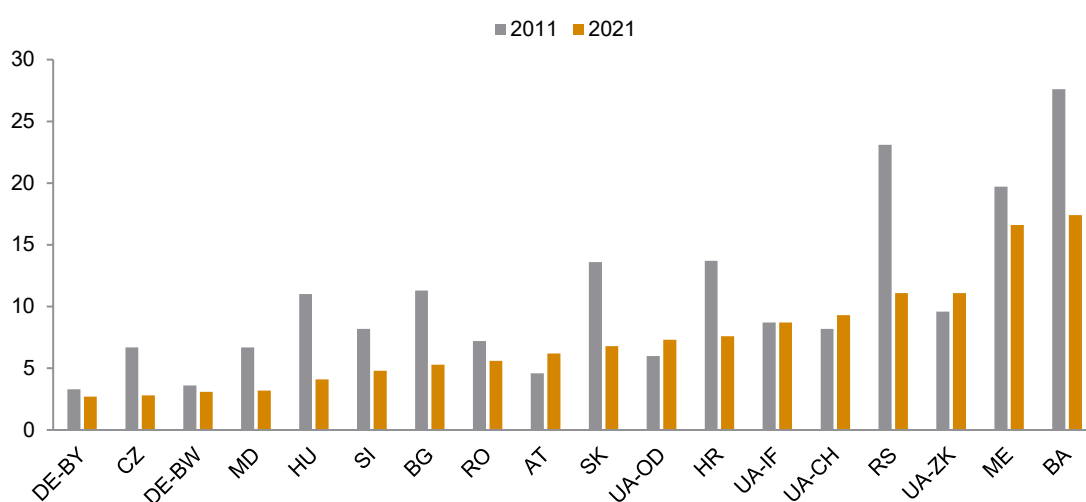
Source: Eurostat, wiiw

Figure 13 illustrates the migration rates across the regions grouped by their degree of urbanisation from 2020 to 2022. These rates are defined as the ratio of total migration into or out of a region in 2020-2022 to the total population of the respective region in 2020. The figure illustrates that migration significantly influences population dynamics in the Danube Region. Thus, it contributes strongly to the population increase in the Austrian and German regions and the urban centres in the EU-Enlargement 2004 countries. Also, the intermediate and rural regions experience inward migration in the latter country group. Given the population dynamics above, these regions tend to have declining natural population trends due to low birth rates, partly mitigated by inward migration flows. By contrast, most regions in Bulgaria, Croatia and Romania, as well as Montenegro and Serbia, lose population due to outward migration, the exception

being the urban regions in the latter country group, indicating an urbanisation process, as well as the rural regions in the EU-Enlargement group 2007/13. However, this result is due to sizeable inward migration from the Republic of Moldova to Eastern Romanian regions, which is facilitated through easy access to Romanian citizenship for Moldovan citizens.

One driver of migration is the employment prospects within the regions. In this respect, Figure 14 compares the unemployment rates among the working-age population (ages 15-74) in two distinct years: 2011 and 2021. It highlights changes in employment trends, reflecting economic recovery, growth, or decline across various countries and regions in the Danube Region.

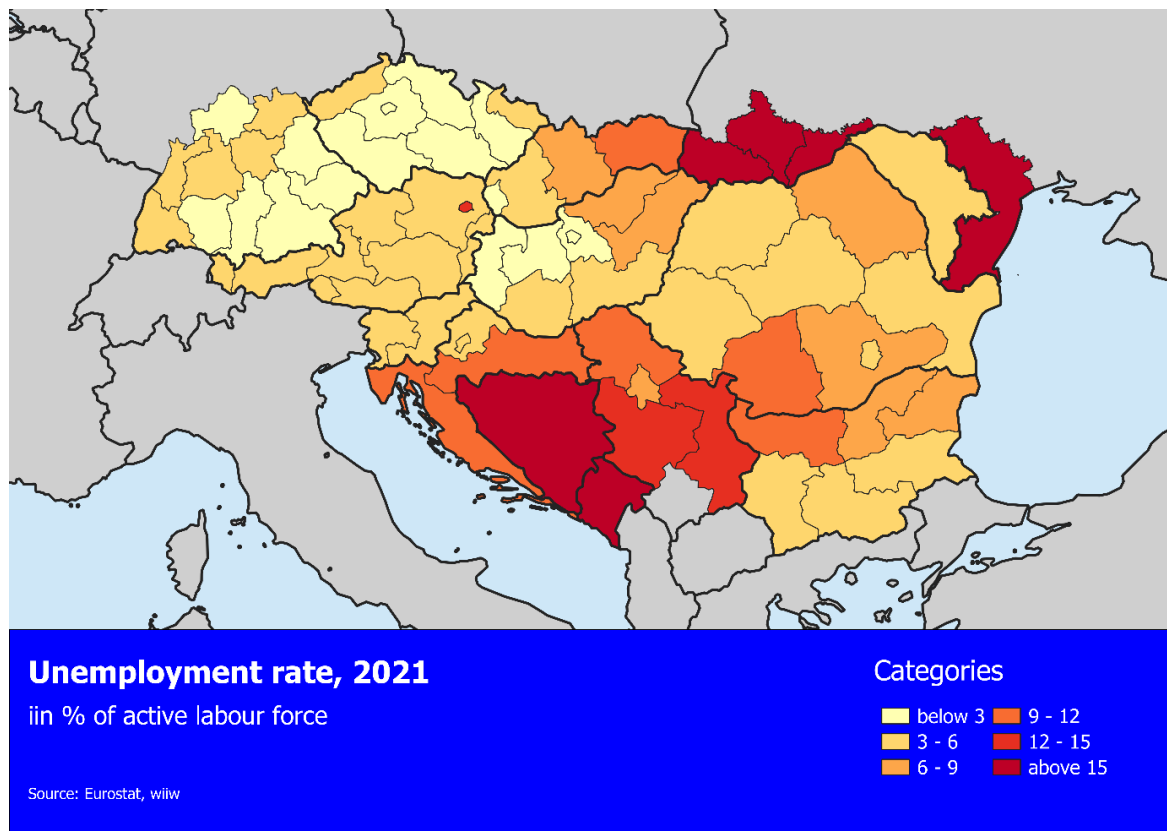
**Figure 14 / Unemployment rates, population aged 15-74 years, in % 2011 & 2021**



Source: Eurostat, wiiw

In 2011, unemployment rates in the Danube Region were high (exceeding 13%) partly as repercussions of the 2008 global financial crisis, particularly in countries such as Slovakia, Croatia, Serbia, Montenegro or Bosnia and Herzegovina, which were further hampered by structural challenges. By 2021, a noticeable decline in unemployment rates for many countries is recorded, highlighting successful economic recovery and labour market reforms. The data also suggests that the impact of the COVID-19 pandemic in 2020, which led to spikes in unemployment across many regions, was only temporary, indicating some resilience of labour markets in the face of challenge. Unemployment rates were particularly low in both German Länder, Czechia, Hungary and Slovenia, reflecting that, as discussed in the literature, in these countries labour shortages tend to be more of a problem than unemployment. Nevertheless, unemployment showed high rates in Bosnia and Herzegovina, Montenegro, Serbia and the Ukrainian regions (at around 9% or higher), suggesting that their labour markets and economies still face significant structural challenges.

At the regional level, the unemployment situation in the Danube Region countries is more differentiated, as shown in Figure 15, with the economically more robust regions, including the capital city regions (except Vienna) and the regions with a high share of medium-high and high technology intensive industries typically show lower unemployment rates than regions with a less advanced economic base, like for example the Eastern regions in Czechia, Hungary, Slovakia, the North-East region in Romania or the Northern regions in Bulgaria.

**Figure 15 / Unemployment rate, 2021, NUTS-2 regions, in % of the active labour force**

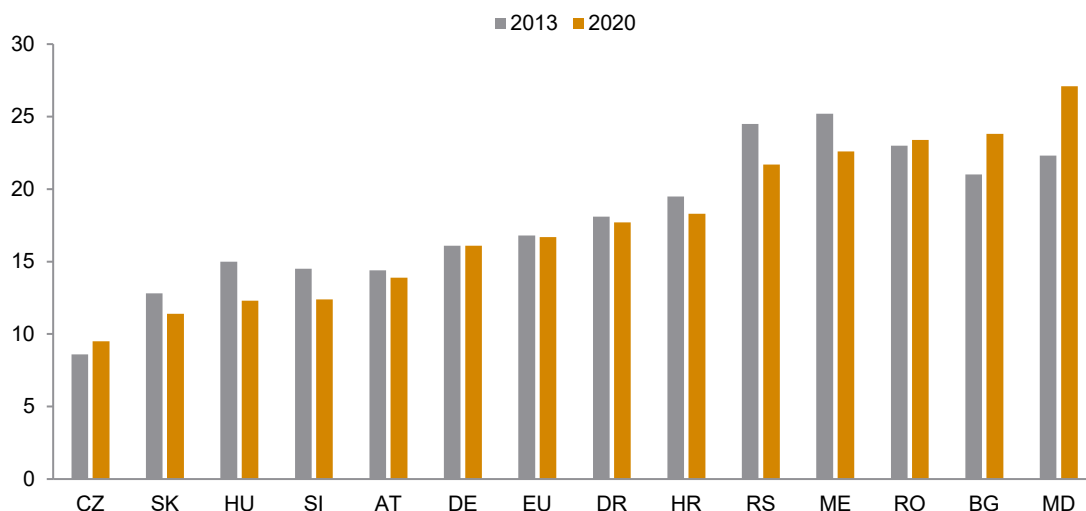
Source: Eurostat, wiiw

A second driver of migration is poverty. Hence, Figure 16 illustrates the percentage of the population living below the poverty line, defined as having a disposable income of less than 60% of the median income in the respective country. This is a critical indicator of economic well-being and social inequality within the Danube Region.

In 2013, many countries in the Danube Region, especially the less prosperous ones, exhibited high poverty rates, indicating substantial socio-economic challenges. This includes countries like the Republic of Moldova, Romania, Bulgaria, and Serbia, which had significant portions of their populations (i.e., over 20%) living in poverty due to historical economic disadvantages, low wages, and limited access to social safety nets.

Until 2020, the data suggest an overall decrease in poverty levels across most Danube Region countries, reflecting the impact of various social policies, economic growth, and improved job opportunities. Still, in the most affected countries, poverty rates are persistent, i.e. decreasing only slowly or even increasing, suggesting that economic recovery has not been uniform. This could highlight a lack of investment in social programs, structural economic challenges, or ongoing labour market issues.

**Figure 16 / Poverty rates, 2013 & 2020 – Share of population with a disposable income less than 60% of the median income**



Source: Eurostat

### 2.3. GOVERNANCE IN THE DANUBE REGION

#### Existing Literature

Corruption remains a severe problem in many Danube countries, deterring foreign investment and increasing emigration. Despite national and supranational efforts, significant improvements have failed to be made. The World Bank's Corruption Perceptions Index has shown some positive developments in some member and candidate countries between 2002 and 2013 (ZEW, 2015, p. 15), but overall progress has been limited.

One way to address corruption and improve governance in the region is through increased institutional cooperation and, in some areas, the creation of new transnational institutions. This is particularly important in cross-border areas, where governance is challenging due to the lack of existing institutions (CESCI, 2019, pp. 15, 185).

Digitisation of government services is another promising way to improve governance and reduce corruption across the Danube Region. The Danube Region shows a strong east-west divide in e-government development, with only Germany, Austria and Slovenia above the EU average. At the same time, eastern countries such as Romania, Republic of Moldova, Ukraine and Bosnia-Herzegovina have significant deficits in online services and telecommunications infrastructure (CESCI, 2019, p. 80). Austria leads the way, with at least 60% of the population interacting with government services online. Hungary shows a notable east-west divide, with higher usage rates in the western part of the country. However, Central Serbia, Bulgaria, and Romania lag, with the lowest rates of online interaction in both the Danube Region and the broader European context. Only their capital regions show slightly higher adoption rates (Eurostat, 2018, as cited in ESPON EGTC, 2021, p. 25).

This east-west divide is somewhat worrying since well-developed e-governance is crucial in fighting corruption and improving public services. The EU's 9th Report on Economic, Social and Territorial



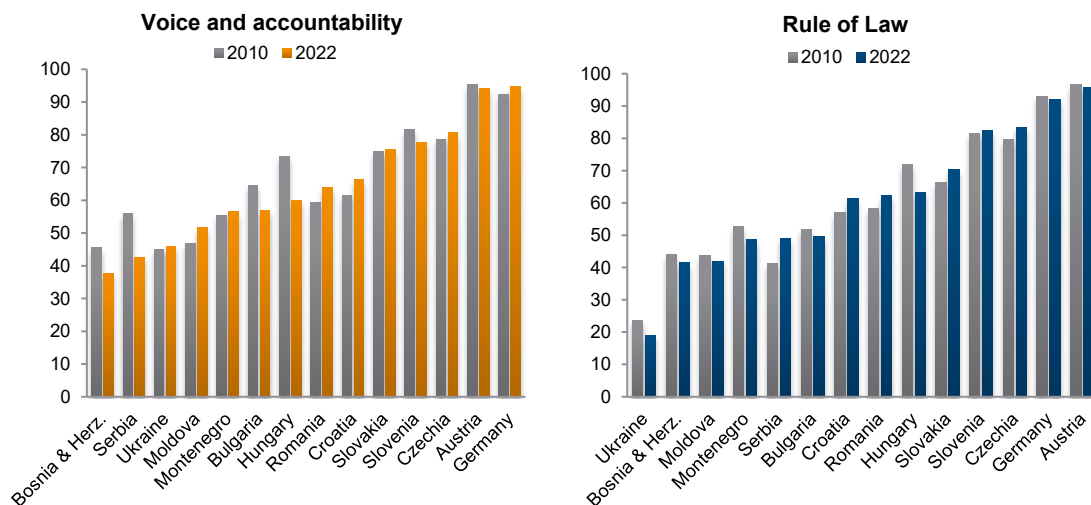
Cohesion highlights the potential of e-governance to address many of the region's challenges. By leveraging technology, e-governance can improve the efficiency and accessibility of government services, increase transparency and accountability, and reduce bureaucracy, fraud and corruption (European Commission, 2024a, p. 226).

### Empirical evidence

The governance challenges described in the literature are also clearly visible in the empirical evidence. This section briefly analyses the quality of governance in the Danube Region countries using four indicators taken from the World Bank Global Governance Indicators, which assess various aspects of governance in the Danube Region.

First, "Voice and Accountability" (Figure 17, left graph) captures perceptions of the extent to which a country's citizens can participate in selecting their government, as well as freedom of expression, freedom of association, and free media. Second, the "Rule of Law" (Figure 17, right graph) captures perceptions of the extent to which people have confidence in and abide by the rules of society, and in particular, the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. The third indicator is "Political Stability and Absence of Violence/Terrorism" (Figure 18, left graph), which measures perceptions of the likelihood of political instability and/or politically motivated violence, including terrorism. Finally, "Control of Corruption" (Figure 18, right graph) captures perceptions of the extent to which public power is exercised for private gain, including petty and grand forms of corruption. All indicators are expressed as ranks, with 0 corresponding to the lowest rank and 100 to the highest in a global comparison. The data shown here is an excerpt of the international data focussing on the Danube Region.

**Figure 17 / Voice and Accountability & Rule of Law: Percentile Rank**



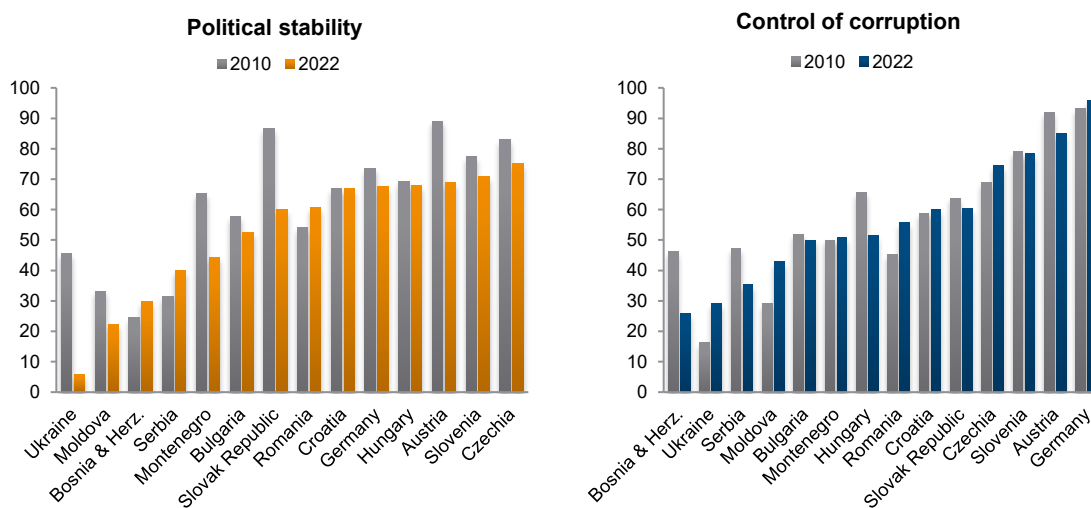
Source: World Bank, Global Governance Indicators

For all indicators, the quality of governance varies widely across the Danube Region, with Western European countries demonstrating more robust governance and democratic processes. In contrast, accession and enlargement countries face significant challenges in transparency, political stability, and legal enforcement. Thus, Austria and Germany typically score higher than other Danube Region countries,

reflecting stable democratic processes, strong civic participation, well-functioning legal systems, and control of corruption. Only in the case of political stability are both countries outranked by Slovenia and Czechia. Furthermore, the EU countries in the Danube Region have a higher quality of governance than the Accession countries, as shown by all four indicators, whereby within the EU countries, often the more prosperous EU countries like Czechia, Slovakia and Slovenia are ranked above the less prosperous EU countries like Romania or Bulgaria. The Accession countries within the Danube Region generally have the lowest quality of governance due to weaker institutional frameworks, less media freedom, corruption, internal political tensions or an outright war situation, as in the case of Ukraine.

Since 2010, the quality of governance has been mixed across countries and in governance indicators. The "Voice and Accountability" indicator suggests that in many countries, the freedom of expression or free media has declined, more significantly in Bosnia and Herzegovina, Bulgaria, Serbia, and Hungary, and to a lesser extent in Slovenia and Hungary. This indicator remained stable in other countries and only saw minor improvements. Regarding the "Rule of Law", changes over time were primarily small, except for Serbia showing a more pronounced improvement while Hungary experienced a relatively strong decline. Changes in "Political Stability" mainly were negative in the Danube Region, particularly in Ukraine, because of Russia's war of aggression, but also in other countries like the Republic of Moldova, Montenegro, the Slovak Republic and Austria. Improvements were made in Bosnia and Herzegovina, Serbia and Romania. The "Control of Corruption" declined firmly in four countries, i.e. Bosnia and Herzegovina, Serbia, Hungary and Austria, while substantial improvements were made in Ukraine, the Republic of Moldova and Romania.

**Figure 18 / Political Stability & Control of Corruption: Percentile Rank**



Source: World Bank, Global Governance Indicators

## 2.4. KEY FINDINGS AND CONCLUSIONS FOR THE COOPERATION POTENTIAL IN THE DANUBE REGION

The Danube Region is a **highly differentiated economic area** that can be split into four groups of countries with significant differences in development levels. The highest income level group consists of the German and Austrian regions in the Danube Region, followed by Czechia, Hungary, Slovakia and Slovenia, i.e. those countries that entered the EU in 2004. The third group consists of Bulgaria, Croatia and Romania (entering the EU in 2007 and 2013), while the group with the lowest levels of economic development consists of the EU Accession countries Bosnia and Herzegovina, Republic of Moldova, Montenegro, Serbia and Ukraine.

