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Economic strategies for a thriving Danube Region

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Economic strategies for a thriving Danube Region

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Abstract

This policy note explores key issues in the Danube Region, focusing on labour market dynamics, including the development of digital skills, foreign direct investment (FDI) with a particular emphasis on FDI in the IT sector, and the robotisation and automation of the region's industries. Covering 14 countries—Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czechia, Germany, Hungary, Moldova, Montenegro, Romania, Serbia, Slovakia, Slovenia, and Ukraine—it outlines policy recommendations aimed at enhancing workforce readiness, attracting high-tech foreign investments, and ensuring the region's competitiveness in an increasingly digitalised and automated global economy.

Keywords: Danube Region, Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czechia, Germany, Hungary, Moldova, Montenegro, Romania, Serbia, Slovakia, Slovenia, Ukraine, Economic Policy, FDI, Digitalisation, Automation, Labour Market Dynamics, Regional Development

JEL classification: O52, R58, F21, J24, O33

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Economic strategies for a thriving Danube Region

1. INTRODUCTION

A set of 14 countries located near the Danube River – namely, Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czechia, Germany, Hungary, Moldova, Montenegro, Romania, Serbia, Slovakia, Slovenia and Ukraine – together make up the Danube Region. With a combined population of over 115 million, it is a major economic area within Europe – roughly equal to 25% of the population of the European Union (EU) and 21% of its GDP.[1] The Danube serves as a vital channel linking these diverse countries together, facilitating discussions and collaborative strategies for the region's collective development. Indeed, the adoption of the EU Strategy for the Danube Region (EUSDR) in 2010 was a decisive step in advancing policy dialogue across the region, and it continues to be a platform for policy makers and stakeholders from across the Danube Region to come together. This policy note, which has been produced in the context of Austria's presidency of the EUSDR in the 2023-2024 period, aims to provide an overview of the key economic challenges and opportunities that the countries in the Danube Region presently share in addition to exploring common solutions and outlining policy strategies going forward.

This policy note comes at a time when the region is undergoing significant transformations, driven by a combination of internal dynamics and external shocks. Internally, the region is grappling with a plethora of challenges, including inequality, ageing populations, labour and skills shortages, and looming risks of falling into certain development traps. Externally, a number of shocks have been reshaping the region in recent years. The most adverse and significant is Russia's ongoing war of aggression against Ukraine. Furthermore, in an increasingly volatile and multi-polar world, firms have also begun to reassess how they organise their supply chains and to weigh the benefits of locating closer to their final markets, which is leading to increased talk of 'near-shoring'. In addition, China's growing competitiveness in certain key technologies has reignited global competition, bringing industrial policies back to the political mainstream. Tackling these challenges and finding opportunities in the evolving global landscape calls for carefully thought-out strategies and stepped-up collaboration, which are making the Danube Region platform ever more relevant. Importantly, since the Danube Region brings together 'old' EU member states, 'new' EU member states and EU candidate countries, it serves as an important means for deepened European integration and cooperation on strategic issues across Europe as a whole.

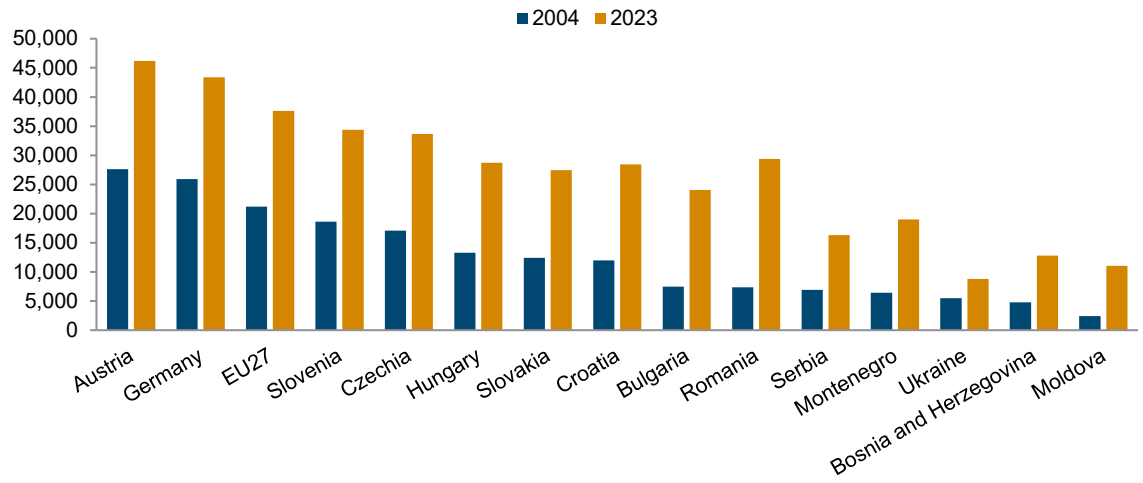
The rest of this policy note is structured in the following way: Section 2 gives a brief economic overview of the Danube Region, which is followed by three thematic sections. Specifically, Section 3 will zoom into the situation on the labour market, touching on skills and qualifications across the region. Section 4 will consider the dynamics and sectoral distributions of foreign direct investment (FDI), with special attention given to digital sectors, which have been growing in importance. Section 5 focuses on the state of industrial development and robotisation across the Danube Region. Finally, Section 6 concludes with policy suggestions.

[1] Based on 2021 figures.

2. THE DANUBE REGION AT A GLANCE: AN ECONOMIC OVERVIEW

Economically speaking, the Danube Region is a diverse area consisting of upper-middle-income countries (Ukraine, Moldova, Bosnia and Herzegovina, Serbia, Montenegro, Bulgaria) and high-income countries (the remaining eight countries, of which only two exceed EU levels of GDP per capita; see Figure 1).[2] While most countries in the region have experienced notable growth over the past 20 years, differences in income levels remain significant, with the GDP per capita of the most developed Danube Region country being more than five times that of the least developed. Still, the gap in GDP per capita between the richest and the poorest country has narrowed compared to the situation seen in the EU enlargement year of 2004 (when the difference was over elevenfold), indicating a trend towards economic convergence. Indeed, the countries that have experienced the strongest relative gains in per capita incomes between 2004 and 2023 were those with lower starting points, including Bulgaria, Romania, Montenegro and Moldova. At the same time, GDP per capita levels have increased the most in absolute terms in Romania, followed by Austria and Germany.

Figure 1 / GDP per capita of Danube Region countries, (in purchasing power standards per capita)



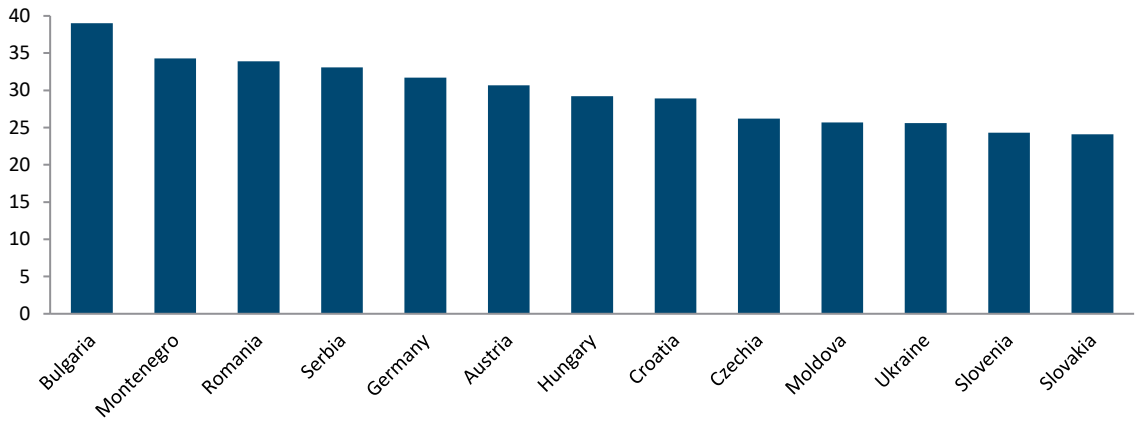
Note: PPS (EU 2020) per capita.
Sources: wiiw Annual Database and Eurostat

Looking within individual Danube Region countries, inequality can be considered moderate to low, as evidenced by the Gini index falling in the range of 24 to 39.[3] Slovakia and Slovenia are characterised by the least unequal income distribution, while Bulgaria, Montenegro and Romania are the most unequal among the 14 countries. Given that those countries which have experienced the highest relative jumps in GDP per capita levels are also those which are most internally unequal, questions regarding the distributional implications of the achieved growth may be raised. Furthermore, despite the relatively low starting points, the Gini indices have not displayed much movement over time (and have even marginally deteriorated in certain cases), which points to persistent challenges in achieving more equitable income distributions in the Danube Region countries.

