Report on Productivity and Competitiveness

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Please note:

The material presents the opinions of the authors from IHA, and need not reflect the official opinions of the Ministry of Economy of the Slovak Republic. The purpose of this publication is to

animate and improve professional and public debate on current economic topics. All opinions included herein should therefore be attributed to IHA and not the Ministry of Economy.

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Introduction

The aim of the present Report on Productivity and Competitiveness (hereinafter referred to as the "Report") is to identify the challenges of public policies in this area based on independent diagnosis and analysis of the development of productivity and competitiveness. This aim is in line with the EU Council Recommendation of 20 September 2016 on the establishment of National Productivity Boards (2016/C 349/01).

The structure of the report is based on the decision of the Working Group on Business Environment, Export and Investment of the Government Council for Competitiveness and Productivity of 19 May 2022. Since this is the first such report prepared under the auspices of the Ministry of Economy of the Slovak Republic, it was designed to cover all key aspects affecting the productivity and competitiveness of Slovakia in some depth. Future reports should be more focused on a deeper examination of selected aspects of productivity and competitiveness in Slovakia.

The first chapter describes the development of productivity and its individual components, while trying to identify the reasons for the slowdown in its growth. Structural factors are considered mainly in the context of the standard period from the financial crisis to the pandemic crisis, as the multifactorial crises since 2020 may could mask deeper structural challenges. The second chapter deals with soft and hard indicators of competitiveness and their comparison within the EU. The third chapter looks at the density and quality of physical infrastructure (transport, energy and telecommunications), while the fourth chapter looks at the development of soft infrastructure, i.e. the skills necessary to raise the economy to a qualitatively higher level. The final chapter attempts to quantify the cost of doing business in terms of taxes, labour and energy prices.

The report focuses on the comparison of selected indicators and public policies, primarily with other V4 countries (Poland, Czechia and Hungary), with which Slovakia shares a similar starting position and similar economic development challenges. These indicators and policies are also compared with the EU average, or with Germany as the prime mover of the region's economy, or with Estonia as a leader among the new EU Member States.

Summary and recommendations

Structural factors in the quality of education, the business environment and innovation which slowed down labour productivity growth in Slovakia after the global financial crisis have been further exacerbated by the accumulation of multiple crises on the demand and supply sides. This has had a negative impact on aggregate labour productivity. FDI's impact on productivity growth has been exhausted. The presence of foreign investors has provided only limited support to the productivity of domestic companies, as domestic enterprises do not have significant involvement in the supply chains of multinational companies. Increases in efficiency within the manufacturing sector have stalled.

Technological progress is no longer contributing enough to economic growth to accelerate productivity growth. This natural weakening was not compensated by more robust investments in information and communication technologies, nor has there been sufficient growth in the educated or trained workforce needed for activities making intensive use of knowledge and

technology. The Slovak economy is not keeping up with the pace of global technological development. It provides only slight support for growth based on advanced knowledge and high-level skills. Future productivity growth will require accelerated digitalisation and a shift towards a knowledge-based economy. Limited resources in the business sector may constitute barriers to growth, especially in a time of accumulating crises, in particular energy, inflation and climate crises.

This state of affairs is confirmed by Slovakia's unsatisfactory position in the composite competitiveness ranking created for this Report based on selected sub-indices, pillars or elements in the indexes of seven supranational organizations. These were selected, considering the objective of the Report, to eliminate the risk of bias from one institution or giving excessive importance to any of the competitiveness factors. Only in the category of physical infrastructure does Slovakia achieve relatively good results. This is also shown by hard data, according to which the gap in transport, energy and telecommunications infrastructure in relation to Germany as a benchmark is not unbridgeable. It was the solid physical infrastructure combined with the geographical proximity of the target markets and low labour costs compared to the "western" EU countries that drove the rapid growth of FDI and integration in global value chains. However, physical infrastructure alone is not enough to raise the economy to a qualitatively higher level.

Significantly more lagging behind is shown in "soft infrastructure", which is the key to future economic development. The digital economy can only be a new engine of productivity if it has access to a large enough talent pool and a high digital capacity in both enterprises and the state. However, the education system produces many graduates who do not go on to work in their field and few of the technical graduates needed for digitalisation. In the context of the European market, Slovakia is a source of talent for ageing economies. The quantified[1] economic losses from the brain drain are high. The pandemic has accelerated the use of information and communication technologies in both households and enterprises. Slovakia is below the EU average in households' use of online communication with the public administration or in the digital intensity of enterprises.

The differences between the better performance of sectors with foreign capital and the weaker performance of sectors with predominantly domestic capital affects not only digital capacity, but also the implementation of other innovations. Small businesses are lagging behind. The duality of the Slovak economy in productivity, digital intensity or the introduction of innovations is the result of a long-term economic policy favouring larger companies over smaller ones and anchoring foreign investors more significantly in manufacturing industries than in highly innovative sectors of the economy. This is confirmed, for example, by the very low number of sophisticated product groups in which Slovakia has a comparative advantage.

The outlook for improvement in the foreseeable future is not bright. Existing, domestically-owned companies are struggling to establish themselves on foreign markets, while the foreign direct investment of Slovak companies in relation to GDP is extremely low, even in comparison with new EU countries. The likelihood that the upcoming generation of domestic enterprises will change this is also low. In the "soft" category of entrepreneurship, which monitors the ability, willingness and conditions of entrepreneurship, Slovakia is at the tail of the EU.

[1] According to a preliminary estimate by ISA in cooperation with VAIA, the state loses 2.8 million euros in constant 2022 prices with the loss of one university-educated person.

Slovakia continues to be an attractive destination for work demanding moderate skills. The sharp increase in labour costs in the last decade was from a low base, and therefore the share of labour costs in value added remains amongst the lowest in the EU. However, other V4 countries are in a similar position, whereas Slovakia does not excel in other aspects of cost competitiveness in the region. The implicit corporate tax rate and electricity prices for business are among the highest in the EU.

Table 1 below summarizes the main recommendations that could bring about a partial reversal of the above-described unflattering situation in Slovakia's productivity and competitiveness. Numerous strategy papers have done a good job of identifying structural challenges and measures that could reasonably be adopted to address them. The key thing, however, is their implementation, which is not yet adequate.

Table 1: Main recommendations

Area	Recommendations
Strategy papers	Consistent implementation of the Recovery and Resilience Plan, which offers a comprehensive response to the structural challenges of the Slovak economy. Consistent implementation of the National Strategy for Research, Development and Innovation and the Recovery Plan in the following areas: Twenty-first century education, higher education performance improvement, more effective science, talent attraction and retention. Consistent implementation of priorities and schedules in the construction of road and rail infrastructure.
State support	In times of permanent crisis, the production capacity of the economy must be preserved to prevent productive and promising companies from leaving the market. New FDI should be oriented towards knowledge-intensive economic activities. The digitalisation and automation of small and medium enterprises should be supported. A blueprint for the coordinated development of industrial parks should be prepared. The effectiveness of training programmes for future and start-up entrepreneurs should be reviewed in relation to the survival rate of enterprises in their first years of operation.
Regulatory environment	E-government services should be made more accessible and user-friendly. Changes in legislation and circumvention of the standard legislative process should be less frequent. The administrative and regulatory burdens on business should be reduced Cooperation with other countries in the region in the area of digital challenges should be expanded.
Business costs	The focus of the tax mix should focus more on the types of taxes that are less harmful to business and economic growth. Ways to reduce retail electricity prices for the unregulated part of the business sector should be examined. Compensation for indirect CO_2 costs from Envirofond sources should be substantially increased.

Source: IHA

1. Productivity of the Slovak economy in the domestic and international contexts

The aim of the chapter is to determine how far Slovakia's productivity lags behind developed countries and to identify at least part of the reasons for the slowdown in catching up. The purpose of such identification is to asset in designing economic policy measures that will help to increase labour productivity. This is a prerequisite for economic growth and raising the standard of living, especially in a time of dual transformation of economies, both digital and green.

The report divides the long-term development of productivity into three phases according to the condition of the Slovak economy. The first period is defined by the years 2000 to 2007, when global growth peaked and Slovakia expanded its production capacity through FDI. At that time, the economy was helped by a well-disciplined economic policy as Slovakia sought to join the euro area and adopt its common currency, the euro. The second period is 2010-2019, from the post-crisis recovery to the eurozone debt crisis, the beginning of geopolitical tensions between Russia and Ukraine and the cooling of global demand. The development of productivity in the years 2020 to 2022 is considered separately due to the effects of the COVID-19 pandemic and the subsequent accumulation of crises.

For the purposes of the report, productivity is defined as GDP per hour worked, except where it is defined otherwise for interpretation or statistical reasons. Hourly productivity takes into account different working hours across countries and the use of part-time work, which remains hidden when measuring productivity per worker. Hourly productivity is an especially useful measure for the pandemic period. Hours worked better reflect the actual consumption of labour (work input) in a period of limited economic activity. The number of workers is a less accurate indicator when they are protected by government schemes (to a different extent in each country).

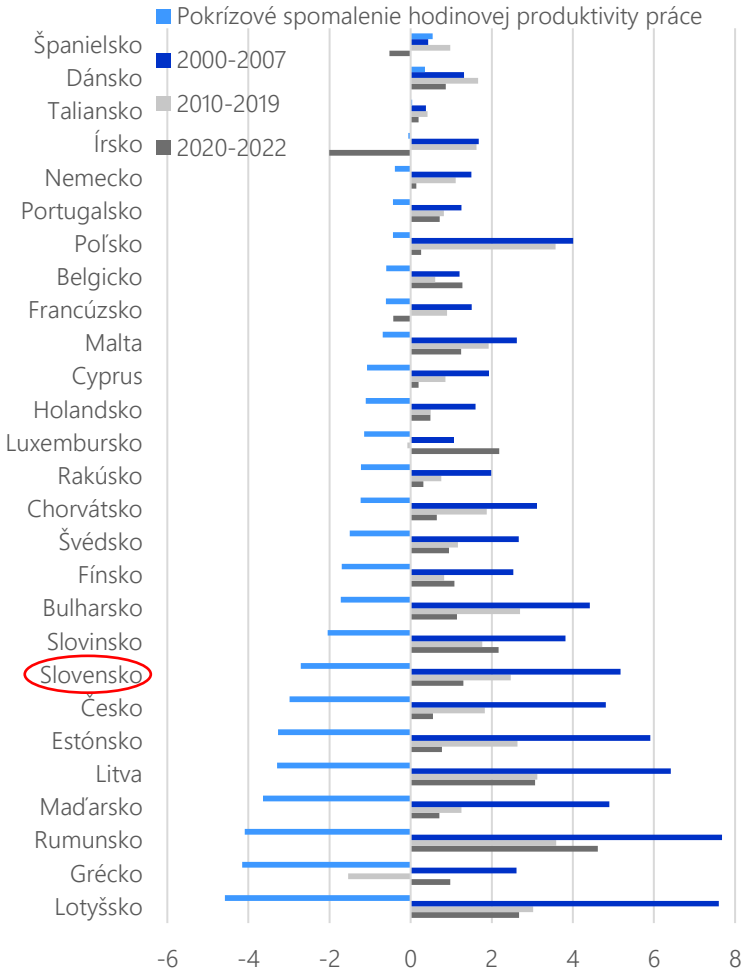
1.1 International comparison

The reason why European and international authorities are paying more attention to productivity is because its growth has slowed, especially since the global financial crisis of 2008–2009. Slovakia's problem is that the slowdown was sizeable (see figure 1) and has put back its previously successful catching-up to developed countries (see figure 2). Before the financial crisis, FDI helped productivity to grow rapidly, albeit from a lower initial base. This, however, was not enough to provide more than a temporary boost to productivity. After the crisis, productivity growth slowed to a third of its pre-crisis rate and Slovakia also lost its leading position in the V4 bloc (see figure 3). The slowdown in productivity without significant employment support meant that Slovakia's economic growth weakened more than the other V4 countries (see figure 4). The supportive impact of technological progress on productivity and economic growth has diminished, more so in Slovakia than in other V4 countries, and Slovakia has not reaped the dynamizing effects of a quality workforce (see figure 5) or investment in information and communication technologies (see figure 6).

In the early days of the pandemic, hourly productivity increased, but without a stronger economic basis (see section 1.3). The growth was episodic and temporary. Under pressure from compounding demand and supply crises, productivity declined in 2022. Structural factors are considered mainly in the context of the standard period from the financial crisis to the pandemic

crisis, as the multifactorial crises since 2020 could obstruct the view of deeper structural challenges.

Figure 1: Hourly labour productivity at purchasing power parity (average annual growth rate, %) and its post-crisis slowdown (2010–2019 vs. 2000–2007, p.p.) in the EU27

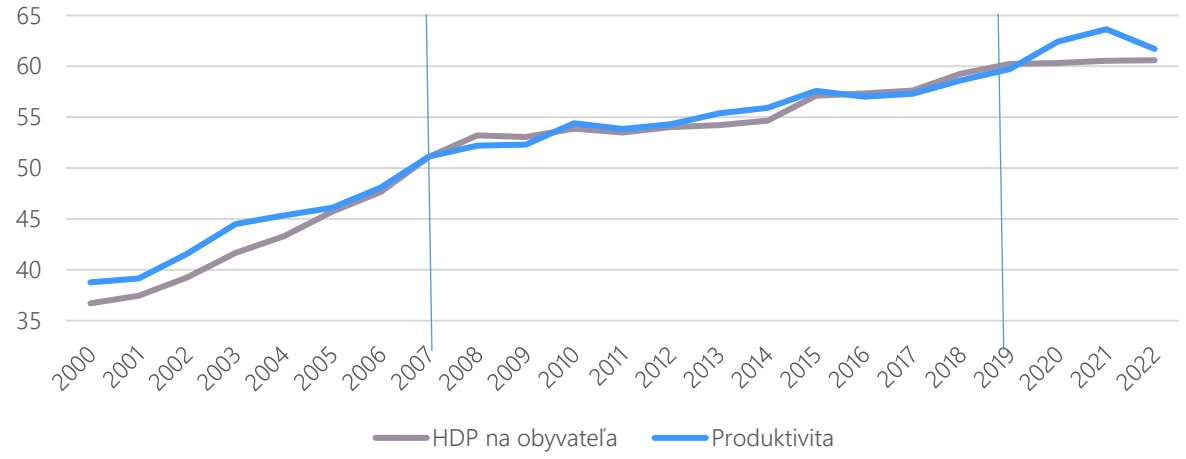


Sources: The Conference Board Total Economy Database™[2], April 2022, IHA calculations
Note: Countries are ranked by the rate of productivity slowdown after the global financial crisis.

Both productivity and living standards, as measured by GDP per capita, stagnate just above 60% of Germany's level (see figure 2). The convergence of living standards is hampered by weaker productivity growth, but also by a lower rate of the population's participation in the workforce. Even after workforce participation increased in 2022, Slovakia is in the lower third of EU countries. The share of people of working age is declining, though there is spare capacity in some population segments. The employment gaps for mothers with young children, the low-skilled and marginalised communities cannot be narrowed without structural changes in the areas of education (meeting the needs of the labour market, an inclusive school system and an inclusive labour market), health (increasing healthy life years), the availability of necessary services (childcare) or housing (development of a functional rental housing system).

[2] Cross-material data reproduced with the permission of The Conference Board
Total Economy Database™ - Sources & Methods | The Conference Board (conference-board.org)

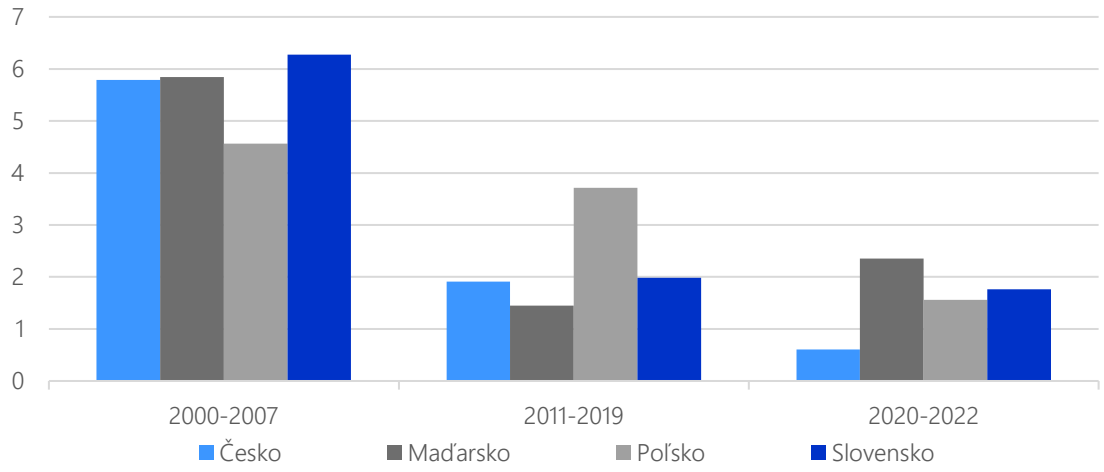
Figure 2: Relative productivity and GDP of Slovakia at purchasing power parity (Germany = 100)



Sources: The Conference Board Total Economy Database™, April 2022, IHA calculations
Note: 2022 – TED™ Forecast

After the financial crisis, productivity growth slowed to a third of its pre-crisis rate and Slovakia also lost its leading position in the V4 bloc (see figure 3). Given the long-term preference for low-value-added production and exports, high productivity growth was unsustainable. While comparable countries have slightly increased the share of domestic value added in exports, Slovak integration in global value chains is stagnating at the level of processing of imported intermediate products (Giorno, 2019).

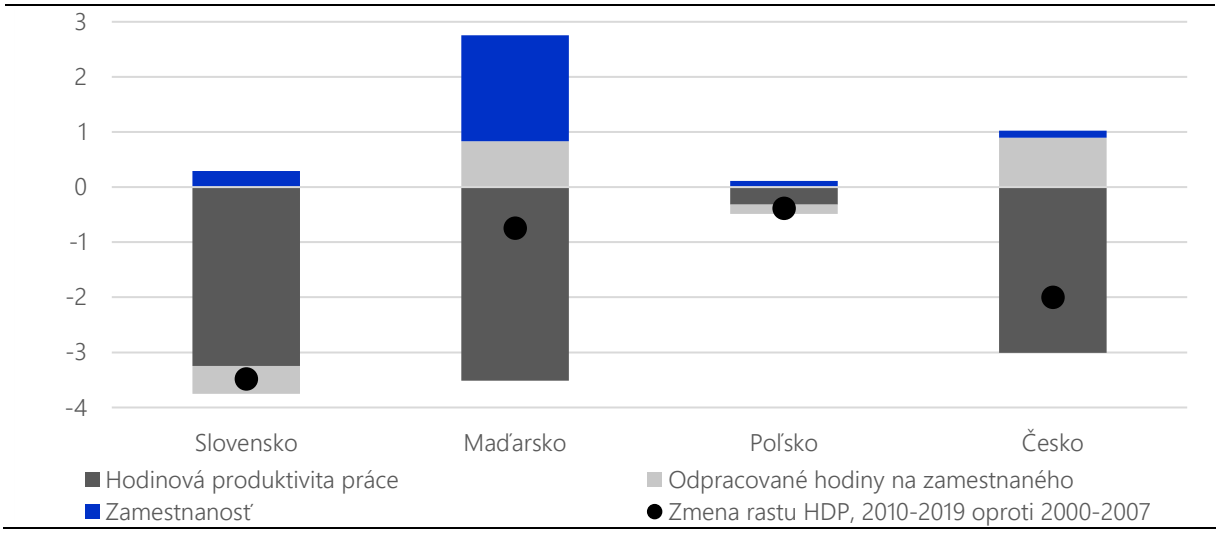
Figure 3: Average annual growth rate of hourly labour productivity (constant prices, %)



Sources: Eurostat (2023) [NAMA_10_A10], IHA calculations

Economic growth has slowed (see figure 4) in the industrialised, export-oriented economies of Czechia, Hungary and Slovakia. In Poland's diversified economy with a larger domestic market, GDP growth has declined only slightly. After the financial crisis, Hungary supported economic growth by increasing employment and the number of hours, Czechia mainly by increasing hours worked. Lacking structural reform, Slovakia could not access similar growth channels and so its post-crisis GDP growth rate slowed the most among these countries.

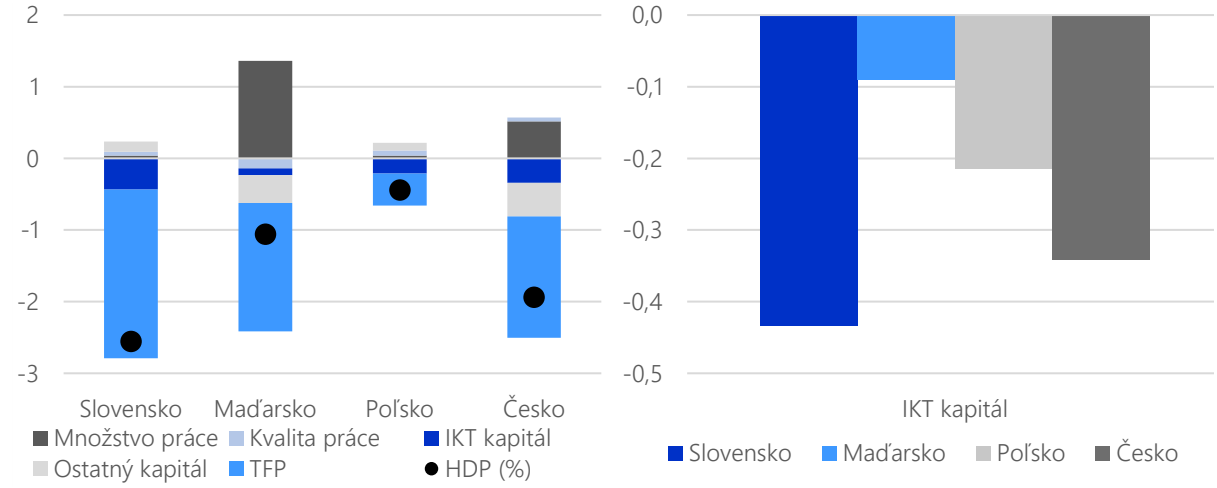
Figure 4: Decrease in GDP growth rate after the financial crisis (average growth in 2010–2019 vs. 2000–2007 p.p.)