Although the **economic gap between East and West** has been narrowing, also because the economic impacts of Russia's war of aggression have been minor, except for Ukraine, the pace of convergence has slowed in some countries, especially Czechia, Hungary, Slovakia and Slovenia. In contrast, for others, economic convergence may be a lengthy process that takes several decades. Convergence is even more of an issue at the sub-national level, as in most Danube Region countries, metropolitan areas, particularly capital cities, are growing ahead of rural and peripheral regions, which face more significant challenges in catching up. Thus, urban areas are the engines of growth in the region. However, this comes at the cost of increasing disparities within the countries, in particular between urban and rural regions.

These **differences in economic development** between and within the countries of the Danube Region, in combination with partly high unemployment and poverty rates, are the primary sources for the demographic challenges the region faces. In particular, outward migration from low-income regions, especially those in more rural areas of the countries, and, at the more aggregate level, from the less prosperous countries themselves, is of concern. The loss of population, especially if a large proportion of young, highly skilled workers amongst those leaving the regions or countries, is likely to exacerbate regional inequalities as less prosperous regions and countries lose their growth potential, threatening their long-term economic growth and convergence path.

A critical factor in securing the long-run growth potential in the Danube Region, but simultaneously one of the main challenges, is the quality of **governance and institutions**. The results indicate that the quality of governance is closely tied to the economic differences in the Danube Region. Countries with better governance structures tend to have higher levels of economic prosperity. Despite the increase in the use of e-governance in the Danube countries, which has improved transparency and accountability, though mainly in the more developed countries, governance quality tends to exhibit a downward trend, with issues such as corruption and weak institutional frameworks hampering growth and potentially also limiting effective cooperation in the Danube Region.

### Conclusions for the cooperation potential in the Danube Region

The Danube Region's complex geopolitical context makes regional cooperation essential and challenging. The results of this section suggest that policy cooperation and coordination in the Danube Region could address **three main areas**: Economic development and economic integration, urban-rural partnership and governance.

As far as **economic development and economic integration** are concerned, important issues for cooperation in the Danube Region are:

- › Developing **new growth models** that specifically account for the differences in the level of economic development of the Danube Region countries, which means sustaining the competitiveness of

Austrian and German regions while avoiding Czechia, Hungary, Slovakia and Slovenia being stuck in a middle-income trap and ensuring that the less prosperous countries have a realistic chance to catch up to more developed countries in a reasonable time frame.

- › These growth models could focus on investments in **strategic sectors and industries** to unlock the potential of each region. Alternatively, adopting performance-driven approaches like the STEP initiative could enhance competitiveness in the Danube Region.
- › Sharing **innovation and research** efforts, in the sense that Western regions with advanced research and innovation capabilities cooperate with Eastern regions to **transfer knowledge**, technology, and best practices, will help strengthen the innovation landscape in the East and thus increase their long-run growth potential.
- › **Diversification of the economy and labour markets**, e.g., through cooperation in developing diversification strategies, can help eastern regions establish their economies on a broader and potentially more advanced industry base, thus reducing their dependence on a single sector or foreign investment.

To strengthen **regional development** and **urban-rural partnerships** within the countries of the Danube Region, there is a wide range of potential cooperation options:

- › A vital issue for most, if not all, Danube Region countries is the economic disparities between the main urban centres, i.e. mainly the capital cities, and the rural or intermediate regions. To reduce the economic differences, cooperative work to develop and introduce **new policies for a more balanced regional development**, focussing on enhancing the attractiveness and economic viability of smaller and medium urban centres, will support a more balanced urban and **polycentric development**, creating growth poles in the less prosperous regions.
- › Additionally, **strengthening the connections between urban and rural regions** will promote mutual benefits, such as developing value chains that connect rural producers to urban markets, ensuring that rural areas benefit from economic activities concentrated in urban centres.
- › This could be supported by **increasing the accessibility of rural areas**, for instance, through investments in the local **transportation networks** to improve the physical links between the main economic areas and the outlying areas. This will facilitate the movement of people, goods, and services and thus stimulate economic activity in less prosperous regions. Also, **investments in digital infrastructure**, e.g., developing high-speed internet and other digital infrastructure, can help peripheral regions participate in the digital economy, attract remote workers, and support local businesses.
- › To mitigate the adverse effects of population decline in less prosperous regions, continued **investment in basic services** avoids a loss of territorial attractiveness as access to health services or housing improves.
- › Furthermore, to tackle potential skill mismatches or the lack of skills, which may hinder the economic development of the less prosperous regions, **cross-border educational partnerships** could be established, where, for example, schools throughout the Danube Region work together to develop standard curricula that meet the needs of the regional labour market and promote standardisation. Importantly, this could also include an **increase in the labour market participation** of the population, particularly women, minorities, and marginalised groups. For the latter, establishing **educational programs**, for example, developing and implementing inclusive education programs specifically

aimed at integrating marginalised groups, such as Roma, into the education system can help reduce the loss of skills through outward migration.

As far as **governance** is concerned, cooperation in the Danube Region could support

- › Improving **inter-institutional relations** and creating **new joint institutions** in the Danube Region while ensuring their long-term support will help the region more effectively meet the emerging needs of transnational cooperation.
- › A key facilitator in improving governance is further developing **e-governance** structures by promoting digital governance solutions across the region. These aim to increase transparency and limit opportunities for corrupt practices. Cooperation can support this by **sharing technology and expertise** to implement e-governance platforms that improve public service delivery and accountability.
- › Furthermore, increasing the **inclusiveness of governance** will improve decision-making at various levels of governance. Thus, a greater involvement of representatives from peripheral regions in decision-making processes will ensure that their needs and perspectives are considered. Likewise, establishing new transnational links to support the cooperation between cities, including regional and secondary centres outside the capitals, will help to work jointly on common challenges and support developing new solutions for urban-rural governance.

## 3. Globalisation and technological change

This chapter deals with the challenges of globalisation and technological change for the countries and regions of the Danube Region. Globalisation and technological change, especially digital change, are expected to significantly change existing business models by introducing disruptive technologies and processes such as artificial intelligence, data analytics, robotics and the Internet of Things (European Commission, 2020). At the same time, change brings new skill requirements and calls for measures to strengthen basic skills, promote lifelong learning and strengthen the link between education, training and the world of work (Morandini et al., 2020). Globalisation and technological change offer new potential to increase national and regional productivity and prosperity and create jobs. This goes hand in hand with new business opportunities for innovative companies, which will outstrip "old", less innovative companies. The same applies to the labour market, as "old" jobs are lost while new jobs with different skill profiles are created. This chapter analyses these potentials and the challenges they pose for the countries and regions of the Danube Region and the regional and spatial implications of these trends based on these central themes: a) Foreign trade and foreign direct investment, b) Value chains in the Danube Region, c) Cooperation, border and infrastructure networks, d) Technological change and innovation, e) Digital transformation and f) Industrial development.

The final section of this chapter develops conclusions about the cooperation potential in the Danube Region to strengthen global competitiveness, technological change, and industry development.

### 3.1. FOREIGN TRADE AND FOREIGN DIRECT INVESTMENT

#### Existing Literature

The Danube Region has a distinctive economic profile. It is characterised by dual, labour-intensive economies that function primarily as technology followers, adopting innovations from more advanced countries rather than developing them independently (CESCI, 2019, p. 4). This technological dependence is closely linked to the region's investment patterns and innovation capacity.

The region's economic landscape is shaped by substantial but unevenly distributed foreign direct investment (FDI) and trade flows (CESCI, 2019, p. 6). FDI has been a significant driver of economic development in the Danube Region since the early 2000s, with Central and Eastern European countries benefiting from cost advantages, infrastructure and EU membership (Zavarska, 2024, p. 15). FDI has led to specific geographical concentrations, with greenfield investment particularly prominent in the Czech Republic, Slovakia, Hungary, Romania and Bulgaria. While capital regions attract significant investment, areas with strong industrial employment structures, such as central Slovakia and western Romania, have also emerged as primary FDI recipients. In the western parts of the Danube Region, Greater Munich, Upper Austria, and Styria have become notable investment destinations (Copenhagen Economics based on BvD's Zephyr and the Financial Times databases, 2016, as cited in ESPON EGTC, 2021, p. 21).

The Danube Region has also experienced diverse patterns of FDI, with Germany and Austria maintaining stable growth, Southeastern European countries (such as Romania and Bulgaria) showing strong fluctuations, CEE countries (i.e. Czechia, Slovakia and Hungary) experiencing a decline after growth in

the early 2000s, and countries like Ukraine and Serbia showing volatility due to geopolitical factors (Zavarska, 2024, p. 15).

In 2019 CESCO comes to the conclusion that the Danube Region's strategic importance stems from its transit and interface zone position between Western Europe and Russia. This geographical advantage has shaped its economic relationships, though trade patterns with these two markets show varying intensities and sectoral structures (CESCO, 2019, p. 188) and despite this dual orientation, Germany remains the dominant economic partner, with the region's economies heavily dependent on German production, trade, and capital connections (CESCO, 2019, p. 4). The region's economic integration continues to evolve through various transnational business networks (CESCO, 2019, pp. 188-189), including significant connections with non-Danube economies. An emerging trend shows the gradual establishment of non-German transnational companies in the macro-region, suggesting a slow diversification of economic influences (CESCO, 2019, p. 17).

Following Russia's withdrawal from the Black Sea Grain Initiative in July 2023, the Danube became Ukraine's main grain export route, leading to increased efforts to develop port capacity and rebuild infrastructure, while strengthening cooperation among EUSDR countries to ensure global food security and Ukraine's agricultural income (Austrian Presidency of the EU-Strategy for the Danube Region, 2024). However, in view of the current developments regarding the Russian war of aggression, it is not possible to predict when the Danube Region will be able to fully utilise its geographical advantage to better connect the eastern with the western markets.

## Empirical Evidence

This section briefly overviews the Danube Region countries' foreign trade performance and main trading partners. For data reasons, the analysis is only at the country level.

Starting with the exporting activities, Figure 19 compares the total value of exports as a percentage of GDP for the Danube Region countries in 2010 and 2023. A recurrent characteristic is that smaller countries are more export-oriented than larger countries, as the latter can rely on a larger domestic market for the goods they buy and sell. By contrast, smaller economies are typically more reliant on inputs from other countries, as they cannot produce all the goods and services needed for modern-day production and consumption. This stylised fact is shown in Figure 19 by the example of Germany, which is generally considered a strong exporting economy. However, the share of exports in total GDP is only around 43% in 2023 and thus much smaller than for many other Danube Region countries.

The figure also indicates several countries with high export-to-GDP ratios, such as Slovakia, Slovenia, Hungary and Czechia, underscoring their strong industrial base and significant role in European and global trade. For these countries, the high ratios reflect their specialisation in machinery, automobiles, and other high-tech goods, contributing substantially to their GDP. By contrast, most of the Accession countries in the Danube Region have lower export ratios, indicating that these countries face competitive challenges and, from a quantitative and technological point of view, a less developed industrial base.

On the other hand, over the period 2010-2023, most Danube Region countries, except Ukraine, which suffered from Russia's war of aggression, and Hungary, experienced a growth in their export-to-GDP ratios, signalling increasing integration into international trade networks and a shift toward more export-led economic growth. This export expansion can be attributed to growing industrial capabilities, foreign investments, and access to European markets, especially after joining the European Union (for the EU member states in the Danube Region).

**Figure 19 / Total exports in percent of GDP, 2010 & 2023**

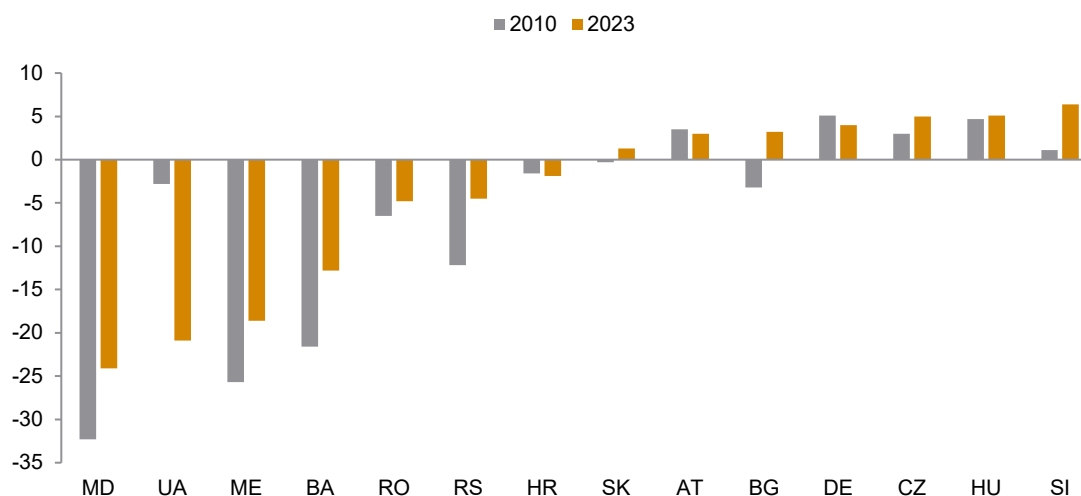
Source: Eurostat, wiiw

The competitiveness of the Danube Region countries on global markets is analysed through their net export performance, representing the difference between exports and imports in terms of GDP. This indicates a strong divide between the countries in the Danube Region. On the one hand, some countries have positive net exports, suggesting that they export more than they import. These countries include the more prosperous countries in the Danube Region, including Austria, Germany, Czechia, Hungary, Slovakia, Slovenia, and Bulgaria, which transformed from a net-importing to a net-exporting country over the last year. In many countries, the trade surplus highlights their competitive industries, mainly manufacturing, high-tech goods, and automobiles.

In contrast, countries like Romania and Croatia and the Accession countries in the Danube Region show negative net exports, reflecting trade deficits. This suggests that these countries rely heavily on imports, particularly in high-value sectors such as machinery, electronics, and energy, which outweigh their export capacities. Countries with persistent trade deficits may have vulnerabilities to economic shocks, dependence on foreign production, and the need to strengthen domestic industrial sectors. These differences indicate disparities in economic structure and trade performance across the region, with the more industrialised Western countries outperforming their Eastern counterparts.

Looking at the main trading partners of the Danube Region countries, Table 1 shows their imports and Table 2 shows their exports by major partner countries and country groups. These groups include Austria and Germany as the first group, the EU-Member States in the Danube Region as the second group, and the Accession countries in the Danube Region as the third group. Trade partners are further split into Other EU countries, i.e. the EU without its Danube Region members, China, Russia, and other countries.



**Figure 20 / Net exports in percent of GDP, 2010 & 2023**

Source: Eurostat, wiiw

One key observation is that most countries with positive net exports, i.e. Czechia, Hungary and Slovakia, have strong ties to either Austria or Germany (or both) in imports, indicating a solid integration into EU-value chains. For most Danube Region countries, except Ukraine, the EU, including the EU Member States in the Danube Region, is by far the most important import trading partner. Imports from Accession countries are generally less important, except for Bosnia and Herzegovina, Montenegro, and Republic of Moldova, implying the existence of some forms of regional value chains. Imports from Russia are negligible, primarily because of Russia's war of aggression against Ukraine, which led to a substantial reduction in trade flows between Russia and Europe. China's share is notable, particularly in Czechia, Republic of Moldova, Montenegro, Serbia, Slovenia, and Ukraine, and it tends to increase over time, particularly in Ukraine after Russia's invasion.

**Table 1 / Imports by main trading partners, in % of total imports, by country, 2023**

	Austria & Germany	Danube Region EU	Danube Region AC	Other EU	China	Russia	Other countries
<b>Austria</b>	38.5	13.7	1.1	23.4	3.4	1.8	18.1
<b>Bosnia and Herzegovina</b>	15.6	17.9	10.8	25.5	9.5	1.7	19.1
<b>Bulgaria</b>	15.1	15.5	4.4	29.4	5.4	6.6	23.7
<b>Czechia</b>	30.1	11.8	1.1	31.0	11.9	1.3	13.0
<b>Germany</b>	4.4	12.3	0.6	48.6	6.9	0.2	27.0
<b>Croatia</b>	19.6	24.0	6.8	32.2	3.2	0.1	14.0
<b>Hungary</b>	28.1	16.2	2.7	25.1	7.7	4.0	16.2
<b>Moldova</b>	8.1	22.0	12.4	18.2	11.7	3.7	23.9
<b>Montenegro</b>	10.9	11.5	22.2	23.5	11.2	0.2	20.6
<b>Romania</b>	22.9	17.3	3.2	33.2	5.5	0.3	17.6
<b>Serbia</b>	14.7	15.6	3.6	23.2	13.3	4.4	25.0
<b>Slovenia</b>	17.0	11.1	2.3	20.6	14.9	0.2	33.8
<b>Slovakia</b>	26.8	28.7	1.6	23.9	4.1	3.6	11.2
<b>Ukraine</b>	8.8	14.1	0.6	28.2	16.4	0.0	31.9

Source: Eurostat, wiiw

Table 2 shows the percentage share of exports from various Danube Region countries to the same categories of trading partners. The critical observation is that for almost all countries, except Germany and Ukraine, the Danube Region is an important, if not the most important, exporting market for their goods and services. Still, the distribution of exports across partners suggests that integration of the Danube Region countries into European value chains tends to differ. Thus, Bosnia and Herzegovina, Czechia, Hungary or Slovakia are highly integrated with Austria or Germany, while for other countries, the other EU countries (including the Danube Region Member States) or the Accession countries are more important exporting markets. Exports to China and Russia are mostly insignificant, except for German, Serbia and Ukrainian exports to China.

Overall, both tables reflect the solid intra-regional trade between Danube countries and the EU, with Austria, Germany, and other EU countries being pivotal trading partners. The influence of non-EU countries like China is growing, though still smaller than Europe.

**Table 2 / Exports by main trading partners, in % of total exports, by country, 2023**

	Austria & Germany	Danube Region EU	Danube Region AC	Other EU	China	Russia	Other countries
<b>Austria</b>	28.7	16.4	1.2	24.3	2.4	0.6	26.4
<b>Bosnia and Herzegovina</b>	26.3	29.2	16.8	17.5	0.2	0.6	9.4
<b>Bulgaria</b>	15.8	14.8	4.7	33.1	2.3	1.1	28.2
<b>Czechia</b>	36.9	14.5	1.4	30.0	1.0	0.3	15.8
<b>Germany</b>	5.2	9.1	0.8	40.8	6.1	0.6	37.4
<b>Croatia</b>	17.7	23.0	17.6	26.7	0.3	1.0	13.8
<b>Hungary</b>	30.2	19.2	4.4	29.4	1.0	0.7	15.0
<b>Moldova</b>	6.0	42.7	14.7	16.7	0.2	3.6	16.2
<b>Montenegro</b>	4.3	17.9	39.5	13.9	0.4	0.0	24.0
<b>Romania</b>	23.0	16.1	6.5	33.5	0.9	0.3	19.8
<b>Serbia</b>	18.4	26.9	10.5	20.4	4.2	2.9	16.7
<b>Slovenia</b>	18.8	17.6	2.9	22.4	0.6	1.7	36.0
<b>Slovakia</b>	26.1	23.9	2.5	27.3	2.6	0.3	17.2
<b>Ukraine</b>	7.3	22.3	2.7	35.1	6.7	0.0	26.0

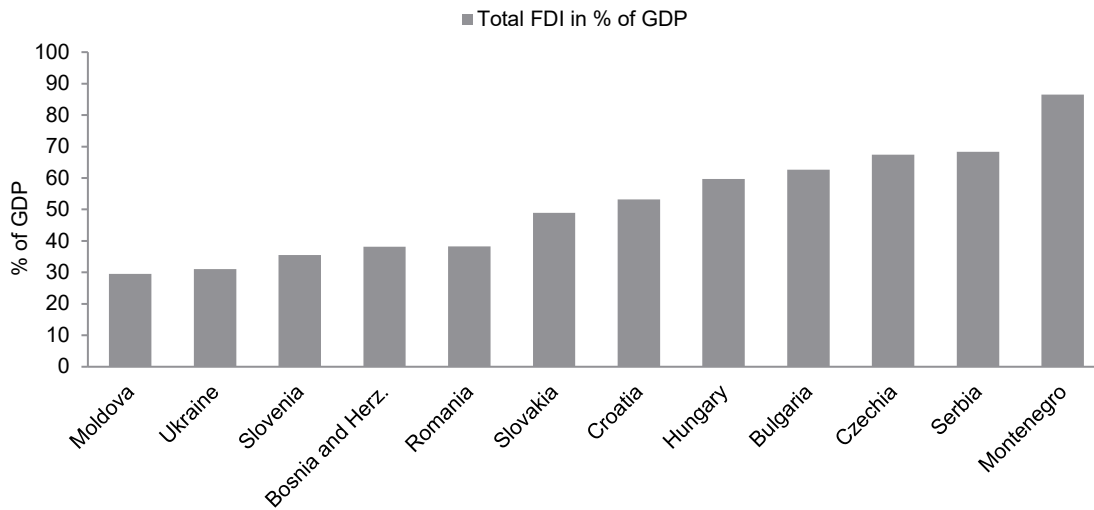
Source: Eurostat, wiiw

Turning to FDI, it is an essential driver of economic growth and development in the Danube Region, as it facilitates technology transfer, enhances productivity, contributes to job creation, diversifies the economic base, reduces dependence on traditional sectors, and increases the countries' export capacities, making them more competitive in European and global markets. As Figure 21 shows, FDI intensity, i.e. the FDI stock to GDP ratio, tends to vary across Danube Region countries, which reflects differences in investment attractiveness, though, on the other hand, also the dependence on FDI of the respective economies.