[2] Based on the World Bank Income Classifications FY25.

[3] The Gini index is a measure of income inequality within an economy and ranges from 0 to 100. While a Gini index score of 0 represents perfect equality, a score of 100 implies perfect inequality.

Figure 2 / Gini index scores in Danube Region countries (2021 or latest data available, score 0-100)



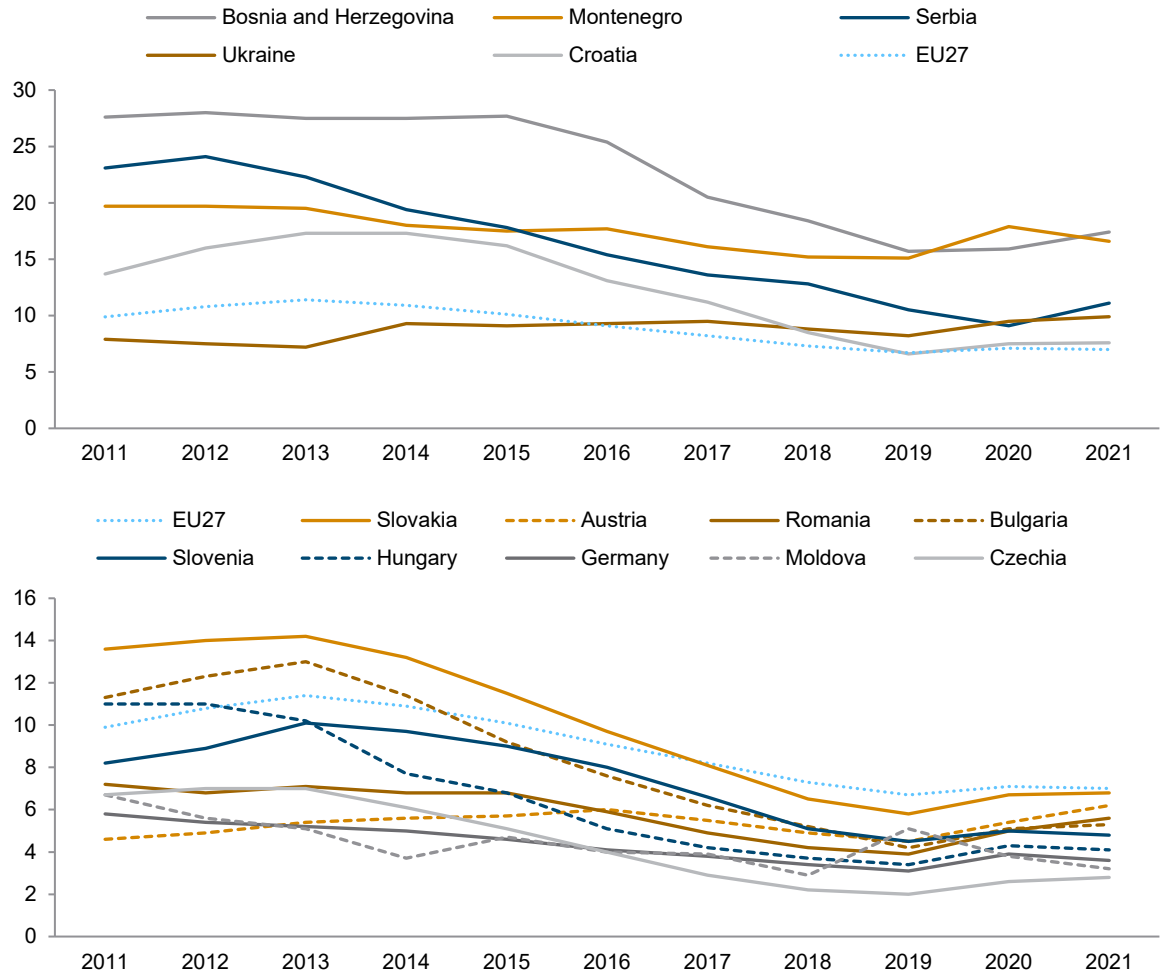
Note: Data for all countries are for 2021 except for Ukraine (2020) and Germany (2019). Bosnia and Herzegovina is excluded, as only data for 2011 are available.
Source: World Bank

3. LABOUR MARKETS AND SKILLS

The labour markets of the Danube Region economies are diverse, although the majority of countries exhibit unemployment rates below the average EU average level (Figure 3). Moreover, Austria and Ukraine are the only two countries that have seen marginal increases in unemployment since a decade ago, with most countries seeing declining trends over time. Czechia, Moldova and Germany are particularly characterised by low unemployment, which hints at the existence of stretched labour markets in these countries.

Indeed, labour shortages are increasingly becoming an issue across many countries in the Danube Region, as they are experiencing demographic declines driven by a combination of population ageing, low birthrates and emigration (Astrov et al. 2022). This holds particularly true for the EU candidate countries, such as Moldova and Ukraine, as well as for the new EU member states (particularly Bulgaria, Romania and Croatia), which have experienced significant population shrinkages since the early 2000s (Figure 4). Eurostat projections further underscore the acuteness of the situation, revealing sharp drops in the working-age population by 2040 among all EU member states in the Danube Region (Figure 5). These trends will inevitably require innovative policy solutions to be adopted across the region, including automation, greater labour market participation, immigration and pro-natalist policies.

Figure 3 / Unemployment rate (aged 15-74, in %)



Note: While the top graph includes countries with unemployment rates above the EU average in 2021, the bottom one includes those with an unemployment rate below the EU average. The share of unemployed persons aged 15-74 is shown as a percentage of the active population. A new methodology in line with the Integrated European Social Statistics Regulation (IESS) was used beginning in 2021, though not for Moldova and Ukraine.
Sources: Danube Region Monitor based on wiiw, Eurostat, national statistical offices

Figure 4 / Total population (% change 2004-2023)