Sources: OECD, IHA calculations

Figure 5: Decomposition of GDP growth slowdown into ICT, other investments, labour and technological progress (2010-2019 vs. 2000-2007, p.p.)

Figure 6: The negative contribution of ICT to GDP change (in 2010–2019 vs. 2000–2007, p.p.)



Sources: The Conference Board Total Economy Database™, April 2022, IHA calculations

Productivity and economic growth are hampered by lagging behind in technology and the quality of the workforce. There has been a deterioration in the overall productivity of the factors of TFP (see figure 5), based on technological progress, streamlining management processes and the adoption of quality management systems from foreign investors. The slowdown was greater in Slovakia than in its neighbouring countries. There is considerable room for improvement in the quality of the workforce. Reduced investment in ICT (software, hardware, telecommunications equipment, databases, research and development) has hindered economic growth the most among the countries in the region (see figure 6). New technologies, ICT and the quality of the

workforce cannot by themselves create future growth unless innovation is kindled in place of low costs.

Slovakia is not keeping up with the pace of global technological development and is not building on the quality of work given by the qualifications and skills of workers. In the composite competitiveness ranking of EU Member States prepared for this Report, it was ranked 19th in technology infrastructure, 21st in innovation (the worst ranking among the V4 countries) and 22nd in human capital (see section 2.1). According to the Reform Compass of the Slovak Economy, technological capacity is a serious retarding factor, although it is compensated by high capital endowment (Habrman, Habodászová and Šrámková, 2022). The country is lagging behind in one of the basic factors necessary for dynamizing productivity and gaining a competitive advantage, i.e. in innovation, especially in products (see section 4.4). One third of the innovators here are multinational corporations based abroad. Only Luxembourg, a traditional headquarters of multinational corporations, has a higher share of innovators from other EU countries. The activity of multinational corporations in the Slovak economy is concentrated mainly in large manufacturing enterprises. The domestic sector and small enterprises lag behind in innovation activity. There are gaps in the use of digital tools for information sharing, big data analysis, artificial intelligence and protection against cyberattacks in the business sector (see section 4.3). Companies pay less attention to ICT training for their employees. They face a shortage of STEM graduates and workers with advanced digital skills (see section 4.1). The high-tech sector is not developed enough to provide a wide range of jobs for highly qualified workers (see section 4.6). The size of the knowledge economy, measured by employment in the high-tech business sector, is relatively small in Slovakia, the smallest in the V4 countries after Poland.

Box 1: The problem of purchasing power parity and the data source used

Purchasing power parity (PPP) is a conversion unit taking into account differences in price levels between countries, which allows for an international comparison of variables respecting price variation. The Eurostat method for calculating price levels in Slovakia at PPP shows increases that are not supported by national statistics. This results in an unfavourable development of convergence at PPP. As Hlaváč (2023) demonstrates, Eurostat statistics are affected by shortcomings in the input data, in particular changes in the methodology for estimating housing rent expenditure in national accounts after the benchmark revision in 2019, changes in the reporting of dwelling area for the purpose of calculating PPP and, in the past, the failure to account for intermediate consumption in rent. Therefore, the usefulness of an inconsistent time series is limited, especially considering the differences in the measurement of price levels and inconsistencies in the calendars of statistical revisions (Dujava, Žúdel, 2023).

The Total Economy Database™ (TED™) is used in this report for international comparisons of PPP-adjusted indicators. It was developed by the University of Groningen in the Netherlands and is maintained by The Conference Board, a non-profit network of global business leaders, for 130 countries. In this database, PPP is anchored in 2017 and other years are extrapolated in the database using GDP deflators. This does not change the finding that Slovakia's convergence with developed countries is slowing down. The advantage of this approach is the consistency of the time series without (economically uninterpretable) step changes in annual changes in

variables. The disadvantage is the simplified approach of the TED, though this is still outweighed by the consistency.

The TED™ database also supplies a module on the sources of economic growth, i.e. the quality and quantity of the workforce, ICT, other investments and total factor productivity (TFP). The module integrates datasets from Harvard University and the Groningen Growth and Development Centre. It defines the quality of the workforce as the contribution of the educational structure of workers to GDP growth. With higher employment of more educated people, the contribution of "quality of work" to GDP growth increases. With a higher number of hours worked and employees, the contribution of work quantity increases. Their contribution to GDP growth depends on the composition of investments in ICT (hardware, software, communication equipment) and other investments. TFP is the difference between GDP growth and the contributions of the "quality" and quantity of work, ICT and other capital. The content of TFP is technical progress, inefficiency, imperfect competition or variable returns on a scale instead of the assumed constant ones.

1.2 The reasons for slower productivity growth in the domestic economy

The barriers to productivity growth are structural. In particular, FDI's capacity to drive productivity growth has been exhausted. Specialisation of the economy, especially in the automotive industry, gave a boost to rapid productivity growth before the financial crisis. In the current period of dual transformation, its impact on productivity growth may be limited. It is already apparent that the contribution of car production to value added was disproportionately low compared to its share in production and employment (car production accounts for about 5% of national value added in both Czechia and Slovakia, but its 15% share in Slovakia's production is relatively high compared to 10% in Czechia). The rate of value added from production has not increased significantly so far. The challenges and threats faced by the automotive industry are also a threat to aggregate productivity in Slovakia.

The presence of foreign investors in the country has not been enough to transform the productivity of domestic companies (OECD, 2022). The transfer of total factor productivity from multinational corporations to the domestic sector ("spillovers") is limited. The average productivity of domestic companies did not significantly converge with the higher productivity of foreign companies as potential for spillovers remained untapped. According to the OECD, this is due to the low level of involvement of Slovak enterprises in the supply chains of multinational companies. Therefore, the gap between the higher productivity in foreign companies and lower productivity in domestic companies has persisted, especially in small and medium enterprises.

Spillover effects are also limited due to the concentration of foreign investment in sectors with a low level of value added (i.e. a low share of value added in production), where there is weak spillover potential. An example given by the OECD is the assembly of cars. Slovakia participates in supplies with lower value added (see Box 5). Small market size is also a barrier to the involvement of domestic firms in the supply chain. As mentioned by the OECD, branches of multinational corporations are more integrated with the local market in larger economies than in small, open economies. Studies prior to the financial crisis already pointed to low expectations of spillovers (e.g. Ferenčíková, Fifeková, 2008). Although subsidiaries use the same technology as parent companies, most of them do not own the intangible assets, do not depreciate them, and

do not make financial preparations to acquire new intangible assets. Ferenčíková and Fifeková identified the quality to price ratio as a competitive advantage for domestic manufacturing companies, which have low prospects for technology transfer.

The reasons for slower productivity growth may also include the lack of structural change and the persistence of Slovakia's position in global value chains (see Box 5). According to A. Kordalska and M. Olczyk (2023), the involvement of the European economies in global supply or value chains changed countries' specialisations from products to functions. While production activities are carried out in the new EU Member States, the old Member States with corporate headquarters specialise in research and development. The study mentions Slovakia (and Poland) as countries with an unfavourable position in global supply chains specialising in low-added-value production functions.

Between 2017 and 2019, intra-sectoral labour productivity declined and caused a cumulative decline in productivity (Košta et al., 2020). According to this study, the increase in efficiency within the manufacturing sector, which had hitherto driven overall productivity growth, has stalled. At the same time, employment in highly productive sectors grew at the expense of less productive ones. The structural change in employment had a positive effect on overall productivity, but could not compensate for the decline in sectoral productivity. At the same time, the results of the study showed a more significant effect from the transition from low-productivity to high-productivity sectors in comparable economies than in Slovakia. This would mean that the structural shifts in neighbouring countries were more dynamic than in Slovakia.

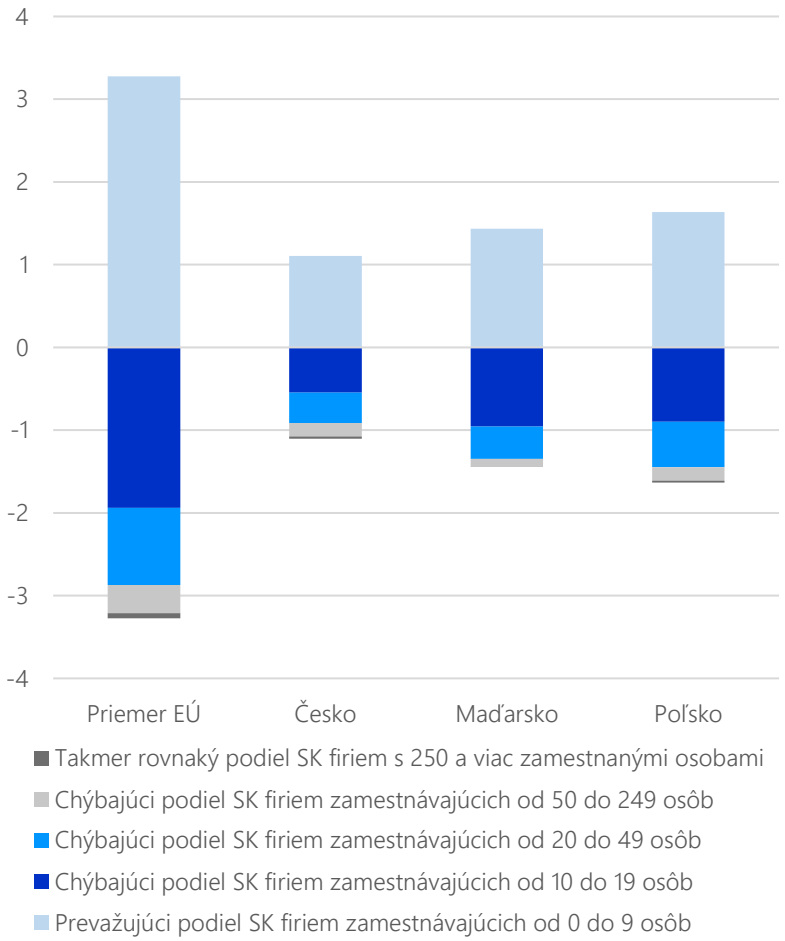
Just as Slovakia's economic model, dominated by car production, is running out of sectoral efficiency improvements, it now faces not just the challenge of diversification, but also of digital and green transformation. Resources for diversification and the dual transformation of the business sector are limited. Especially considering that profit primary source of financing for investments. Small and medium enterprises are particularly dependent on profit to finance their investments. Profits and investments are concentrated mainly in manufacturing, real estate activities, transport and storage. This concentration points to a limited capacity for economic diversification in future (OECD, 2022). The sectoral concentration of profits is demonstrated by the concentration of income tax in public budgets. In normal years, the 30 largest economic entities together paid a quarter of total corporate income taxes (Finstat, 2021). In 2021, the year marked by the pandemic, they paid a third (IFP, 2022).

There is a lack of productive domestic enterprises with digital capacity in the Slovak business population. The highly digitally intense part of the economy in Slovakia is relatively small, with the small and medium enterprise sector particularly lagging behind. At the same time, small and medium-sized enterprises are generally attributed higher productivity, especially in digitally demanding sectors (McKinsey, 2022).

There is a shortage of mid-sized enterprises in Slovakia (see figure 7). It is dominated by micro-enterprises with low productivity and limited human and financial resources for automation and digitalisation. At the same time, the level of productivity increases with the size of the company (Institute for Strategy and Analysis, Office of the Government of the Slovak Republic, 2020). The greatest shortfall is in manufacturing enterprises with 10 to 49 employees. The share of companies with 250 or more employees is typical for the EU.

The risk of factors hindering productivity growth persists. It is multiplied by increased material and energy costs, and the uncertainty of demand due to the war in Ukraine. Weakened economic growth, lower purchasing power of the population due to high inflation, and static employment with persistent uncertainty (of both demand and the labour market) indicate weaker prospects for productivity in the short run. In the longer run, future productivity growth depends on accelerated digitalisation and a transition towards a knowledge-based economy.

Figure 7: Difference in the size structure of enterprises in Slovakia compared to the EU average and surrounding countries (p.p., 2021)



Sources: Eurostat (2022) [SBS_SC_OVW], IHA calculations

1.3 Productivity changes during the COVID-19 pandemic and risks to future development

Hourly productivity growth (see figure 8) in the first year of the pandemic was the fastest since the post-crisis recovery in 2010 (6% year-on-year in 2020). The acceleration was related to

changes in economic activity. In the following year, productivity continued to grow (2.9%) and was the main source of year-round GDP growth almost without any contribution from hours worked. Productivity fell in 2022 (by 2.5% year-on-year), the most since the crisis slump in 2009. The decline in aggregate productivity was mainly due to developments in industry, where the increased costs of multiple crises limited the creation of value added.

Figure 8: Development of real labour productivity (year-on-year change, %)

Source: SO SR

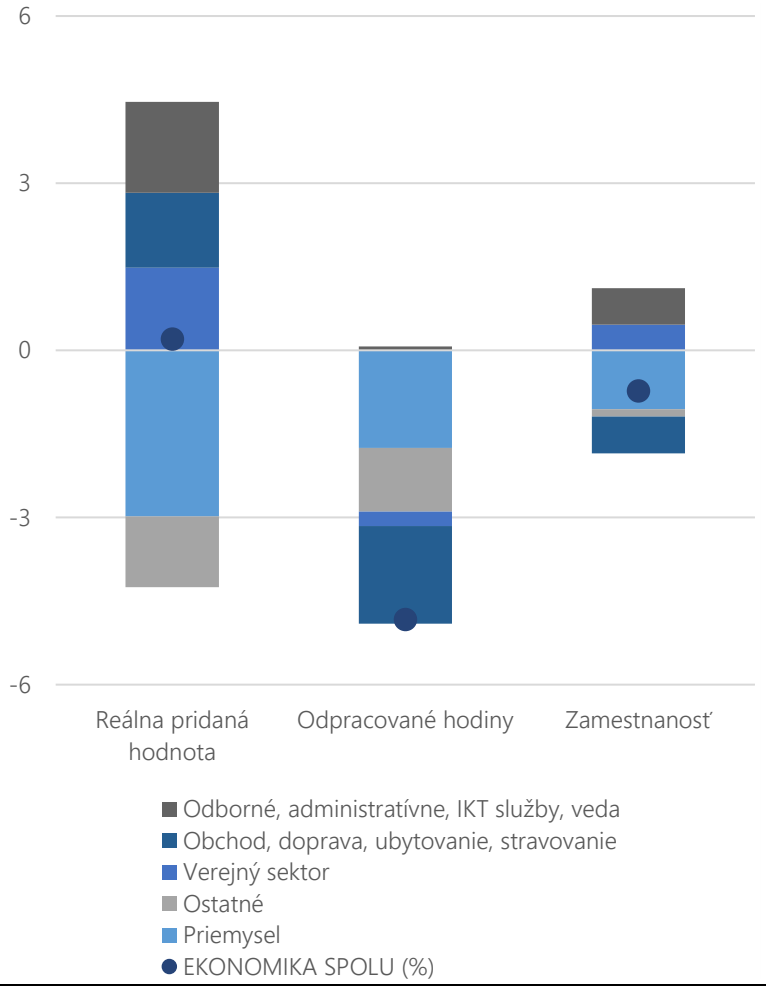
The hourly labour productivity of the Slovak economy increased at the beginning of the pandemic, mainly due to the redistribution of activity between sectors. The pandemic reduced activity in lower-productivity sectors such as arts, entertainment, personal services, accommodation and catering. Industries with higher productivity, such as information and communication services and professional, scientific and technical activities, gained more weight in the economy. Interruptions in the supply chain, shortages of imported components and logistics problems led to a reduction in value added creation and aggregate productivity in the manufacturing industry. In all sectors, the number of hours worked decreased in response to falling demand, trade restrictions and anti-pandemic measures.

A positive development in this period came from the acceleration of digitalisation and automation of processes and support for the ICT sector in Slovakia. A negative factor was the temporary exclusion from the economy of certain supplies (accommodation, catering, part of passenger transport and trade, art and culture). Professional, administrative services, ICT and science increased output despite an initial decrease in hours worked. The coronavirus crisis necessitated more digitalisation and automation of processes and increased demand for this service segment. Increased productivity has strengthened the sector's position in the economy and its contribution to value added compared to the pre-pandemic period (see figure 9).

Sectors that rely heavily on in-person interaction have managed to increase hourly productivity since the beginning of the pandemic despite a period of decline in aggregate productivity in 2022. Retail, transport, accommodation and catering did not lose productivity even when there was an extraordinary reduction in hours. During the pandemic, there was an intensification in e-commerce, postal and transport services and courier activities. After the relaxation of anti-pandemic measures, strong domestic demand was restored, benefiting not only retail but also

accommodation and catering. Instead of increasing hours worked, the sectors that rely heavily on in-person interaction have used labour productivity reserves to cover significant demand.

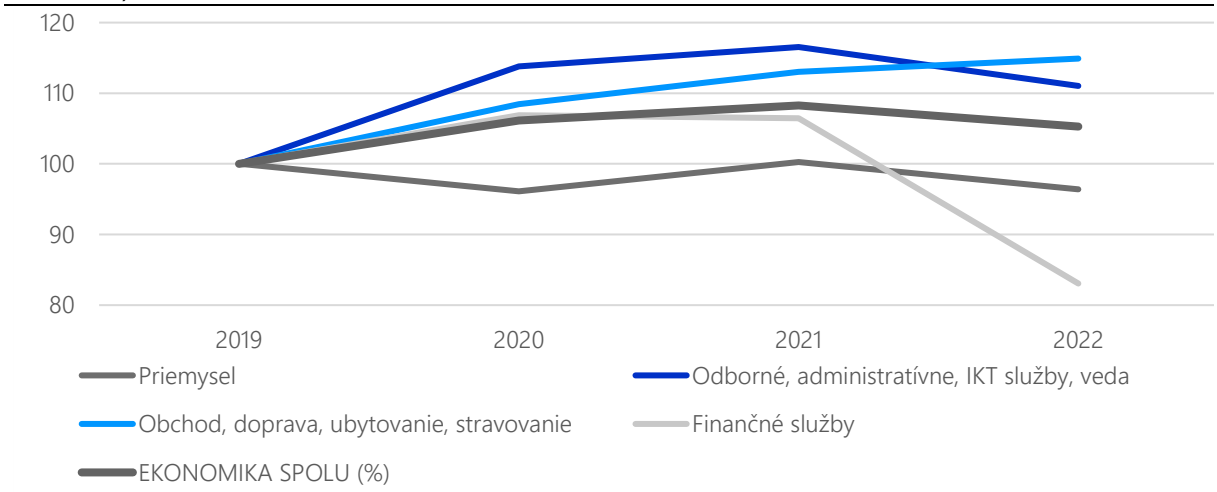
Figure 9: Industries' contributions to changes in 2022 compared to the year before the pandemic 2019 (p.p.)



Sources: Eurostat (2022) [NAMA_10_A10], IHA calculations

The coronavirus crisis did not cause significant financial damage to companies with permanent consequences; in most cases, lost sales could be compensated by lower costs. Nevertheless, it put them in a situation that was more vulnerable to new shocks (NBS, 2022). Energy, price, food, demand and other shocks have accumulated since Russia's military attack on Ukraine (in February 2022). The accumulation of rising costs, volatile foreign demand, persistent uncertainty about future domestic demand while, at the same time, maintaining employment (after the experience of labour shortages in the pre-pandemic period) limited the growth of value added per hour worked. With the exception of retail, transport, accommodation and catering, hourly productivity declined across the board in 2022 (see figure 10). Industry had the largest share in the aggregate decline in productivity, while financial services and professional, administrative and ICT services also recorded a correction.

Figure 10: Development of hourly productivity in selected sectors of the Slovak economy (index 2019=100)

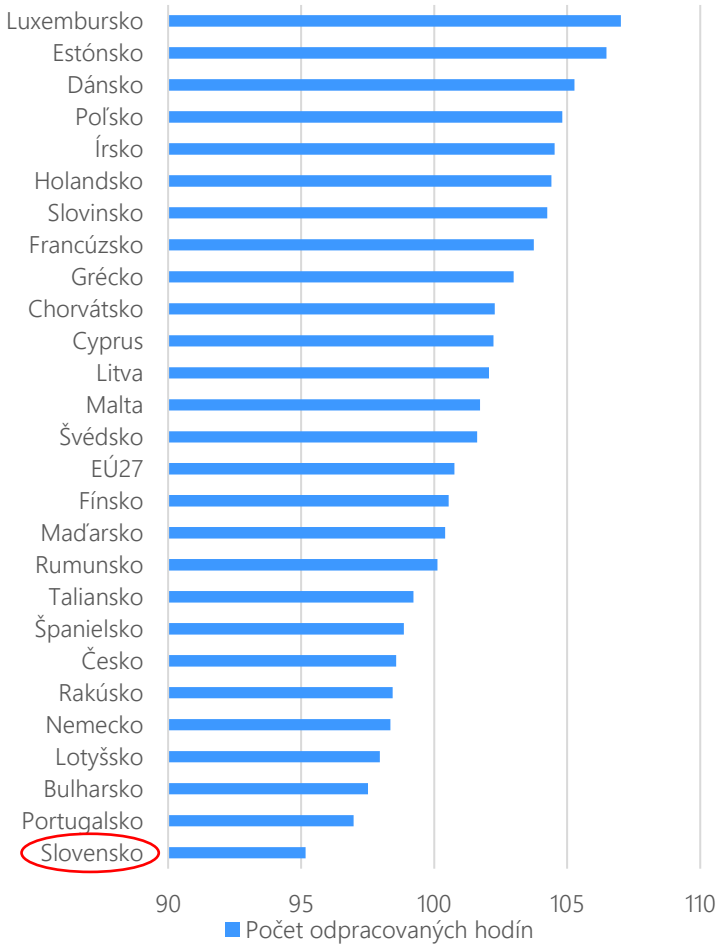


Sources: Eurostat [NAMA_10_A10], IHA calculations

The decline in productivity was also related to companies' efforts to restore the number of hours worked. The hours worked in the economy increased in 2022 but did not reach their pre-pandemic level. The EU as a whole restored the number of hours worked to the pre-pandemic level as early as the end of 2021. Among EU Member States, Slovakia lags the furthest behind its pre-pandemic levels of hours worked (see figure 11). Industry was particularly affected due to both weakened demand and measures taken to optimise production in response to a changed cost structure.