Among the Danube Region countries, Montenegro and Serbia report the highest FDI stocks as a percentage of GDP, followed by Czechia, Bulgaria, and Hungary. By contrast, Ukraine and Republic of Moldova have particularly low FDI levels.

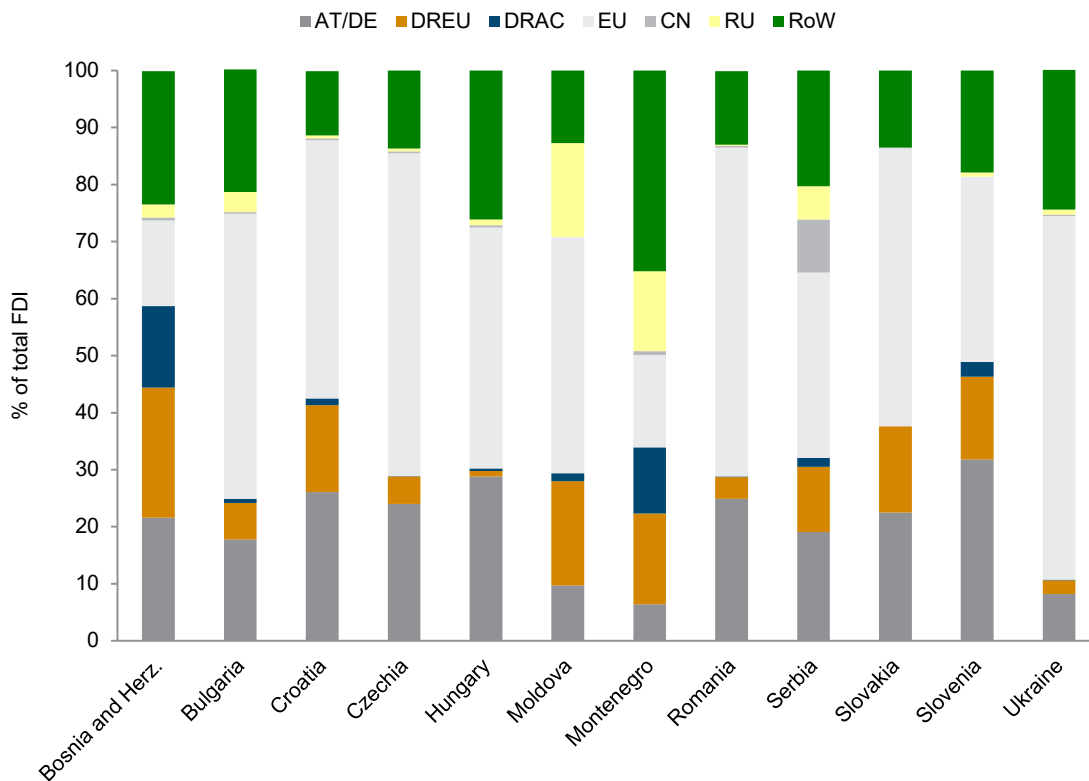
Figure 22 illustrates the distribution of FDI in the Danube Region by main investing countries or areas. Thus, FDI is split whether it originates from Austria or Germany (AT/DE), the other EU Member States in the Danube Region (DREU), the EU Accession countries in the Danube Region (DRAC), the EU (without the EU countries in the Danube Region), China (CN), Russia (RU), or the rest of the world (RoW).

**Figure 21 / Foreign direct investment stocks, 2022, in % of GDP**



Note: Austria and Germany are not covered  
Source: wiiw

**Figure 22 / FDI by investing countries, 2022, in % of total FDI stocks**



Note: Austria and Germany are not covered  
Source: wiiw

It shows that the primary source of FDI throughout the Danube Region (except Montenegro) is the EU, with Austria and Germany often among the most important individual investors. The other EU Member States (DREU) also have a substantial investment position in the Danube Region, indicating that the more prosperous countries, like Czechia, Hungary, Slovakia or Slovenia, started to invest in its neighbouring countries, mainly in the less prosperous, such as Montenegro, Republic of Moldova or Bosnia and Herzegovina. Investments from the EU Accession countries are only of importance in Montenegro and Bosnia and Herzegovina. The role of China is still mostly negligible, except for Serbia, while Russia's investments are only of more importance in the Republic of Moldova, Montenegro and Serbia.

### 3.2. VALUE CHAINS IN THE DANUBE REGION

#### Existing Literature

The economic development trajectory of the Danube Region presents a stark contrast between ambitious goals and structural realities. In 2015, regional decision-makers expressed strong aspirations for rapid progress, rejecting proposals to focus on medium- and low-tech sectors in favour of immediately catching up with the most developed economies (ZEW, 2015, p. 28).

The reality, however, is that the region is predominantly characterised by a dual economy. The term "dual economy" refers to the coexistence of two different economic systems within the same region. One is advanced and technology-driven (mainly in Germany and Austria), and the other is more labour-intensive and less technologically advanced (in the eastern parts of the region) (CESCI: 2019, p.4). Despite the above aspirations, economic restructuring has been slow, with a notable imbalance in favour of traditional services, such as tourism, compared to technology-intensive activities (CESCI, 2019, pp. 6, 190).

A fundamental weakness is the underdeveloped SME sector. The Danube region shows a lower density of SMEs than the EU average. These enterprises typically suffer from undercapitalisation and limited growth potential (CESCI, 2019, p. 94). This, together with the following interrelated challenges, plays a significant role in the low value added of the economy of the Danube Region. (CESCI, 2019, p. 190):

- › Research and innovation activities are unevenly distributed, mainly concentrated in the western part of the Danube Region and major urban centres (CESCI, 2019, p. 6).
- › The eastern part of the region faces significant labour shortages (CESCI, 2019, p. 208)
- › Production remains concentrated in less processed and semi-processed goods (CESCI, 2019, p. 190)
- › SMEs show limited innovation capacity (CESCI, 2019, p. 19)

Weak cooperation patterns further hamper the region's economic development. This is evident from limited cooperation in trade and higher value-added production (CESCI, 2019, p. 18), coupled with insufficient knowledge and technology transfer at the transnational level (CESCI, 2019, p. 191).

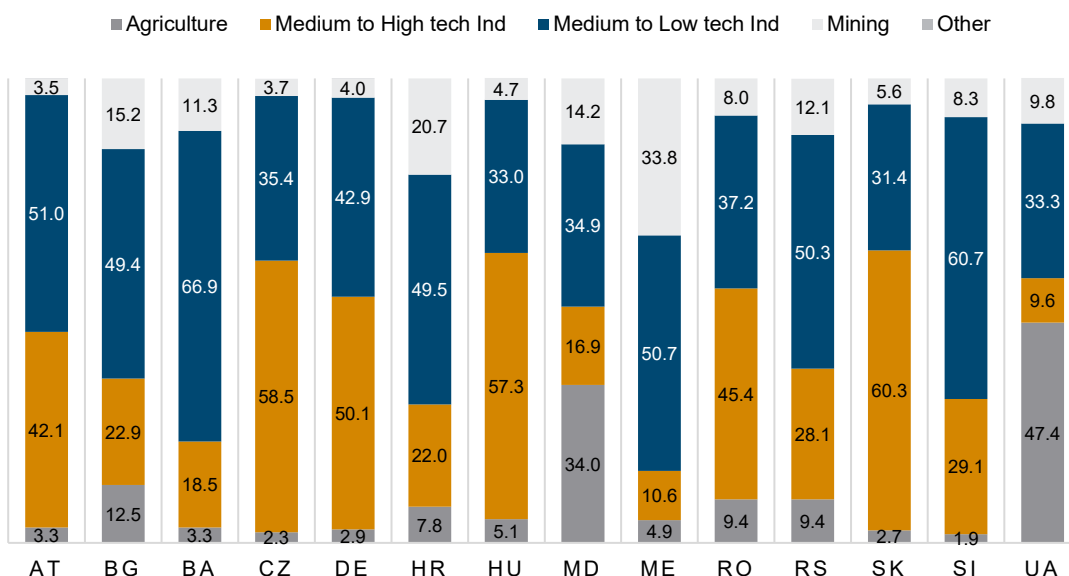
#### Empirical Evidence

This section provides a very brief indication of the Danube Region countries' involvement in value chains. Value chain analysis is typically extensive and includes highly detailed firm-level or multi-country input-output data. Both are beyond the scope of this analysis, which thus is confined to illustrating the composition of the countries' export and import structure, dividing total exports/imports into groups of goods according to their degree of technological intensity. Thus, the trade structure is split into "agriculture", "medium and high-tech intensive industries" such as automotive or machinery industries,

"Medium to low tech-intensive industries" such as textiles and food industries, mining and other industries that include works of art and other products that could not be classified elsewhere.

Figure 23 illustrates the composition of exports by sector for the countries in the Danube Region in 2023. It shows that, apart from Austria and Germany, many of the more prosperous countries, including Czechia, Hungary, Slovakia, and Romania, strongly focus on medium to high-tech-intensive products, reflecting their advanced manufacturing sectors and close ties to German industries. Their export structures predominantly feature high-value-added products such as machinery, vehicles, and chemicals, demonstrating their competitive edge in global markets. By contrast, most of the less prosperous countries rely more heavily on lower-value sectors, particularly the medium to low-tech intensive industries and mining. In contrast, in the least prosperous countries, i.e. Republic of Moldova and Ukraine, agricultural exports are a central part of their foreign trade activities.

**Figure 23 / Export structure, 2023, in % of total exports, goods trade aggregated by sectoral groups**

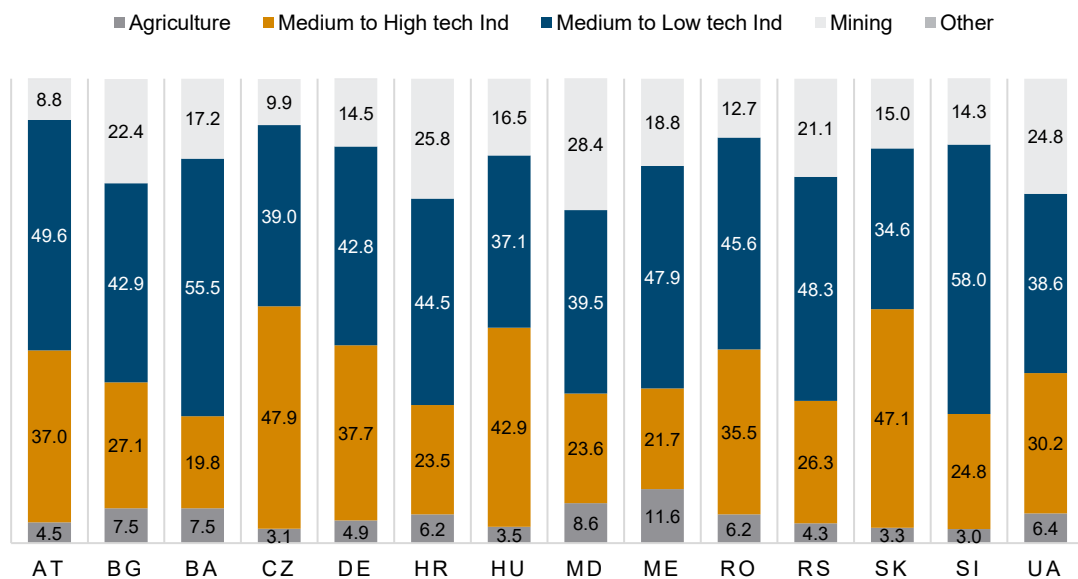


Source: Eurostat, wiiw

Figure 24 presents the composition of imports by sector, displaying the types of goods each country in the Danube Region relies on from external markets in 2023. While showing the diverse import needs of the different countries, the data also indicates the countries' involvement in European or global value chains. Thus, typically, those countries of the Danube Region that show high exporting shares of medium to high-tech intensive products also record high importing shares in these products, suggesting a strong involvement in the corresponding value chains. Similarly, the countries with high export shares in medium to low-tech intensive industries, as a tendency, also show higher import shares in these types of goods.

Given the correlation between the level of economic development, the sectoral structure, and the export and import structure, understanding trade patterns is crucial to identifying strategic areas for growth and diversification. By boosting domestic production capabilities and moving towards higher-value-added industries and trade, countries can enhance their economic resilience and performance and improve trade balances.

**Figure 24 / Import structure, 2023, in % of total imports, goods trade aggregated by sectoral groups**



Source: Eurostat, wiiw

### 3.3. COOPERATION, BORDER AND INFRASTRUCTURE NETWORKS

#### Existing Literature

The development of the Danube Region as a significant European transit corridor is significantly influenced by the varying intensity of cross-border public services (CPS) and cooperation across its territory. While some areas show robust collaboration, such as the German-Austrian and Czech-German border regions, as well as between Austria and Hungary, other partnerships, such as Austria-Slovenia, Hungary-Croatia, Croatia-Serbia, Romania-Hungary and Bulgaria, Republic of Moldova, remain more limited in scope (TCP international, 2018 & Eureconsult, 2018 & various data sources, 2018, as cited in ESPON EGTC, 2021, p. 27).

This uneven distribution of cross-border cooperation is reflected in the regions' infrastructure and accessibility patterns. There is a pronounced east-west divide, particularly evident in the fragmented rail network of the eastern regions (CESCI, 2019, p. 195). Differences in population density and significant differences between urban and non-urban infrastructure further exacerbate this divide. The air transport system shows similar patterns, with eastern capitals such as Budapest and Bucharest matching the passenger volumes of Vienna. In contrast, secondary airports outside capital regions remain underutilised and offer minimal domestic connections (Eurostat, 2020 & ESPON S1W, 2014, as cited in ESPON EGTC, 2021, p. 6).

The region's development is further complicated by varying degrees of border permeability and different border regimes. In particular, the southeastern part needs more border crossings than Western Europe (CESCI, 2019, p. 6) and faces significant infrastructure bottlenecks and uncoordinated development (CESCI, 2019, p. 122). The development of public transport could be a potential solution to improve border permeability and regional connectivity (Zillmer et al., 2022, p. 125).

In 2019, CESCO came to the conclusion that despite these challenges, the Danube Region's strategic location between Eastern (Russia, China, Middle East) and Western markets offers significant economic opportunities. The region's network of TEN-T and pan-European corridors puts it in a favourable position to develop into an efficient transit and interaction zone for trans-European business relations, including trade, foreign direct investment and technology transfer (CESCO 2019, pp. 4, 6). In light of the current developments in relation to the Russian war of aggression, it is not foreseeable when the Danube Region will be able to fully utilise the opportunities offered by this geographical advantage.

## Empirical Evidence

To the best of our knowledge and research, empirical data on transport linkages across transport flows, especially freight and person transport flows via road, rail, and waterways, are not publicly available.

### 3.4. INNOVATION

#### Existing Literature

Technological change is in full swing and cannot be stopped, presenting challenges and opportunities for innovation in the Danube Region. While this change is inevitable, its implementation and impact vary considerably between regions and countries. The countries of the Danube Region need to actively address the socio-economic changes that accompany this technological revolution, as even essential technological adaptations require considerable learning periods before positive results can be achieved. (ESPON EGTC, 2020, pp. 44-45).

Right now, there is a clear East-West divide regarding innovation capabilities. The western countries of the Danube Region possess better conditions for innovation-driven smart growth, as evidenced by higher Research, Development, and Innovation (RDI) expenditures. Eastern countries need more innovation capacity, knowledge transfer, and transnational cooperation across the innovation cycle (CESCO, 2019, p. 192).

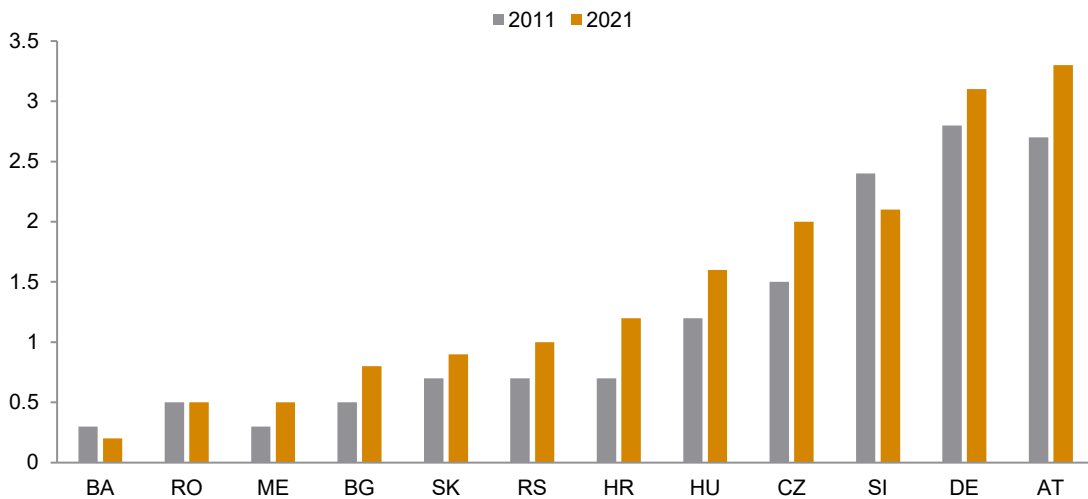
However, the dynamics of technological progress have changed significantly from historical patterns and may favour innovation growth in many countries in the Danube Region. While capital cities and metropolitan areas remain important drivers of technological change, the traditional divide between technologically advanced and underdeveloped countries has become more nuanced. As we could not find appropriate examples for the Danube Region in the literature, we illustrate the dissolution of this traditional divide by looking at two European countries. Germany, with a GDP per capita of around USD 52,000 (World Bank, 2023), and Italy, with a GDP per capita of around USD 38,000 (World Bank, 2023), are both at the forefront of technology adoption in manufacturing, despite their relatively large GDP gap. This illustrates how national digital infrastructures and regulatory frameworks are now more decisive in technological progress than mere economic status (ESPON EGTC, 2020, pp. 45-46).

#### Empirical Evidence

This section explores the innovation potential of the Danube Region countries using five different indicators, including the countries' Research and Development (R&D) spending, the regional distribution of R&D spending across the regions, information on patenting, the supply of digital skills, and the supply of young highly qualified people.