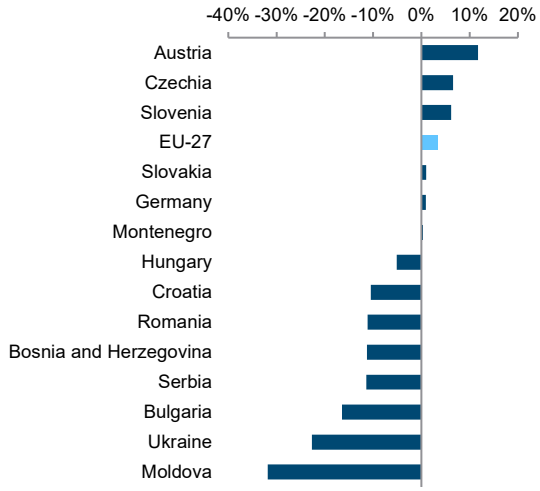
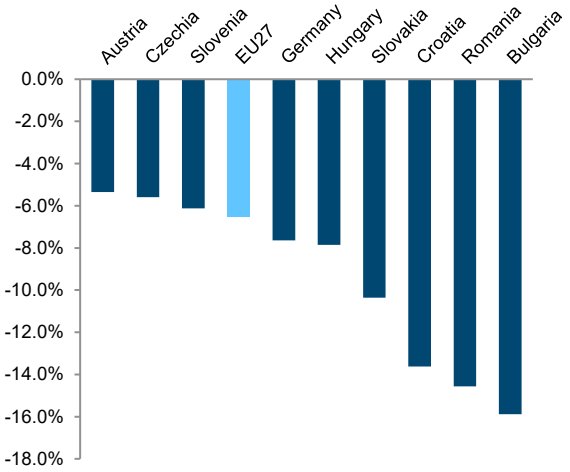
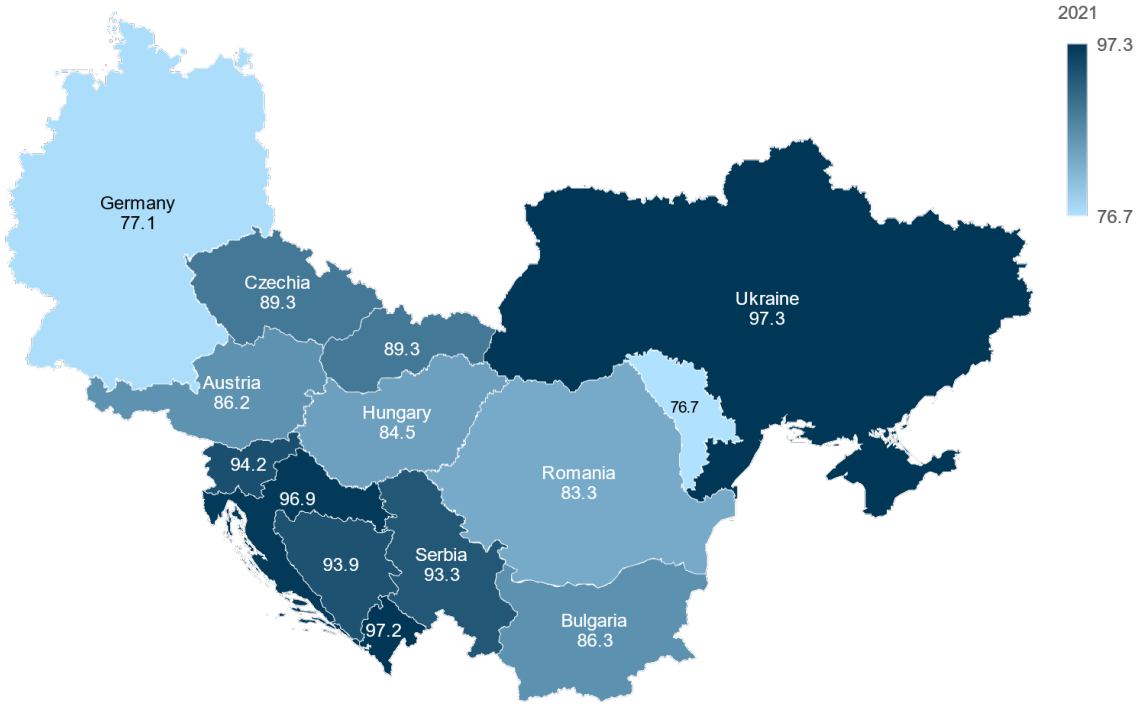


Figure 5 / Working-age population (20-64) (projected % change 2023-2040)



Note: Projections only available for EU member states.
Sources: wiiw Annual Database, Eurostat.

Figure 6 / Share of population aged 20-24 who have completed at least upper secondary education (in % of total population)



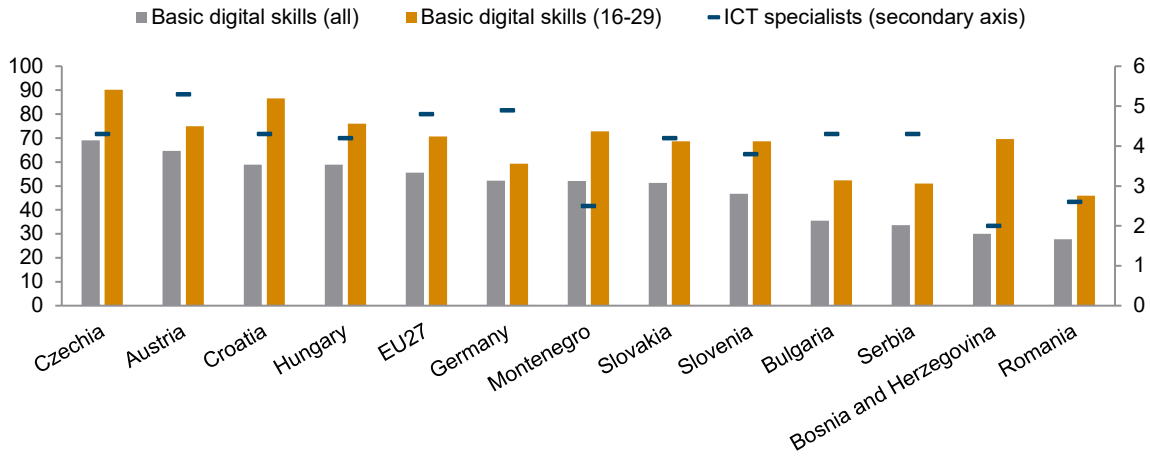
Sources: Danube Region Monitor, Eurostat, national statistical offices

In addition to the supply of labour, it is also essential to consider qualitative aspects, including skills and qualifications. Generally speaking, the Danube Region is characterised by a relatively well-educated population, with all countries having high shares of young people with at least secondary education (Figure 6). Nevertheless, Hungary, Romania, Germany and Moldova underperform compared to the EU average in this respect, which calls for stepped-up efforts in wide-reaching education policy. Moreover, there remain stark gender differences when it comes to both secondary and tertiary education attainment in the Danube Region, as women tend to be more educated than men, who tend to start working at a younger age (Tverdostup and Stehrer 2023).

As Tverdostup and Stehrer (2023) further point out, the average public spending dedicated to education in the Danube Region as a whole is comparable to that of the EU average. Importantly, public investment in education has increased across all countries (with the exception of Serbia) since the COVID-19 pandemic, likely driven by the social-distancing measures that necessitated a shift to online learning.

The acceleration of the digital transformation, catalysed by the pandemic, is also requiring individuals to adopt new skills. At present, only Austria and Germany have shares of information and communication technology (ICT) specialists in their labour markets that would exceed the EU average, which indicates that the ICT sector is still in relatively nascent stages of development in the region (Figure 7) and that there is a 'digital divide' across the Danube Region. Still, the level of digital literacy in a number of Danube Region countries far exceeds the average EU level, reaching almost 70% in Czechia and Austria. These countries can offer valuable know-how to other countries in the region on how to cultivate digital skills. There is particularly room for significant improvement in south-eastern countries of the region, where less than a third of the population has at least basic digital skills. However, even in these cases, younger populations demonstrate much higher levels of digital skills, which could unlock potential for future development.

Figure 7 / Share of individuals with at least basic levels of digital skills and the share of ICT specialists in the labour market (secondary axis) (in %)

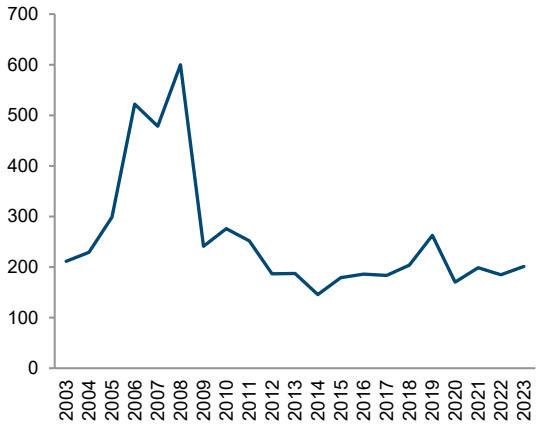


Note: Data is for 2023 for all observations except ICT specialists in Montenegro, which is for 2021. No data available for Moldova and Ukraine. ICT specialists as a percentage of total employed individuals. Digital skills as a percentage of the respective age group.
Source: Eurostat

4. FOREIGN DIRECT INVESTMENT

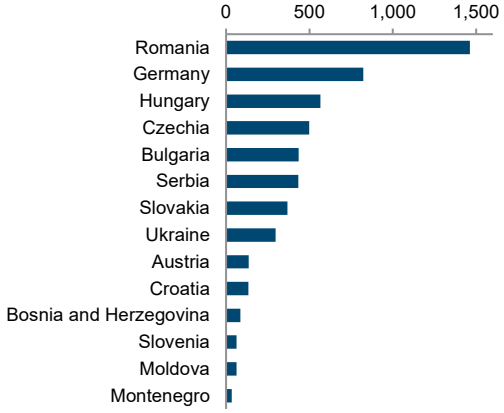
Foreign direct investment (FDI) has been a major driving force when it comes to shaping the economic development of the Danube Region in recent decades. Inward FDI activity in the region picked up particularly as the European integration process accelerated in the early 2000s, creating a significant number of new jobs in these economies and advancing their industrialisation (Figure 9). As shown in Figure 9, countries in Central and Eastern Europe (CEE) (e.g. Romania, Hungary and Czechia) are the most significant recipients of FDI from the job-creation perspective. This has been influenced by a range of factors, including labour cost advantages compared to Western Europe, industrial heritage, relative institutional stability, fairly developed infrastructure and EU membership.