Employment did not fall as sharply as hours worked; in 2022 it was only 0.7% below the level of 2019. In addition to the standard protection against layoffs, employment was cushioned by new government schemes to preserve jobs. State support for wages during reduced working hours (known as "kurzarbeit"), contributions to companies and the self-employed, partial remission and deferral of insurance and pension contributions, subsidies for rent or credit programs prevented job losses and helped to maintain income from employment. The measurement of productivity in terms of GDP per employee showed a decline in the first year of the pandemic due to the number of workers unable to work then.

Figure 11: Number of hours worked in the EU27 in 2022 (index 2019=100)



Sources: Eurostat [NAMA_10_A10], IHA calculations

Government assistance in the first year of the pandemic provided some support for Slovak companies' productivity, without which the decline in productivity per employee would have been deeper (Bighelli et al., 2021). Wage subsidies, despite concerns about inefficient distribution, were not directed to inefficient enterprises. They were primarily used by high-productivity enterprises, i.e. enterprises with the highest pre-pandemic productivity (see table 2). The widely feared risk of the needless rescuing of problematic companies was not realised, according to study findings. Only a small part of the subsidies was allocated to failing enterprises with the worst results in declining productivity and, at the same time, in company size. The authors of the study also considered whether late receipt of a subsidy could cause the premature exit of a failing company from the market before its support from the state. The size of this effect was assessed to be low. In Slovakia, only 0.04% of companies that were in decline in 2019 left the market in the first year of the pandemic. The most frequent recipients of wage subsidies were in low-tech, low-skill sectors, including services reliant on in-person contact that were most affected by the pandemic (restaurants, accommodation, travel agencies, transport services). Slovakia provided greater support to high-skill and technology-intensive processes. This reflects the dominant role in the structure of the Slovak economy played by the car industry, considered in the study to be part of a technology-intensive cluster. Slovakia supported only 1% of highly productive enterprises with less than three years in operation, whereas Croatia, for example, supported 2.8% of start-ups.

Although total government aid benefited productivity, it could provide only partial compensation for the strong economic downturn.

Table 2: Distribution of state pandemic support in 2020 (% of wage subsidies)

Enterprise cluster	Slovakia	Croatia	Slovenia
High-productivity	32	34	30
Low-productivity	6	7	10
Productive startups	1	3	1
Zombies	5	3	2
High intensity of technology and skills	33	16	23
Low intensity of technology and skills	62	76	71
Growing	11	16	12
Declining	3	2	3

Source: Bighelli et al. 2021

Note: Clusters are not mutually exclusive, an enterprise may be included in several clusters.

The risk of current development is that the accumulation of crises (permanent crisis) could take down the productive companies as well as the unproductive ones. For long-term productivity development, it is important to maintain the production capacity of the economy and prevent the departure from the market of productive companies capable of contributing to the digital and green transformations.

Another risk for the further development of productivity is the quality and quantity of human capital. The number of persons fit for work in the aging population is decreasing, and the shortage of qualified workers is worsening due to the unreformed Slovak education system. The cleansing effect of the permanent crisis cannot lead to the reallocation of human capital to more efficient sectors if the necessary human capital is unavailable. Consistent implementation of the Recovery and Resilience Plan in the field of education and digital transformation is therefore all the more vital for economic policy.

The digital capacity of enterprises in Slovakia is another risk factor. In order to ensure sustained productivity growth, digital transformation and process automation must be embraced not only in large enterprises, but above all in micro, small and medium-sized enterprises. An OECD study of the impact of the COVID-19 crisis on productivity (OECD, 2021) found that there is scope for support measures in economic policy as well as timely monitoring of investments in information and communication technologies.

2. Competitiveness of Slovakia from an international perspective

The concept of national competitiveness can be defined as the set of institutions, policies and factors that determine the level of productivity of a country (WEF, 2016). In other words, national competitiveness itself can be replaced by the term productivity and ways of directly stimulating productivity can be pursued (Porter, 1990; Krugman, 1994; Zábojník, Čiderová and Krajčík, 2020). For the purposes of this report, competitiveness is considered in a broader context, including the ability to place the economy's production on foreign markets and attract investments to the country, ideally with higher value added.

The aim of the first part of the chapter is to analyse Slovakia's position in the competitiveness rankings in more detail and identify the key factors determining this position. Considering the relatively wide variety of approaches used in practice to rank countries by their competitiveness, a methodology to aggregate them into one, comprehensive ranking was seen to be needed. The results were supplemented by the proposed measures of several supranational institutions such as the OECD, the IMF and the EU Council. Hard data is evaluated in Chapters 3 and 4.

The second part of the chapter looks at national competitiveness through the lens of hard data from foreign trade and the balance of payments, which indicate the country's ability to attract foreign investment of various levels of sophistication and the ability of domestic enterprises to establish themselves in foreign markets.

2.1 Evaluation of the competitiveness of the Slovak economy in the international context

There are many indicators, reports and assessments of the state of the business environment, productivity and competitiveness from every corner of the world. It should be noted that recognised competitiveness rankings cover almost all the countries in the world, and thus include a mixture of various indicators suitable for various countries in the world at various stages of development.

Box 2: IHA Competitiveness Ranking

To give a better picture of how the Slovak economy measures up in competitiveness, a ranking of the competitiveness of EU Member States was created based on the most recently published data in selected sub-indices, pillars or elements of seven supranational organizations (referred to in the methodology as components of the ranking). The ranking defines eight categories of competitiveness: physical infrastructure, innovation, technology infrastructure, human capital, entrepreneurship, regulation, labour market and governance. Slovakia's position was compared with 26 other European Union Member States (Malta being omitted due to lack of data). Creating a bespoke ranking eliminates the risk of bias that could arise from evaluating an index from only one supranational institution or organisation.

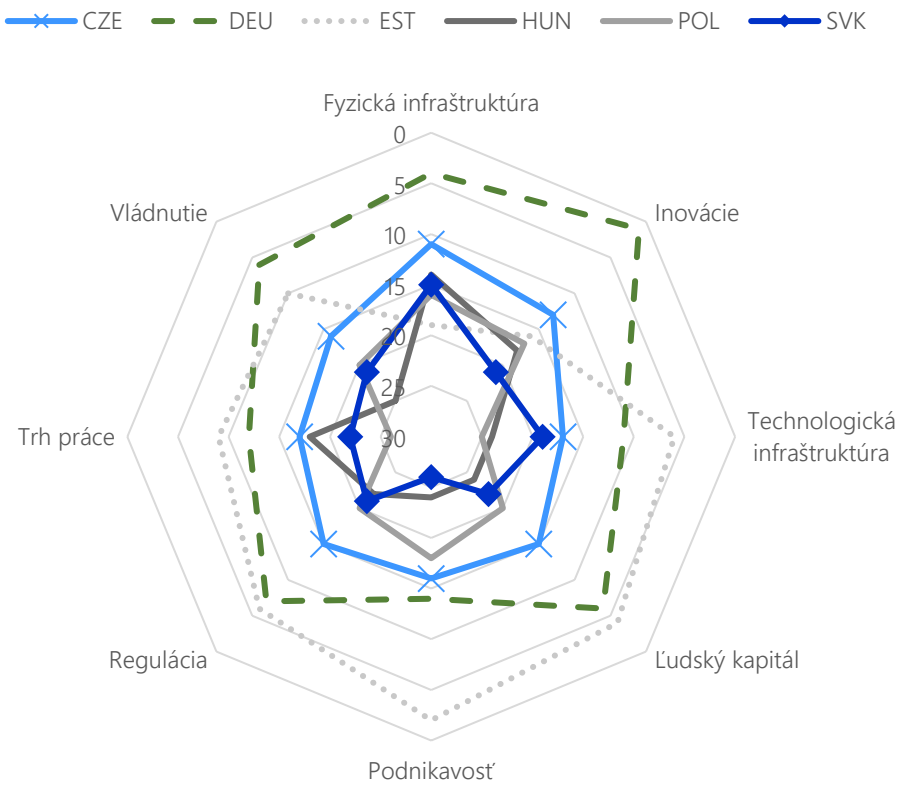
Essentially, the procedure we adopted was to calculate weighted arithmetic averages of the positions of EU Member States in selected indicators (components). The calculation could not treat pillars and sub-indices equally. It was decided that a pillar would have a weight of 1 and a sub-index, an element or indicator would have a weight of 0.2. The disadvantage of the procedure is the fact that due to methodological changes affecting most indicators, it is not

possible to compile historical series. On the other hand, our approach allows for a relatively simple international comparison of the competitiveness of EU Member States over one time period, or the latest period for which data is available. Further information on the methodology of the ranking is given in Annex 1.

Figure 12 shows where Slovakia (SVK) stands compared to the V4 region. It also includes the position of Estonia (EST), as an extremely successful new member of the European Union, and Germany (DEU), which can in some respects be seen as the gold standard of national competitiveness on the European continent.

Among EU Member States, Slovakia ranked 21st overall. The quality and state of the Slovak business environment and competitiveness are summarized in several reports by supranational and national institutions, thus providing a better understanding of the position Slovakia has achieved and the strengths and weaknesses of national competitiveness. First, however, it is useful to measure the position of Slovakia in the international context, i.e. compared to selected EU members. A detailed comparison is set out in Annex 2.[3]

Figure 12: Competitiveness position of selected countries



Sources: IHA calculations based on WEF (2022), WEF (2019); IMD (2022); GEM (2022a-b), Legatum Institute (2021), Fraser Institute (2022), Heritage Foundation (2022) and OECD (2018)

[3] The commentary here focuses on overall average values, not the position of individual countries in partial components. For example, within the category of human capital, there are components in which Germany performs better than Estonia. However, we do not identify these in detail.

Among the benchmark countries, Germany ranked first in most of the evaluated categories compared to other EU Member States. Germany achieves its worst results in the categories of labour market and entrepreneurship, yet its rating here is still significantly higher than that of the V4 countries. Germany takes first place in the innovation category and thus dominates in indices that evaluate, for example, spending on science and research, the number of patent applications, the number of scientific workers, scientific articles or the quality of research institutions. Overall, Germany ranked fifth in the EU, behind Sweden, Finland, Denmark and the Netherlands, which ranked first. Entrepreneurship (14th position) and the labour market (12th position), however, represent Germany's worst and second worst positions. The German economy benefited from competitiveness growth based on the international division of labour and the liberalisation of the world economy (Grimm et al., 2022). On the one hand, the openness of the German economy accelerated economic growth, but on the other hand, these processes contributed to an increase in the degree of dependence within the global economy, especially in energy and the supply of critical raw materials.

None of the countries of the V4 region comes close to Germany's positions in any of the categories. However, there are some noteworthy results from Estonia, which overtook it in many areas. This means that even an economy from the new Member States can catch up or even overtake European leaders in terms of quality. Estonia performs worse in physical infrastructure than any of the V4 countries (the availability and quality of transport infrastructure, access to electricity, water, space and the like). On the other hand, Estonia has overtaken Germany in five of the monitored categories, namely the quality of the labour market, regulation, entrepreneurship, human capital and technology infrastructure. Estonia took the best position in the entrepreneurship category (2nd place). In the category of human capital (which quantifies the quality of education, including business education and skills), the country is in fourth place, in technology infrastructure (expenditure and transfer of research and development results to business, or penetration of information and communication technologies) and in regulation in sixth place. It ranked in ninth place for both quality of the labour market and governance. Estonia even occupies the second position behind the overall leader of the ranking for entrepreneurship, thus attacking the position of the Netherlands. Overall, however, the country ranked seventh.

In the V4 region, the leading country is Czechia, which achieves 16th place overall. After the break-up of Czechoslovakia, the Slovak economy was shown to be less efficient and developed with weaker economic potential and resilience than Czechia (Morvay, 2022). The country achieves its best rankings in the categories of physical infrastructure (11th position) and innovation (13th position). In terms of technology infrastructure and the labour market, Czechia ranked 17th, the lowest ranking for this country.

Poland took the 20th position in our ranking and thus represents the second most successful economy in the V4 region. Poland ranks 16th in the category of physical infrastructure, which is also the countries best result across our eight categories. This is followed by 17th place in innovation. The country has its lowest rankings in the categories of the labour market (26th position) and technology infrastructure (25th position).

2.1.1 Physical infrastructure

Physical infrastructure is the most successful category for all countries of the V4 region. Slovakia ranks 15th in this category. The category of physical infrastructure includes the quality and availability of road, rail and aviation infrastructure, as well as the supply of electricity, water and the like. Slovakia achieved its best position – 8th out of 26 EU Member States – in the Global Entrepreneurship Monitor component (physical infrastructure and service infrastructure sub-index). The Legatum Institute's rankings in this area are based on three separate sub-indices – energy (18th), transport (26th – worst ranking) and water (13th). Slovakia ranked 16th in the second pillar of the World Economic Forum's Global Competitiveness Index and 20th in the assessment of the Institute for Management Development. Hard indicators on the condition of physical infrastructure are discussed in more detail in Chapter 3.

The ageing of the Slovak population will lead to a shrinkage of the workforce. Our ranking includes a component from the Institute for Management Development called basic infrastructure, which also covers selected demographic characteristics (for example, the ratio of the population under 15 years of age and over 64 years of age to the total active population; IMD, 2022). In the future, population ageing will become a serious problem for Slovakia (Habrman, Habodászová and Šrámková, 2022). Supranational institutions see this as a threat because of the low retirement age, which will lead to a reduction in the workforce. The OECD recommends alleviating this problem by increasing the employment of mothers with young children, low-skilled workers, the Roma minority, and by improving health care. Better health care will allow the elderly population to extend their economic activity, and the retirement age should then be adjusted in line with the increasing life expectancy of the OECD population (2022a). According to the International Monetary Fund (IMF, 2022a), the ratio of Slovak public debt to GDP was only 63% in 2022, but as the population ages, the pressure on public finances will increase. In this perspective, Slovak public debt is risky in relation to future needs.

2.1.2 Labour market

Slovakia ranked 22nd in the category of the labour market.[4] Labour market is the category where the impact of labour legislation on the labour market, and the quality, availability and flexibility of the workforce are assessed. The labour market is viewed from the perspective of employers who perceive a rigid and costly labour market and the lack of qualified workers as restrictions on their business activities. It should be noted that some pillars and sub-indices could not be decomposed in greater detail, which is how, for example, in the case of the Institute for Management Development, some aspects of the labour market ended up in the category of regulation. This is an acknowledged methodological limitation. Slovakia achieved its best rating in the labour market regulation sub-index from the Fraser Institute, where it ranked 11th. The same institute (Fraser) also gave Slovakia its worst ranking – 25th place in the sub-index on labour market flexibility.

One of the reasons why Slovakia falls behind here is the low number of workers, which is compensated by a high number of hours worked (Habrman, Habodászová and Šrámková, 2022; OECD, 2022a). The low number of workers is due to the higher unemployment rate of Roma, a low number of foreign workers, and low economic activity among young people, pensioners

[4] Our sub-index includes 6 components, of which two are pillars (weight 1) and 4 are sub-indices (weight 0.2). Further details of the methodology are given in Annex 1.

and mothers with young children. These groups of the population work part-time or alternatively abroad. "*For every 100 inhabitants of Slovakia, only 43.9 people worked in the economy in 2020. For comparison, it was 53.9 in Germany*" (Habrman, Habodászová and Šrámková, 2022). It should be noted that from 2010 to 2019, employment growth was approximately double in marginalised Roma communities. The employment of Roma women remains a problem, standing at only 60% of male employment, and this rate has seen no growth for a long time (Hidas et al., 2022). Although the low number of people in work holds Slovakia back, it is compensated by a high number of hours worked. This is due to the low use of part-time work. There is another risk here related to population ageing: "[...] *Slovakia is currently helped by the high proportion of people of working age. In the future, however, the situation will change as it is expected to become the fastest ageing country in the EU*" (Habrman, Habodászová and Šrámková, 2022).

It should also be noted that the Slovak labour market has undergone various structural changes in addition to demographic changes. During economic recessions in the past, there was an increase in the unemployment rate in Slovakia. However, the most recent crisis, which was caused by the COVID-19 pandemic of 2020, was not accompanied by a significant increase in the unemployment rate, but by a decrease in employee capacity utilisation, i.e. a reduction in the number of hours worked. This was made possible by spreading the impacts of the pandemic and labour costs between employees, employers and the state (Morvay, 2022). During the 2020 pandemic, jobs in the services sector, the low-skilled workforce and the young population were at particular risk. The pandemic had specific effects on the labour market in respect of two factors: the ability of workers to work from home (which created high risks for the jobs of low-skilled workers for whom there is currently no opportunity to work from home) and the intensity of physical contact with other people in a job (Dujava and Peciar, 2020).

2.1.3 Factors affecting the transition of the Slovak economy from cost competitiveness to competitiveness based on higher value added

Three categories in our ranking are especially relevant to the challenge of shifting the focus of the Slovak economy from cost competitiveness (tax and contributions burden, labour costs) to competitiveness based on higher value added: technology infrastructure, innovation and human capital. Chapter 4 deals with this issue in more detail.

In technology infrastructure, Slovakia was ranked 19th, innovation was ranked 21st and human capital was ranked 22nd.[5] According to the Reform Compass of the Slovak Economy, one of the factors holding Slovakia back from convergence with Germany is its technological capacity. In contrast, the lag is compensated by Slovakia's high capital endowment, which in relation to intellectual property, is proof of the Slovak economy's strong involvement in global supply chains. In this sense, a low share of intellectual property and a high share of machinery and equipment is an indicator of involvement in global supply chains (Habrman, Habodászová and Šrámková, 2022): "*They* [note: foreign investors] *see no need to locate research activities or intellectual property in Slovakia, but tend to concentrated them in their country of origin. On our*

[5] Four components were used to calculate the technology infrastructure category, of which 1 was a pillar and 3 were sub-indices; the innovation category is based on 1 pillar and 1 sub-index and human capital on 7 components, of which 1 was a pillar. In contrast to the methodology for compiling the ranking, the average position of Slovakia for the three selected categories was 21st, abstracting from the allocation of weights for pillars and sub-indices. Further details of the methodology are given in Annex 2.

side, we have very few "national champions", i.e. companies able to expand abroad." (Habrman, Habodászová and Šrámková, 2022)

Long-term growth is conceivable only on the basis of increasing human capital and total factor productivity (expenditure on science, research and knowledge). In the past, Slovak economic growth was boosted by the employment of free capacity in the workforce and an influx of foreign investment with high productivity. Among other things, a high rate of apartment ownership, a scattered rural population, an insufficient number of apartments with regulated rents, and low quality of roads and public transport contribute to the inefficient allocation of resources (Habrman, Habodászová and Šrámková, 2022). "*A key factor for achieving high value added is the specialisation of companies and workers, for which reason it is necessary to concentrate people in cities.*" (Habrman, Habodászová and Šrámková, 2022) The EU Council (2022) also addressed recommendations to Slovakia to accelerate the green and digital transformations: "*Long-standing challenges in education, childcare, healthcare, and research and innovation (R&I) are also addressed with comprehensive measures for the most serious shortcomings, such as the low quality and inclusiveness of education, fragmented R&I policy coordination, insufficient public-private cooperation, and weak R&I performance.*" (EU Council, 2022). Participation in global supply chains also requires higher quality human capital to facilitate a change of specialisation from production functions to research and development activities (see box 5).

The duality of the Slovak economy deepened even further in the period of digital transformation. Insufficient penetration of digital technologies into companies could create further obstacles to future productivity growth. The productivity growth and convergence of the Slovak economy have decreased since the outbreak of the global financial crisis. Development has been different in the manufacturing sector with high productivity gains and in the service sector with small and medium-sized enterprises. This situation is referred to as the duality of the Slovak economy, which was further deepened by the digital transformation (OECD, 2022a). The OECD identifies increasing investment in education, skills, research and innovation capacity as priorities. With regard to human capital, the recommended approach is to improve active labour market policies, such as training, including for workers on short-term working schemes. Such programmes and schemes are crucial for reducing the long-term unemployment rate, especially in the low-skilled workforce and among Roma people. Insufficient quality of human capital is one of the reasons why Slovakia lags behind Germany. This is a problem especially in relation to younger age categories whose future is at risk because today's pupils have worse results in international testing than the current active population (Habrman, Habodászová and Šrámková, 2022). The issue of "soft" infrastructure is discussed in more detail in Chapter 4.

2.1.4 Regulation and governance

Slovakia ranks 21st in the categories of both regulation and governance. The category of regulation considers the level of support for entrepreneurship, as well as the burdens imposed on the business sector by the state and administrative authorities, protection of property rights, and obstacles to foreign trade. Governance is concerned with the enforcement of treaties, the judiciary, corruption, and institutional trust. The regulation category is based on 32 components and governance on 18. From the large number of available indicators that are quantified in reports on the state of competitiveness, entrepreneurship and economic freedom, it can be seen that this is an important factor determining the institutional settings of studied countries. Slovakia

achieved varying scores within this wide range of elements. It achieved second place in the sub-index of military interference in the rule of law and politics, which means the second smallest military influence (in the category of governance), and the same second-place ranking in commercial freedom (a pillar in the category of regulation) and in regulatory restrictions on the sale of immovable property (sub-index in the category of regulation). At the other end of the scale, it was rated in the last, 26th, place in two sub-indices – corporate regulation (in the category of regulation) and police reliability (in the category of governance).