R&D spending as a share of GDP is a crucial indicator of a country's focus on innovation and technological advancement. In The Danube Region, Germany and Austria maintain the highest levels of R&D expenditure, consistently investing around 3% of their GDP in R&D. This reflects their strong commitment to fostering innovation in sectors like automotive, chemicals, pharmaceuticals, and industrial machinery. Countries such as Czechia, Hungary and Slovenia have relatively high R&D expenditures, which for the first two countries also tended to increase strongly from 2011 to 2021, indicating efforts to improve competitiveness through technological innovation.

**Figure 25 / R&D expenditures, in % of GDP 2011& 2021**



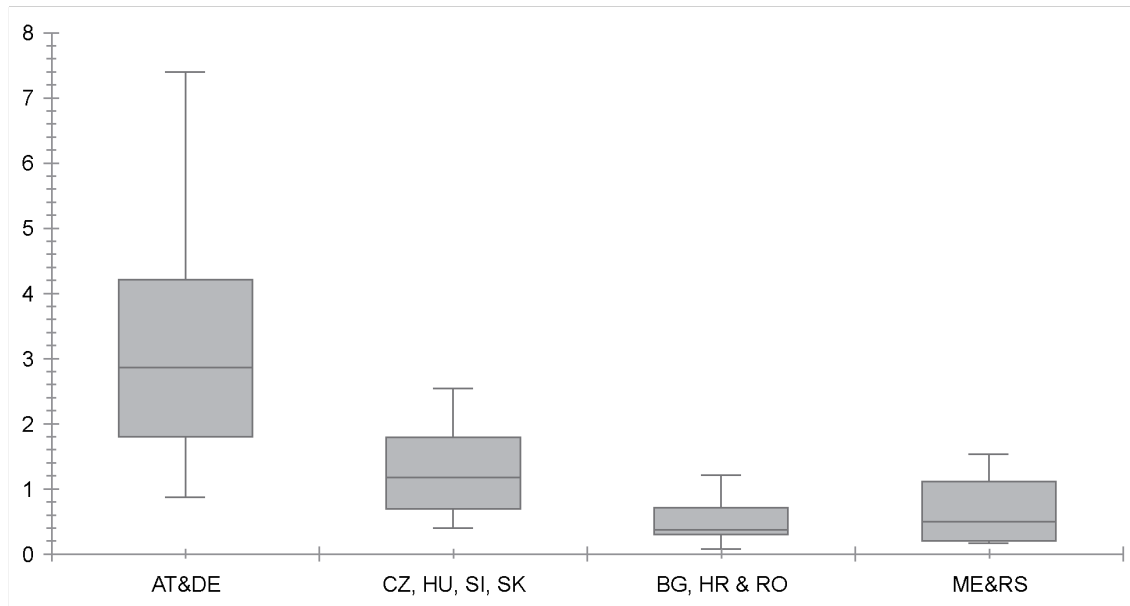
Source: Eurostat

However, many of the less prosperous countries in the Danube Region, Eastern European countries like Romania, Bulgaria, Bosnia and Herzegovina, and Montenegro, as Slovakia lag significantly in R&D investments, with less than 1% of GDP allocated to research activities. This disparity in R&D expenditure reveals a significant innovation gap between most of the more developed and the less developed economies in the Danube Region countries. Low investment in R&D is often linked to weak innovation ecosystems, limited industrial diversity, and reliance on less technology-intensive sectors, which may impede long-term economic growth.

Concerning the regional distribution of R&D spending, Figure 26 provides a detailed look at the geographic disparities in R&D spending within countries, focusing on NUTS-2 regions grouped into the four country groups used throughout the analysis. On the one hand, the data shows that the differences in R&D expenditures at the country level transpire at the regional level, as regions in Austria and Baden-Württemberg and Bavaria in Germany tend to have significantly higher innovation activities than other regions. On the other hand, the data also shows that, typically, in each group, there is a wide variation in regional R&D expenditures, particularly in the urban centres and the regions with a strong presence of high-tech industries exhibiting high research efforts. In contrast, many regions have meagre R&D spending, especially in rural and economically less developed areas. This uneven distribution of R&D investment highlights the challenge of fostering innovation in less industrialised and rural regions, where economic activity is often concentrated in agriculture or low-tech manufacturing. The disparities reflect the varying levels of regional development, access to infrastructure, skilled labour, and proximity to innovation hubs.

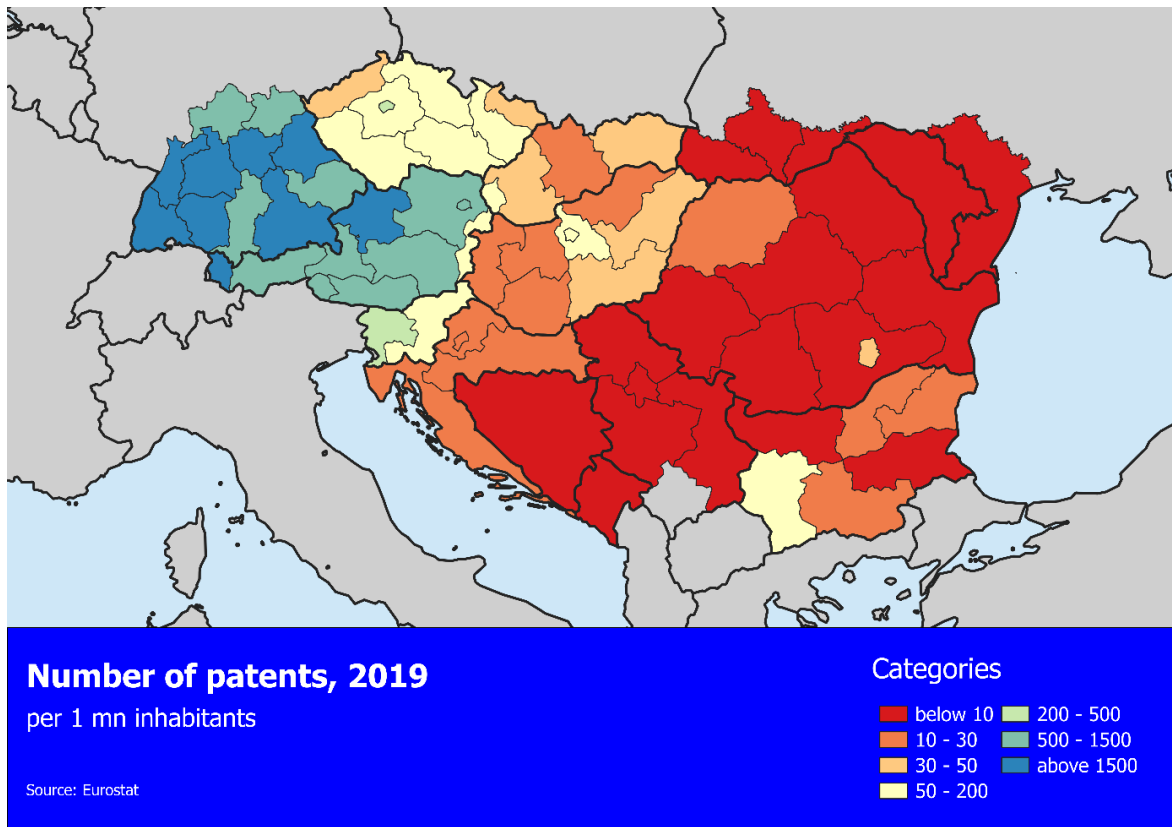


**Figure 26 / Regional distribution of R&D expenditures – NUTS-2 regions, in % of GDP 2019**



Source: Eurostat

**Figure 27 / Number of patents per 1mn inhabitants, 2019, NUTS-2 regions**

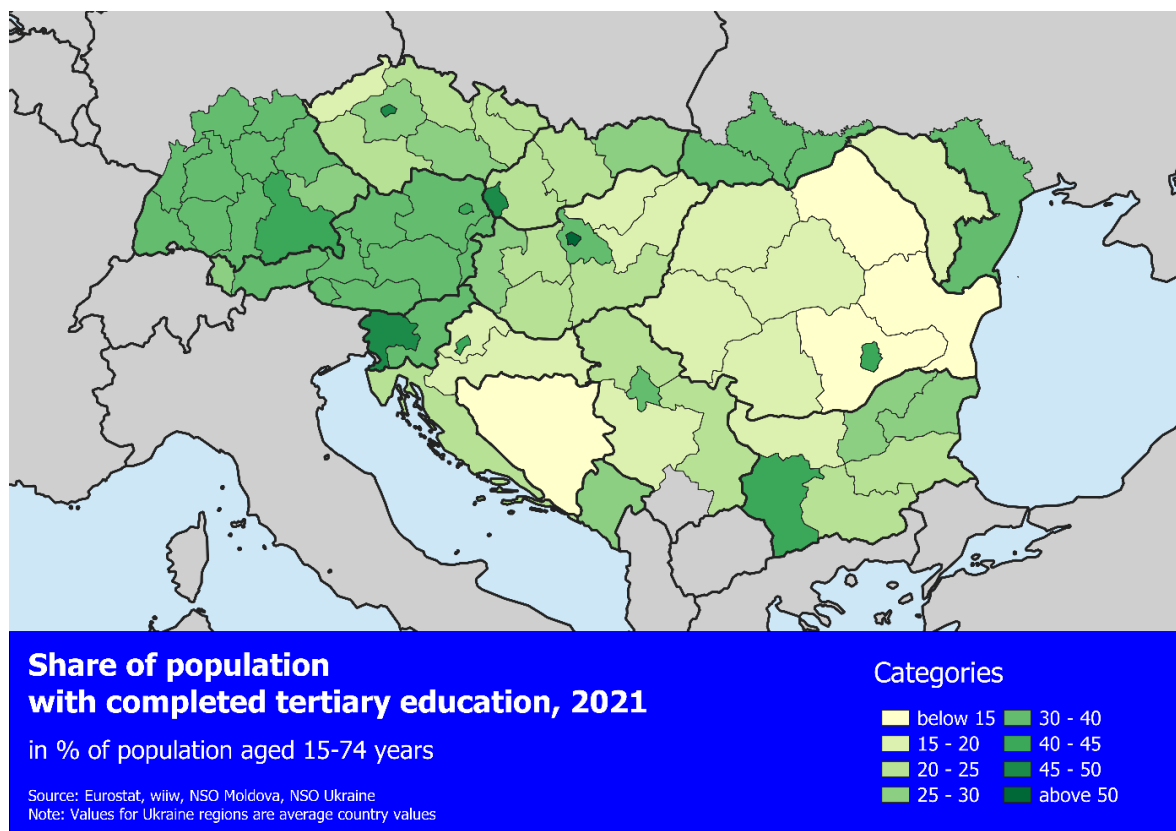


Source: Eurostat

As shown in Figure 27, patenting activity is a strong indicator of innovation capacity. Germany and Austria lead the Danube Region in the number of patents filed per 1 million inhabitants, particularly in their major industrial regions and urban centres. Both countries are known for innovating in the automotive, chemicals, and advanced machinery sectors, with regions like Stuttgart, Karlsruhe, Tübingen, and Vorarlberg generating the highest patent activity per inhabitant. In contrast, countries such as Bosnia, Ukraine, Republic of Moldova, and Montenegro show significantly lower levels of patenting activity, which points to weaker innovation ecosystems, less investment in high-tech industries, and limited access to R&D funding. These countries typically rely more on lower value-added sectors, with fewer resources dedicated to innovation, leading to a technology gap that hinders competitive advancement in global markets.

The capacity of countries and regions in the Danube Region to actively participate in and benefit from technological change depends to a considerable extent on the skills available to innovate and implement new technical solutions in all sectors of the economy. In this respect, the information on the supply of highly educated people (Figure 28) is one indicator of the countries' capacity to support technological and digital transformation.

**Figure 28 / Share of population with completed tertiary education, 2021, NUTS-2 regions, in % of total population aged 15-74 years**



Source: Eurostat, wiiw, NSO Moldova, NSO Ukraine

There are substantial regional differences in the Danube Region regarding the supply with a highly educated population. On the one hand, Austria, Germany and Slovenia tend to have high and relatively evenly distributed high-skill supply across their regions, with slightly higher shares in the capital cities. By comparison, the availability of high skills in the other Danube Region countries tends to be lower,

particularly in the more rural regions. In contrast, in the capital cities or other urbanised areas, the high-skill supply tends to be comparable to or higher than the Austrian or German levels.

### 3.5. DIGITAL TRANSFORMATION

#### Existing Literature

The digital transformation of Europe's public sector is entering a decisive phase, as illustrated by the ESPON EGTC: TEVI 2050 (2022) project's narrative, "The transformation to a hyper-digital economy in the Danube Region". This forward-looking scenario envisions prosperity through extensive digitisation, where economic growth is driven by extensive technological integration.

The public sector is at the forefront of this digital revolution and faces increasing pressure to adapt to ever more complex challenges. Modern citizens expect government services to be more flexible, agile and tailored to their individual needs (ESPON EGTC, 2022b, p. 11). This transformation is in line with the 'Europe's Digital Decade' strategy, which sets an ambitious goal: by 2030, all essential public services must be fully accessible online, creating an inclusive digital environment that combines user-friendly interfaces with robust security and data protection (ESPON EGTC, 2022b, p. 17).

Digital transformation has emerged as a pillar of public sector innovation (ESPON EGTC, 2022b, p. 16), offering multiple benefits (ESPON EGTC, 2022b, p. 8):

- › Reduced operational costs
- › Enhanced service quality
- › Increased proactivity
- › Improved citizen-centricity

To maximise these benefits, digital innovation must be implemented through a multi-level governance approach (ESPON EGTC, 2022b, pp. 9-10).

Interestingly, population size, rather than wealth, is the primary driver of digital government innovation. Larger populations create more complex service delivery needs, making digital solutions more attractive due to economies of scale (ESPON EGTC, 2022b, p. 60). This dynamic creates a particular opportunity for populous countries in the Danube Region, such as Romania, where the incentive for digital transformation remains strong despite lower per capita wealth. This factor could accelerate the region's digital development and help achieve the ambitious goals in the hyper-digital economy scenario.

The revised Action Plan (2022) recognises that digital transformation is not only important in the public sector but is also necessary to support SMEs in meeting the challenges of a digitised world. By creating an innovative digital ecosystem (Action 2) and promoting the application of artificial intelligence (AI) technologies (Action 5) in the Danube Region (European Commission, 2020, pp. 11-12). Digitisation is mentioned as one of the key "horizontal frames" relevant to all strategic objectives and priority areas of the Strategy for the Danube Region (European Commission, 2020, p. 7).

The transformation goes beyond basic digitisation, fundamentally reshaping industrial processes and everyday life. Industry 5.0 is emerging as the new standard, while citizens conduct their most important interactions through digital channels, including virtual reality platforms (ESPON EGTC, 2022a, p. 8). This vision highlights the opportunity for the Danube Region to overcome its current digital divide and enhance its economic position.

The western part of the Danube Region has made notable progress in preparing for the Fourth Industrial Revolution, with several countries developing targeted strategies and measures. However, a significant readiness gap remains, with most Danube countries still needing to adequately prepare for the challenges of Industry 4.0 (CESCI, 2019, p. 193).

Looking ahead to 2050, the ESPON study TEVI2050 "Territorial Scenarios for the Danube and Adriatic Ionian Macro regions" (2022) presents a compelling "transformation to a hyper-digital economy" scenario for the Danube Region. This vision depicts an extensively digitised Danube Region, where prosperity is derived from hyper-digitalisation-driven economic growth, encompassing industrial operations, daily life and virtual reality interactions. The Danube is a vital trade route in this digital future. Most importantly, this technological transformation represents a unique opportunity for the Danube Region to achieve economic parity with other European regions. The essential advantage lies in that successful technological implementation is not predetermined by current economic or technological status, allowing all countries in the Danube Region to participate in and benefit from this digital revolution, provided they make the necessary preparations and investments.

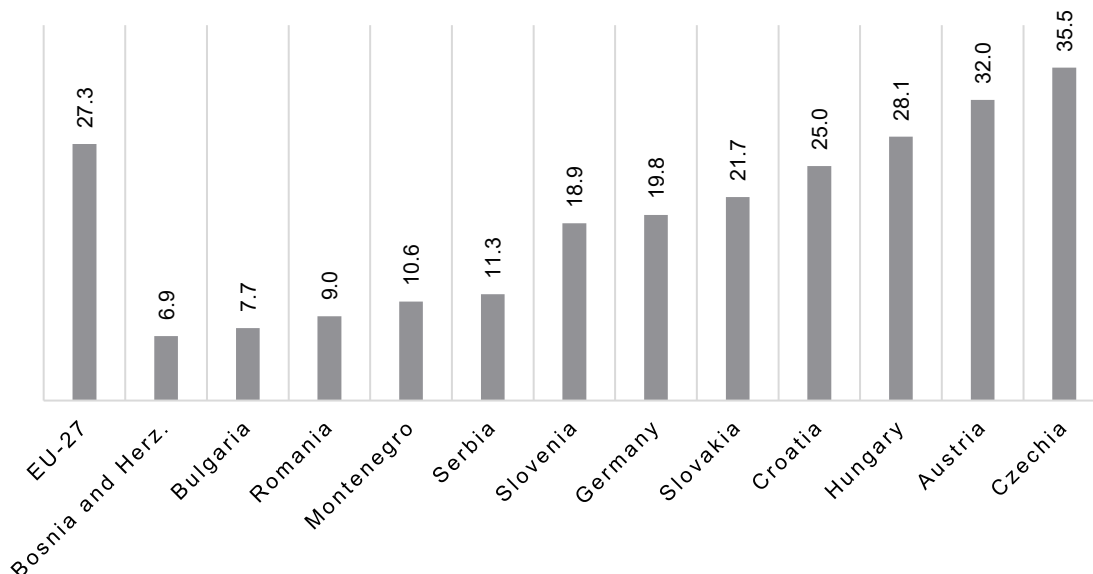
## Empirical Evidence

This section explores the state and development of the digital economy and society in the Danube Region with a broad range of indicators, including the digital skills of the population, household internet connection, e-government, and the extent of digital technologies used in workplaces and enterprises.

The first indicator illustrating the countries' preparedness for the digital transition is the digital skills of the population in the Danube Region. These skills are, compared to the EU27 average level, low in 2023. Only Czechia, Austria and Hungary report above EU27-average percentages of individuals with strong digital skills, indicating their higher readiness to participate in the digital economy. This is crucial for sectors increasingly relying on digital tools, automation, and information technologies. By contrast, all other countries, and especially Bosnia and Herzegovina, Bulgaria, Romania and Montenegro, have a much lower percentage of the population with advanced digital skills, suggesting a digital divide that could limit these countries' ability to engage in the global digital economy fully. This digital skills gap is often linked to lower investments in education, technology infrastructure, and a slower adoption of digital technologies across industries, which can hinder economic modernisation and innovation.