Figure 8 / Number of jobs created by inward greenfield FDI projects in the Danube Region (in thousands)



Note: Preliminary data for 2022 and 2023. Totals for all 14 countries in the Danube Region.
Source: fDi Markets

Figure 9 / Number of jobs created by inward greenfield FDI projects by country (in thousands, total 2003-2023)



Note: Preliminary data for 2022 and 2023.

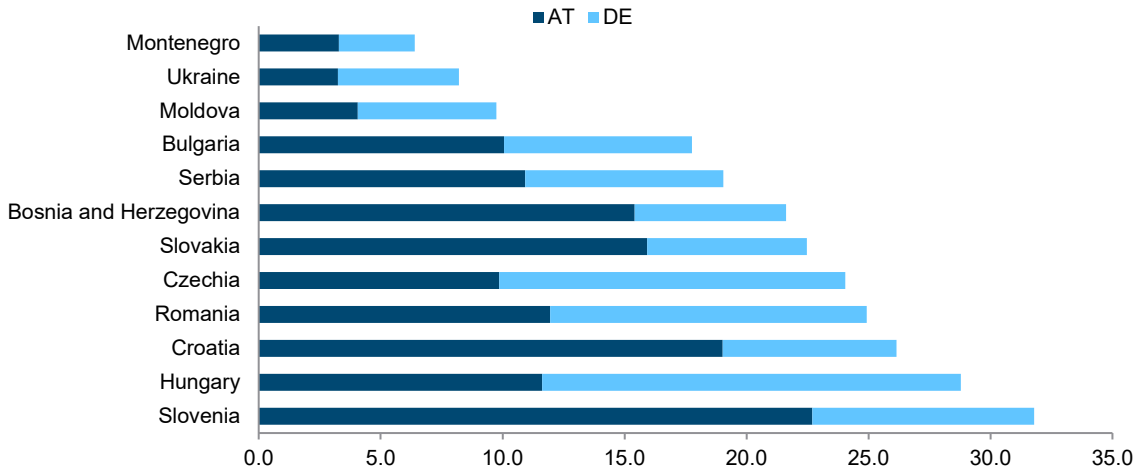
Source: fDi Markets

In more recent years, however, there has been a visible slowdown in greenfield FDI projects coming into the Danube Region. Looking at country-specific dynamics (see Appendix A), one can observe that while Germany and Austria managed to maintain steady though mild growth in terms of FDI projects, countries such as Romania and Bulgaria experienced sharp fluctuations with peaks and troughs. The region's CEE countries (i.e. Czechia, Slovakia and Hungary) have seen a gradual decline following strong growth in the early 2000s, which indicates challenges in maintaining long-term economic momentum. In contrast, Ukraine and Serbia displayed significant volatility, likely influenced by geopolitical factors and institutional instability.

The observed trends also suggest that the much-debated process of 'near-shoring' (i.e. the process of relocating production closer to the final market) is not yet visible from the data, as any restructuring is anticipated to be a lengthy and gradual process. Still, given the longstanding competitiveness of the region in terms of attracting FDI projects, there are opportunities going forward to stand on the receiving end of near-shoring investments. However, for them to materialise, FDI-attraction policies that are sensitive to the evolving needs of firms are needed in order to incentivise their relocation and supply-chain restructuring for greater resilience (Jovanović et al. 2021; Zavarská 2022).

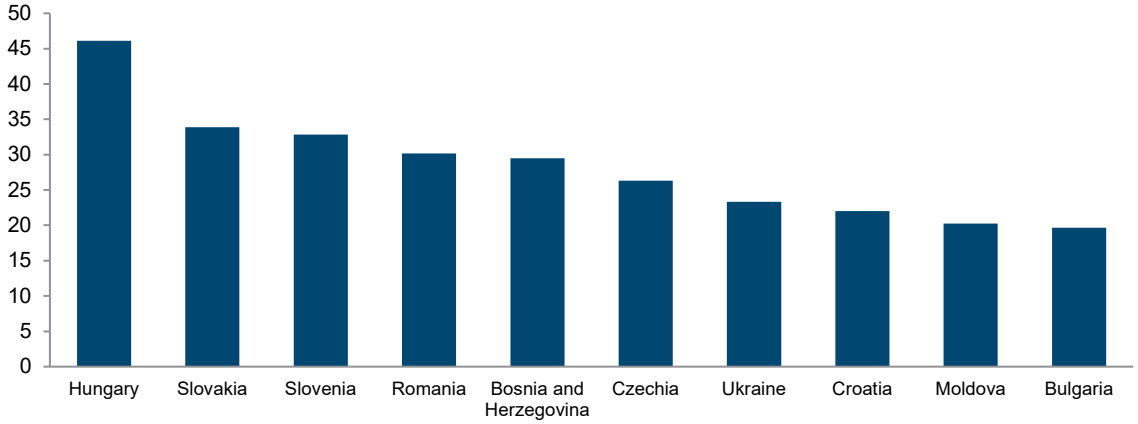
Looking at the main FDI partners, Austria and Germany are among the top investors in other Danube Region countries. In some cases (e.g. in Slovenia, Hungary, Croatia and Romania), these two countries together account for roughly a quarter to a third of all the FDI stocks of the country (Figure 10). In addition to being large in terms of sheer scale, intra-Danube Region investment activities also have major developmental impacts. For example, the results of Jovanović and Hanzl-Weiss (2022) show that while FDI coming into countries of Central, East and Southeast Europe (CESEE) has had positive impacts on economic growth, German and Austrian FDI were particularly growth-enhancing and poverty-reducing for the region. These findings underline the importance of regional value-chain integration for development.

Figure 10 / Share of Austrian and German FDI in total inward FDI stocks (in %, 2022)



Source: wiiw FDI database

Figure 11 / Share of manufacturing in the inward FDI stocks of Danube Region countries (in % of total FDI stocks, 2022)



Note: Slovakian data are for 2021. Other Danube Region countries are excluded due to data unavailability. NACE Rev.2 C-Manufacturing.
Source: wiiw FDI database

Furthermore, from a sectoral perspective, FDI in the manufacturing sector can be generally regarded as the most desirable for converging economies, as foreign firms tend to bring new technologies, create productivity-enhancing jobs and foster innovation. In this context, it is important to note that there are stark differences in the manufacturing shares of FDI in the Danube Region, reaching as high as 46% of all FDI stocks in Hungary and as low as 20% in Bulgaria. For the countries on the lower end of Figure 11, targeted FDI-attraction policies to advance their industrialisation can be considered particularly relevant.

Looking into greater sectoral detail, the real estate services sector tops the list of key sectors in terms of the volume of capital pledged and the number of jobs created as a result of greenfield FDI in the Danube Region as a whole (Table 1). Renewable energy also represents one of the most prominent greenfield FDI sectors for the Danube Region, hinting at potential opportunities in the green transition (see also UNIDO 2024). However, the volume of FDI in coal, oil and natural gas also underlines the still prominent position of fossil fuels in the region. At the same time, countries like Germany, Hungary, Czechia, Slovakia and Romania lead in terms of automotive components and OEM, with high levels of investment (see Appendix B for a sectoral breakdown by country). In these economies, the ongoing transformations within the automotive industry are creating substantial uncertainty when it comes to future competitiveness and will inevitably necessitate adaptation. Moreover, Romania shows strong activity in the renewable energy, consumer products, and food and tobacco sectors, while countries like Bulgaria and Serbia are notable in textiles. The aerospace and industrial machinery sectors are seeing heavy investment in Austria and Germany, while renewable energy is also gaining traction in several countries, especially Bulgaria and Hungary. Furthermore, while Czechia has a notable presence in consumer electronics and pharmaceuticals, Ukraine is active in transportation and warehousing, which reflects diverse industrial focuses across the region.