Allocation efficiency, which can be severely impacted by poor institutional quality, is crucial for Slovakia's convergence with Germany. The most serious source of Slovakia's lag in relation to Germany is the effect on allocation efficiency of low-quality institutions (the tying up of labour and capital in inefficient economic activities, e.g. within uncompetitive companies) (Habrman, Habodászová and Šrámková, 2022). "*It is caused by institutions – law enforcement, corruption control, regulatory quality and public administration in general.*" (Habrman, Habodászová and Šrámková, 2022). This highlights the importance of regulation and the quality of governance for the competitiveness of Slovakia.

Allocation efficiency in Slovakia is impeded by strict regulation, which results in the excessively long processes for various permits, as well as legislation that is unclear and subject to frequent change (Habrman, Habodászová and Šrámková, 2022; SBA, 2022). The Doing Business survey of the quality of the business environment has repeatedly warned about the length of the building permit process in Slovakia. According to alternative indicators that temporarily replaced the Doing Business ranking, in 2019 it took 82 days to obtain a building permit in Slovakia, compared to 81.1 days in Poland, 73.9 days in Estonia and just 62.4 days in Hungary. Some countries were slower though: obtaining a building permit took 169.8 days in Czechia and 363.9 days in Cyprus (WBG, 2023a). Other problematic areas in respect of allocation efficiency include enforcement of property rights, trade barriers, corruption, financial capital and its availability, information asymmetry, barriers to the labour market, housing availability or the regulations on foreign workers (Habrman, Habodászová and Šrámková, 2022). Besides the high burden of red tape, frequent legislative changes are a further challenge. While 32.1% of SMEs identified the instability and ambiguity of laws and regulations as a critical obstacle, a further 39.7% of respondents identified this barrier as a serious obstacle. "*Two-thirds of SMEs (66.2%) have difficulty finding out what laws and regulations apply to them. Nearly the same percentage of SMEs (65.5%) see a problem in laws being passed without assessing the impacts on their environment and 62% think that some legislative changes introduce unfeasible requirements*." (SBA, 2022).

The implementation of rational reforms and rules would help to improve the position in two cross-cutting categories with a major impact on national competitiveness. The International Monetary Fund (IMF, 2022a) would welcome the adoption of fiscal ceilings, the amendment of the constitutional act on budgetary responsibility, the strengthening of the position of the Council for Budgetary Responsibility and the Fiscal and Macroeconomic Forecasting Committee. This recommendation was partly reflected in the approval of expenditure ceilings as one of the key reforms of the recovery plan, which was also appreciated by the IMF mission to Slovakia in May 2022. On the topic of regulation and the quality of institutions, the EU Council (2022) addresses recommendations to Slovakia concerning increased public investment in the green and digital transformations and in energy security. The EU Council also calls for reforms in the areas of justice, public procurement and anti-money laundering legislation.

Slovakia has a problem not only in the area of corruption, but also in the quality of the functioning of its institutions. The quality of the functioning of institutions includes, for example, the duration of commercial disputes, the predictability of court decisions, the quality of self-governing bodies and the like (Habrman, Habodászová and Šrámková, 2022). Some of the most widely-used indicators of the quality of the institutional sphere are the Worldwide Governance Indicators (WGI) from the World Bank Group.

Quality of governance in Slovakia is on approximately the same level as the other countries in the V4 region, but there are significant gaps with Estonia, which is well ahead of it. When interpreting the results of the Worldwide Governance Indicators, it is necessary to take into account the standard error that gives rise to the confidence interval (see figure 13 and methodology in the box below). This makes it impossible to interpret the differences between Czechia and Slovakia as statistically significant, even if the mean value of the Czech index is higher than that of the Slovak index. In the case of Hungary, there is a difference only in the voice and accountability sub-index, with Slovakia achieving a better position for this indicator. A very similar situation can be observed when comparing this sub-index with Poland, although in this case, the confidence intervals for voice and responsibility overlap at the Slovak lower and Polish upper bounds.

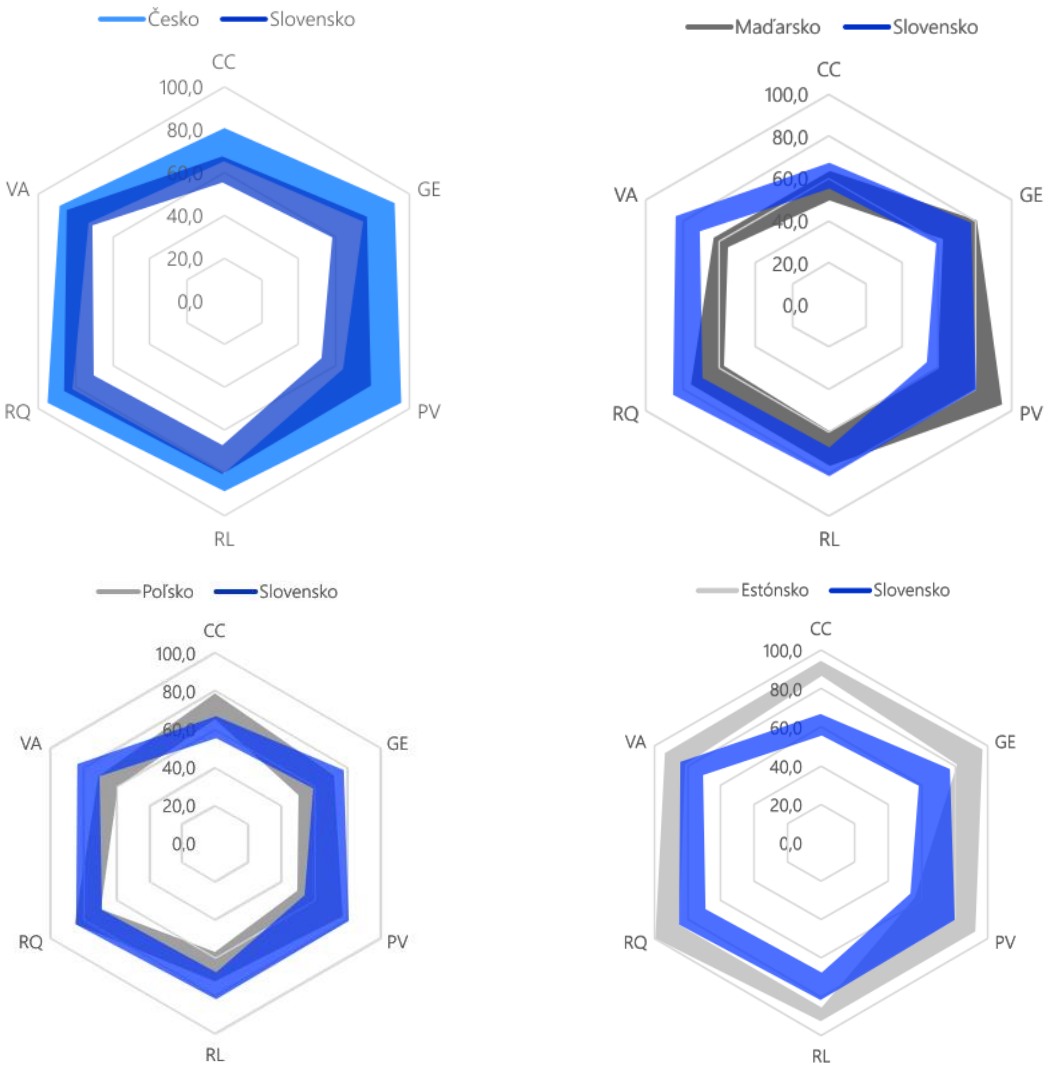
While Slovakia's results do not differ significantly from the rest of the V4 region, there is room for improvement in the indicators on control of corruption and government effectiveness. These are two sub-indices where Slovakia lags significantly behind Estonia. Estonia has laws and an anti-corruption strategy in place that have led to the prosecution of high-ranking politicians. In Estonia, there is also a change in the perception of corruption as a purely public sector problem, with increasing attention being given to B2B (business-to-business) corruption, e.g. in the field of procurement (US Department of State, 2022). The so-called Estonian tax, which is considered one of the most effective in the world (see box 11), can be mentioned among other inspirational measures taken by this Baltic country.

Box 3: Worldwide Governance Indicators (WGI)

The WGI consists of six aggregates (sub-indices) of indicators which can be evaluated in the form of an estimated score on a scale from minus 2.5 to plus 2.5, with a higher value indicating better quality. Alternatively, the percentile rank of countries is also available (WBG, 2022d). The indicators are compiled from a large number of source databases, which are mostly survey-based. It is a disadvantage that for some countries, not all the necessary databases and data are available, which affects the interpretation of the WGI results because they are therefore published with estimates modelling any missing databases and sources needed to complete the calculation. The limitations on comparisons between countries are represented by a standard error, which is increased by the number of databases that are unavailable when calculating the indicator (Kaufmann, Kraay, Matruzzi, 2010). For the purposes of the present report, the percentile rank with the upper and lower bounds of the 90% confidence interval was used. If the confidence interval for individual countries overlaps, the difference between countries should not be interpreted as statistically significant. For this reason, no single average index value is provided for all evaluated areas. The present research includes a calculation for Slovakia in the period from 2010 to 2021 despite the methodological limitations. The evaluated areas (sub-indices) are:

- Control of Corruption (CC) – the indicator shows the extent of large-scale and small-scale corruption, as well as the "capture" of the state by elites;
- Government Effectiveness (GE) – the indicator reflects perceptions of the quality of public services and legislation;
- Political Stability and Absence of Violence/Terrorism (PV) – the sub-index quantifies the likelihood politically motivated violence or violent change of government;
- Regulatory Quality (RQ) – countries implementing regulations that support the private business sector;
- Rule of Law (RL) – this sub-index evaluates, in addition to the quality of contract enforcement, the protection of property rights, the judiciary, the police, and the likelihood of violence in the evaluated country;
- Voice and Accountability (VA) – Freedom of expression, freedom of assembly and freedom of the media.

Figure 13: Comparison of Slovakia and selected countries in the Worldwide Governance Indicators in 2021

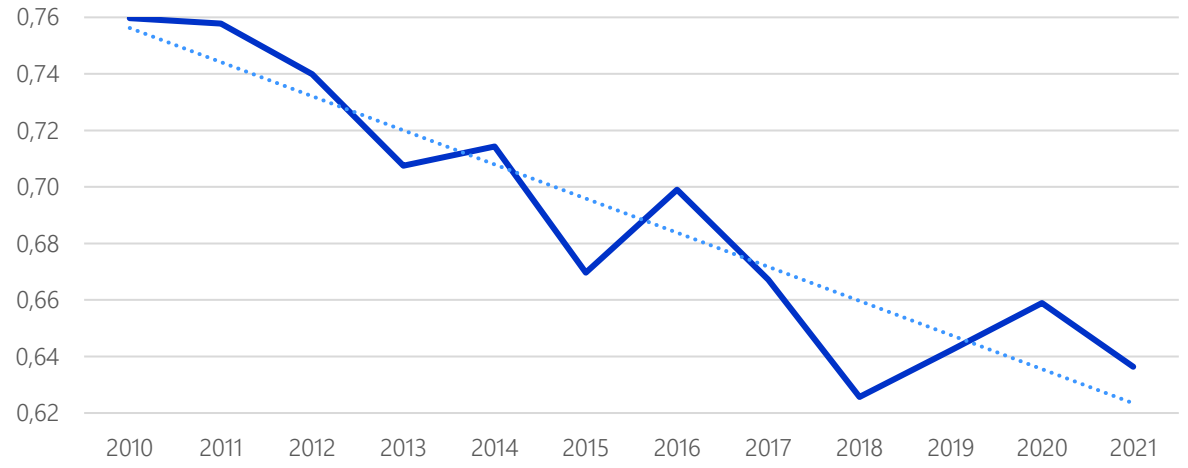


Sources: IHA calculations based on WBG (2022d); illustration made in Inkscape

Note: CC – Corruption Control; GE – Government Effectiveness; PV - Political Stability and Absence of Violence/Terrorism; RL – Rule of Law; RQ – Regulatory quality; VA – Voice and Responsibility.

The long-term view shows a deterioration in Slovakia's ranking for governance quality. Figure 14 shows a calculation of the average value of Slovakia's WGI index from 2010 to 2021, which has a declining long-term trend.

Figure 14: Average value of Worldwide Governance Indicators for Slovakia



Sources: IHA calculations based on WBG (2022d)

2.1.5 Entrepreneurship

Slovakia received its worst placement in the entrepreneurship category, in which it took the last, 26th position.[6] The strength of the Slovak business environment is its above-average use of networking contacts for business, even compared to other economies. Among other things, networking is important for accelerating the transfer of knowledge and experience between entrepreneurs. On the other hand, the share of established entrepreneurs in the total population is only 5.9% even though entrepreneurship is crucial to the creation of economic value. The Slovak share of established enterprises can therefore be seen as insufficient in comparison with other economies. Furthermore, Slovakia has a high "index of death" for nascent entrepreneurs (Pilková et al., 2020). This is reflected in a higher ratio between new entrepreneurs operating from 3 to 42 months and nascent entrepreneurs operating less than 3 months. "*Many nascent entrepreneurs did not reach the new business phase because they decided to close their business. The Slovak index of death was the second highest in Europe, seventh in the world, and fourth among high-income economies. This situation could be attributed to the entrepreneurial environment with low support for early-stage business, weak entrepreneurial education, and overall entrepreneurial culture in Slovakia*." (Pilková et al., 2020). As of 2021, entrepreneurs see critical barriers to doing business in the instability and ambiguity of laws and regulations (32.1%), law enforcement through the courts (23%), corruption (18.7%), the availability and quality of the workforce (15.2%), the quality and availability of infrastructure (9.2%), organized crime and blackmail (8.3%), and market entry restrictions and other anti-competitive practices (6.6%). From the opposite perspective, for 46.2%

[6] Economies are ranked on their willingness, motivation and ability to do business. The evaluation of entrepreneurship was largely based on data from the 2021 Global Entrepreneurship Monitor (GEM). However, data from 2019 are also processed based on a report in Slovak (Pilková et al., 2020).

of respondents, organised crime and blackmail do not constitute any obstacle, and 34% saw no problem from restrictions on market entry and other anti-competitive practices, followed by the quality and availability of infrastructure (30.4%), corruption (24%), law enforcement through the courts (16.4%), the availability and quality of the workforce (15.3%) and the stability and ambiguity of laws and regulations (4.7%) (SBA, 2022).

2.2 Revealed Comparative Advantage Index and Economic Complexity Index

Slovakia is one of the most export-oriented economies in the world. Slovakia's export share in GDP reached 85.1% in 2020 and 92.4% in 2021 (WBG, 2023d). In addition, the Slovak economy is characterised by a strong focus on the production of motor vehicles, as has been demonstrated by an analysis of the revealed comparative advantage of exported value added by the Institute for Strategy and Analysis (Cedzová et al., 2021). From the point of view of national competitiveness, it is also useful to examine the structure of exports and Slovakia's position in the export of sophisticated commodity groups. For this purpose, a revealed comparative advantage (RCA) index was used to identify those commodity groups in which the SR achieves a comparative advantage compared to other economies. The Slovak economy naturally achieves a significant comparative advantage in vehicle exports. On the other hand, sophisticated commodity groups account for only a small share of total exports.

Box 4: Revealed Comparative Advantage (RCA) Index methodology and interpretation

According to an UNCTADStat methodological note (2022c), patterns of trade among countries are governed by their relative differences in productivity and these differences can be estimated on the basis of the revealed comparative advantage index (RCA). This means that it is possible to obtain a picture of the product groups in which an economy has achieved a competitive advantage over others. The RCA index measures the ratio of a country's exports in a given product group to the country's total exports against the ratio of world exports of the same product group to total world exports:

$$RCA_{Ai} = \frac{\frac{X_{Ai}}{\sum_{j \in P} X_{Aj}}}{\frac{X_{\omega i}}{\sum_{j \in P} X_{\omega j}}} \geq 1$$

where P is the set of all products (product groups); X_{Ai} is country A's exports of product i; $X_{\omega i}$ is the world's exports of product i; $\sum_{j \in P} X_{Aj}$ is the country A's total exports and $\sum_{j \in P} X_{\omega j}$ is the world's total exports. Traditionally, groups with a comparative advantage are those that achieve RCA values greater than or equal to 1. However, a limitation of the RCA calculation is the fact that it is abstracted from the impact of national trade policy instruments (e.g. customs duties) (UNCTADStat, 2022c).

UNCTADstat (2022c) offers ready-to-use index results for 2021 with product groups based on SITC 3 classification. However, for the purposes of the present analysis, the SITC 2 export database of commodity groups from the UNCTADStat (2022b) database was used. In addition, the analysis identified product groups requiring a highly qualified workforce and technology-intensive processes, i.e. high-skill and technology-intensive manufactures (UNCTAD, 2022). This required processing more detailed product groups in the SITC 3 classification (using

UNCTADStat, 2022c). The Slovak names of product groups were taken from the titles of SITC4 sections provided by the SO SR (2023b).

Regarding the use of SITC product groups, it should be noted that the total exports in the graphs differ slightly from the value for total exports in the UNCTADStat database (figure 15 and figure 16; in the UNCTADStat database, the values can be found as the item named All allocated products (SITC 0 to 8 + 961 + 971)). If the value of total Slovak exports from the UNCTADStat (2023) and UN COMTRADE (2023) databases is compared, the differences in USD are minimal. There are exceptions in 2017 ($270 million difference) and 2021 ($373.2 million difference), but these differences are still not significant for our purposes.

According to the RCA index, Slovakia's largest comparative advantage in 2021 was in road vehicle exports (group 78), which accounted for almost a third of exports. This was followed by rubber manufactures (group 62) and telecommunications equipment (Group 76). Table 3 shows the results of RCA in SITC product groups for 2010, 2019 and then for 2020 and 2021, on the basis of which it is possible to evaluate the impact of COVID-19 on Slovakia's comparative advantages and the comparison with 2020.

Table 3: Ranking of product groups by RCA in Slovakia in 2021

S/N	SITC	Share of Slovakia's exports	RCA index results			
		2021	2010	2019	2020	2021
1	78 - Road vehicles (including air-cushion vehicles)	32.29	2.80	4.01	4.71	4.69
2	62 - Rubber manufactures, n.e.s.	2.36	2.65	3.45	3.28	3.32
3	76 - Telecommunications and sound-recording and reproducing apparatus and equipment	9.47	3.97	2.97	2.67	2.75
4	81 - Prefabricated buildings; sanitary plumbing, heating and lighting fixtures and fittings, n.e.s.	1.19	3.59	2.37	2.35	2.28
5	67 - Iron and Steel	5.71	2.29	1.79	1.62	2.15
6	74 - General industrial machinery and equipment, n.e.s., and machine parts, n.e.s.	6.09	1.28	1.56	1.49	1.62
7	64 - Paper, paperboard and articles of paper pulp, of paper or of paperboard	1.34	1.54	1.34	1.30	1.47
8	69 - Manufactures of metals, n.e.s.	3.43	1.68	1.53	1.45	1.46
9	82 - Furniture and parts thereof; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings	1.40	1.83	1.53	1.30	1.31

Sources: IHA calculations based on UNCTADStat (2022b); UNCTADStat (2022c); UNCTAD (2022); SO SR (2023b)

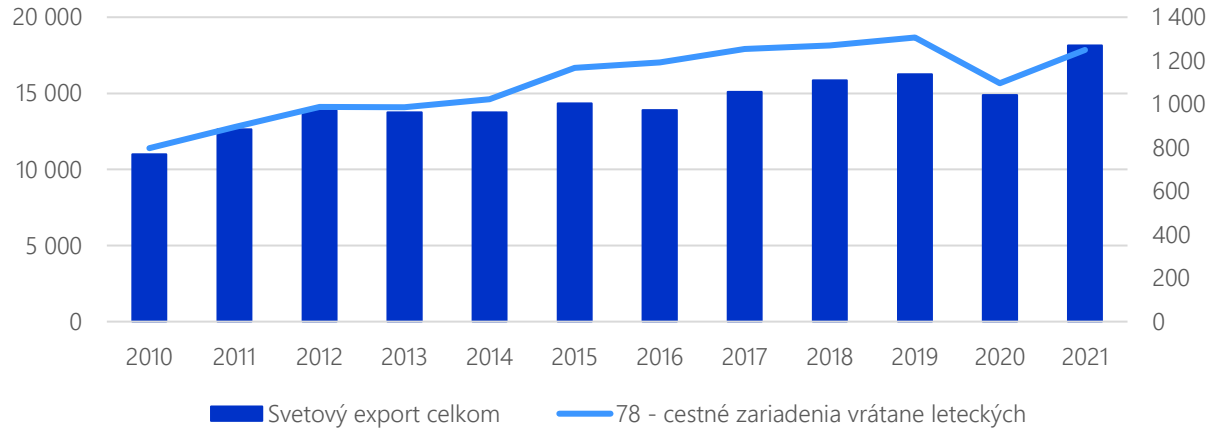
Note: Based on consultations with the SO SR (2023c), product group 35 - Electric current and product groups with a share of less than 1% in total Slovak exports were excluded.

The road vehicle product group (78) is also quantitatively the largest product group in Slovakia.[7] However, the highest RCA value of this product group can be observed in 2020. This is likely due

[7] It should however be noted that according to the OECD (2021) Trade in Value-Added, the share of Slovak domestic value added in the gross exports of the motor vehicle manufacturing sector (D29) is only 33.1%.