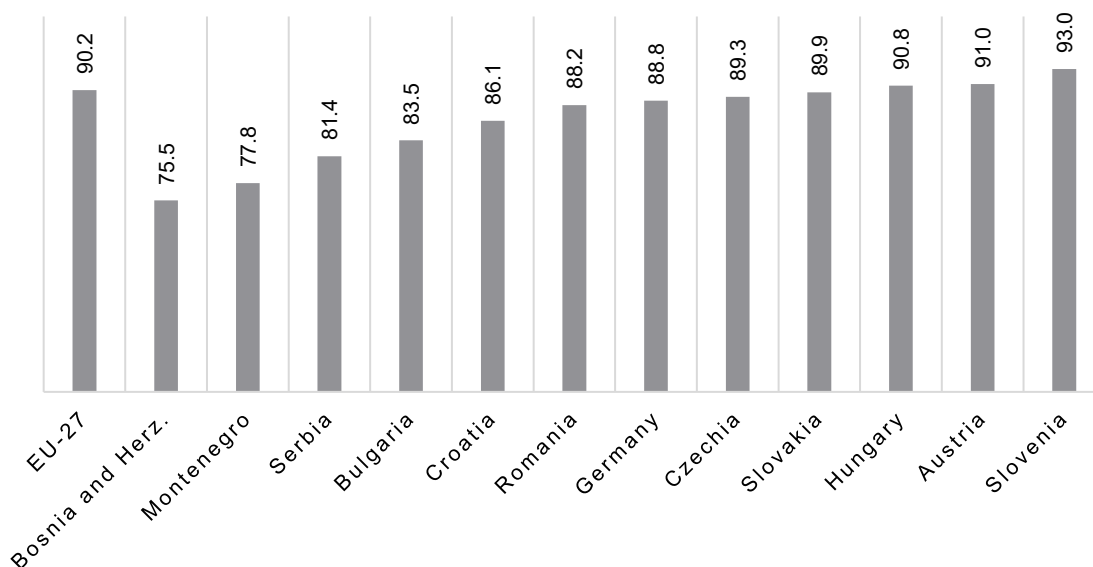
The second indicator is the share of households with broadband internet connection in 2021 (Figure 30), which is considered a critical factor for digital inclusion and economic participation. In the Danube Region, many countries, for example, Hungary, Austria, or Slovenia, demonstrate high levels of broadband penetration, with over 90% of households having access to high-speed internet. These high levels indicate an advanced digital infrastructure and widespread internet access, facilitating digital services, e-commerce, and remote work. In contrast, Bosnia and Herzegovina and Montenegro have significantly lower broadband access rates, with figures closer to 75%. This gap in digital infrastructure presents a barrier to economic development, limiting these regions' ability to fully benefit from the digital economy, including e-commerce, e-learning, and telehealth services.

**Figure 29 / Individuals' level of digital skills - Individuals with above basic overall digital skills, 2023 Percentage of individuals**



Source: Eurostat, wiiw

**Figure 30 / Households with a broadband internet connection, percentage of total households, 2021**

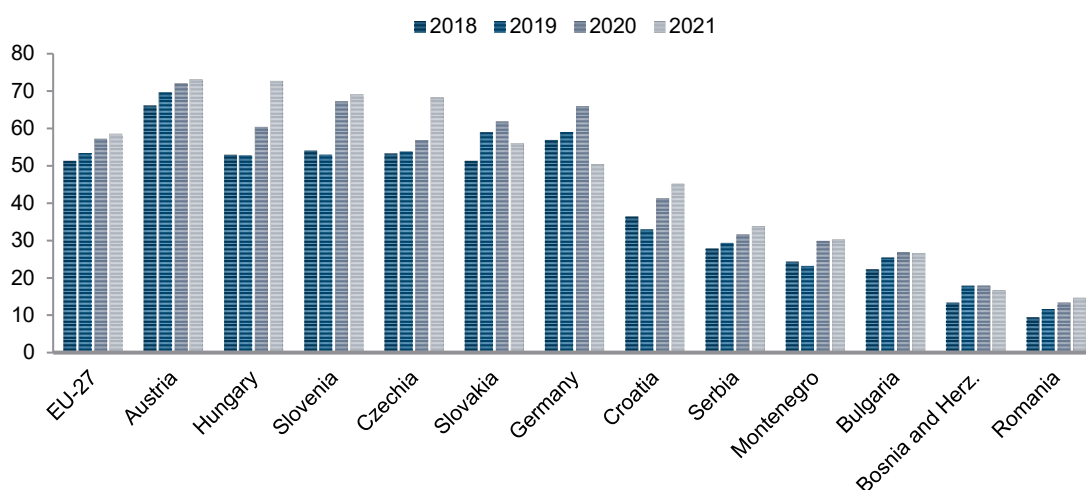


Source: Eurostat, wiiw

The second indicator tracks the percentage of individuals engaging with government services online, such as submitting forms or accessing public information. It thus illustrates the advance of the digital transition in the public sector (Figure 31). Austria, Hungary, Slovenia and Czechia lead in e-government activities, with high levels of interaction between citizens and digital government platforms. This reflects the

advanced digitalisation of public services in these countries, enhancing convenience, transparency, and efficiency. By contrast, the other Danube Region countries, including Germany, have lower than EU27 average e-government uses, with countries such as Bosnia and Herzegovina, Romania, Bulgaria, Montenegro and Serbia showing much lower levels, reflecting underdeveloped digital infrastructures, lower trust in government services, or a lack of digital literacy among the population. Expanding e-government capabilities is crucial for modernising public administration, reducing corruption, and improving public sector efficiency.

**Figure 31 / E-government activities of individuals via websites, percentage of individuals**

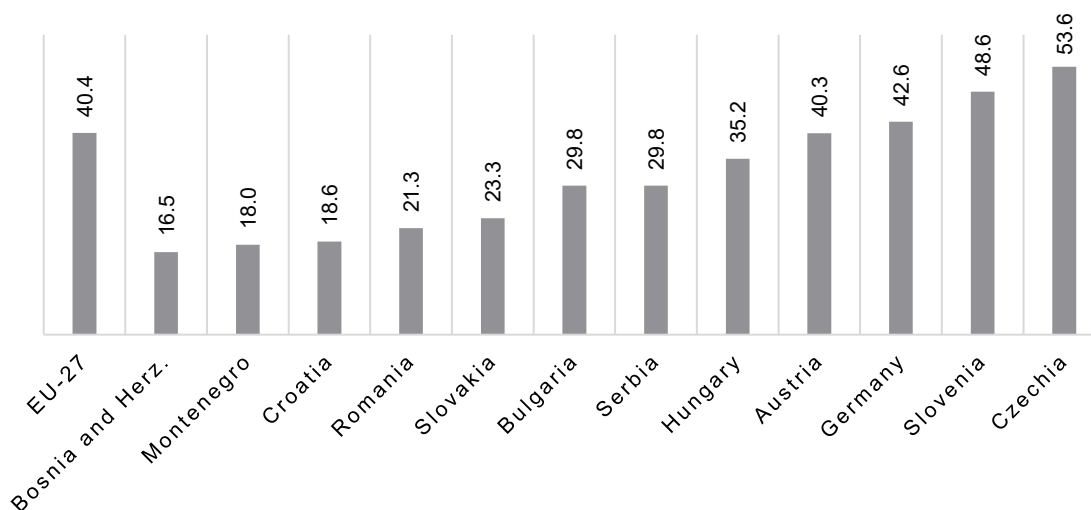


Source: Eurostat, wiiw

The share proportion of workers using computers, tablets, other portable devices or computerised equipment or machinery in their workplaces (Figure 32) indicates the extent to which digital technologies are already present in the work environment and give rise to higher productivity activities and jobs. Czechia, Slovenia, Germany and Austria lead the Danube Region, with many workers involved in jobs requiring advanced machinery or digital tools. This indicates higher technological adoption and integration in manufacturing, logistics, and services industries. By contrast, countries like Bosnia and Herzegovina, Montenegro or Croatia show low percentages of digital tool usage in workplaces, pointing to a slower pace of technological integration and digital transformation in their economies. Overall, there is quite a significant gap in the digital technologies employed in the workplaces in the Danube Region. This suggests potential areas for investment in workforce training and adopting new technologies to increase productivity and competitiveness in the global market.

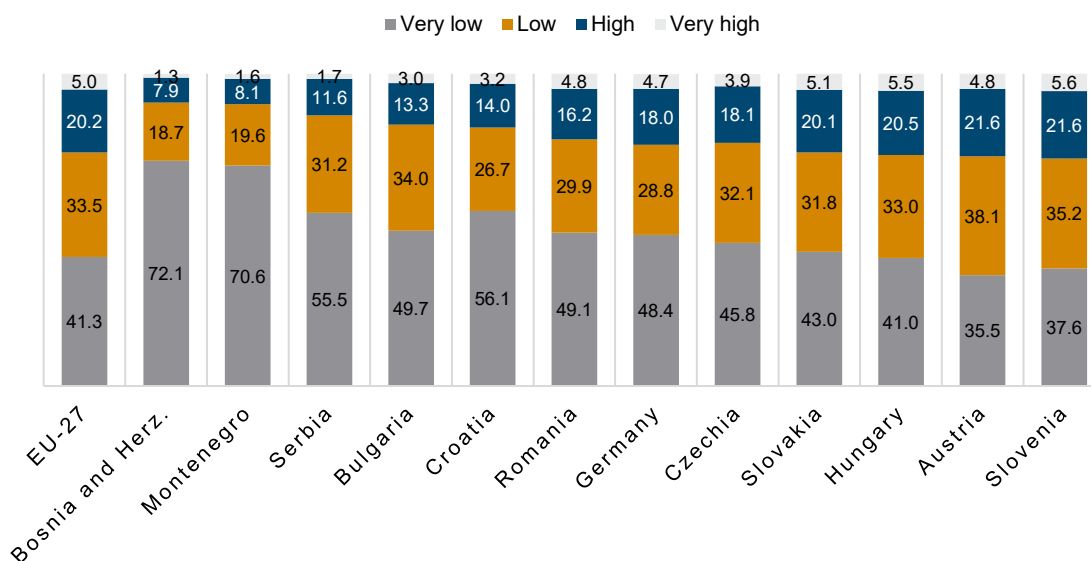
The last indicator categorises businesses by their level of digital intensity, which refers to how extensively they use digital tools and platforms (Figure 33). This indicator suggests a digital divide in the Danube Region, with countries including Slovenia, Austria, Hungary, Slovakia, Czechia and Germany having a higher share of enterprises with high or very high digital intensity, reflecting the advanced integration of digital technologies in business operations. These companies will likely use cloud computing, e-commerce platforms, data analytics, and AI tools, enhancing efficiency and market competitiveness. In contrast, countries like Bosnia and Herzegovina, Montenegro or Serbia show a more significant proportion of businesses with low digital intensity, suggesting that many companies in these countries are not fully leveraging digital tools, potentially limiting their competitiveness in an increasingly digital global economy.

**Figure 32 / Individuals used computers, laptops, other portable devices or computerised equipment or machinery such as those used in production lines, transportation or other services at work, percentage of individuals, 2018**



Source: Eurostat, wiiw

**Figure 33 / Percent of enterprises, grouped by their digital intensity index, 2018  
All activities (except agriculture, forestry and fishing, and mining and quarrying) without financial sector<sup>6</sup>**



Source: Eurostat, wiiw

<sup>6</sup> The Digital Intensity Index is a composite indicator, derived from the survey on ICT usage and e-commerce in enterprises. With each of the 12 included variables having a score of 1 point, the DII distinguishes four levels of digital intensity for each enterprise: count of 0 to 3 points entails a very low level of digital intensity, 4 to 6 – low, 7 to 9 – high and 10 to 12 points – very high DII (for more information see: <https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20211029-1>)

### 3.6. INDUSTRIAL DEVELOPMENT

#### Existing Literature

The industrial landscape of the Danube Region is characterised by a predominance of minimally and semi-processed products, but this foundation can serve as a springboard for significant economic transformation. The region's industrial sector demonstrates resilience and adaptability, as evidenced by the ongoing re-industrialisation processes in several economies, catalysing structural change and enhancing competitiveness (CESCI, 2019, pp. 190-191).

Building on this industrial development, the economic forecasts of the authors of this study point to an encouraging trajectory, particularly in the Balkan countries and Eastern Europe. These countries are expected to experience an increase in production and demand for higher value-added industrial goods, machinery and equipment. This projected growth offers significant opportunities for deeper production integration and market expansion in various industrial sectors (CESCI, 2019, p. 190).

Smart specialisation strategies are emerging as a pivotal tool to take advantage of these opportunities, mainly to drive structural change in the Eastern Danube Region. These strategies have the potential to create valuable synergies between different industries. However, the current implementation of smart specialisation initiatives faces significant challenges, as most remain fragmented and need more effective coordination, preventing the region from fully realising its industrial potential (CESCI, 2019, p. 190).

#### Empirical Evidence

This section provides a brief overview of the state and development of the manufacturing industry sector in the Danube Region countries, focusing on the importance of the aggregate manufacturing sector for the respective economies and on the productivity growth in the industry as one indicator of competitiveness.

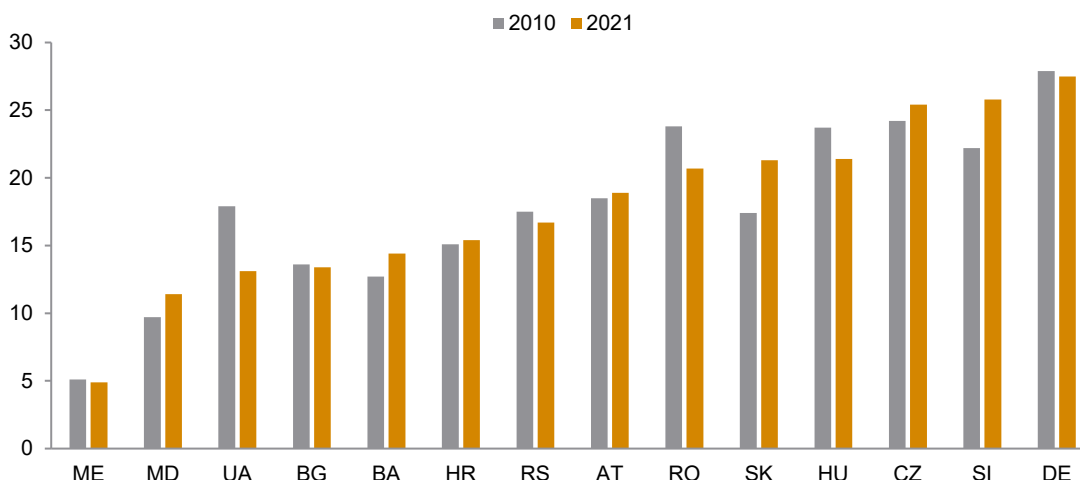
The manufacturing share shows the manufacturing sector's importance for the economy in the total gross value added of the Danube Region countries between 2010 and 2021 (Figure 34). Germany, Slovenia, Czechia, Slovakia, and Romania demonstrate high manufacturing contributions to their economies, with shares of over 20% of their GDP derived from industrial production. These countries are highly industrialised, producing high-tech machinery, vehicles, and other manufacturing-intensive goods. Moreover, in many of the highly industrialised countries, except Romania, the share of manufacturing industries tends to increase over time or remains stable, as in the case of Germany, indicating that, despite the frequently heard hypothesis that advanced economies will be led by growth in the services sector, manufacturing industries are a vital backbone to the countries' and regions' economy and provide the economic base for many of the services that rely on the income produced in manufacturing. However, in this context, it is important to distinguish between the tasks that are carried out in industrial production. In this group of countries, Germany is specialised in the pre- and post-production stages of the industrial production process, while the Central European countries tend to be specialised in the production stage, which is regarded as the least value-adding of the entire industrial production process. Therefore, though the high share of industry is an important element for the economic development of the Central European countries in the Danube Region, moving to higher value added tasks in industrial processes is considered necessary for further growth (Zavarska, 2024).

Still, countries like Montenegro, Republic of Moldova, Ukraine, Bulgaria, and Bosnia and Herzegovina have much lower shares, indicating a reliance on agriculture and services while manufacturing sectors



remain underdeveloped. For those, industry development, independent of the potential tasks within industrial processes is a crucial element of future economic development and growth.

**Figure 34 / Share of the manufacturing industry in total Gross Value Added, 2010&2021**



Source: Eurostat, wiw

Figure 35 tracks productivity growth in the manufacturing sector and, for comparison, in the overall economy from 2014 to 2021. Slovenia and Montenegro show significant productivity growth during this period, particularly in the manufacturing sector, indicating that they have made considerable strides in modernising their industries. While maintaining high productivity levels, Germany, Slovakia, Hungary and Austria show more moderate growth rates, reflecting their mature industrial sectors. The rapid growth in less industrialised countries such as Republic of Moldova or Croatia suggests a catch-up process, where these countries are gradually increasing their productivity through technology adoption, foreign investment, and improvements in labour efficiency. However, continued growth is necessary to close the gap with more developed economies.

**Figure 35 / Productivity growth 2014-2021, manufacturing industry and total economy, annual average growth rate**



Source: Eurostat, wiw

### **3.7. KEY FINDINGS AND CONCLUSIONS FOR THE COOPERATION POTENTIAL IN THE DANUBE REGION**

The Danube Region is characterised by a pronounced divide in globalisation, industrial development, and technological progress. This dichotomy shapes its integration into global markets and longer-run development potential.

The region is split into two groups based on global competitiveness: highly competitive countries like Austria, Germany, Czechia, Hungary, Slovakia, and Slovenia, as well as less competitive countries. This divide is mirrored in export strengths and international integration. The EU is the dominant trading partner, while Russia's significance wanes, giving way to growing Chinese influence in some countries. Prosperous nations benefit from deep integration into advanced value chains with Germany and Austria, whereas less affluent countries lag, relying on lower value-added activities. Thus, the EU Member States in the Danube Region are more integrated into medium- and high-tech industries. At the same time, the EU Accession countries remain tied to lower-tech sectors like mining and agriculture. Still, even for the more advanced Eastern European countries in the Danube Region, much of their role in global and European value chains centres on lower-value activities like assembly, with innovation and design concentrated elsewhere. Moving up the value chain is essential for future growth in these countries, while less integrated countries must gain initial access to these systems. In all this, FDI plays a vital role as the Eastern European EU Member States benefitted from FDI in technology-intensive industries, particularly from other EU countries, with Austria and Germany, contributing a large share of these investments in the Danube Region. Investments from Russia are primarily important in some of the Accession countries in the Danube Region, such as Montenegro and Serbia.

In contrast, China's investments still have only a tiny share of total FDI in the Danube Region. Importantly, especially in the more prosperous Eastern European countries in the Danube Region, the FDI-driven growth model may have peaked, with some countries showing signs of a middle-income trap. Transitioning to a self-reliant growth model, driven by domestic innovation and investment, is crucial for sustained development.

Infrastructure, a vital backbone for economic cohesion, reflects the region's disparities. The east-west divide in accessibility hampers connectivity, particularly in non-urban areas—borders, with varying permeability, further fragment the region. Improved public transport and better utilisation of transit positions could bridge these gaps, fostering greater collaboration.

Technological change poses both an opportunity and a challenge. The Danube Region's innovation landscape is uneven, with urban and industrial centres thriving while rural areas lag. Most Danube countries are technology followers, and many need better preparedness for more advanced production structures. A strong digital divide exacerbates economic inequalities, with more prosperous nations leveraging digital innovation while others struggle. However, digital transformation offers a pathway to economic growth for the latter countries, as it is a relatively new industry compared to traditional manufacturing sectors.

## Conclusions for the cooperation potential in the Danube Region

The EUSDR offers a comprehensive framework to unlock the Danube Region's potential. By focusing on innovation, connectivity, digital transformation, and industrial growth, the region can overcome its divides and build a more integrated, competitive, and sustainable future. Collaborative efforts across these domains will improve the lives of the region's residents and position the Danube Region as a leader in European cooperation.

As far as **global competitiveness** and integration into European and global **value chains** are concerned, there is a potential for cooperation in the following areas:

- › **Encouraging industry collaboration** and creating partnerships between leading Western European companies and Eastern companies can promote mutual learning and adoption of advanced technologies and market trends. This could make Eastern European companies more self-sufficient by learning about best practices, new technologies and market trends from Western companies.
- › The integration into value chains could be strengthened by supporting transnational cooperation in supplier networks and promoting the integration of SMEs into vertical and horizontal value chains through cluster policies and transnational partnerships.