Table 1 / Inward greenfield FDI projects in the Danube Region – top 10 sectors by jobs created and capital pledged (number of jobs and EUR m, cumulative 2003-2023)

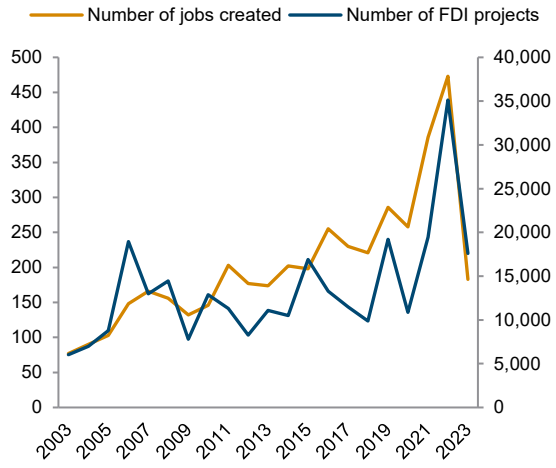
	jobs created	capital pledged
Real estate	1,600,511	147,376.6
Renewable energy	22,326	74,619.35
Alternative/renewable energy	42,096	71,282.13
Coal, oil and natural gas	100,363	62,686.8
Automotive OEM	190,949	56,401.08
Consumer products	345,030	55,654.95
Electronic components	252,070	52,949.09
Communications	138,282	51,828.08
Semiconductors	31,643	51,200.02
Automotive components	388,052	46,071.25

Note: In descending order based on capital pledged (in EUR m). Preliminary data for 2022 and 2023. Totals for all 14 countries in the Danube Region.
Source: fDi Markets

Notably, IT and software services have been on a dynamic upward path and enjoyed an exceptionally strong year in 2022 (Figure 12; see Appendix C for a country breakdown). The growing competitiveness in the IT and software services sector, combined with the relatively strong digital skillsets discussed in the previous section, is providing good foundations for multiple Danube Region countries in the digital transformation. The top recipients of FDI projects in this sector were Germany, Romania, Hungary,

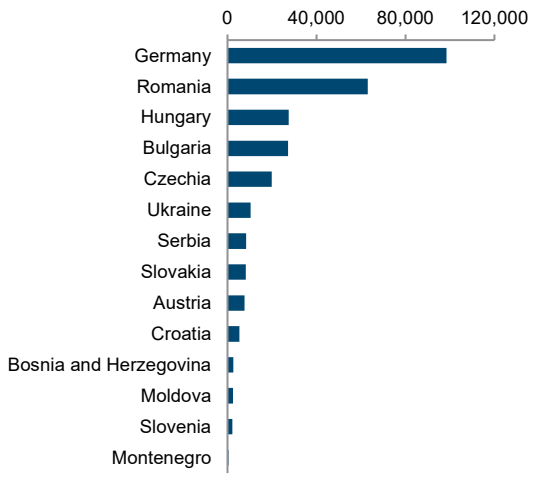
Czechia and Bulgaria (Figure 13). On the other hand, several Western Balkan countries appear to be lagging when it comes to attracting IT-oriented FDI, which threatens to broaden digital divides across the region. While Germany and Romania experienced steady and substantial growth from 2003 to 2023, Romania has experienced rapid increases in its IT sector, especially since 2014 (see Appendix C). In contrast, Bosnia and Herzegovina showed minimal growth, with values remaining nearly stagnant. Moldova and Montenegro also exhibited limited development, with only slight changes over the years.

Figure 12 / Greenfield FDI in IT and software services in the Danube Region- number of FDI projects (left axis) and number of jobs created (right axis)



Note: Preliminary data for 2022 and 2023. Totals for all 14 countries in the Danube Region.
Source: fDi Markets

Figure 13 / Jobs created by greenfield FDI in IT and software services in the Danube Region, by country, cumulative 2003-2023 (number of jobs)

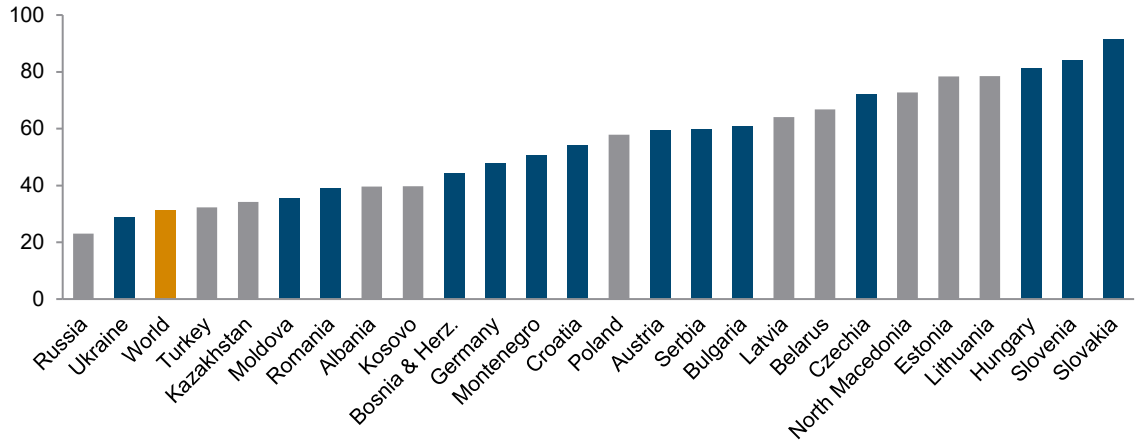


Note: Preliminary data for 2022 and 2023. Totals for the full time period.
Source: fDi Markets

5. INDUSTRIAL DEVELOPMENT

As discussed in the previous section, FDI has played a major role in shaping the industrial landscape of the Danube Region. Owing to these FDI flows, countries in the Danube Region now rank among the most export-oriented economies in the world, with countries like Slovakia, Slovenia and Hungary having exports of goods and services above 80%, which exceeds by far the global average of roughly 30% (Figure 14). This outward orientation can be attributed to the fact that they have tight interlinkages with regional production networks centred around Germany (and, to a lesser extent, Austria), together forming the Central European manufacturing core (Stehrer and Stöllinger 2015).

Figure 14 / Exports of goods and services (in % of GDP, 2023)



Notes: The data for Russia are from 2022.
Sources: World Bank, national sources, Eurostat, wiiw

Table 2 / Global rankings of Danube Region countries in the Economic Complexity Index 2021 (ranking)

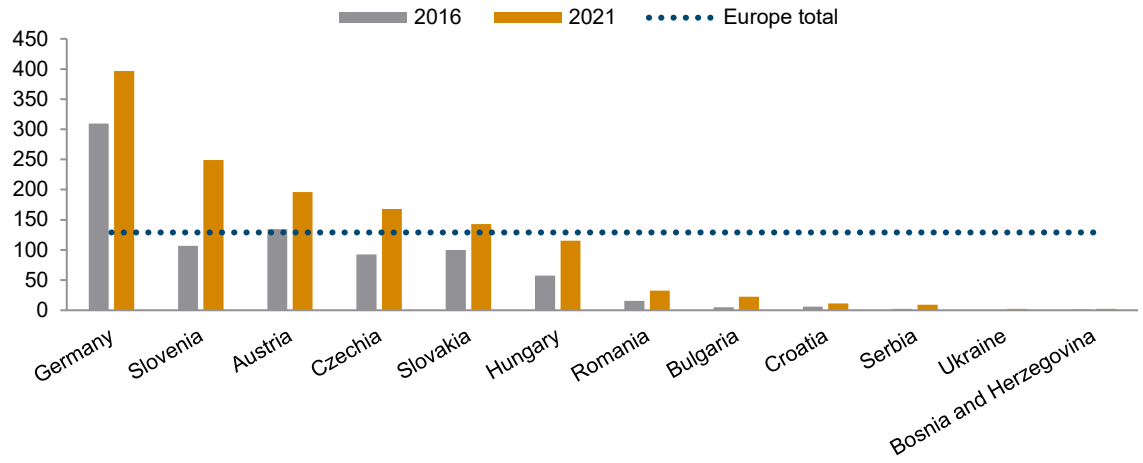
Country	Rank
Germany	4
Czechia	6
Austria	7
Slovenia	9
Hungary	11
Slovakia	12
Romania	19
Croatia	31
Bosnia and Herzegovina	32
Serbia	37
Bulgaria	39
Ukraine	49
Moldova	62

Source: The Atlas of Economic Complexity of the Growth Lab at Harvard University (https://atlas.cid.harvard.edu/rankings)

The industrial integration of the Danube Region countries is further manifested by their strong positions in the Harvard Growth Lab's Economic Complexity Index, which finds that Germany, Czechia, Austria and Slovenia are among the top 10 most complex countries in the world in terms of their export sophistication, driven by their orientation towards automotive and electronics manufacturing. Similarly, Hungary, Slovakia and Romania all rank in the top 20 (Table 2).