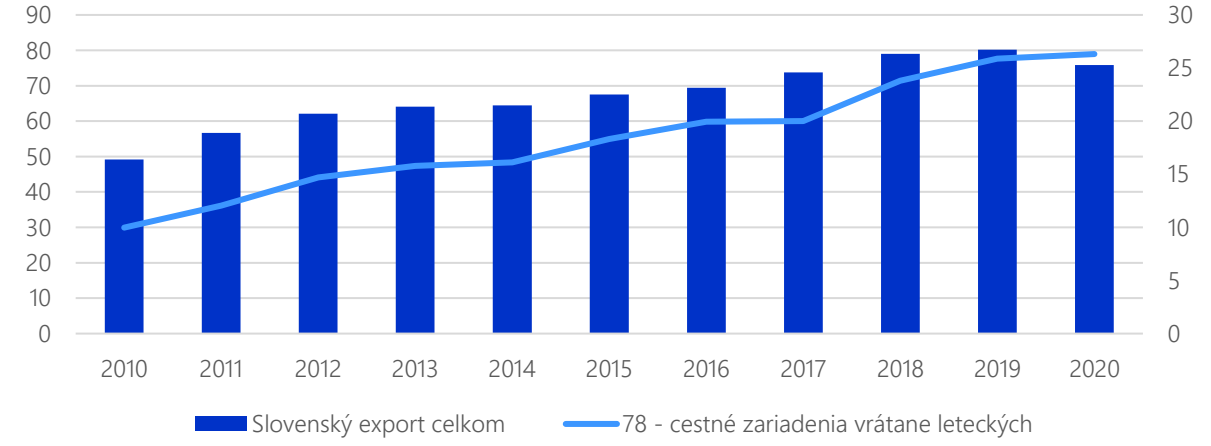
to the COVID-19 pandemic. This year saw a slowdown in the global car trade and a decrease in the value of global exports overall, resulting in a higher index value (see figure 15). However, the situation in road vehicle exports was different in Slovakia. There was no decrease in the value of car exports, but only a slowdown in the growth rate (see figure 16).[8] There are several possible reasons for this: the start of production by a fourth car manufacturer, Jaguar Land Rover Slovakia near Nitra, the sale of stock already produced, and the development of prices for new and older vehicles on the market.

Figure 15: World exports and exports in product group 78 (EUR million)



Sources: IHA calculations based on UNCTADStat (2022b); SO SR (2023b); FRED (2022)

Figure 16: Slovak exports and exports in product group 78 (EUR million)



Sources: IHA calculations based on UNCTADStat (2022b); SO SR (2023b); FRED (2022)

It is noteworthy that Slovakia achieves comparative advantages mainly in product groups with lesser and medium sophistication. In 2021, it gained a comparative advantage in only eight sophisticated groups. What is more, these seem to be quite heterogeneous, which also points to the weaknesses in the Slovak economy's position within the international division of labour (see box 5). Germany reports the largest number of sophisticated product groups (32 groups

[8] The development dynamic presented in the UNCTADStat (2022b) database recalculated using the FRED (2022) exchange rate is in line with data from the SO SR (2023d)

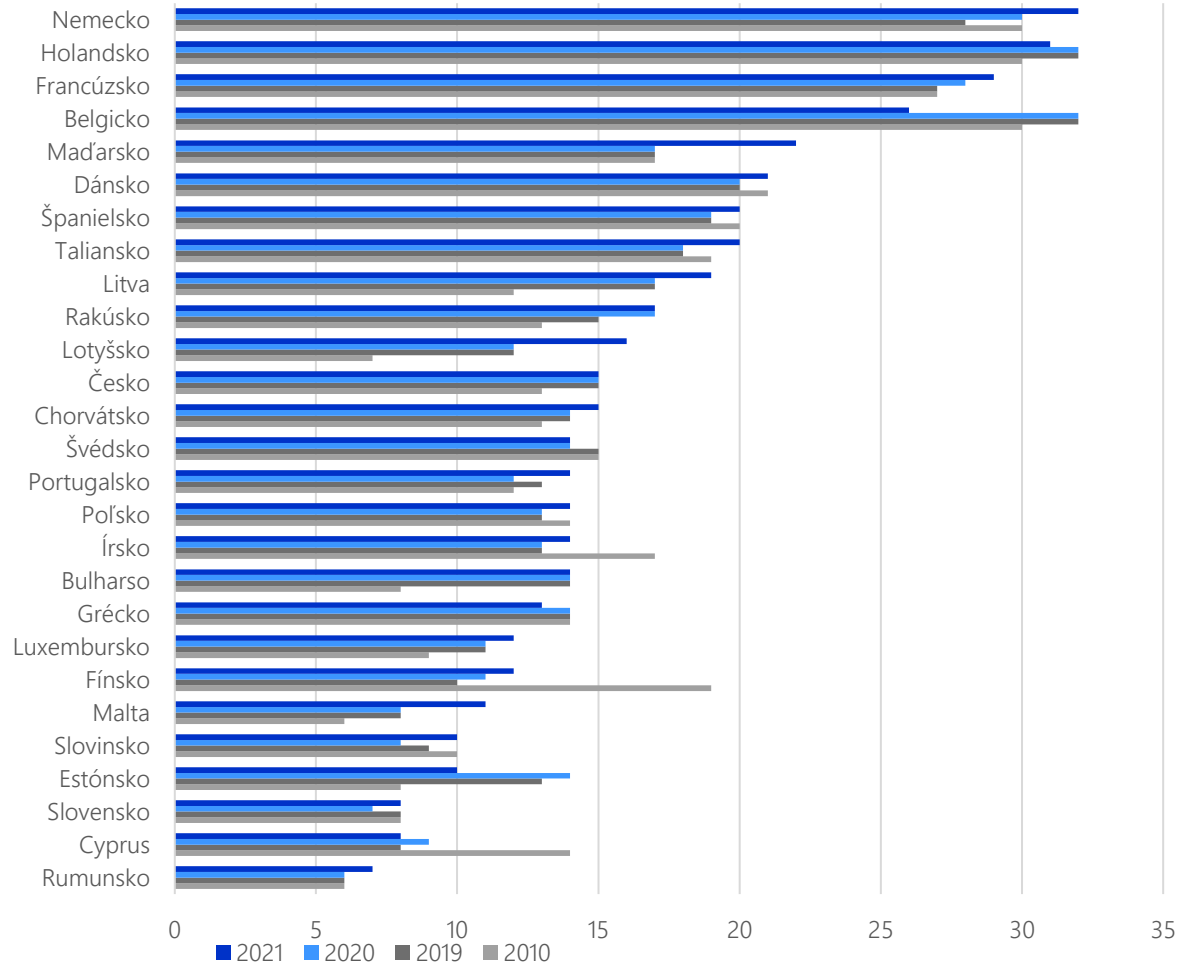
with comparative advantage), followed by the Netherlands (31 groups) and France (29 groups). Hungary ranked fifth (22 groups). At the opposite end of the spectrum are Romania (7 groups) then Cyprus and Slovakia (each having 8 groups). Regarding the other two V4 countries, Czechia is in the middle of the ranking with 15 sophisticated product groups and Poland has 14 such groups. Slovakia achieved a comparative advantage within sophisticated product groups in 2021 in the following items:[9]

1. 761 – Television receivers (RCA = 10.02);
2. 873 – Meters and counters (RCA = 3.73);
3. 583 – Monofilaments of plastics with a cross-section greater than 1 mm (RCA = 2.06);
4. 764 – Telecommunications devices (RCA = 1.65);
5. 579 – Waste, parings and scrap of plastics (RCA = 1.37);
6. 891 – Arms and ammunition (RCA = 1.36);
7. 892 – Printed matter (RCA = 1.26);
8. 562 – Fertilisers (RCA = 1.21).

These product groups account for 11% of Slovak exports (SO SR, 2023d), whereas product groups 761 and 764 each account for almost 5% of total Slovak exports. Each of the other groups accounts for less than half a percentage point of exports.

[9] Following consultation with the Statistical Office of the Slovak Republic (SO SR, 2023c), special consideration should be given to group 764 – Telecommunications devices. The trade in this group is dominated by the business activities of large logistics centres located in Slovakia and these devices are not intended for the Slovak market nor do they originate here in any significant extent.

Figure 17: Number of sophisticated product groups with comparative advantage (RCA ≥ 1)



Sources: IHA calculations based on UNCTADStat (2022c); UNCTAD (2022); SO SR (2023)

The cause of this situation is the low share of domestic value added in exports. It is therefore desirable for Slovakia to focus on improving its economy's position within the global value chain (GVC), while increasing security and resilience in case of GVC failure. Many reports and studies have looked at involvement in GVC, both in a positive (increase in efficiency and productivity) and a negative sense (risks resulting from interruption of GVC due to a pandemic, conflicts, etc.; less value added is produced). The economy's integration in global supply chains is considered in more detail in box 5.

More complex economies are more productive. The economic complexity index is partly based on the revealed comparative advantage index, taking into account the number of product groups and types of services that a given economy exports (diversity) and the number of countries that export these product groups (ubiquity). Sophisticated products are produced in fewer countries than ordinary consumer goods. This index aims to quantify the accumulated productive knowledge in an economy that is responsible for income diversification in different regions of the world, because this knowledge can be used for another purpose if necessary and thus ensure the growth of the income level and well-being of the country concerned (Hausmann et al., 2013).

In 2020, Slovakia achieved 13th place in economic complexity among all countries of the world (based on SITC product groups). Germany achieved the third best ranking, Czechia took sixth

place overall and Hungary ninth. Poland ranked the worst of the V4 countries, with 26th place in the world (Growth Lab at Harvard University, 2019). In this regard, M. Habrman, L. Habodászová and L. Šrámková (2022) warn that Slovakia's strong position in the Economic Complexity Index does not reflect a strong position in innovation and research. Such activities are retained close to the headquarters of multinational corporations. Slovakia's favourable position is more the result of its deep involvement in global supply chains.

Box 5: The intensity and quality of the Slovak economy's integration in global supply chains

According to the OECD (2021) Trade in Value-Added indicator, the share of Slovak domestic value added in gross exports in 2018 was only 52%, compared to 84.2% of gross exports for EU Member States and 91.6% for OECD members. In the motor vehicle manufacturing sector (D29), the share of domestic value added in Slovakia's gross exports of vehicles is just 33.1%, whereas EU countries achieve 84.8% for the same indicator and OECD members as much as 90.7%. This means that the performance of Slovak exports is particularly exposed to risks arising from interruptions in the supply of intermediate production from abroad (even if due to poor transport infrastructure, instability of the electricity network, or closure of national borders due to a pandemic, migration, etc.). An example is the shortage of rare gases caused by the war in Ukraine (Alper, 2022).

Increasing human capital may lead to a change the specialisation of the new Member States from manufacturing functions to research and development activities, which will in turn increase value added in the economies concerned. As for the quality aspects of Slovakia's participation in these processes, it relates mainly to goods with lower value added. "*Poland and Slovakia have an unfavourable position in global supply chains and specialise in low value-added fabrication function*" (Kordalska - Olczyk, 2020). Kordalska and Olczyk (2023) argue that the involvement of European economies in global supply or value chains has brought a change in the perception of countries' specialisations. They move from specialising in products to specialising in certain functions in production processes. Production activities are mainly carried out in the new Member States (EU15), with the older Member States act as headquarters specialising in research and development activities. As wages increase, countries can be expected to become more specialised in research and development activities, as they will exhaust the advantage of low costs (cost competitiveness). According to the authors, an increase in wages is not enough by itself and must be accompanied by growth in employee skills, so EU15 countries need to invest in raising human capital (better education and training).

At the same time, there are significant benefits to being involved in global supply chains. The marked increase in the concentration of European industry leads to positive productivity growth and allocation efficiency (Bighelli et al., 2022). The participation of European (EU) countries in these processes is significantly higher than in the United States of America or Asia, and it is proven that global supply chains reduce the unemployment rate, especially in the less developed EU Member States (Camarero, López-Villavicencio and Tamarit, 2022).

The 2020 COVID-19 pandemic can be seen as an opportunity for further improvement in processes: "*On the one hand, the need for digital capacity has increased (helped by changes in the use of labour as a production factor), but the understanding of production chains has also changed. The importance of the reliability of production chains has increased, to some extent*

even at the expense of their efficiency (in order to avoid the risks of efficient, but fragmented, long chains vulnerable to local epidemiological restrictions, etc.). The restructuring of production chains is a potential opportunity for offensive-oriented actors." (Morvay, 2022)

2.3 Foreign direct investment in relation to national competitiveness

In the past, the inflow of FDI to Slovakia was a significant development factor and accelerator of Slovak productivity and competitiveness. While many recent studies suggest that FDI's potential to contribute to Slovakia's development has been exhausted (e.g. Habrman, Habodászová and Šrámková, 2022), measures of outward FDI are indicative of an economy's level of development. FDI is thus an interesting economic development indicator. The theoretical basis for this is Dunning's work on FDI (Narula, Dunning, 2010; Dudáš, 2005).

Box 6: Dunning's theory of foreign direct investment

The development path of an improving economy can be divided into five stages in terms of net outward foreign direct investment stock. This indicator represents the difference between a given country's outward and inward FDI stocks (e.g. Djokoto, 2021).

1. In the first stage, the country does not invest abroad. It is however a destination for initial limited inward FDI from other countries. The economy benefits from natural resources, later from the size of its market.
2. In the second stage, the country is a significant recipient of inward FDI and is slowly starting to invest abroad. Thus, the inflow of investments becomes the driving force of the economy. Net outward FDI is significantly in the red.
3. In the third phase, the inflow of FDI is constant, but outward FDI begins to accelerate. This requires innovations as a factor to generate the necessary investment in international competition. The net outward FDI thus moves back towards zero.
4. The fourth stage is characterised by higher outward FDI than inward. Net outward FDI is thus positive. Fourth-stage and higher economies are knowledge-based.
5. In the last, fifth phase, outward FDI decreases and, according to the traditional version of the theory, the net outward FDI again approaches zero (Dunning, 1973; Dunning, Narula, 2010; Dudáš, 2005).

As pointed out by Boudier-Bensebaa (2008), Dunning was not the only economist to formulate a development theory based on countries' participation in international business. Porter (1990) proposed development theory with four stages: factor-driven, investment, innovation, and wealth-driven. Dunning's theory has, however, as Boudier-Bensebaa (2008) notes, become the most widespread.

Djokoto (2021) applied Dunning phases in a study of small states. There were some differences between the Dunning's original theory and the study's empirical findings. This means that some groups of states cannot be fully explained by this theory. Narula and Guimón (2010) focused on Eastern Europe (including countries that should be considered in Central and Eastern Europe). This study concludes that it is important to monitor not only the size of FDI flows, but also their quality. FDIs are supposed to support countries' strategies and their development. For example, they can augment domestic technological and location-specific advantages. The

authors further argue that if a country is in higher stages of development, investments are directed to sectors with high value added within global value (supply) chains.

According to Narul and Guimón (2010), the countries of Eastern Europe have undergone a fundamental economic transformation while still benefiting from informal institutions and knowledge infrastructure. These advantages developed in the period of centrally planned economies (see also Narula and Jormanainen, 2010). Otherwise, the movement of Eastern European economies, within Dunning's development phases, is highly idiosyncratic and difficult to compare with other developed or developing economies. Before the transformation, these economies had relatively high GDP values, which corresponded to stages 2 to 3 of development. Net outward FDI, however, was in line with stage 1. In recent times, Eastern European countries have implemented privatisation and joined supranational institutions, but domestic entities have not always been able to compete with those from abroad, which tended to more efficient. This was followed by rapid GDP growth, which was accompanied by significant inward FDI. However, investments abroad remained at a low level (it is typical for Eastern European countries to have negative net outward FDI) in line with the second stage of development theory. Nevertheless, the authors believe the inflow of FDI into Slovakia's region has been a transformative element.

Boudier-Bensebaa (2008) also considered the unusual position of the Central and Eastern European countries in relation to the older EU Member States (EU-15). She concluded that the countries of Central and Eastern Europe are in the first or second stage of development, with GDP catching up to the EU-15, but diverging in net outward FDI stock.

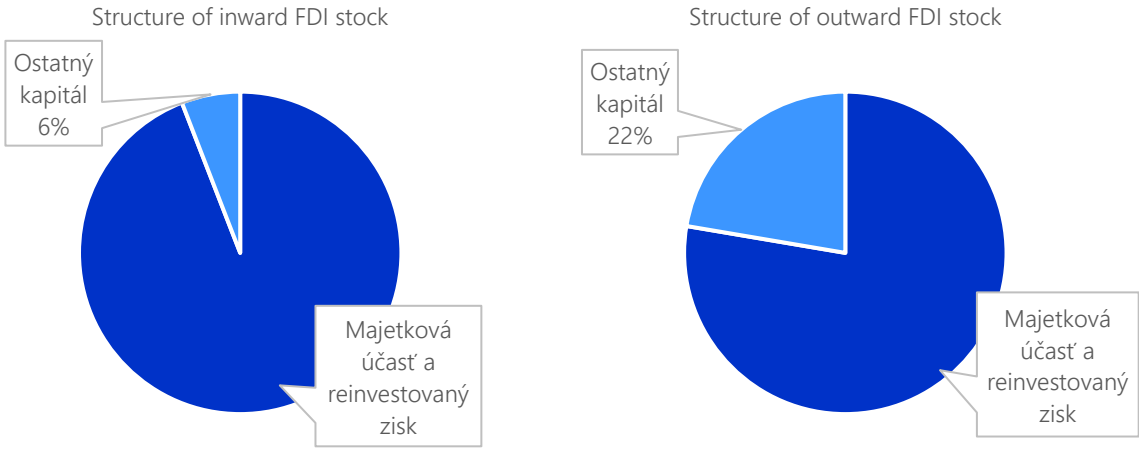
2. 3.2 Foreign direct investment in Slovakia

Inward FDI stock in Slovakia in 2021 amounted to EUR 52.4 billion (56.1% of annual GDP) while Slovak entities' outward FDI stock was EUR 4.8 billion, which is just 5.14% of annual GDP (NBS, 2023a).[10] Foreign investment consists of the following items:

- Equity and reinvested earnings (together accounting for 94% of FDI in Slovakia in 2021, or 78% of outward FDI);
- Other capital (including intercompany loans which contribute to the growth of gross external debt, accounting for 6% and 22% of inward and outward FDI respectively).

[10] Slovakia's net outward FDI (outward investment minus investment) in 2020 amounted to approximately minus EUR 47.6 billion. Slovakia's GDP at market prices in 2020 was EUR 93.4 billion [Eurostat, NAMA_10_GDP].

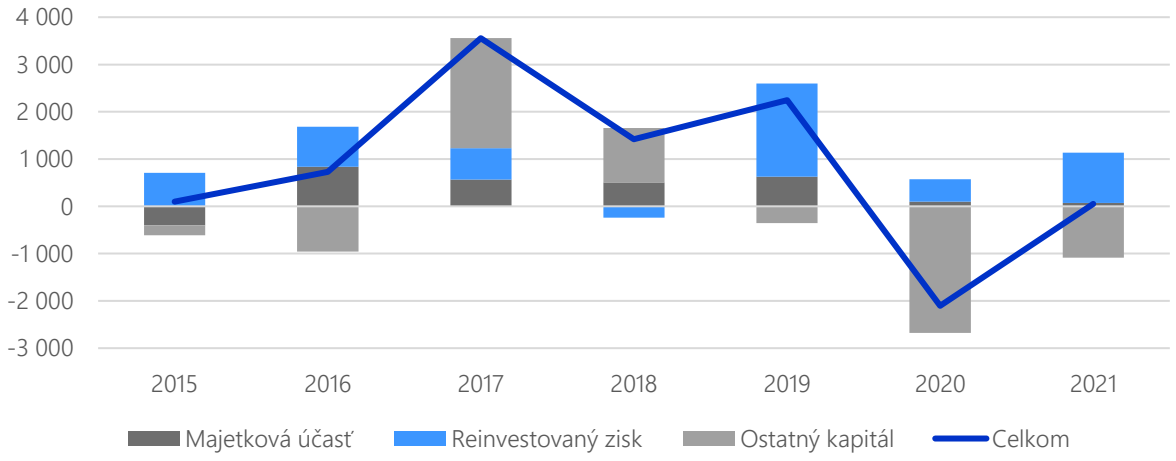
Figure 18: FDI structure 2021



Sources: IHA calculations based on NBS preliminary data (2023a)

As regards the flow of FDI, in 2020 there was a negative value for inward investment in Slovakia in the amount of minus EUR 2.1 billion, which could be considered "disinvestment". On the other hand, it could be the result of repayment of debts by FDI entities, which will be reflected in a reduction of Slovakia's external debt. Disinvestment means the departure of foreign investors from a given country. To know whether the statistics for 2020 really represent disinvestment requires analysis of the structure of FDI. In 2020, the inward other capital flow had a negative value of minus EUR 2.7 billion, which contributed to the final negative position for inward FDI flows that year. Other capital mainly represents liabilities of a debt nature (loans). However, if foreign-owned enterprises in Slovakia repay their liabilities (which reduces the inward other capital stock), they reduce their debts and thus reduce Slovakia's external debt, which is a positive economic phenomenon. This is the more likely scenario in a time of economic uncertainty like the COVID-19 pandemic.