Essential factors for increasing the global competitiveness of the Danube Region countries are the improvement of the **research and innovation potential** connected to **digitalisation** and a **technological change** to support the development of **higher value-added industrial sectors** and the shift towards **higher value-added activities** in industrial production. For this, cooperation could focus on:

- › **Enhancing innovation and research efforts** by stimulating the **collaboration** of Western regions with advanced research and innovation capabilities with Eastern regions to facilitate knowledge, technology, and best-practice transfer, strengthening innovation in less developed areas. This could be institutionalised through joint R&D centres or innovation hubs focused, for example, on Industry 4.0 technologies.
- › Establishing **best-practice networks** and building platforms for countries to share technological advances, implementation strategies, and successful practices in innovation and digitalisation in different areas of the economy.
- › Joint educational and awareness **campaigns** and comprehensive **support structures** could support this. This would help break down mental barriers regarding the 'technological and digital transition' and provide social and technological support.
- › A vital driver of an economy-wide push towards digitalisation could emerge from a **digital transformation of the public sector**. Cooperation could support this by promoting multi-level governance approaches to implement effective digital solutions, such as developing a common digital infrastructure or platform that benefits multiple stakeholders.
- › Additionally, fostering citizen engagement in digital services by involving them and community organisations in designing and delivering these services might ensure a greater acceptance of the digital public sector.
- › The innovation and digital efforts must be accompanied by **smart specialisation strategies** to create new or transform older low-value-added industrial activities into more modern, higher-value-added activities. Cooperation can help motivate local stakeholders to engage in this by involving local

businesses, research institutions, and government agencies in the planning and implementation stages to ensure that initiatives address their needs.

- › Furthermore, cooperation could support collaboration to strengthen industrial development. Across sectors and industries, this could provide valuable insights and innovative solutions that may not be apparent within a single industry. Companies can learn from each other's experiences and best practices, avoid common pitfalls, and replicate successful strategies.

Regarding connectivity and Infrastructure, the EUSDR provides a platform for improving transport infrastructure, linking Western economies with Eastern markets, and establishing the region as a critical European trade corridor. In this context, cooperation in the EUSDR has a strong potential, through:

- › **Improving transnational cooperation** on border management and infrastructure policy.
- › **Transport infrastructure** investments will make the Danube Region an essential link between Western economies and Eastern markets. Expanding public transportation, for example, could improve the permeability of borders.
- › This could include **new border management agreements that will** harmonise border control procedures, reduce administrative burdens, and streamline customs procedures. These agreements could focus on mutual recognition of inspection and security standards to facilitate smoother border crossings.
- › **Integrated border management** systems, e.g. through implementing standard IT systems for border management, could facilitate real-time data sharing and coordination among border agencies. This could streamline processes, enhance security and reduce waiting times at borders.
- › In this context, **public-private partnerships** could support infrastructure projects by financing, building and maintaining infrastructure in order to involve partners from the public and private sectors and to support the best possible networked development.
- › Also, **awareness needs to be raised of the importance, success and advantages of cross-border public services**, which were successfully implemented on the German-Austrian, Czech-German and Austrian-Hungarian borders. Other border areas, especially Austria-Slovenia, Hungary-Croatia, Croatia-Serbia, Romania-Hungary, Bulgaria and Republic of Moldova, could benefit from this.

## 4. The green transition of the economy and society

A climate-neutral economy in 2050 is one of the European Union's core objectives. However, given regional differences in terms of energy and greenhouse gas intensity, sectoral specialisation, mobility patterns and housing stock, it is likely that the impact of the green transition will differ substantially across the EU, in general, and in the Danube Region, in particular. Depending on their characteristics, regions can benefit from this transition, e.g., by introducing new technologies and innovations. In contrast, high conversion and adaptation costs will hinder other regions' development. Such regional and spatial differences are very pronounced in the Danube Region and represent a central challenge for future harmonious development and cooperation. In this context, this chapter describes the challenge of the green transition for the economy and society based on the following points:

- › Green energy transition
- › Green transport
- › The green transition and bioeconomy

### 4.1. GREEN ENERGY TRANSITION

#### Existing Literature

The Russian invasion of Ukraine and the COVID-19 pandemic have highlighted the European Union's vulnerability in energy security, prompting an urgent need to accelerate energy efficiency measures and increase renewable energy adoption across the Union (The European Parliament, 2023, p. 4). This situation is particularly relevant for the Danube Region, where energy dependency patterns and renewable energy adoption vary significantly among countries.

The Danube Region exhibits notable disparities in renewable energy ambitions. While Austria, Germany, and Croatia demonstrate high aspirations for increasing their renewable energy sources for electricity (RES-E) share with well-developed action plans, countries like Slovakia, Czechia, Bulgaria, and Romania show relatively modest ambitions. Slovenia and Hungary occupy a middle ground, and among non-EU Danube countries, only the Republic of Moldova has established a specific renewable electricity target of 15% (REKK, 2020, p. 14).

The region's green energy landscape is characterised by diverse generation methods shaped by local conditions and resources. For instance, Austria predominantly utilises hydropower for power generation (approx. 58% in 2023), Germany has made significant strides in wind power (from approx. 19% in 2017 to 32% in 2023) and Hungary has recently expanded its solar capacity (From approx. 0.05% in 2018 to 14% in 2023) (Electricitymaps.com, 2024). However, despite varying levels of photovoltaic potential - exceptionally high in northern Croatia, southern Romania, and northern Bulgaria - solar energy remains underutilised throughout the region (ESPON, Territorial Futures, 2017, as cited in ESPON EGTC, 2021, p.7).

The Danube Region's primary challenge is its heavy dependence on external energy sources, especially Russian hydrocarbons. Furthermore, nuclear energy still plays an essential role in several countries, including Bulgaria, Czechia, Hungary, Slovenia and Slovakia. (CESCI, 2019, p. 200). Russian gas imports remain well above 60% in many countries of the Danube Region (EUSDR), making it more vulnerable than the EU average. The ongoing war of aggression against Ukraine has serious implications for the security of the energy supply for most EUSDR countries. It is, therefore, of the utmost importance to provide different scenarios on how these countries can diversify and secure their energy supplies (Danube Strategy Point, 2024).

The region's energy infrastructure presents a mixed picture. While east-west connections are well-established, north-south energy connections remain insufficient (CESCI, 2019, p. 199). Smart grid development shows similar disparities, with Germany, Austria, Czechia, and Slovenia leading the way while other countries lag behind (CESCI, 2019, p. 200).

Developing energy networks (CESCI, 2019, p. 199) and innovation in general (The European Parliament, 2023, p. 6) is crucial to achieving more competitive renewable energy prices. National policies and installation regulations are also needed to significantly influence the approval and implementation of renewable energy systems (ESPON, Territorial Futures, 2017, as cited in ESPON EGTC, 2021, p. 9).

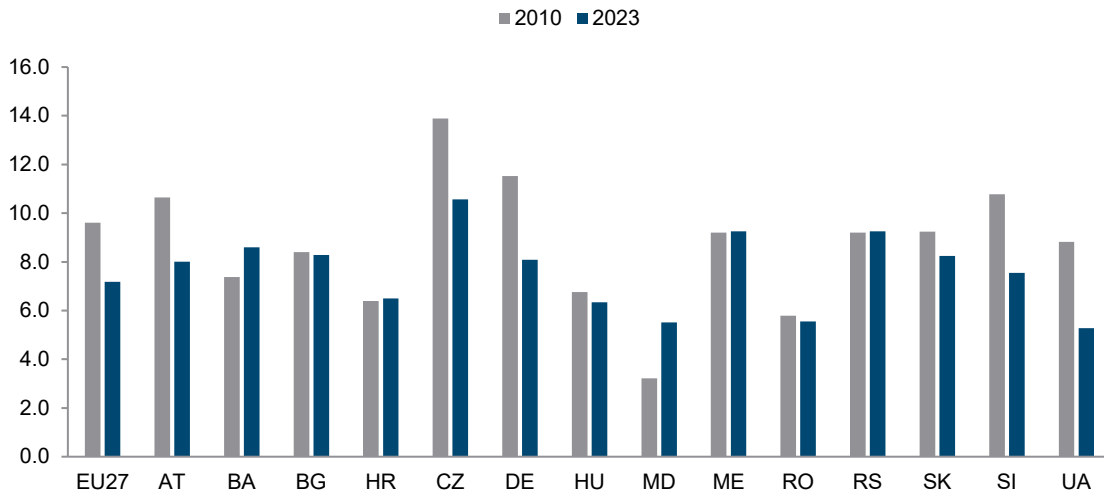
## Empirical Evidence

This section briefly overviews the Danube Region countries' transition to climate neutrality and green energy, focusing on the countries' greenhouse gas (GHG) emissions, energy consumption and production, and the share of renewables as energy sources.

Figure 36 shows total GHG emissions per 1,000 inhabitants, measured in Gigagrams of CO<sub>2</sub> equivalent, across the Danube Region, giving insight into the carbon footprint of countries relative to their population. It indicates that in 2010 GHG emissions tended to vary significantly in the Danube Region, with Germany, Czechia, Slovenia and Austria having high and above EU27 average GHG emissions per capita, while in the Republic of Moldova, Croatia and Romania, they were comparatively low.

Over time, GHG emissions tended to decline, particularly in the EU Member States in the Danube Region in most countries, except for Bulgaria, Croatia, and Romania. In the Accession countries, except for Ukraine, per capita GHG emissions increased, most strongly in Moldova and Bosnia and Herzegovina. Thus, most EU Member States in the Danube Region show a positive trend towards reaching EU climate goals. However, the figure also indicates that foremost the less prosperous countries in the Danube Region need to focus more on reducing emissions through energy efficiency, renewable energy adoption, and industry decarbonisation, which however might be in conflict with their need for economic growth and development.

**Figure 36 / Total greenhouse gas emissions per 1000 inhabitants, in Gg CO<sub>2</sub> equivalent<sup>1</sup>**

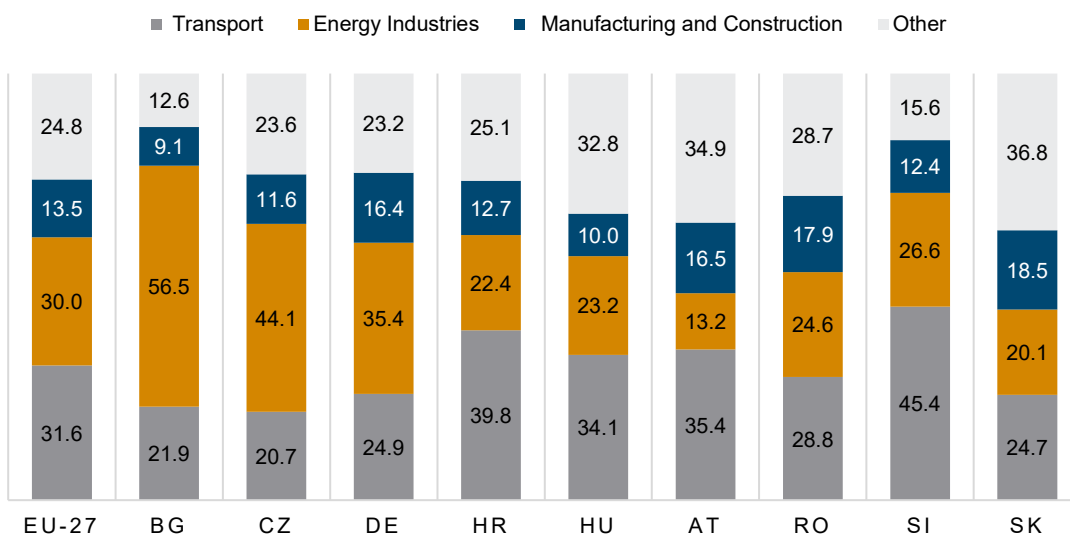


Notes: <sup>1</sup> in Gigagrams = 1000 tonnes

Source: EDGAR Community GHG Database ([https://edgar.jrc.ec.europa.eu/dataset\\_ghg2024](https://edgar.jrc.ec.europa.eu/dataset_ghg2024)), own calculations; This database does not split Serbia and Montenegro, hence an average value is provided for both countries.

Figure 37 presents a sectoral breakdown of CO<sub>2</sub> emissions, showing the contribution of the transport sector, energy-related sectors (e.g., public electricity and heat production, petroleum refining), manufacturing industries, including construction, and other sectors (e.g., commercial and institutional sectors, residential, agriculture, forestry, and fisheries) to overall CO<sub>2</sub> emissions in 2022. Each sector contributes differently depending on a country's industrial profile and energy mix.

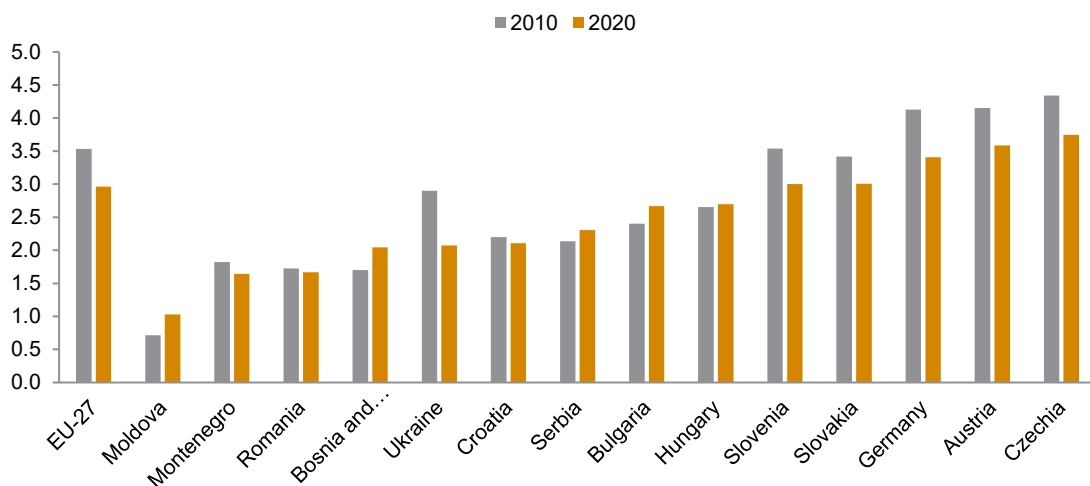
**Figure 37 / CO<sub>2</sub> emissions by sector, in % of total CO<sub>2</sub> emissions, 2022**



Throughout the EU Member States in the Danube Region, transport and energy industries are essential contributors to country-wide CO<sub>2</sub> emissions, though at varying degrees. In countries like Germany, Czechia, Slovakia, and Bulgaria, transport contributes less than a quarter to total CO<sub>2</sub> emissions, and this share goes up to around 40% to 45% in Croatia and Slovenia. This indicates that while making transport more environmentally friendly in the Danube Region, reaching the EU 2030 and 2050 climate targets requires simultaneous efforts, in particular regarding the energy-related sectors and the residential sectors (the latter are included in the 'other' sectors in the figure below).

Figure 38 illustrates the total inland energy consumption per 1,000 inhabitants, measured in thousand tonnes of oil equivalent. It measures how energy-intensive a country's economy and society are. The results indicate that the more prosperous and more industrialised countries in the Danube Region show higher energy consumption due to their extensive industrial activities and higher living standards. Compared to that, less prosperous countries have low energy consumption levels, though the trends over time suggest that it may increase as those countries' levels of economic development increase. By contrast, many more prosperous countries are already on track to reducing energy consumption while maintaining high living standards. Overall, the results indicate that lowering energy consumption while supporting economic growth and convergence is a crucial challenge for the Danube Region.

**Figure 38 / Gross inland energy consumption per 1000 inhabitants, Thousand tonnes of oil equivalent**

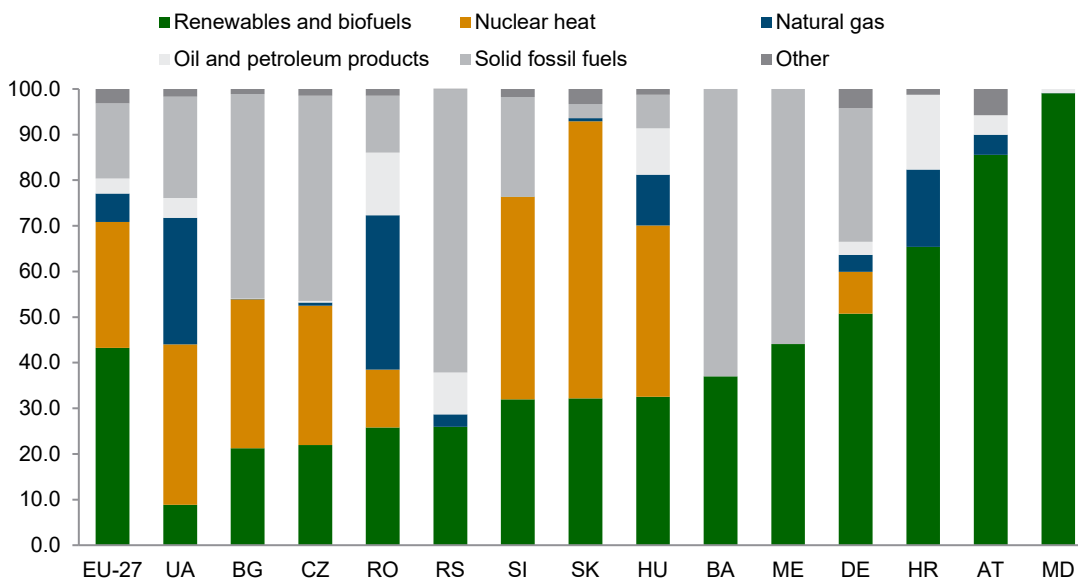


Source: Eurostat

Figure 39 and Figure 40 focus on renewable energy production and consumption. The latter provides a breakdown of different energy sources (e.g. renewables, fossil fuels, nuclear and others) in total energy production for 2022 and thus provides insight into how dependent countries are on renewable versus fossil energy sources. It illustrates wide disparities in the use of renewable energy sources, as Austria and the Republic of Moldova cover over 85% of their production via renewable sources. At the same time, it only plays a minor role in Ukraine, Bulgaria, and the Czech Republic, which rely on nuclear power and fossil fuels. Thus, for many countries, increasing the share of renewable energy production is a critical goal for becoming more environmentally sustainable. Therefore, they must ramp up investments in renewable energy infrastructure to reduce their reliance on fossil fuels or nuclear power.



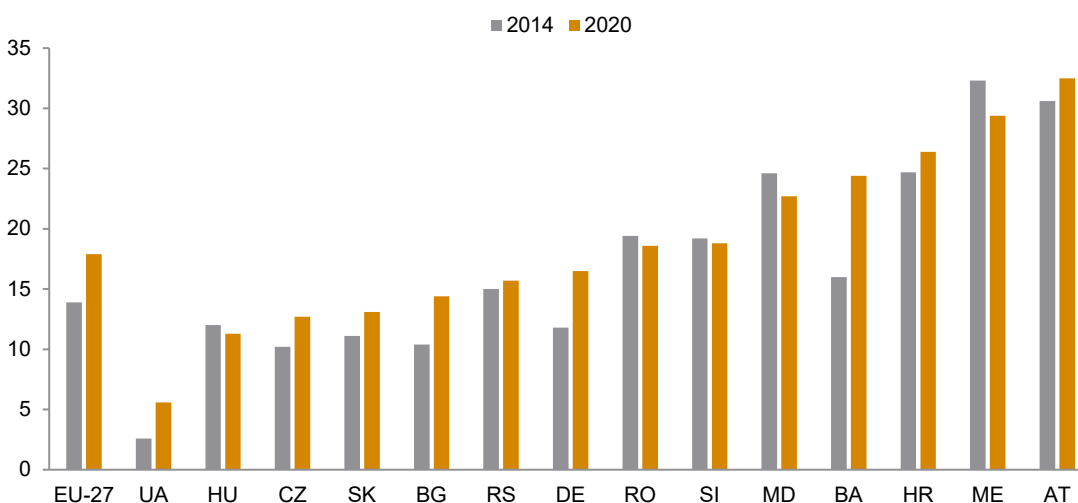
**Figure 39 / Energy production, share of energy sources in total production, 2022**



Source: Eurostat

Figure 40 focussing on the share of renewables in gross inland energy consumption for 2014 and 2020, shows similar results and compares how much progress has been made in renewable energy adoption over these six years. Countries like Austria, Montenegro and Croatia demonstrate a higher share of renewables, partly due to their reliance on hydropower and increasing investments in solar and wind, while in Ukraine, Hungary or Czechia, the share of renewable energy in total energy consumption is comparatively low also to the EU27 average.