Moreover, the presence of multinational enterprises with state-of-the-art production capabilities enables countries in the Danube Region to make leaps towards Industry 4.0, including greater adoption of automation technologies. At the same time, with the availability of labour becoming a growing issue (as discussed in Section 2) and labour costs rising, robotisation is becoming an increasingly attractive solution for companies operating in the Danube Region (Astrov et al. 2022). Indeed, according to the International Federation of Robotics (2022), Germany accounted for 5% of the world's robot installations in 2021, making it the fifth-largest market for robots globally. When it comes to robot density in the manufacturing industry, in addition to Germany, countries such as Slovenia, Austria and Czechia have also robotised their industries far beyond the European average (Figure 15). Furthermore, as the figure illustrates, the robot density across several Danube Region countries has increased notably in the five-year period between 2016 and 2021. Slovenia, Slovakia, Austria and Hungary all show notable increases. However, disparities across the region persist. For example, whereas Romania and Bulgaria experienced only modest growth, Croatia, Serbia, Ukraine, and Bosnia and Herzegovina remain far below the average European levels of robotisation.

Figure 15 / Robot density in the manufacturing sector (installed robots per 10,000 employees)

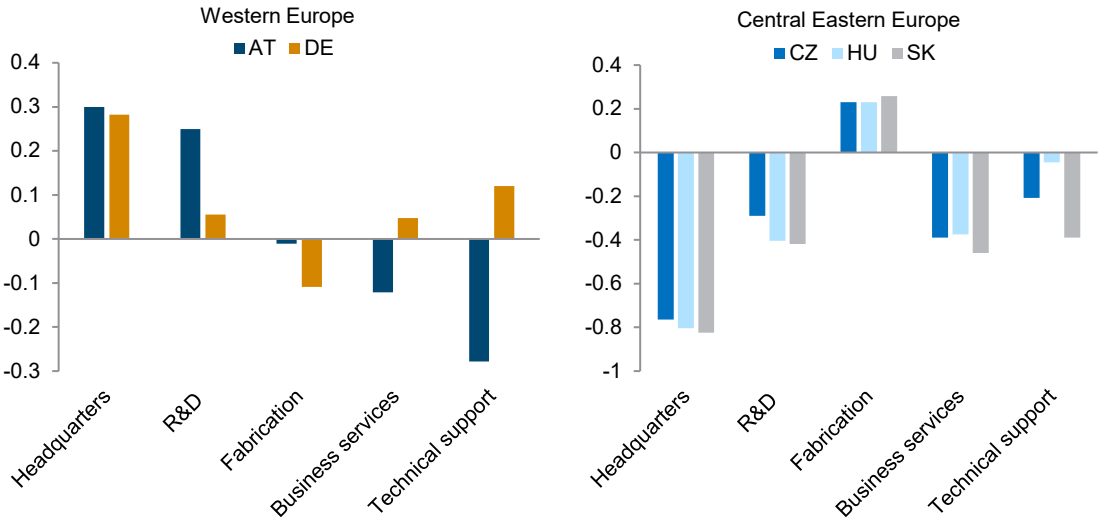


Source: International Federation of Robotics (2022)

It is also important to point out that the FDI-driven development path has also come with its own unique set of challenges. While the type of industries that many Danube Region countries concentrate their efforts in are indeed those of relatively high technological sophistication, it is vital to distinguish the types of tasks ('functions') that are being carried out. From this perspective, Stöllinger (2021) and Kordalska et al. (2022) show that there are distinct labour divisions between European countries. Specifically, whereas Western European countries (e.g. Austria and Germany) tend to be specialised in the pre- and post-production

stages of the production process, CESEE countries tend to solely specialise in production (Figure 16 illustrates this on selected countries in the Danube Region). While such complementary functional specialisation patterns can be deemed to contribute to the industrial competitiveness of the region as a whole (since each country takes care of the activity that it is relatively best at), it can become challenging for those specialised in production to break away from their specialisation. Given that the production stage is regarded the least value-adding of the entire production process (Mudambi 2008), this creates a risk of being caught in a 'functional' middle-income trap (Stöllinger 2021; Grieveson et al. 2021).

Figure 16 / Functional specialisations of selected Danube Region countries (Index)



Note: A country with exactly the functional profile of the EU would have a value of 0. Values above 0 indicate relative specialisation in the given business function against the EU benchmark. Based on cumulative FDI data for the 2003-2021 period.
Source: fDi markets. Replication of the results of Kordalska et al. (2022), following the approach of Stöllinger (2021).

One contributing factor to why the CESEE countries of the Danube Region find it difficult to break away from their position as Europe's factory lies in their rather passive stance towards industrial policy – with the choice of which sectors and functions should grow traditionally being left to the hands of the market alone (Zavarská et al. 2023; UNIDO 2024). Hence, without more active interventions to promote structural change, the move away from their current positions as 'dependent market economies'[4] to more innovation-driven ones with their own national champions is hard to imagine (Zavarská 2024). Moreover, with other EU member states (as well as other major global economies) becoming more prominent users of industrial policy in recent years, the threat looms large that the gap between advanced and converging countries will grow even wider. In this sense, to mitigate subsidy races while stimulating the upgrading of less developed countries, collaborative solutions to industrial policy making are needed (UNIDO 2024).

[4] A term used by Nölke and Vliegenthart (2009).

6. POLICY PRIORITIES AND CONCLUSIONS

The Danube Region is a diverse geographic, cultural and economic region, which has undergone significant changes in recent decades. This includes deepened regional integration – not least through the eastward enlargement of the EU and ongoing EU accession processes – as well as impressive growth and convergence across the region. As this short policy note has illustrated, a number of Danube Region countries now rank among the most export-oriented, complex, industrialised and robotised countries in the world. At the same time, many of these economies have high shares of educated youth with very good levels of digital literacy. However, the Danube Region also faces both lingering and emerging challenges, as well as persistent disparities, which need to be addressed to ensure sustainable development. Taking these challenges and global trends into account, in this section, we now turn to outlining the policy priorities for the Danube Region going forward. We divide the discussion into three main themes covered by the policy note, namely: (i) skills development (particularly focusing on digital skills), (ii) FDI attraction (especially focusing on investments in IT and software services), and (iii) industrial development and robotisation.

(i) Skills development

Close the remaining gaps in education attainment. While most countries in the Danube Region are characterised by very high levels of young people with at least secondary education, there are some countries that fall behind in this respect. Specifically, as identified Section 3, Hungary, Romania, Germany and Moldova underperform the EU average, influenced by factors such as urban-rural disparities or challenges with the inclusion of ethnic minorities and immigrants. In these countries, targeted policies for a more inclusive education system are called for to achieve universal access to education. This includes a range of strategies, such as boosting investments in schooling infrastructure in disadvantaged regions, providing specialised trainings to teachers in these areas, and focusing on migrant integration in addition to identifying and providing ongoing support to pupils at the highest risk of early school leaving.

Formulate and adapt national digital skills strategies to reflect different starting points. As highlighted in this policy note, there is a digital divide across the Danube Region, with some countries holding a competitive edge while others are falling behind. For countries like Czechia, Austria, Croatia and Hungary, which are already characterised by relatively high rates of digital literacy, strategies should target upskilling and increasing the role of ICT specialists in labour markets. This means focusing on more advanced digital skills and incorporating them into curricula of different educational levels; incentivising firms to adopt state-of-the-art digital solutions (e.g. cloud computing or AI technologies) and thereby stimulating demand for more ICT specialists in labour markets; and targeting digital sectors in their Smart Specialisation strategies. In countries characterised by lower levels of basic digital skills among the general population but high digital literacy among young people (e.g. Bosnia and Herzegovina, Slovakia and Montenegro), stimulating life-long learning policies and reskilling schemes among older populations stand out as particularly important. In this respect, incentivising firms to regularly provide training opportunities to employees would be one means of boosting the digital literacy of older populations. Finally, for countries with weak digital skill adoption across the board (e.g. Bulgaria, Serbia and Romania), modernising the digital infrastructure and ensuring universal access to the internet – especially in rural areas – are a priority.