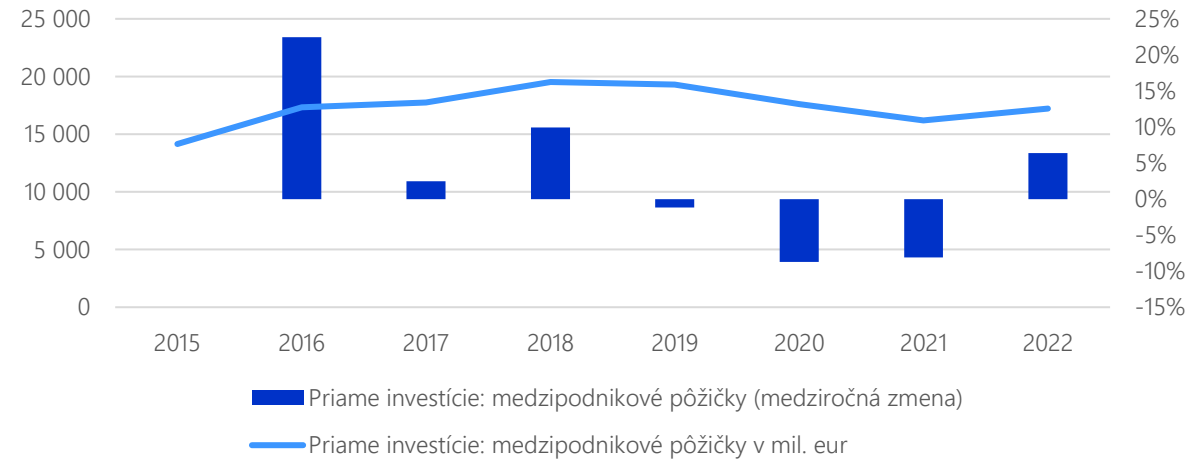
Figure 19: Structure of inward FDI flows to Slovakia (in million euros)



Sources: IHA calculations based on NBS (2023a)

The negative change in Slovakia's inward FDI was most likely caused by a decrease in intercompany loans. The value of FDI consists of the values of equity, reinvested earnings and other capital. It is the other capital item that records changes in debt. In 2020, therefore, there was a negative value for FDI inflows to Slovakia (minus EUR 2.1 billion) and a negative value for other capital inflows (minus EUR 2.7 billion). At the same time, between 2019 and 2020, there was a 9% year-on-year decrease in the item of intercompany loans in Slovakia's external debt, which corresponds to a decrease of more than EUR 1.7 billion in absolute terms. It can therefore be assumed that the negative value for the inflow of other FDI capital in 2020 also caused a decrease in foreign debt, which from a macroeconomic point of view represents a positive effect on the Slovak economy.

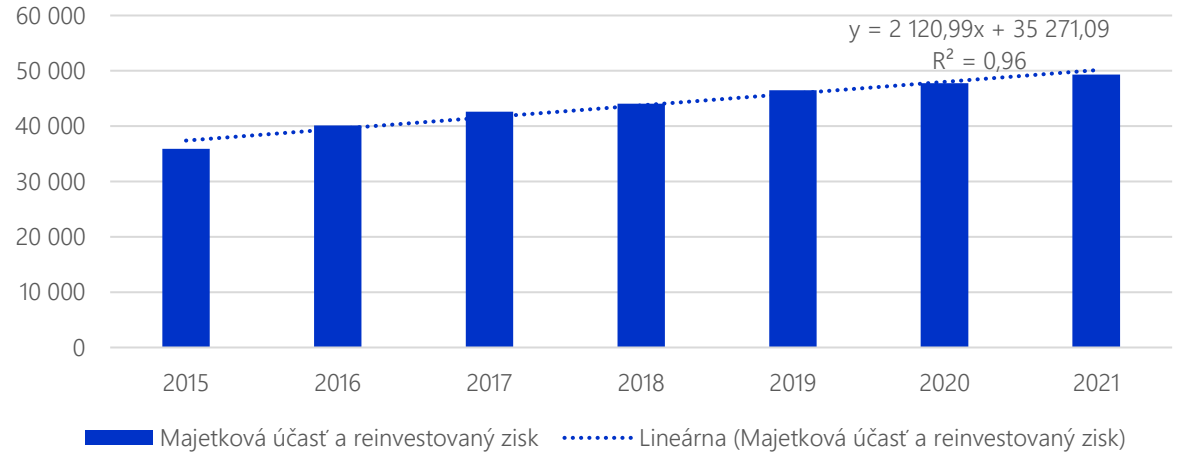
Figure 20: FDI and external indebtedness (intercompany loans)



Sources: IHA calculations based on NBS (2023b)

Inflows of equity slowed in 2020, but this is attributable to a reduction in investment activity during the COVID-19 pandemic. On the other hand, the inflow of the sum of equity and reinvested earnings does not show any negative or positive deviation from the trend. It is true that the influx of equity to Slovakia decreased from EUR 626 million in 2019 to approximately EUR 101 million in 2020 but this slowdown in inflows can be explained as a result of the COVID-19 pandemic. The pandemic crisis has had a dampening effect on investment both nationally and internationally. Figure 21 shows the development of the sum of equity and reinvested earnings in Slovakia from 2015 to 2021. As part of a simple analysis, a trendline was inserted into the graph based on an equation with a rising slope and a high value for the coefficient of determination (R^2), which suggests that the growth in equity participation and reinvested earnings in Slovakia is in line with the long-term trend of the domestic economy.

Figure 21: Inward FDI stock in Slovakia, sum of equity and reinvested earnings (EUR million)



Sources: IHA calculations based on NBS (2023a)

2. 3.2 International comparison of foreign direct investment

Over the long run, inward FDI stock in Slovakia shows a slow rising trend. Figure 23 shows the development of countries' inward equity stock as a percentage of GDP, which represents inward FDI stocks excluding the effect of other capital. Values for Hungary were obtained from the Hungarian National Bank (MNB) and preliminary Slovak data were provided by Národná banka Slovenska (NBS).

Box 7: Influence of special purpose entities on FDI reporting

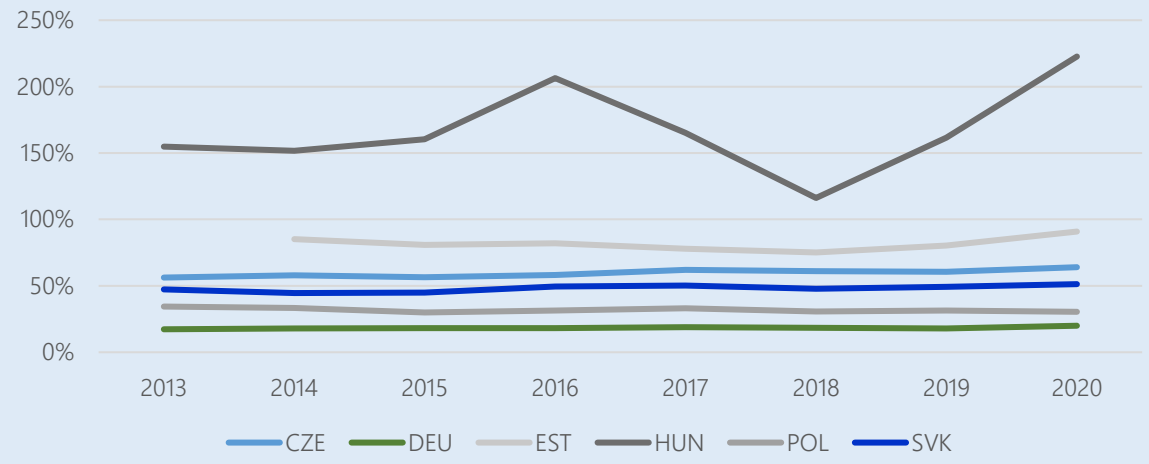
An accurate assessment of FDI depends on the analysis of its components. The most frequently used classification divides it into equity, reinvested earnings and other capital. Other capital may have a debt character, in which case its decrease will appear as an overall decrease in FDI (disinvestment), but also a decrease in foreign indebtedness (under the intercompany loans item).

Another source of distortion in FDI reporting is special purpose entities (SPEs). Hungary is one of the economies for which it is appropriate to report FDI without SPEs, because since the late 1990s substantial amounts of money have been flowing through the Hungarian economy that do not affect the economy itself and are generated by SPEs (Montvai, 2015). SPEs are established to take advantage of favourable tax, regulatory or legislative conditions in a given economy and the characteristics of SPEs include that they are mostly owned by a foreign entity and almost all their assets and liabilities represents investments in or from other countries. They employ a small number of staff and they have a limited physical footprint in the jurisdiction. According to the manual of the International Monetary Fund, it is thus appropriate to make FDI reports including and excluding SPEs (IMF, 2009). B. Montvai (2015) states that in addition to Hungary, SPEs have a significant impact of SPEs on FDI in economies such as the Netherlands and Luxembourg.

The practical effects of this problem can be seen in, for example, the selection of a suitable database. If FDI data from Eurostat or the International Monetary Fund are processed, not only will Hungary have unrealistically high FDI values in relation to GDP, but also there will also be

significant year-on-year fluctuations in values (see figure 22). For this reason, further data for Hungary will be taken from the database of the Hungarian National Bank (MNB).

Figure 22: Inward equity positions as a percentage of GDP according to Eurostat



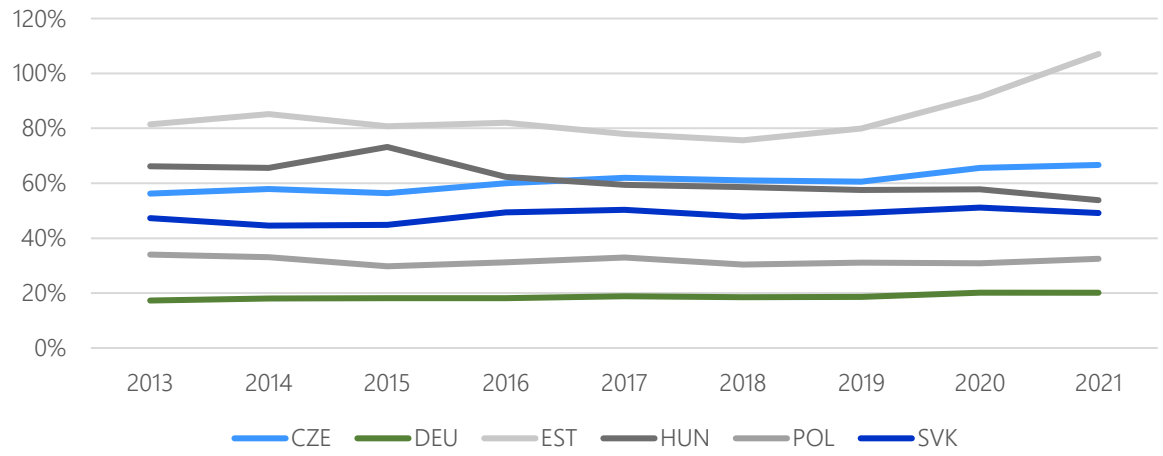
Sources: IHA calculations based on Eurostat (2022) [BOP_FDI6_POS], [NAMA_10_GDP]; NBS (2022a)

In the V4 region, Slovakia ranks third in the ratio of FDI to GDP. Among the benchmark countries, Estonia has the highest ratio of inward FDI to GDP, followed by Czechia, which overtook Hungary in 2016. Slovakia and Poland followed, with Germany in last place.[11] The order of countries is in line with theoretical and empirical expectations. The German economy is in the higher stages of economic development where lower FDI inflows are expected. Poland benefits from the size of its economy; and the remaining selected economies, for which an idiosyncratic development path is expected, are relatively stable with a persistent rising trend in the ratio of inward equity stock to GDP. The gap separating Slovakia from Estonia and Czechia reflects the position of these countries in competitiveness rankings.

As for the year-on-year change in the level of inward equity stock in relation to GDP, the countries under review show a similar trajectory. The exception may be the Hungarian economy, where, after rising by almost 12 p.p. in 2015 (between 2014 and 2015, the value of this indicator for the Hungarian economy increased by 11.68%), the ratio of inward equity to GDP fell by nearly 15 p.p. in 2016. This was followed by years when the given indicator fell slightly or remained flat. In 2020, Estonia shows the highest growth rate of the indicator (year-on-year change of 13.23 p.p.).

[11] It is natural for small and open economies to benefit from FDI inflows (e.g. Habrman, Habodászová and Šrámková, 2022). The openness of an economy can be understood as the ratio of total exports and imports to GDP (Baláž, Hamara and Sopková, 2015). Slovakia achieves 179% openness of the economy, followed by Hungary with 178%, Czechia (155%), Estonia (152%), Poland (103%) and Germany (87% openness) (WBG, 2023c). Data were calculated from export, import and GDP values at constant 2015 prices in USD.

Figure 23: Inward equity positions as a percentage of GDP (excluding Hungarian SPEs)



Sources: IHA calculations based on Eurostat (2023) [BOP_FDI6_POS], [NAMA_10_GDP]; MNB (2023b)

Slovak companies are struggling to establish themselves abroad. The highest ratios of outward FDI stock to GDP are achieved by such economies as Cyprus, Luxembourg, Malta or the Netherlands. However, when assessing national competitiveness, it is more appropriate to evaluate the ratio of outward FDI to inward FDI stocks, especially when comparing a wider sample of countries. In 2021 Germany achieved a ratio of outward FDI to inward FDI stocks of 188%, which is also the highest percentage among EU Member States. Denmark is in second place (175.6%), followed by France (158%), Finland (142%) and the Netherlands (130.3%). At the tail of the ranking, Romania (2.5%), Bulgaria (5.7%) and Slovakia (9.1%) had the lowest ratios of outward FDI to inward FDI stocks. Slovakia also lags behind all the other V4 countries. The ratio of outward to inward FDI in Poland is 10.2%, in Czechia 26.7% and in Hungary 38.1%.[12]

Table 4: Inward and outward FDI stock as percentages of GDP in Slovakia and other EU Member States (%)

	Outward FDI stock in relation to GDP (%)				Outward FDI stock as a percentage of inward FDI stock (%)			
EU27	2010	2019	2020	2021	2010	2019	2020	2021
AUT	46.35	53.78	54.84	51.41	113.09	123.54	118.31	123.25
BEL	89.74	122.16	126.08	117.09	91.18	109.39	106.6	114.33
BGR	5.10	4.13	5.11	4.12	5.74	5.5	5.95	5.68
HRV	8.13	7.99	9.46	9.26	15.25	13.83	14.07	15.56
CYP	943.54	1790.56	1990.85	1537.05	93.24	103.08	102.7	101.69
CZE	7.14	17.88	20.90	18.91	11.61	26.34	26.27	26.73
DNK	50.66	63.51	69.76	68.69	169.69	171.11	167.11	175.64
EST	28.38	32.73	36.08	36.06	35.66	36.09	32.04	36.95
FIN	55.25	54.49	53.26	47.47	158.79	170.67	158.73	142.02
FRA	44.30	52.28	58.69	52.44	185.98	167.33	160.59	157.97
DEU	40.18	46.85	51.73	50.65	142.75	189.05	179.59	187.98
GRC	14.36	9.38	7.42	6.64	121.69	42.6	33.71	30.66
HUN	17.86	19.73	23.58	21.41	25.94	34.29	35.8	38.06
IRL	153.44	281.94	284.53	261.31	119.1	92.79	89.98	93.49

[12] Table 4 is compiled from UNCTADStat data (2022–2023). It should be noted that the values published by NBS or Eurostat are only broadly consistent UNCTADStat. This may be due to the aforementioned impact of reporting SPEs (e.g. Montvai, 2015).

	Outward FDI stock in relation to GDP (%)				Outward FDI stock as a percentage of inward FDI stock (%)			
EU27	2010	2019	2020	2021	2010	2019	2020	2021
ITA	23.02	27.80	30.98	26.41	149.73	125.94	123.79	121.63
LVA	3.89	6.31	7.63	15.26	8.57	12.05	12.53	24.97
LTU	7.13	12.94	18.72	16.59	17.13	30.45	36.04	36.83
LUX	333.03	397.34	1803.36	1497.84	108.57	145.05	119.76	125.54
MLT	671.27	427.95	486.65	404.45	46.69	31.88	30.12	28.61
NLD	114.36	251.92	391.09	333.51	164.62	157.62	131.43	130.3
POL	3.42	4.51	4.72	4.12	8.75	11.2	11.27	10.24
PRT	30.13	25.43	26.38	22.84	59.12	36.96	33.98	32.5
ROU	1.40	0.97	1.19	0.95	3.39	2.44	2.65	2.45
SVK	3.81	4.50	4.98	4.72	6.87	7.81	8.16	9.13
SVN	16.92	14.18	15.92	14.01	76.38	42.28	41.97	41.86
ESP	45.98	44.52	49.11	42.43	103.96	80.62	72.77	73.29
SWE	79.58	77.04	85.92	71.96	111.88	118.39	112.15	115.76

Sources: IHA calculations based on UNCTADStat (2022–2023)

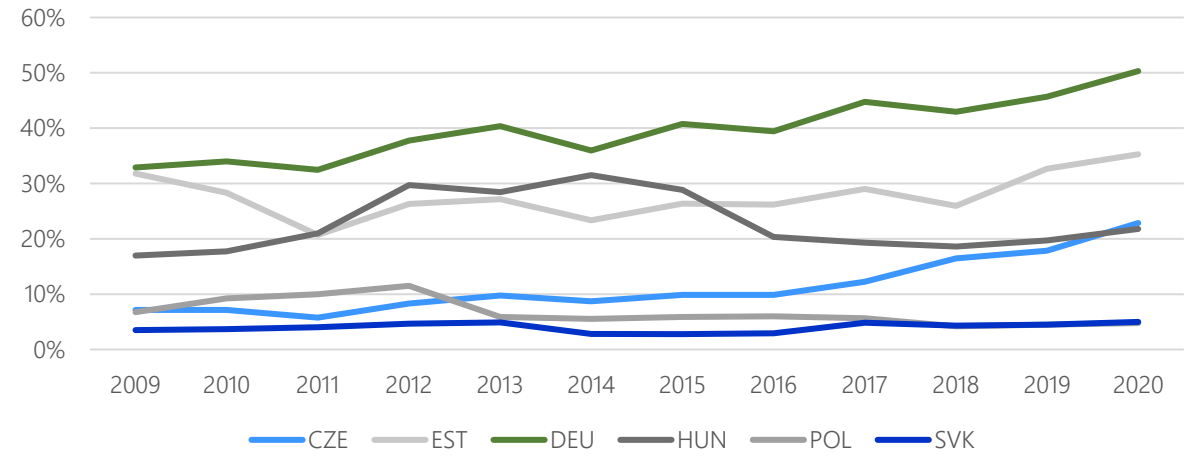
Slovakia's outward FDI stock has been stagnating as a percentage of GDP at around 4% for a long time and the net stock of investment as a percentage of GDP even fell by about 4.5 percentage points between 2010 and 2020.[13] Other monitored indicators include the development of outward FDI as a percentage of GDP (figure 24) and, finally, net outward FDI as a percentage of GDP (figure 25).[14] In this case, data is taken from the International Monetary Fund, which offered the advantage of higher availability of observations in the time series. In the case of Hungary, data from the Hungarian National Bank (MNB) in euros were used, these values being converted into US dollars at the average rate for the years in question (FRED).

A noteworthy development is the increase in the ratio of outward FDI stocks to GDP for Germany, Estonia, Czechia and Hungary (see figure 24). A similar development can be identified in the case of Poland, which is in a quantitatively different situation due to the large size of the Polish economy. In addition, Poland has higher ratio of net outward FDI (figure 25).

[13] From this, it is clear that Slovakia, remains in the second stage of development according to Dunning's theory, but it also supports the observation of R. Narul and J. Guimón (2010) that Dunning's theory needs to be applied having regard for historical and political development in the regional context.

[14] Net outward foreign direct investment or NOFDI. Net outward FDI represents the difference between outward and inward FDI stocks (e.g. Djokoto, 2021).

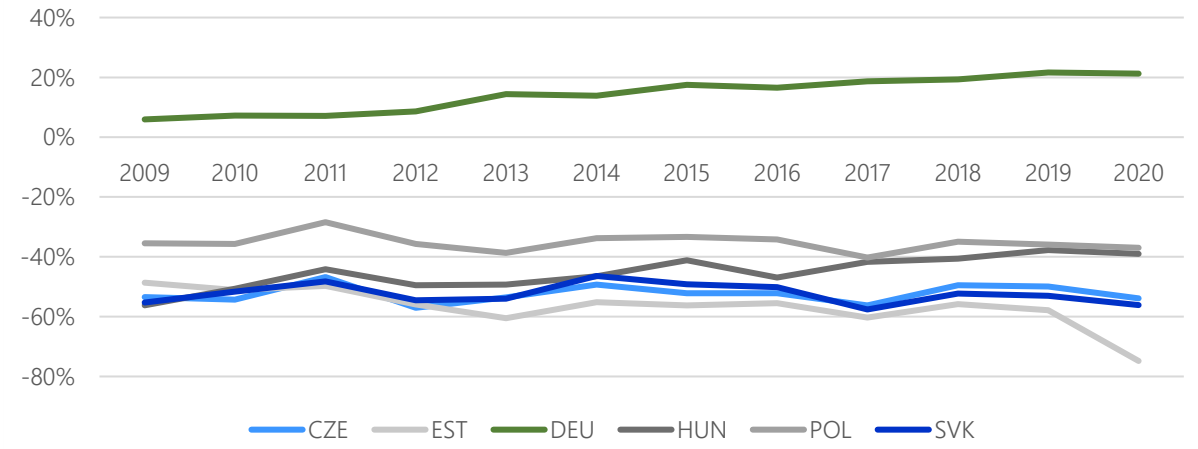
Figure 24: Total outward FDI stock as a percentage of GDP (Hungary without SPEs)



Sources: IHA calculations based on IMF (2022b-c); MNB (2023a); FRED (2023)

Since 2013, a gap has opened between Slovakia and Czechia in the ratio of outward FDI to GDP although both countries have the same ratio of NOFDI to GDP. Estonia's level of NOFDI as a percentage of GDP has been declining since 2019.