**Figure 40 / Share of renewable energy in gross inland energy consumption, 2014/2020**



Source: Eurostat

However, in most of the Danube Region countries, the share of renewable energy is increasing over time, though in many at a relatively modest pace if compared to the EU27 average and quickly progressing countries within the regions like Germany and Bosnia and Herzegovina. Thus, for all countries in the Danube Region, adopting renewables is critical for reducing CO<sub>2</sub> emissions and achieving the EU's climate targets. However, further actions and investments are needed to accelerate the transition.

## 4.2. GREEN TRANSPORT

### Existing Literature

The Danube Region faces significant transportation challenges that require a comprehensive and integrated approach to mobility. Recognising this need, the EUSDR Priority Area PA 1b Rail-Road-Air Mobility has developed the Danube Region Multimodal Corridors Policy, which is in line with both national priorities and EU objectives for a more connected, competitive and environmentally sustainable Europe (Danube Strategy Point, 2022a).

The region's transportation infrastructure shows notable contrasts between different areas and modes of transport. While the western part of the Danube Region has a high density of railway lines, with rail maintaining a significant share of public and freight transport in most countries, the overall picture is more complex. Despite the strong rail infrastructure, road freight transport continues to dominate the transportation landscape (CESCI, 2019, pp. 196-197, 201).

A concerning trend is emerging as non-environmentally friendly private transport (CESCI, 2019, p. 201) and freight transport (CESCI, 2019, p. 196) continue to grow. This challenge is exacerbated by geographical disparities, particularly in the eastern and southern parts of the Danube Region, where cross-border rail connections are limited. The role of rail transport has either stagnated or declined in many countries, leading to increasing disparities in network distribution and density (CESCI, 2019, p. 197).

The Danube Region has made some progress in transportation infrastructure, establishing various transport hubs and intermodal centres. Modern technologies supporting multimodality and interoperability have been introduced, and there has been growth in cross-border transport services and related infrastructure (CESCI, 2019, p. 197).

However, significant challenges remain. The region suffers from insufficient interoperability and few transport hubs connecting different modes. This is most noticeable in the southern and south-eastern parts of the Danube Region, where integrated and multimodal transport systems are notably lacking. Furthermore, traffic management systems are inadequate, and the integration of electric mobility remains underdeveloped (CESCI, 2019, p. 197).

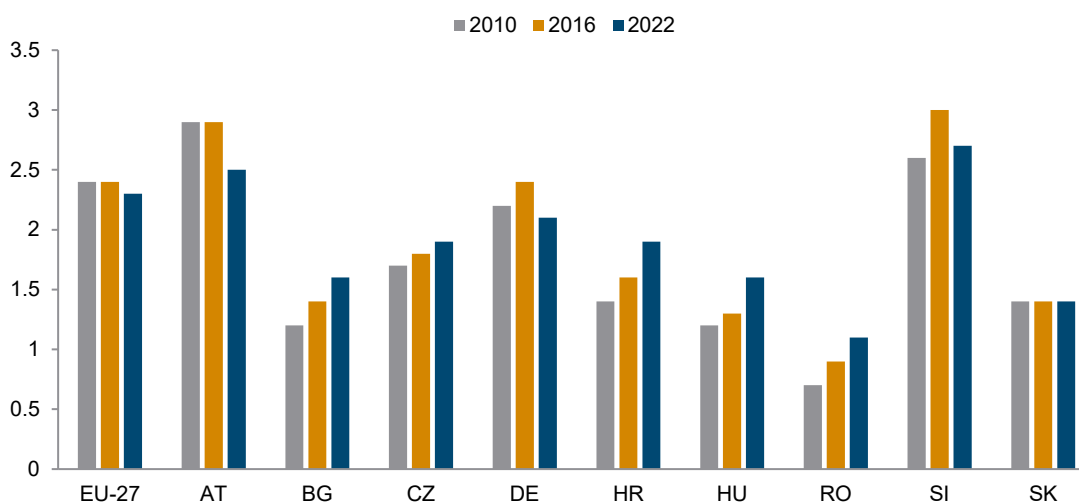
While the Multimodal Corridors Policy offers potential solutions to these infrastructure deficits, implementing this policy faces practical challenges, particularly regarding adequate funding for all the necessary projects (Danube Strategy Point, 2022a).

## Empirical Evidence

This section provides an overview of critical environmental aspects related to transport based on the available data from Eurostat and other sources. However, data coverage is limited to the EU Member States in the Danube Region as no comparable data for the Accession countries is currently collected. The analysis focuses on transport's CO<sub>2</sub> emissions and its share in the respective countries' total CO<sub>2</sub> emissions and the modal split in freight and passenger transport.

Starting with the CO<sub>2</sub> emissions generated by the transport sector, Figure 41 depicts its total CO<sub>2</sub> emissions normalised by population across the EU Member States in the Danube Region. Transport emissions come from various sources, including passenger cars, freight vehicles, buses, and other motorised transport. This measure allows for comparison between countries with differing population sizes.

**Figure 41 / CO<sub>2</sub> Emissions from Transport, Million tonnes per 1mn inhabitants**



EU Commission, 2024 - Statistical Pocketbook 2024

The size of the transport emissions tends to vary significantly within the Danube Region, likely following differences in the level of economic development, assuming that higher levels of development are correlated with a higher transport intensity. Correspondingly, within the Danube Region, transport CO<sub>2</sub> emissions are highest and above the EU average in Austria and Slovenia (also an important “hub-function” with the port of Koper), followed by Germany. At the same time, they are lowest in the least developed countries within the sample, i.e. Bulgaria and Romania.

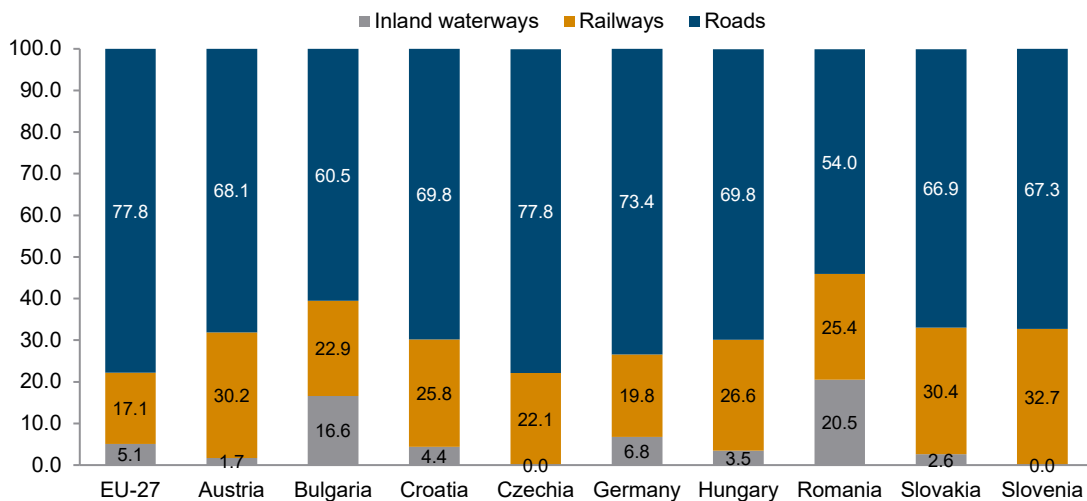
Looking at the trends over time, however, we see some improvements in Austria, Germany, and Slovenia based on potential investments in public transport, rail infrastructure, or the promotion of renewable energy. By contrast, countries with relatively low transport CO<sub>2</sub> emissions show an increasing trend therein, which likely correlates with their economic catching-up process to more developed countries and their growing integration into European value chains. They might also be due to older vehicle fleets with lower efficiency standards, contributing to higher emissions.

Overall, this figure highlights the ongoing challenge in the Danube Region to reduce transport-related emissions, both for mature economies to reduce their currently high emissions and for catching-up economies to disentangle their economic progress from generating additional CO<sub>2</sub> emissions. It

underscores the need for transitioning to cleaner transport options, including electrification of public transport, investment in rail networks, and encouraging the use of bicycles and other non-emitting forms of transport in urban areas.

Figure 42 shows the distribution of freight transport by mode, including road, rail, and inland waterways, in 2022, providing insights into the dominant modes of moving goods across the Danube Region. This indicates that in all countries, road transport is the most common mode of transport for freight, particularly in Czechia and Germany. Rail freight is generally well developed in the Danube Region, at least if compared to the EU27 average, accounting for up to 30 percent of total freight transport in some countries, e.g. Austria, Slovakia and Slovenia. Inland waterways, among the least polluting but less flexible methods for bulk goods transport, are used extensively in countries along the Danube River, particularly Bulgaria and Romania, but less so in Austria and Hungary.

**Figure 42 / Modal split, freight transport, 2022**

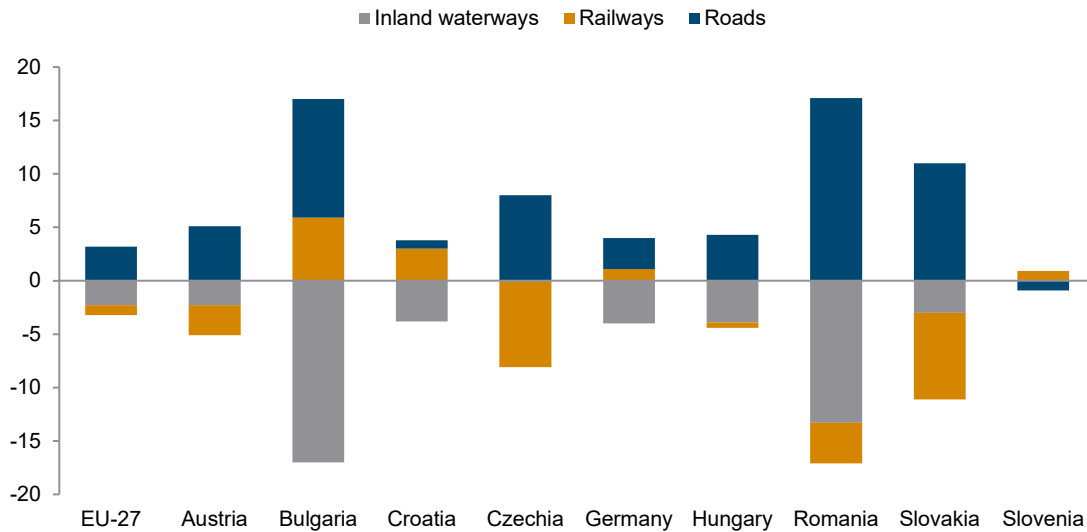


Source: Eurostat

Extending the above analysis, Figure 43 shows how the modal split in freight transport has evolved over the 12 years between 2010 and 2022, indicating whether countries have shifted freight transport from road to rail or waterways. Throughout the Danube Region countries, just like in the EU27, freight transport mostly shifted in favour of roads instead of waterways. Regarding rail transport, the changes were mixed across countries, with some countries, including Bulgaria, Croatia, Germany and Slovenia, shifting some freight transport in favour of rail. In contrast, in other countries, its importance became smaller over time.

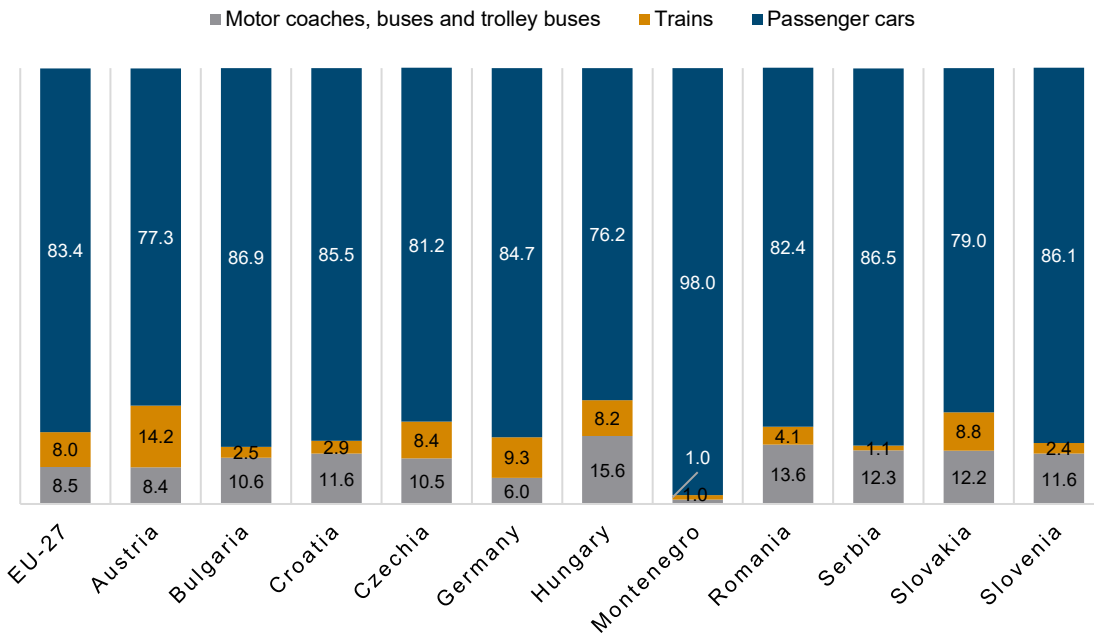
Figure 44 reveals the modal split of passenger transport in 2022, i.e. the distribution of passenger transport by passenger cars, trains, and buses or trolleybuses). This indicates that in all countries and the EU27, cars are the dominant mode of passenger transport due to the convenience and widespread availability of road infrastructure. Countries with well-developed public transport systems, such as Germany, Hungary, Slovakia and Austria, show higher train usage, especially in urban areas and for intercity travel. However, buses may play a more significant role in public transportation in countries with less developed rail networks.

**Figure 43 / Change in modal split – freight transport, 2010-2022 in percentage points**



Source: Eurostat

**Figure 44 / Modal split, passenger transport, 2022**

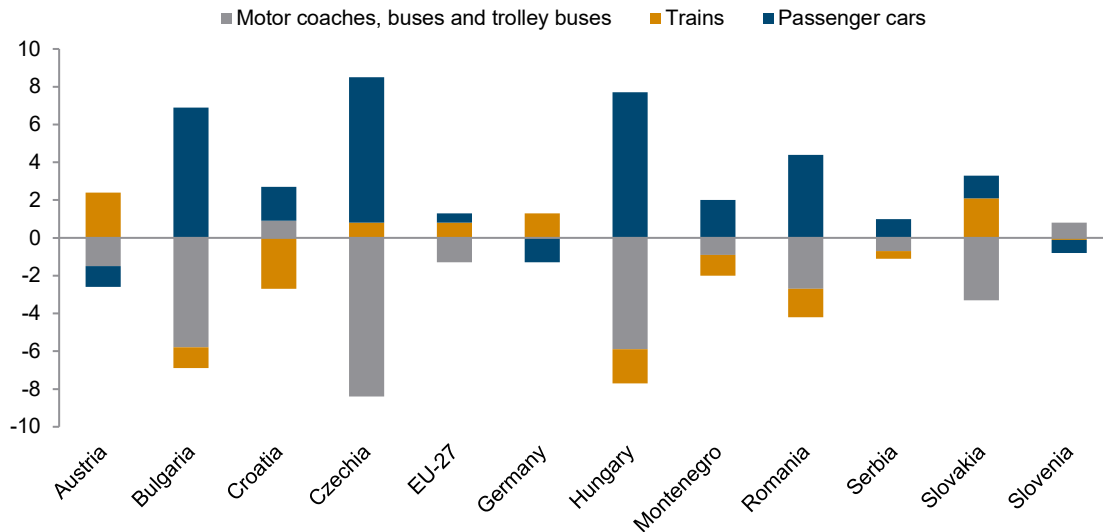


Source: Eurostat

Corresponding to the above, Figure 45 illustrates how the modal split for passenger transport has evolved, tracking the shift between cars, trains, and buses from 2010 to 2022. The critical observation is that passenger transport has shifted towards vehicles in most countries, thus away from more environmentally friendly rail or bus transport. Only in Austria and Germany was there a shift away from cars to trains. This figure underscores the slow progress or even the backsteps in shifting passengers from private cars to

more sustainable modes of transport and the necessity of accelerating investments in green public transport solutions to meet climate goals.

**Figure 45 / Change in modal split – passenger transport, 2010-2022 in percentage points**



Source: Eurostat

### 4.3. THE GREEN TRANSITION AND BIOECONOMY

#### Existing Literature

Recent global events, notably the COVID-19 pandemic and the invasion of Ukraine, have highlighted the strategic importance of developing the bioeconomy. This focus stems from the potential of the bioeconomy to create shorter, more circular bio-based supply chains, thereby reducing dependency on imported raw materials while supporting the green transition (Lasarte Lopez et al., 2023, pp. 367-368).

Transitioning from a fossil fuel-based economy to a circular bioeconomy offers many opportunities. In addition to boosting economic growth and creating jobs, it enables the development of new products and processes that can compete effectively with fossil fuel-based alternatives in terms of price and quality. This transformation also addresses critical environmental challenges by contributing to climate change mitigation, reducing air pollution and minimising environmental degradation (Langeveld, 2015, as cited in Höltinger et al., 2017, p. 6).

The importance of the circular bioeconomy is particularly evident in the Danube Region, where it promotes cross-sectoral and cross-regional networking through efficient and integrated value chains. This approach has become increasingly important as different sectors become more interlinked, especially in raw materials and renewable energy. Success in this transition requires coordinated development across all sectors and strong cooperation between science, industry, government and civil society (Höltinger et al., 2017, p. 6).

Germany has emerged as a pioneer in developing the bioeconomy in the Danube region, establishing a Bioeconomy Council and implementing comprehensive strategies. The country's "National Research Strategy on the Bioeconomy 2030" emphasises research into the efficient use of biogenic resources to create a sustainable bio-based economy capable of producing diverse food products and contributing to renewable energy supplies. At the regional level, both Bavaria and Baden-Württemberg have developed their bioeconomy strategies (Höltinger et al., 2017, pp. 3-4).

Austria has also made significant progress, with BIOS Science Austria and the Austrian Society for Agricultural Research initiating the bioeconomy discourse in 2013. This led to government recognition of the importance of the bioeconomy and the subsequent presentation of an RTI strategy for the bio-based industry by the Federal Ministry of Transport, Innovation and Technology in 2014 (Höltinger et al. 2017, pp. 3-4). The Bioeconomy Action Plan was updated in 2023 and comprises 112 specific measures in 11 thematic areas, which are driving Austria's transformation towards a sustainable, bio-based economy through lighthouse projects under the leadership of three ministries (BMK, 2024).

Hungary has integrated bioeconomy aspects into its National Strategy for Rural Development and its National Strategy for Environmental Technology Innovation, while Czechia and Slovenia address bioeconomy-related issues in their rural development strategies (Höltinger et al., 2017, p. 4).