Facilitate knowledge sharing across the region. Given the major cross-country differences in the digital sphere, creating platforms for mutual learning, increasing cross-border training and exchange programmes, and building capacity can help to accelerate the digitalisation of the Danube Region as a whole. By partnering across borders, countries can facilitate the exchange of knowledge, spread technological advancements and gain access to broader markets, which in turn can boost industrial growth and competitiveness, particularly for the less developed participants (UNIDO 2024). With the Danube Region already being a well-integrated region with tight investment and trade linkages, these networks can be further enhanced through common policy frameworks. A country like Austria would be well positioned to lead such an initiative, given its solid digital skillset and orientation towards IT in labour markets, combined with its strong investment and trade ties with other countries in the Danube Region. Furthermore, harmonising on aspects such as e-government standards can offer a conducive way to advance the digitalisation of the public space in the Danube Region.

(ii) FDI attraction

Take a more targeted approach to FDI attraction to maximise positive economic impact. As Section 3 has shown, there are major differences across the region when it comes to the ability to attract FDI projects, and manufacturing sector projects in particular. With less productivity-enhancing sectors (e.g. real estate or fossil fuel extraction) still playing a dominant role in some countries of the region (e.g. Bulgaria, Ukraine and Serbia), there is a need to adopt FDI-attraction policies that would help to advance economic development and enhance economic complexity. This means setting a number of well-defined priority sectors that match the host country's current capabilities and future priorities while also offering tailored incentives to foreign firms in these promising fields. Similarly, in countries that have not been able to attract any sizable greenfield FDI inflows (e.g. Moldova and Montenegro), fostering a stable and favourable business environment while strengthening the role of investment promotion agencies may feature as a policy priority. Given the especially favourable growth effects on CESEE countries of FDI originating from Austria and Germany (Jovanović and Hanzl-Weiss 2023), promoting stronger investment linkages within the Danube Region can have positive developmental impacts for such countries. By contrast, those countries that are already significant recipients of FDI in advanced industries but have found themselves in the positions of 'assemblers' within value chains (e.g. Hungary, Slovakia and Czechia), dovetailing FDI policies with innovation policies will be critical (as discussed in greater depth in the next section). At the same time, given the notable regional disparities in the FDI stocks even in these countries, augmenting the role of investment promotion agencies in lagging regions is also needed. Here, the regional office network of Czechia's investment promotion agency (CzechInvest) can serve as a role model, as it operates across the country to gain insights into the specific needs and capabilities of local economic actors before tailoring appropriate FDI policies (Zavarská et al. 2023).

Capitalise on the dynamism recently seen in IT software and services. Considering the strong growth of greenfield FDI projects in the IT sector seen in the Danube Region as a whole, there is potential for the region's countries to emerge as digital front-runners in the global economy. However, for the opportunities to materialise, a differentiated policy approach based on prevailing conditions in individual countries is needed. For countries like Germany and Czechia, which are already competitive in gaining IT-oriented greenfield FDI projects while also boasting solid digital skills (as discussed above), priorities may be centred around cluster formation and advancing innovation. For countries like Romania, which have received substantial IT-oriented FDI projects but are still characterised by low levels of digitalisation, what is crucial is to translate the successes in FDI attraction into wider economic

wins. This entails different policies to generate spill-over effects and build linkages to ensure that multinational enterprises are connected to the local economy rather than operating as isolated success stories. Those countries that have not received much greenfield investment in the IT sector and lag in terms of digital skills adoption (particularly in parts of the Western Balkans), it will be very difficult to attract investors without first cultivating suitable conditions. In this regard, focusing on skills development, educational reform to reflect the latest technological developments, and digital infrastructure-building should be prioritised to ensure that these countries do not fall even further behind in the digital transition. Temporarily relying on tax incentives for skilled IT workers may be an effective way to achieve 'brain gain' and attract shared service centres in the IT industry in these less developed countries (Manelici and Pantea 2021). However, as the Romanian experience shows, one needs to be careful not to over-extend the support in a way that exacerbates regional inequalities (UNIDO 2024).

(iii) Industrial development and robotisation

Rethink industrial innovation policies in a way that enables moving up the value chain. While most Danube Region countries perform exceptionally well when it comes to the sophistication of their export baskets, only two of the 14 economies (i.e. Austria and Germany) specialise in tasks beyond simpler production activities in these advanced sectors. Hence, in order to improve the region's position in value chains, it is imperative to formulate more proactive industrial innovation policies. Particularly for the most industrialised and economically complex countries of the region (e.g. Czechia and Slovenia), the focus should be on switching from imitation to innovation through a well-functioning national innovation system (Zavarská et al. 2023; 2024). To this end, inspiration can be drawn from the experiences of Ireland and Singapore, which have strategically leveraged their FDI stocks to transform themselves over time into innovation leaders. These efforts entailed a wide array of policy interventions, including, among others, taking a highly selective approach to FDI attraction (commonly referred to as 'innovation as invitation' in the case of Ireland), providing financial incentives for multinational enterprises to form partnerships and linkages with local firms, tailoring the education system to desired sectors, and providing suitable infrastructure for desired FDI projects (see Zavarská et al. 2024). Beyond the innovation-oriented FDI-attraction policies inspired by Singapore and Ireland, this also entails a broad set of policies to help domestic firms to climb up the technological ladder, such as increasing the availability of R&D incentives (particularly in the form of grants), supporting clusters and identifying promising niche markets (Zavarská et al. 2024). It is also important to note that, given the increased competition faced in future-oriented technologies even by traditional innovation leaders (e.g. Austria and Germany), these kinds of enhanced innovation policies are equally critical for the most advanced countries in the region.

Foster robotisation to drive productivity growth and free up scarce labour. Incentivising greater automation of low-skill tasks can represent an effective way to boost productivity while counteracting the impacts of demographic decline. Some countries in the Danube Region (e.g. Germany, Slovenia, Austria, Czechia and Slovakia) have already made significant strides in this direction and have increased their robot density in manufacturing to high levels, including by global standards. In these countries, the priority is to further enhance the efficiency of production processes through automation, to integrate cutting-edge technologies (e.g. AI), and to provide worker training to ensure compatibility between the human and the robot inputs to the production process. However, we also find that many countries in the Danube Region have a very low level of robot adoption. Considering that these countries (e.g. Ukraine, Serbia, Croatia and Bulgaria) are also the ones that are projected to have notable shrinkages in their workforces in the years ahead, there is a need to create stronger incentives to robotise and automate production. To this end, as

highlighted by Grieveson et al. (2021), inspiration can be drawn from Scandinavian countries, where productivity-enhancing automation was coupled with robust social policy to provide a safety net in the transition process (Sandbu 2020). Specifically, in the first instance, minimum wages were increased in a way that made labour costs relatively higher, thereby encouraging greater automation. Second, to ensure that labour markets adjusted to this change rather quickly, barriers to job mobility were minimised, making the transition process of employment smooth. However, these growth-enhancing and disruptive policies were accompanied by wide-ranging welfare measures (e.g. income support and tax reliefs) along with training and reskilling programmes to mitigate social fallout.