Figure 25: Net outward FDI (NOFDI) as a percentage of GDP (Hungary without SPEs)



Sources: IHA calculations based on IMF (2022b-c); MNB (2023a); FRED (2023)

Slovakia does not invest enough abroad and inward investments to Slovakia should be directed to innovative sectors with higher value added. The outward FDI stock of Slovak investors is tiny in proportion to the inward FDI that the country receives. It is a matter for debate what strategy should be adopted to overcome the stagnation of net outward FDI, i.e. to provide strategic support for investment by Slovak entities outside the home economy. A similar problem can be observed in the case of exports, which are generated mainly by foreign enterprises. It is widely known that Slovakia is one of the countries with the highest export performance of the economy[15], and at the same time the Slovak economy is an important destination for FDI in the region. The flipside of the coin is that domestic enterprises accounted for only about 12% of total Slovak

[15] Export performance represents the ratio of exports to GDP, e.g. Ružeková, Kittová and Steinhauser (2020) or Baláž, Hamara and Sopková (2015). In 2020 and 2021, Slovakia achieved export performance of 85.1% and 92.4%, respectively (WBG, 2023d).

exports in 2021 (Steinhauer – Boros, 2022). In this respect, there is much more room for growth in the international activities of Slovak enterprises. More developed economies should have higher positive outward FDI stock relative to inward FDI. The low volume of Slovak investments abroad can be largely explained by the fact that Slovak companies lack capital and innovation capacity (e.g. Habrman, Habodászová and Šrámková, 2022).

Another reason why the region of Central and Eastern Europe, and especially Slovakia, is on an idiosyncratic development path[16] may be the significant integration of the region's economies in global supply chains, which insufficiently stimulates investment activity in innovation, science and research, with the result that little or no competitive advantages emerge in relation to foreign entities. FDI inflows by themselves do not guarantee productivity gains and industrial modernisation for the long term (Narula and Guimón, 2010). "*Slovakia's position in the TOP 15 countries of the world according to the Economic Complexity Index (together with other similar Central European economies) is the result of us being the world's top assembly workshop, not a leader in research and innovation. They* [note: foreign companies] *have no need to relocate the research activities or intellectual property concentrated in their country of origin to Slovakia.*" (Habrman, Habodászová and Šrámková, 2022) At the same time, it is possible to observe a problem with allocation efficiency, which is related to the quality of institutions: "*The slowdown in the convergence of living standards with developed Western economies may be due to the low ability of the Slovak economy to allocate resources effectively. This may be due to inadequate regulation or specific conditions in sectors, such as a lower level of competition or greater informality in services*." (Peciar and Wittemann, 2019)

Innovation is an essential factor for an enterprise seeking to distinguish itself from the competition and gain a competitive advantage. However, innovation can be significantly impeded by the uncertainty of an unpredictable investment environment. Akis (2015) argues that there has been an increasing trend in the intensity of competition, especially after the Second World War and the acceleration of globalisation. The homogeneity of consumer demand has also increased, so many countries produce the same types of goods. In such an environment, there is a growing need for a competitive advantage that will make it possible for such products to stand out from each other. Innovation has become an important element of competitive advantage. Z. Xu (2020) argues that the innovation activity of companies may be suppressed by economic policy uncertainty and that the role of governments in creating a healthy investment environment should be to reduce policy uncertainty. The effect of economic policy uncertainty is even greater than the effect of the "irreversibility of investment", which requires the right timing and investment information, with the result that entities may postpone investment decisions during uncertainty in the external environment (for the theoretical concept of irreversibility of investment, see e.g. Bernanke, 1983 or Gulen and Ion, 2016).

[16] In terms of Dunning's theory, Slovakia remains in the second stage of the development path (see box 6).

3. Physical infrastructure

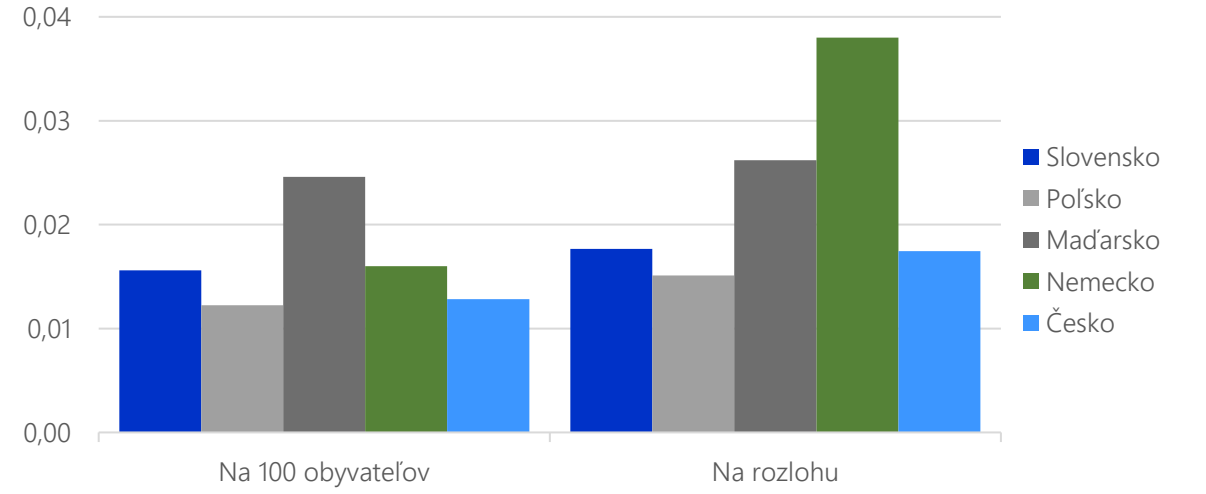
The density and quality of physical infrastructure are important factors in countries' ability to attract investment. The chapter compares the available hard data on transport, energy and telecommunications infrastructure and tries to identify Slovakia's strengths and weaknesses in these categories. The chapter also includes a comparison of the availability of industrial parks for potential investors, which is an important factor due to the long approval processes preceding the construction of industrial sites.

3.1 Transport infrastructure

Investment in transport infrastructure contributes to increasing the overall productivity of the economy, especially in countries with an open economy which are largely oriented towards foreign trade like Slovakia. The reasons are, in addition to reducing trade costs and the resulting support for the country's engagement in international trade, supporting growth in the competitiveness of domestic companies based on easier connections with other enterprises in their supply chains. Effective interregional connections in a country can then contribute to facilitating the participation of people from all regions in the labour market and attracting investment (OECD, 2019).

In the length of roads of the highest quality (motorways and expressways), Slovakia is approximately at the level of the average of the surrounding countries when its area and population are taken into account. After recalculating the total length of motorways and expressways, taking into account the land area of countries, Slovakia with 0.018 km is slightly ahead of Czechia (0.017 km) and Poland (0.015 km). Similar results are also obtained in terms of length per 100 inhabitants, where, of the surrounding countries, Slovakia's 0.016 km is beaten only by Hungary (0.025 km).

Figure 26: Total length of motorways and expressways in relationship to country area



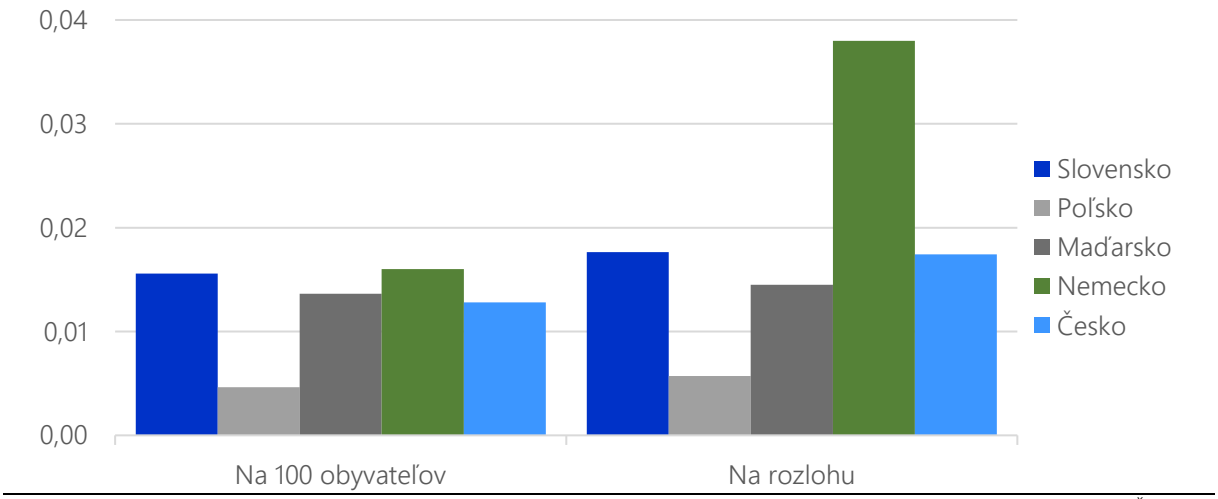
Sources: IHA calculations based on SSC (2021), GDDKiA (2021), GDDKiA (2021), MKNZRT (2021), StBA (2021), MDČR (2021)

It should be noted that definitions of expressways may differ across countries with regard to maximum permitted speed, the existence of non-level junctions or other qualitative indicators. One way to minimise these effects is to compare the length of only those roads where the general

speed limit is equal to or greater than 130 km/h.[17] This definition includes motorways and expressways in Slovakia, but in the surrounding countries only motorways (in Czechia, motorways and expressways are grouped in one category since 2016).

In the length of roads with a maximum speed of 130 km/h or more, taking into account the area and population of the countries compared, only Germany is better than Slovakia from the countries monitored.[18] In a comparison of the total length of motorways and expressways taking into account the land area of countries, Slovakia with 0.018 km is ahead of Czechia (0.017 km), Poland (0.017 km) and Hungary (0.015 km). Similar results are also obtained in terms of length per 100 inhabitants, where, of the surrounding countries, Slovakia's 0.016 km is at the level of Germany. A point that must be noted is that motorway infrastructure in Slovakia is not evenly distributed, but is concentrated mainly in the western and northern parts of the country. This has a negative impact on the competitiveness of regions that are underserved by motorway infrastructure.

Figure 27: Total length of roads with a general speed limit of ≥ 130 km/h and its relationship to country area



Sources: IHA calculations based on SSC (2021), GDDKiA (2021), GDDKiA (2021), MKNZRT (2021), StBA (2021), MDČR (2021)

In the pace of motorway construction, Slovakia did not lag behind the neighbouring countries. Since 2010, motorways have been growing here at an average rate of 2.5% per year (an average of 11.75 km). Only Poland showed a faster pace of construction over the same period, with an average rate of 7.14% per year (82.18 km), while motorways were built more slowly in Hungary (2.13%), Czechia (1.54%) and Germany (0.24%).[19] A comparison of the pace of construction and the position of Slovakia in relation to the surrounding countries taking into account the number of inhabitants and area produces results that differ little from the figures above. The pace of motorway construction also depends on the existing state of the motorway network, which is why countries with an existing extensive motorway network may have a slower pace of construction.

[17] On certain specific road sections, this speed may vary, as may sections of other roads with the same high speed limit. The analysis compares only the types of roads with the stated general speed limit laid down by law.

[18] In Germany certain sections of roads other than motorways (Kraftfahrstraße) also allow this speed but are not quantified in the report. Real numbers for Germany are estimated above.

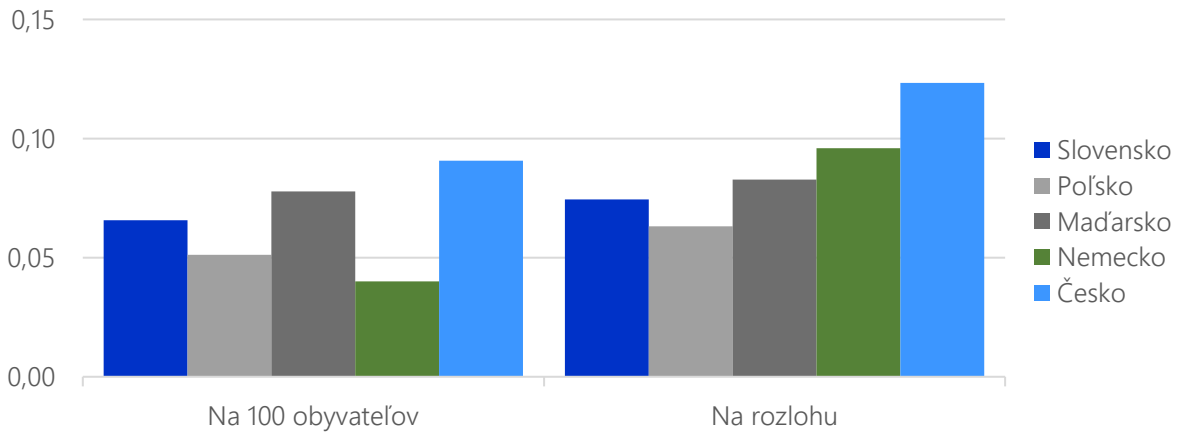
[19] IHA calculations based on Eurostat (2023) [ISOC_CI_IT_EN2].

After the completion of all sections of motorways and expressways currently under construction or planned for completion by 2030, the pace of construction in Slovakia will slow down to 1.60% per year (1.44% for motorways).[20] Currently, 63 km of motorway and expressway sections are under construction in Slovakia (of which 29.8 km are motorways) with the expected completion of all sections by 2025. Current plans point to an average annual increase of 21 km (9.9 km of motorways). In addition to the sections currently under construction, more than 52 km of planned sections of motorways and expressways (over 35 km of motorways) with preliminary completion dates before 2030 are in various stages of preparation.

The technical condition of motorways and expressways in Slovakia is very good, though there are problems with first and second class roads. More than 90% of motorway and expressway sections are in good to excellent condition, while less than 2.5% of sections of both types of roads are in poor to critical condition. First and second class roads are significantly worse, with only 46% and 30% of sections in good to excellent condition respectively, and as much as 32.4% and 43% of sections in poor to critical condition respectively (SSC, 2022). The quality of roads can be compared with the surrounding countries based on the World Economic Forum index, where Slovakia has four points out of a possible seven, on the same level as Hungary. Poland (4.3 points) and Germany (5.3 points) do better. Czechia scored worse with 3.9 points.[21]

In the length of operated railway lines, Slovakia is approximately on the average level of the surrounding countries, as in the case of roads. The length of operated railway lines is a basic measure of the state of railway infrastructure, which is the second most important type of transport infrastructure for a country's competitiveness. However, after dividing the length of railway lines in operation by the land area of countries, Slovakia, with 0.074 km of lines, is in next to last place among the monitored countries. Czechia takes first place with 0.123 km of tracks. When calculated per 100 inhabitants, only Hungary (0.078 km) and Czechia (0.091 km) among the monitored countries are ahead of Slovakia, which has 0.066 km.

Figure 28: Total length of railway lines in operation and in relation to country area



[20] IHA calculations based on NDS (2023) and the Road Infrastructure Project Planning and Construction Schedule (2022).
[21] The points in the index are awarded on the basis of a questionnaire sent to stakeholders in the given countries. It is assumed that stakeholders in Slovakia and its neighbours have similar expectations and therefore their scores in the index are comparable.

Sources: IHA calculations based on ŽSR (2021), UTK (2021), UNECE (2021), KSH (2021), UIC (2022), MDČR (2021)

The railway network is therefore relatively dense by regional standards but it is not used as fully as possible due to poor technical condition. Many of the lines are in poor condition due to underfunding and are little used – the use of railway lines in Slovakia is lower than in any neighbouring country (ÚHP, 2019). Maintenance funding is inadequate and dispersed over a large number of lines. In 2019, as many as 34.5% of railway lines in Slovakia were in poor to critical condition, while only 12.4% of lines were in very good condition (ÚHP, 2021).

There has been practically no increase in railway lines in operation in Slovakia since 2010. Since 2010, their length has increased by only 4 km, so the average annual change is just 0.01% (360 m), indicating there are no new lines. The trend in the surrounding countries is similar, if not worse. In Poland and Czechia, lines in operation are even decreasing, faster in Poland at an average rate of 0.43% (85.5 km) per year. In Germany and Hungary, there is a slight positive trend, with 0.15% and 0.68% annual increases in track respectively.[22] A comparison of the pace of construction and the position of Slovakia in relation to the surrounding countries taking into account the number of inhabitants and area produces results that differ little from the figures above.

The proportion of lines that are electrified is also important for the competitiveness of railway transport, together with the percentage of these lines that are single-track, double-track or multi-track lines. As regards railway electrification, Slovakia is below average among the monitored countries, with 43.7% of lines being electrified. Poland has the best figures with 62.74% and the worst Czechia is with electrification on 34% of lines. Slovakia also achieves below-average values in the percentage of two- and multi-track railway lines, with 28%, whereas Poland has over 46% and Germany over 55%. There are worse results in Czechia (over 21%) and Hungary (just under 17%), however.[23]

Besides developing connections within the country, there must also be links with international corridors for a transport network to achieve its full potential. Completing the TEN-T CORE long-distance network by 2030 should be a priority for Slovakia considering its commitments to the EU.

From the core network of TEN-T multimodal corridors, the Baltic-Adriatic corridor is already largely completed in Slovakia through the motorway connection from Bratislava to Poland, which lacks only sections of the D3 motorway between Žilina Brodno and Oščadnica, and the Orient – Eastern Mediterranean corridor through the completed motorway connection between Hungary and Czechia via the D2 motorway. To complete the Slovak part of the Rhine – Danube corridor, it is necessary to complete the R6 expressway and the D1 motorway, which will connect Czechia and Ukraine.

The completion of TEN-T corridor sections also features in the Priorities in the construction of road infrastructure in Slovakia. Specifically, it includes six sections of the D1 motorway and the R3 and R6 expressways (ÚHP, 2020).

Despite the fact that Slovakia does not lag behind its neighbours in indicators for the overall length of transport infrastructure, the uneven distribution of the transport network throughout

[22] IHA calculations based on Eurostat (2023) [RAIL_IF_LINE_TR].
[23] IHA calculations based on Eurostat (2023) [RAIL_IF_LINE_TR], UIC (2021)

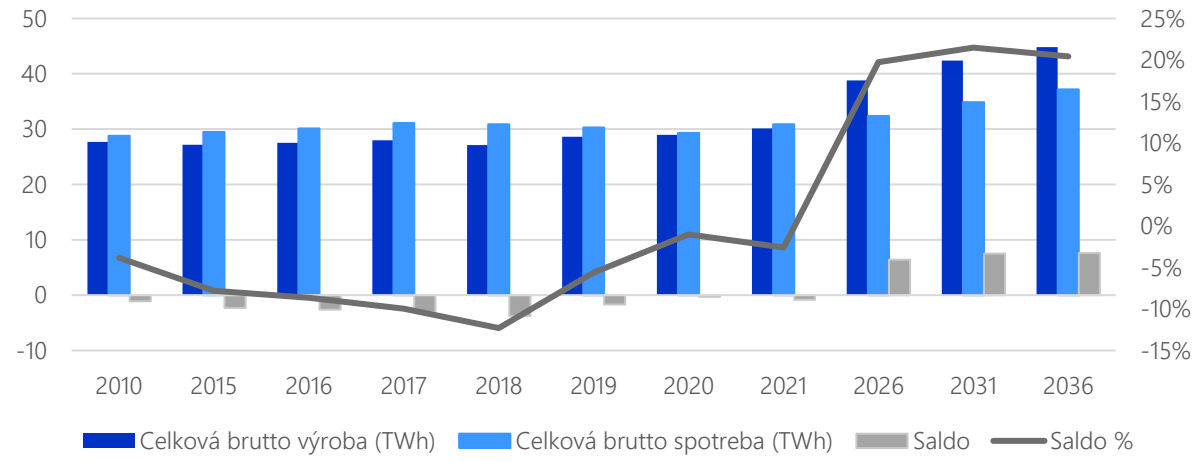
the country and the lack of a direct national motorway connection between the two largest Slovak cities, Bratislava and Košice, may contribute significantly to the deepening of regional differences, especially between the western and eastern halves of the country. Failure to address this problem may ultimately hinder the positive effects of the development of transport infrastructure in Slovakia.

3.2 Energy infrastructure

Approximately 40% of global economic activity is generated in sectors that are sensitive to the type, quality and cost of the energy inputs to production. The most strongly affected sectors are metallurgy, chemical production, paper, construction materials, engineering, transport and logistics, and IT (McKinsey Germany, 2009). The sufficiency, stability of supply and affordability of energy are therefore amongst the key factors for a country's competitiveness. These factors depend on the quality of energy infrastructure.

Slovakia will be a net exporter of electricity after 2023 as a result of the launch of new production capacities. Commissioning of Unit 3 at the Mochovce nuclear power plant began in early 2023, with full operation and commercialisation expected before the end of the year. The commissioning of Unit 4 is expected in the near future, with the current target date being 2025 (in both cases, the installed electricity capacity is 471 MW). Alongside increases in the volume of production from renewable energy sources with variable production, in the context of Slovakia's contribution to the EU goals for 2030 and also in the context of the Fit for 55 agenda, it is expected that the operation of controllable sources will increase. Besides the new nuclear plants, increasing the capacity of photovoltaic and wind power plants will also play an important role. Capacity that will soon be lost includes the coal-fired power plant at Nováky, which is expected to shut down in 2023. The similar units 5 and 6 of the Vojany power plant are scheduled to leave service from 2028. As a result of all these changes and despite forecast increases in electricity consumption, Slovakia will go from being a net importer of electricity to a net exporter with an annual surplus of 6.4 to 7.6 TWh Production from technology with zero CO_2 emissions (nuclear, hydro, renewables) will cover consumption at a level of around 100% in the future, which is a significant increase compared to 73.9% in 2021 (MH SR, 2022a).