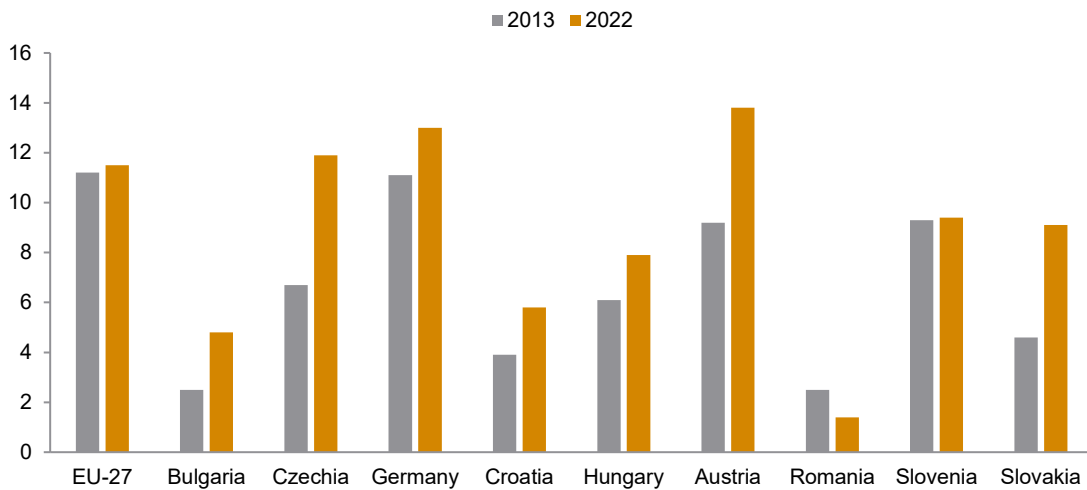
Despite these developments, the circular bioeconomy concept remains unevenly implemented across the Danube Region. Only Germany (specifically Baden-Württemberg and Bavaria) and Austria have comprehensive circular economy strategies, while other Danube countries lack such focused approaches. This disparity has led to fragmented support and underinvestment in the sector. A particular challenge is the disconnect between potential buyers and sellers of secondary materials and by-products, which hinders the formation of new value chains and increases costs for companies in material treatment and disposal (Anteja ECG d.o.o., 2022, p. 4).

## Empirical Evidence

This section analyses the available data on the circular economy within the Danube Region. Generally, this sector is mostly unexplored, as it is a relatively new, or at least an industry that has become increasingly important over the last decade. Moreover, the bio-economy is a cross-over sector that spans all sectors traditionally seen as part of the economy, such as agriculture, manufacturing, or services. Therefore, data coverage is limited, so this section focuses on recycling, waste generation and waste management. Also, for data reasons, country coverage for the Danube Region is limited.

Starting with recycling, Figure 46 illustrates the circular material use rate, which measures the percentage of recycled and reused material within the economy. This rate is a critical indicator of a country's progress toward a circular economy, where the aim is to maximise resource efficiency by minimising waste and reducing the extraction of primary raw materials.

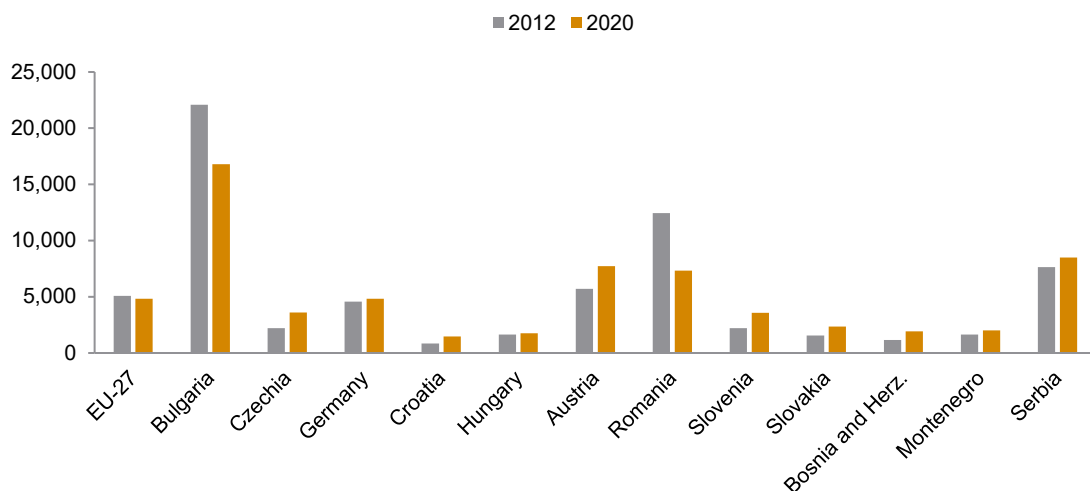
Countries like Germany, Czechia, and Austria exhibit higher circularity rates in the Danube Region, indicative of well-developed recycling infrastructures and robust policies encouraging material reuse. This reflects advanced waste management practices, investment in recycling technologies, and effective regulations promoting circular economy principles. In contrast, countries such as Romania, Croatia and Bulgaria show significantly lower circular material use rates. This can be attributed to limited recycling infrastructure, lower public awareness of recycling benefits, and less stringent regulations regarding waste management. The comparison between 2014 and 2022 indicates that most countries, except Romania, progressed in transitioning towards circular economy principles.

**Figure 46 / Circular material use rate, 2014/2022**

Source: Eurostat

Figure 47 tracks the amount of waste generated per capita, measured in kilograms, across various countries in the Danube Region for the years 2012 and 2020. It provides insight into the trends in waste generation, reflecting changes in consumption patterns, population growth, and industrial activities.

Typically, countries with higher GDP levels based on higher industrial outputs, such as Germany and Austria, likely show higher absolute waste generation, which may reflect higher production and consumption volumes, leading to increased waste generation in all sectors of the economy. Yet, the more prosperous countries also invest more in waste collection, management and treatment so that the per capita amount of waste is potentially lower than in less prosperous countries, which face challenges in waste collection and treatment, as might be the case in Bulgaria, Romania and Serbia, which generate high amounts of waste per capita despite lower levels of economic activity (compare to Blagoeva et al. 2024).

**Figure 47 / Generation of waste, Kilograms per capita, 2012/2020**

Source: Eurostat



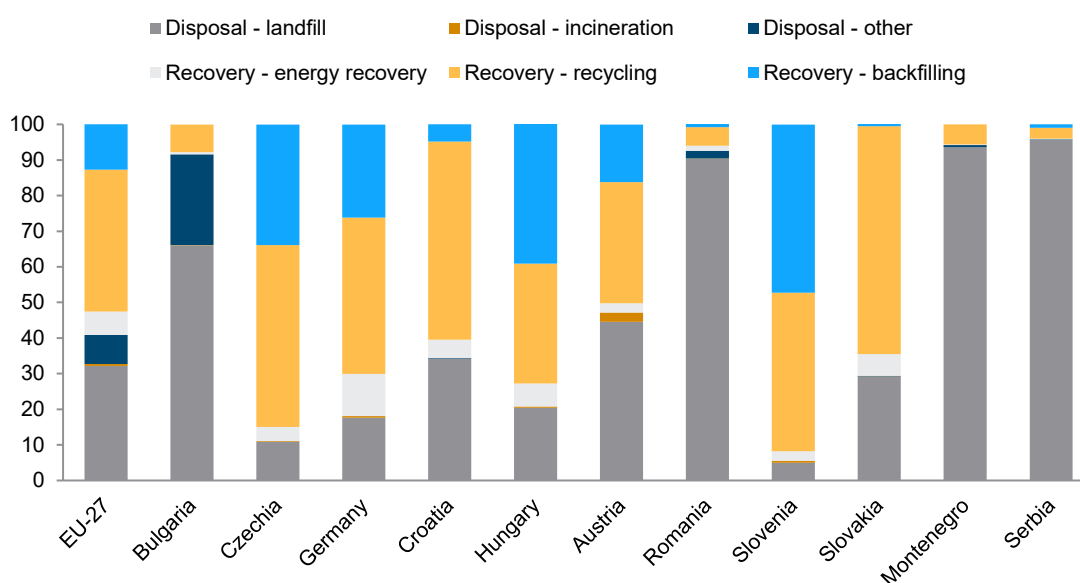
Also, equally or even less prosperous countries like Montenegro, Croatia and Bosnia and Herzegovina, report lower waste generation per capita, which can be associated with lower consumption levels and less industrial activity. However, this lower figure does not necessarily indicate better waste management practices, as these countries may also struggle with informal waste disposal methods.

The data from 2012 to 2020 reveal mostly upward trends in waste generation that can be linked to economic growth and thus could suggest a rise in living standards and consumption, while the effectiveness of national waste management policies might not increase at the same pace. At the same time, a decrease in the amount of per capita waste might indicate successful waste reduction strategies, as could be the case in Bulgaria and Romania.

Figure 48 breaks down the methods of waste treatment used across countries in 2020, showing the percentages of waste treated through various operations, such as landfilling, incineration, recycling, or other management practices. The data suggests that the more prosperous countries in the Danube Region, such as Austria, Germany, Czechia, Hungary, Slovakia, Slovenia as well as Croatia, have higher percentages of waste being recycled or recovered through backfilling, i.e. recovery operations where suitable waste is used for reclamation purposes in excavated areas or for engineering purposes in landscaping and where the waste is a substitute for non-waste materials.

In contrast, countries such as Romania, Bulgaria, Montenegro, and Serbia still rely heavily on landfilling as the primary method for waste disposal. This indicates underdeveloped recycling infrastructures and the necessity for waste management improvement. Waste treatment is crucial for creating a sustainable waste management system. Increasing recycling rates and reducing reliance on landfills are vital for environmental protection and resource conservation. Hence, the data underscores the need for investments in sustainable waste management practices, especially in countries where landfilling is still prevalent.

**Figure 48 / Treatment of waste by waste management operation, 2020, % of total waste treated**



Source: Eurostat

#### 4.4. KEY FINDINGS AND CONCLUSIONS FOR THE COOPERATION POTENTIAL IN THE DANUBE REGION

The Danube Region faces interconnected challenges and opportunities in transportation, energy, and the circular bioeconomy. These sectors form the cornerstone of the region's sustainable development, with the potential for significant progress through collaborative efforts.

The Danube Region seeks to establish a seamless, harmonised, competitive transport system. However, this vision is hindered by current deficiencies, including limited connectivity, underdeveloped rail systems, and insufficient integration between transportation hubs. These gaps are widened by high greenhouse gas emissions and reliance on environmentally unfriendly road transport, trends likely to intensify as economic development accelerates in less prosperous areas.

Energy security and sustainability are critical for the Danube Region, particularly in light of external dependencies, rising energy prices and the potential need for strategic independence from the Russian energy supply. The region exhibits stark disparities in renewable energy production and consumption, with underutilised solar and wind energy potential in many areas. High energy consumption and low efficiency further complicate the Danube Region's path toward carbon neutrality.

The circular bioeconomy offers a promising pathway for sustainable growth in the Danube Region. It combines economic development with environmental stewardship, ensuring food security and mitigating climate change. However, its implementation is uneven, with only a few countries fully integrating bioeconomy strategies into their national plans.

#### Conclusions for the cooperation potential in the Danube Region

The Danube Region's transportation, energy, and circular bioeconomy challenges are opportunities for collaborative solutions. Leveraging shared strategies and resources can address these interconnected issues. Establishing cross-border partnerships, aligning policies, and fostering innovation will transform these sectors, paving the way for sustainable development and enhancing the quality of life for all residents in the region.

Concerning transport, cooperation in the Danube Region could focus on:

- › Supporting **multimodality and interoperability**, taking advantage of the opportunities that digitalisation offers.
- › Developing **traffic management systems** that take interoperability and the integration of electromobility into account
- › Fostering a **comprehensive and integrated approach to mobility**, e.g., implementing the Danube Region Multimodal Corridors Policy developed by the EUSDR priority area PA 1b Rail-road-air mobility.

Regarding the green energy transition, cooperation could support the following:

- › **Establishing or increasing joint energy projects**, such as cooperative projects focused on developing renewable energy sources and infrastructure, could reduce dependence on fossil fuels. Similarly, joint investments in wind, solar, and hydropower could promote energy security.
- › **Strengthening cooperation between government agencies and energy companies** may contribute to the financing and introduction of smart grid technologies and storage systems.

As far as the circular bioeconomy is concerned, cooperation in the Danube region could:

- › **Initiate collaborative and cooperative policy development for a circular** bioeconomy, in the sense that the Danube Region countries work together to develop common policies and frameworks that promote circular bioeconomy principles. This can include, for example, aligning national strategies with regional goals to ensure consistency and coherence or establishing harmonised regulations and standards for circular bioeconomy practices to help reduce barriers to cross-border trade and cooperation.
- › **Establishing joint regional or cross-border investment funds** for circular bioeconomy projects could consolidate funding through contributions from multiple countries or regions, private sector partners or European funding opportunities.
- › **Creating co-financing mechanisms** where multiple stakeholders (e.g. governments, EU institutions, private investors) share the financial risks and rewards of bioeconomy projects could encourage larger investments.

## 5. Conclusions for a future Danube Region policy within the framework of EU Cohesion Policy 2027+

The previous sections are summarised and finalised in this chapter, as are the results from the hypothesis and narrative workshop, such as feedback and comments from the presentations. The focus is on the **potential for cooperation** arising from the analysis results. Notably, the analysis in this study provided a broad overview of many different topics and challenges for the Danube Region countries and regions without going into too much detail about each. The conclusions, therefore, are equally broad in that they adopt more of a birds-eye, strategic perspective instead of providing detailed recommendations on specific issues, where the potential for cooperation might be highest and how it should be designed to yield the most significant benefits.

The Danube Region is, in many aspects, a highly heterogeneous area. As the analysis has shown, significant differences exist between the countries and the regions in terms of innovation potential, sectoral specialisation, trade competitiveness, digitalisation, skills, the quality of governance, etc. Two things are essential to understand in this respect. First, many of these areas are strongly interlinked with each other, as, for example, the pattern of specialisation depends on the skills available, and both are linked with the innovation potential of the countries and regions, while the latter is an essential aspect of competitiveness and so on. Second, all these factors, their quality and level of sophistication, determine the level of economic development and the well-being of the citizens living in the countries and regions in the Danube Region. Or, from the opposite perspective, economic growth and convergence in the Danube Region depend on a multitude of factors within each country and region that, because they are interlinked with and depend on each other, need to be developed simultaneously.

Indeed, given the results of the analysis, the differences in economic development across and within the countries can be considered the most significant common challenge for the Danube Region and, in a broader framework, for Europe as a whole. Increasing the levels of economic development in the Danube Region, especially in the least prosperous countries, will likely increase stability and security in Europe. In contrast, for individual countries and regions, it will mean increased living standards, greater resilience to shocks and a higher adaptive and mitigative capacity to tackle future challenges such as climate change. For cooperation in the Danube Region, it is necessary to consider the socio-economic development of its countries and regions as the main challenge and the overarching goal to be addressed, particularly as it encompasses and depends on many of the priorities already covered by the EU Strategy for the Danube region (EUSDR).

Looking at the current policy themes of the Priority Areas of the EUSDR, a number of them are genuine to the Danube Region, addressing specific challenges to the area, such as Waterways Mobility, Water Quality, Biodiversity, Landscapes and Air & Soil Quality. Yet, there are even more Priority Areas, such as Rail-Road-Air Mobility, Sustainable Energy, Culture & Tourism, Environmental Risks, Knowledge Society, Competitiveness of Enterprises, People & Skills, Institutional Capacity & Cooperation, and Security that

either fully or at least partly have the overarching aim of increasing the level of economic development and the well-being of citizens within the Danube Region.

For the latter group of Priority Areas, it is crucial to understand that their effects on socio-economic development in the Danube Region are interlinked and interdependent. Because of these interdependencies, and to yield the maximum benefits, it is thus worthwhile to consider and approach them more holistically, with the understanding that the development of one area might be dependent on the development of other areas and that in their combination, they are the source of economic growth and convergence. It thus might be argued that cooperation in the Danube Region already needs to start at the programmatic or strategic level of the EUSDR, especially between those priorities that share the common goal of supporting growth and development.

From there, cooperation, having in mind that for all countries, except Austria and Germany, increasing their level of economic development is the main challenge and that this benefits from a holistic approach, taking into account the interdependencies of the different policy areas, can evolve in the Danube Region, specifically in four areas.

The main challenge and the common need for the more prosperous Central and Eastern European countries in the Danube Region, such as Czechia, Hungary, Slovakia and Slovenia, is to converge even closer to more prosperous EU Member States by changing their growth model from being reliant on foreign direct investment to growth based on domestic investment, innovation, skills etc. The Accession countries in the Danube Region, Bosnia and Herzegovina, the Republic of Moldova, Montenegro, Serbia and Ukraine, need to grow and converge within a reasonable time towards EU levels and thus escape their, compared to the EU, low levels of socio-economic development. Countries like Bulgaria, Croatia and Romania are somewhere between the former two country groups, thus requiring a longer-run growth model based on domestic resources, especially regarding the regional differences in economic development within them, also requiring raising the level of economic development for their least developed regions. For Austria and Germany, the economic development of these countries is of high interest, too, not only for potential emotional ties that link the countries together but also for substantial economic reasons, given the strong ties both countries have with the other countries in the Danube Region.

This common need for socio-economic development provides a strong motivation for cooperation in policy-making, specifically looking jointly for economic and integrated development strategies that fit those common needs to generate growth at the country level while ensuring its fair distribution at the regional and individual levels. EU frameworks for cooperation play an important enabling function for cooperation across national borders in this respect.

From this, political cooperation needs to emerge, especially in the context of the EU budget and EU Cohesion Policy post-2027. For many EU Member States in the Danube Region, the EU Cohesion Policy is the main, if not only, tool to support regional development. From this perspective, it is worthwhile to consider cooperation to shape it to the needs of the Danube Region countries. This is particularly important as the EU Cohesion Policy is increasingly used to deliver other EU policies, such as the green transition or smart, sustainable growth. Though these policies are not necessarily at odds with Cohesion Policy goals, they also might not meet the actual needs of the Member States in the Danube Region, which, as has been shown, require more of a holistic, also place-based, approach to address their interlinked challenges in many different areas. Thus, political cooperation in the Danube Region might put a focus on the role of the EU Cohesion Policy as a development policy targeting the specific needs of the countries and regions rather than delivering EU-wide policies, which are certainly helpful but not specific enough, and thus not the most effective way to generate growth and convergence.

Political cooperation in the Danube Region could also address the role of more sectoral policies at the EU level, such as innovation and industrial policies that are vital to the EUSDR and overlap with its priorities. To a large extent, these policies are "spatially blind" in that funds are likely to be distributed to regions and countries where the returns currently are highest, which in many cases are the more developed regions in the EU. With that, these sectoral policies not only contribute to increasing disparities within the EU (and thus partly offset the effects of EU Cohesion Policy) but also quite likely hold those regions at bay that, in the future, could generate the same returns as the more developed regions do now.

Similar arguments apply to the Accession countries in the Danube Region, though since they are not members of the EU, their political power is much lower. Still, the EUSDR offers a platform to make their needs heard at the EU level and, thus, for lobbying in the interests of the needs of the Danube Region - especially against the background of the plans for a new EU funding period. In this context, it is also important to appreciate the 'informal' setting of the EUSDR, which lends itself to exploring opportunities for cooperation and aiming for political momentum in this respect for building networks working on joint policy interests or initiating specific projects between different groups of states in the context of a future EU membership. Thus, importantly, the EUSDR provides a framework for a laboratory for accession, testing cooperation, building trust and skills and getting to know each other at different levels.

Both policy and political cooperation raise issues of governance and capacity limitations. Addressing the need for economic development as the overarching challenge in the Danube Region means addressing different policy areas in a coordinated way, and, for the same reason, means addressing different stakeholders and policymakers at various levels of governance, i.e. at the local, regional, country and transnational levels. Such coordination is no simple task, most likely going beyond the existing capacities in the countries and regions. Still, for effective policy making and, importantly, for its effective delivery on the ground, especially, but not exclusively, regarding delivering EU support, such coordination could be considered necessary for all Danube Region countries. This raises the question of whether cooperation in the Danube Region could also be interpreted as the pooling of individual country or region resources into a joint effort, for example, by creating a specialised institution or using existing ones, to address the issues of holistic cross-sectoral and multi-level policy-making and governance to the benefit of all in a cost and resource-efficient way.

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