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APPENDIX A

Table A.1 / Jobs generated by inward greenfield FDI projects in the Danube Region by country, 2003-2023 (number of jobs)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
RO	30070	41169	76219	202560	170352	261748	69968	61050	70173	50695	60025	35994	42369	2648	6117	7447	80342	54301	53653	20987	23106
DE	27577	20399	18965	25829	28802	63142	36398	36294	40170	27291	32294	26485	34781	47919	49983	48728	57712	46448	36359	35074	24160
CZ	28961	35852	30439	46731	39745	31915	23997	27198	24024	16316	18234	16329	21134	17395	19995	19108	14090	15422	22183	10462	5568
HU	39473	40086	55396	51967	51023	43826	23910	31205	18780	12990	12501	12720	18200	23731	17564	21061	22434	14162	14511	14722	20995
SK	17489	22489	34499	45221	35290	19175	16099	22744	23920	10247	10627	8161	8414	12549	12731	8949	14436	7535	10201	11296	7716
RS	7125	6933	9053	13861	25108	40620	15099	16595	23891	29224	19686	22421	19123	32443	33117	40059	28173	6642	8160	14125	7909
UA	13849	17771	20213	29321	33653	40021	19495	21311	10212	12130	11159	3573	2917	7041	10315	10981	3868	6202	7263	3616	9390
BG	16768	18081	23878	87948	59299	51464	14999	19805	13042	10062	9009	5994	13125	9818	12842	18679	19288	3778	5802	6506	9217
AT	12433	9558	9594	4998	7334	9207	4849	8543	7395	4507	3489	3522	2655	7485	5998	7974	7355	3804	4729	3387	1830
HR	6747	3348	6709	3364	12042	19181	4894	18760	6975	4190	3078	3196	3500	3427	2724	4779	7665	2500	3094	2586	5064
SI	3674	7479	3310	4374	4378	5626	1649	4820	2347	2760	706	1755	987	2640	2023	2991	2315	3232	857	928	1622
BA	5768	3633	7167	1289	5826	8969	3807	1276	5322	3507	2724	2227	5665	3542	4137	3752	2336	867	839	1880	10121
MD	578	1205	1637	2000	1073	1195	2135	2514	1761	1059	1072	1027	2808	4600	2937	1060	567	1047	439	328	717
ME	291	-	-	330	3423	2556	1740	936	2073	698	1801	1097	326	6282	248	7318	1175	431	232	174	307

Note: The data for 2022 and 2023 are preliminary.
Source: fDi Markets

APPENDIX B

Table B.1 / Jobs generated by inward greenfield FDI projects in the Danube Region by country and sector, cumulative 2003-2023 (number of jobs)

	AT	BA	BG	HR	CZ	DE	HU	MD	ME	RO	RS	SK	SI	UA
Aerospace	683		1463	1323	2749	14100	2508			2093	1248	732	155	774
Alternative/renewable energy	295	1823	11081	1580	1508	5010	2282		428	11774	3083	1444	71	1717
Automotive components	9733	5435	17470	1180	60187	19451	59934	19880		74576	62639	45269	2153	10145
Automotive OEM	8243	3488	6129	585	30454	29078	29943	108	99	21826	9706	38067	3997	9226
Beverages	224	116	1722	355	710	1121	1867		174	3382	2114	272	156	2368
Biotechnology	2417	30	11	100	349	4855	319			83	100	147	723	19
Building & construction materials	392	1770	3198	522	1605	833	3968		500	9319	2524	2018	52	4660
Building materials	38	88	220	70	35	1770	183	222		888	385	217		900
Business machines & equipment	630		2698	826	9371	4721	5000			7723	4519	5634	147	1283
Business services	2372	1077	6823	1281	2872	29017	7884	294		21648	2756	2329	716	1510
Ceramics & glass	474	30	11976	93	3045	3760	2135	820		5744	721	2018	80	4437
Chemicals	1979	332	1538	881	3201	11726	9305	120		6839	5644	2172	436	2129
Coal, oil & gas		238	900	348	272	2724	436	4507	586	4678	868	653		2993
Coal, oil and natural gas	933	4727	11161	4107	3455	14729	7962		426	33045	6426	2423	2884	8085
Communications	4351	1169	7022	2724	8512	43275	31605	1944	501	18817	2711	7017	1400	7234
Consumer electronics	2267	456	6756	595	13024	10034	12210	1060	24	11049	7256	11018	2147	9656
Consumer products	9295	5930	27144	11903	46535	104920	24790	2490	786	45144	14777	21038	6844	23434
Electronic components	5340	6102	9603	2138	30009	34475	44176	8586		36960	30621	34128	1820	8112
Engines & turbines	891	125	38	135	1269	2627	4471			319	1122			125
Financial services	3484	2818	10314	1536	14187	15480	23343	1329	648	19252	7570	5059	1845	12567
Food & beverages	1505	2648	8951	2515	5837	6763	4140	6441	2344	34848	11348	3271	1126	10249
Food & tobacco	6577	9190	40766	5140	17503	19489	26317		2336	120952	29731	7764	6128	42521
Healthcare	378	61	1584	10	128	2186	606	14		2747	764	2400	312	20
Hotels & tourism	4161	2295	12422	9841	7826	12586	13086	672	16799	11647	4237	1899	1080	8703
Industrial equipment	1960	1492	2253	718	6954	16307	5277	832	65	4745	4164	8195	1330	1405
Industrial machinery, equipment & tools	6101	1165	8679	665	20406	23521	16609		17	15196	5036	7801	356	1966
Leisure & entertainment	2552	71	5976	2190	2540	4990	5901	702	4	4785	2682	1721	374	923
Medical devices	1026	25	1313	247	3107	7839	6711	36		544	1521	2615	353	71
Metals	1430	3645	10313	1680	6549	13264	15145	160	355	26108	14191	15710	322	5212
Non-automotive transport OEM	919		1227	589	4255	4864	2469		62	2625	2945	282		871
Paper, printing & packaging	1273	190	1913	129	4193	8119	11722	22		1676	391	1981	495	970
Pharmaceuticals	3761	625	2363	1489	3605	12823	5898	72	95	4404	2325	786	1122	397
Plastics	1927	474	2309	676	11847	11139	10952	48		3550	2941	6216	909	4844
Real estate	11372	13898	142993	50149	110971	102408	95836	3894	5721	770759	116439	94198	13487	68386
Renewable energy	262	1318	532	818	313	9145	1323	218	618	2150	3546	200		1883
Rubber	53	7	2221	329	6829	4270	10692			17284	7576	2604	360	60
Semiconductors	4193		746	320	1285	14221	5212			989	580	1260		2837
Software & IT services	5352	1484	20393	4117	17015	69365	19682	2167	405	41407	5676	5874	1450	8830
Space & defence			1517		176	1641	215			456	20	118		3795
Textiles	15774	8124	20387	13865	15889	64384	9985	4844	1169	33225	42132	7008	5003	10463
Transportation	5455	344	3447	1845	10807	34839	16896		372	10045	1718	6931	1327	1844
Transportation & warehousing	3488	910	1348	2339	3826	17661	2196	441	118	2237	693	3421	811	4952
Warehousing & storage	1061	63	443	183	683	2711	773		17	787	3879	466	63	1883
Wood products	199	2028	3343	737	2772	4009	4518			13699	1436	2667	190	1591

Note: The data for 2022 and 2023 are preliminary.
Source: fDi Markets

APPENDIX C

Table C.1 / Jobs generated by inward greenfield FDI projects in the IT and software services sector in the Danube Region by country, 2003-2023 (number of jobs)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
AT	147	211	66	467	723	578	273	234	775	208	167	53	122	535	190	124	156	356	647	1412	280
BA		38	27	218	20	28	38	57	129	3	91		34	152	230			34	343	1099	20
BG	68	390	463	1500	1234	1581	178	2449	451	586	581	1508	325	1483	1369	2605	2288	718	1602	4079	1758
HR	38		180	70		235	96	19	211	136	88	81	223	890	64	413	623	127	538	911	455
CZ	2496	807	1164	3064	1328	864	389	1179	246	509	540	482	758	1118	442	622	471	318	564	1746	780
DE	1579	1719	2168	2382	4007	4900	3126	3041	5310	3268	5443	3763	5213	5975	5807	4188	7692	4231	8893	9990	5687
HU	693	1254	2873	3409	927	1344	1231	632	453	865	592	475	1141	2227	2209	402	487	1612	1541	1883	1316
MD			30	30	168	40	170	326	16	76		536	200		130		76	50	161	328	124
ME																			91	109	205
RO	413	1270	1076	6383	2733	3906	866	3942	2425	1432	2457	2890	8183				6220	2241	2773	8834	5011
RS	95	76	254	142	439	246	38	222	577	671	346	192	112	271	436	236	504	366	415	1878	916
SK	345	645	279	521	829	205	1164	59	379	168	221	235	138	148	150	138	120	110	37	1795	517
SI		246		201	18	122	38	57	123	94	27		34	78	34	127		133	171	401	262
UA	154	323	187	558	566	418	200	647	205	248	530	281	437	406	438	1021	565	569	1673	658	256

Note: The data for 2022 and 2023 are preliminary.
Source: fDi Markets

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