Figure 29: Electricity balance of Slovakia (forecast to 2036)



Source: Ministry of Economy

In the EU context, the Slovak transmission system is relatively well prepared for the future, since, in all the analysed scenarios of development according to entso-e,[24] a relatively low level of investment will be needed in comparison to other EU countries to develop interconnections ensuring smooth cross-border energy flows, with some necessary national network reinforcements, or even international reinforcements. In a scenario without additional cross-border flows, Slovakia performs among the best in the EU, needing only a few network reinforcements. Of the surrounding countries, only Hungary is in the same category. In a scenario with additional cross-border flows, Slovakia is also in the best category, as are the other neighbouring V4 countries with the exception of Poland. Nevertheless, from a strategic point of view, it would be useful to consider a direct connection to the Austrian electricity network (ENTSOE, 2019).

Slovakia has the second least dense distribution system in the V4 region, after Hungary, both in terms of population and area. On the other hand, the entire territory is well covered, even with lines at higher voltage levels. In 2021, the total length of distribution system lines in Slovakia was 91,353 km. Of these, 6,743 km were on high voltage (more than 100 kV, accounting for 7.38%), 32,361 km on medium voltage (from 1 kV to 100 kV, representing 35.42%) and 52,250 km on low voltage (less than 1 kV, representing 57.20%). Compared to the surrounding countries, Slovakia is in second place from last in terms of the total length of lines per capita (Hungary is just behind it) and also in relation to km^2 of area. Czechia has the densest coverage (EURELECTRIC, 2013).

The main future challenges for systems are the transition to the SMART Grid, and cross-border connections. The main bottleneck in the development of distribution systems in Slovakia is authorisation procedures, which in the absence of sufficient capacity (power) or control power for new connections in a given location disproportionately extend the time needed to connect new customers, or connect new sources to the system and increase the installed capacity of existing sources, including renewable sources of electricity. Locations where capacity is already available for new connections, such as industrial parks, often may not suit potential investors for various reasons (demographics, workforce composition, etc.). For example, in the case of electricity-intensive production (such as car batteries), Slovakia currently has only one free location with sufficient space for production.

[24] The analysis scenarios include the ability to meet the targets set in the framework for a sustainable transition (reduction of CO_2 emissions); the decentralisation of the electricity grid (with a view to integrating smart technologies and multi-fuel appliances) and the global climate effort (decarbonisation).

Figure 30: Distribution network density per 1,000 km²

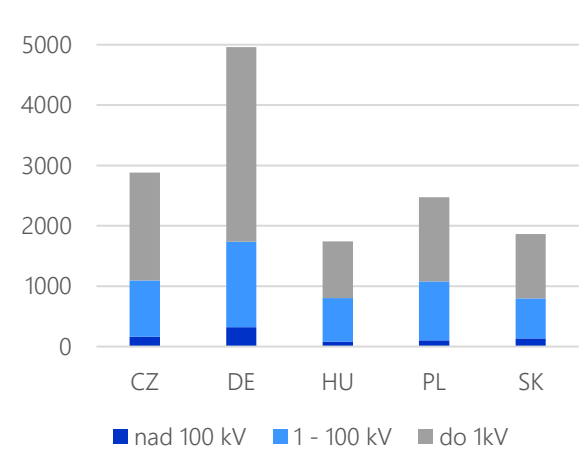
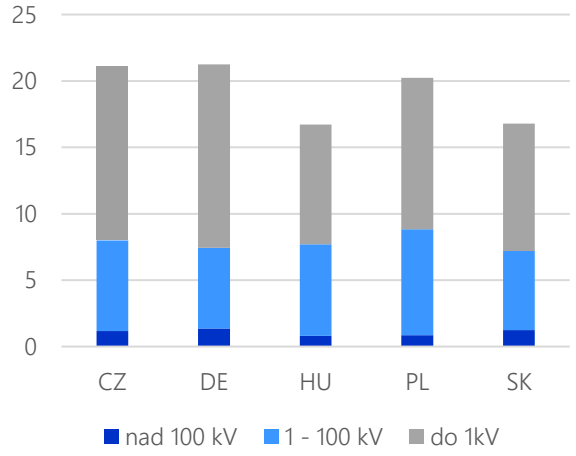


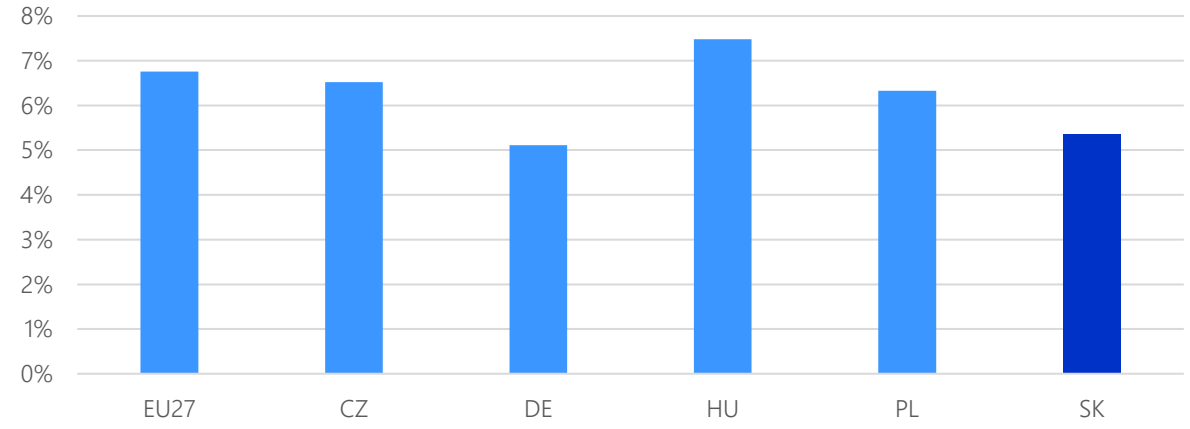
Figure 31: Distribution network density per 1,000 inhabitants



Source: Eurelectric.org, IHA calculations

In the system quality indicator measured by the ratio of reported electricity losses to the total energy supplied to the system, Slovakia is the best among the V4 countries, at a level comparable to Germany. The average losses in the system between 2017 and 2021 were 5.4%. However, the values are highly volatile over time, ranging from 4.6% in 2018 to 6.3% in 2019. Hungary has the highest losses in the region.

Figure 32: Losses in the electricity network (average 2017–2021)

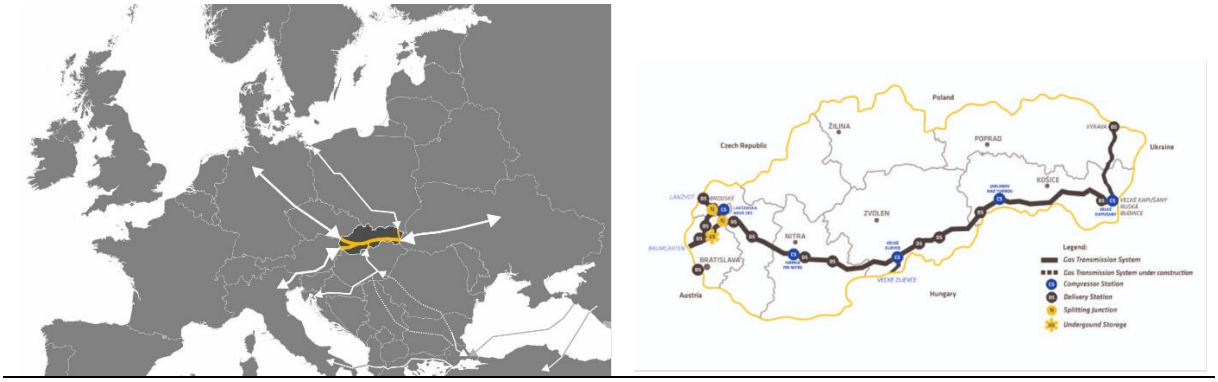


Source: eurostat (nrg_bal_c), IHA calculations

In the case of gas, Slovakia's energy self-sufficiency is minimal. In 2021, imports accounted for 98% of domestic gas consumption, coming primarily from the Russian Federation. Domestic gas production covers only a fraction of consumption. In 2022, it reached 58 million m^3 (Central Mining Office, 2022) whereas in 2021, gas consumption in Slovakia reached almost 5.6 billion m^3. Before the energy crisis, gas consumption was expected to stagnate at 5 billion m^3 in the coming years (Ministry of Economy, 2022b). However, in the twelve months between April 2022 and March 2023, gas consumption fell by almost 20% year-on-year (SPP Distribúcia, 2023). This was partly due to downtime at large industrial customers. However, it is realistic to assume that gas consumption in the coming years will be lower than originally expected.

The transport and transit of gas is handled by Eustream, a.s. As of 1 January 2022, the transport network represented almost 2,270 km of gas pipelines and 5 compressor stations (compressor station No. 5 (Lakšárska Nová Ves) was put into operation on 1 January 2020). The capacity of the transport network is over 90 billion m3 per year. In 2021, 41.6 billion m^3 of gas was transported. In November 2008, a long-term gas transport contract was signed between Eustream, a.s. and Gazprom Export, which remains the most important contract in the field of gas transport. The contract entered effect on 1 January 2009 with a validity period of 20 years (Ministry of Economy, 2022b).

Figure 33: Transport network of Eustream, a.s.



Source: Eustream a.s.

From the point of view of energy security, making maximum use of the existing transport infrastructure for transporting gas from different directions from diversified sources for the countries in the region and the EU remains an absolute priority for Slovakia. In 2019, an agreement on gas transit through Ukraine was concluded at the level of the EU, Ukraine and the Russian Federation for the next 5 years, i.e. until 2024. However, given the current geopolitical situation, it is by no means certain that this agreement will be fulfilled. It is also impossible to say what the situation will be after 2024 and therefore diversification of transport routes is all the more urgent.

Slovakia is doing relatively well in diversifying its transport routes. The primary east-west gas flow has been partially diversified by a reverse setting in the west-east direction from Austria and Czechia. The transmission network can activate reverse gas flow in times of crisis. The quantity of gas that it can transport from west to east exceeds the highest consumption in Slovakia in the winter months (Ministry of Economy, 2022b).

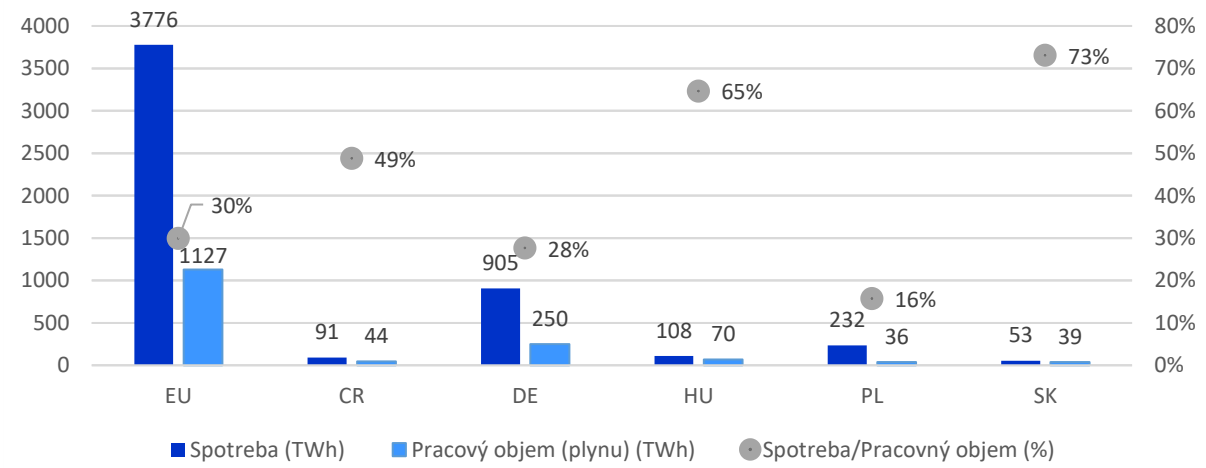
Slovakia is also connected with Poland and Hungary in the north-south and south-north directions, which opens up the possibility of sourcing from other gas pipelines in the territory of our neighbours, as well from LNG ports in Poland or Germany, or from ports in the Adriatic Sea. The new interconnection between the transport networks of Slovakia and Hungary was put into commercial operation on 1 July 2015. Its capacity is 1.3 billion m^3 in the direction of Slovakia and 4.5 billion m^3 in the direction of Hungary. An increase in capacity to 5.3 billion m^3 in each direction is under preparation, which would cover all of Slovakia's annual gas consumption. The connection with Poland was put into commercial operation in November 2022 and has an annual transport capacity of 4.7 billion m^3 in the direction of Slovakia and 6.1 billion m^3 in the direction of Poland. In the event of a failure of the main flow from Russia, the capacity of LNG terminals becomes a bottleneck for energy security. In the future, eustream a.s. is considering the use of

one to two of the existing pipes in the existing gas network to transport hydrogen, up to 100% volume/capacity (Energoklub, 2022).

The largest distribution network in Slovakia is operated by SPP – Distribúcia and covers most of the country[25]. In 2021, there were 6,274 km of high-pressure gas pipelines, and 27,062 km of medium-pressure and low-pressure gas pipelines. The SPP – distribúcia, a.s. distribution network was used by 34 gas traders as of 31 July 2021. SPP – distribúcia, a.s. plans only minimal expansion of its distribution network in the near future. 77% (2,233) of the municipalities in which more than 94% of the total population of Slovakia lives are connected to the gas network. The company has more than 1.52 million customers connected to its network (Ministry of Economy, 2022).

Slovakia is a leading country in the volume of gas storage facilities. Among all EU countries, it is in the third place in terms of the ratio of consumption to gas space[26] (73%), and in the first place in the V4 countries. The storage facilities in the territory of Slovakia are also used by suppliers and traders from other countries. The total storage capacity in Slovakia is 38.75 TWh (approx. 3.65 billion m^3), while the maximum daily fixed deliverability is approx. 465 GWh (43.8 million m^3), the maximum daily injectability is approx. 410 GWh (38 million m^3) (Ministry of Economy, 2022; GIE AGSI, 2023).

Figure 34: Ratio of working volume of underground gas storage facilities to consumption[27]



Source: GIE AGSI, 2023, IHA calculations

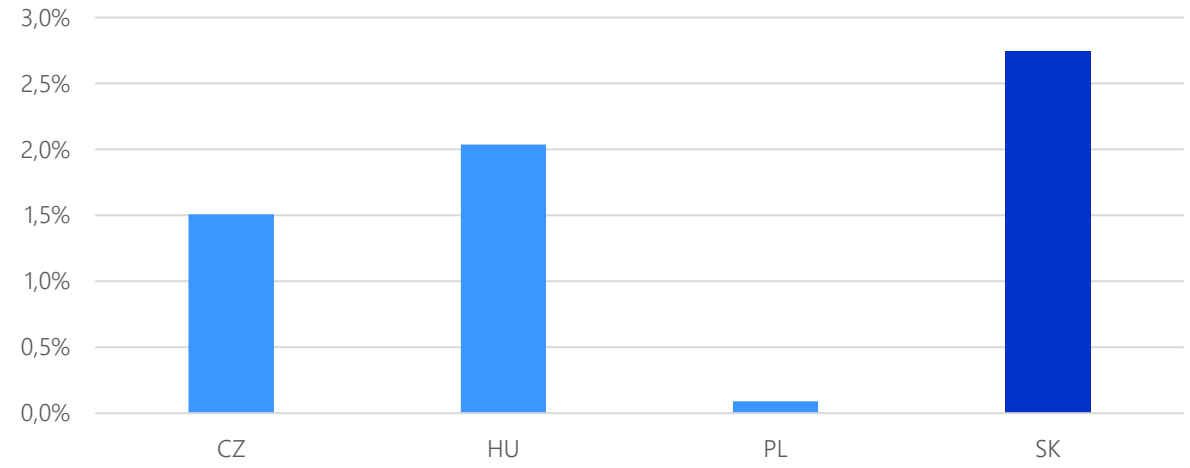
One of the unusual characteristics of the Slovak gas network is the fact that the storage facilities in the territory of Slovakia are not used to balance the gas distribution network and ensure supplies to protected customers (primarily households), but for this purpose the storage facility in Dolné Bojanovice, in Czechia is used, which is directly connected only to the distribution network of SPP-distribúcia a.s. and is independent of the technologies of NAFTA a.s. and POZAGAS a.s.

Where quality of networks is measured in terms of reported losses against gross gas volume available for final consumption, Slovakia emerges as the worst performer of the countries in the

[25] Another distributor with equal legal standing but managing a much smaller distribution system is Veolia Komodity Slovensko, s.r.o. (ex GasTrading, s.r.o.).
[26] The working volume of the gas in the storage tank is the volume that can be extracted from the completely filled storage tank so that the minimum gas volume technologically possible remains in it.
[27] Last known data.

region. Average losses in the years 2017–2021 were around 2.7% with a slightly rising trend. In contrast, the other countries surveyed tended to have declining loss rates.

Figure 35: Losses in the gas network (average 2017–2021)



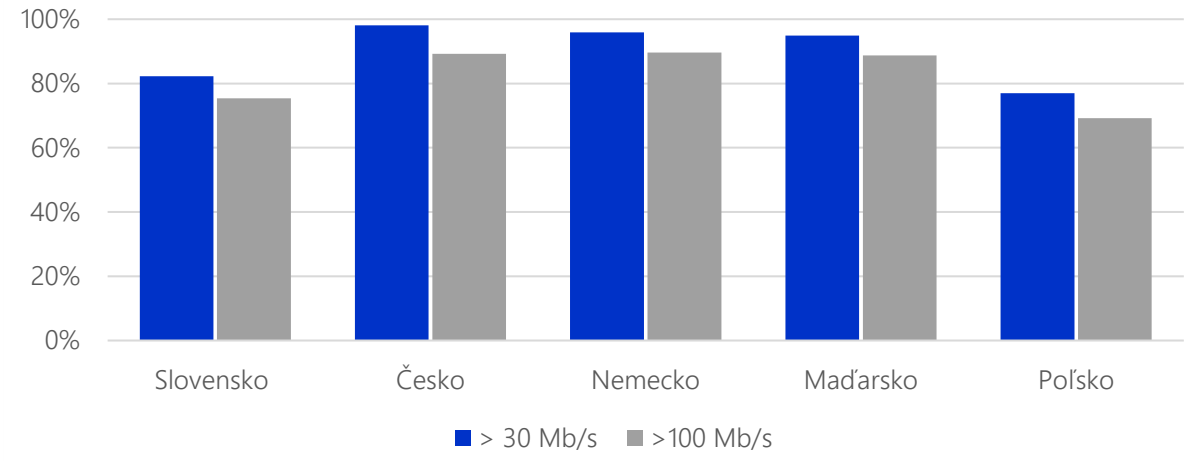
Source: eurostat (nrg_bal_c), IHA calculations

3.3 Telecommunications infrastructure

One of the basic measures of the development of telecommunications infrastructure in the country is the coverage of broadband connections for households. As part of the Europe 2020 strategy, the EU set a target of ensuring that all Europeans have access to broadband connections with internet speeds above 30 Mb/s by 2020. Slovakia did not manage to meet this target even in 2021, when 82.3% of Slovak households had access to such a connection. Of the countries surveyed, only Poland was worse off with coverage of 77% of households. Hungary (94.9%), Germany (95.9%) and Czechia (98.1%) reported better results.

Due to the rapid increase in work from home and the related increase in the importance of internet connection speeds, Slovakia set a target in its Recovery Plan that all households should have access to an internet connection with a speed of at least 100 Mb/s by 2030. In 2021, 75.4% of Slovak households had access to such a connection, which is lower than in Germany (89.6%), Czechia (89.2%) and Hungary (88.7%). Poland reported worse results with 69.2%.

Figure 36: Broadband coverage by internet speed (% of household)

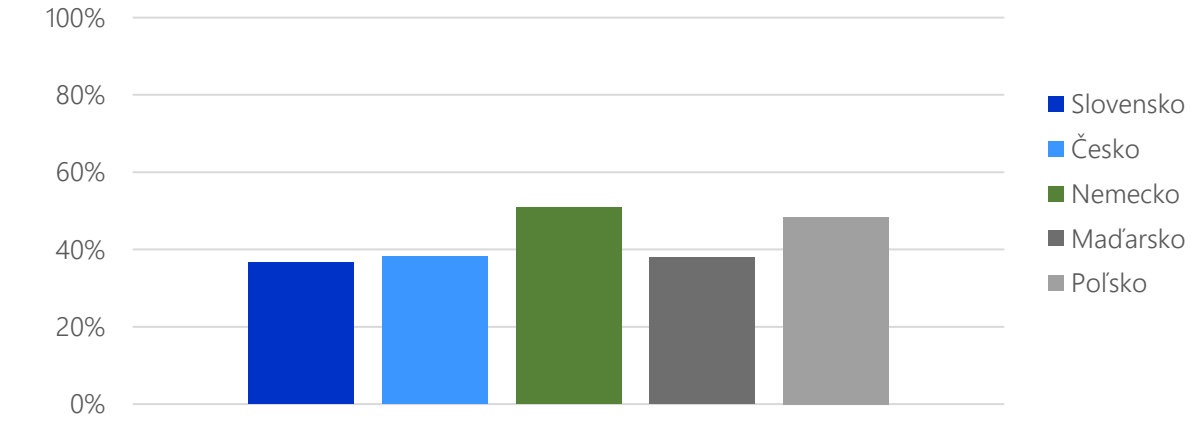


Sources: IHA calculations based on Eurostat (2022) [ISOC_CBS]

Modernisation of rural areas is an important part of the effort to reduce socioeconomic differences between urban and rural environments. It can be measured by, among other things, the indicator of broadband coverage of rural households. In Slovakia, 87.3% of households have broadband internet in rural areas, which is more than in Czechia (85.6%) and Hungary (85.5%). Germany (91.2%) and Poland (91.9%) perform better.[28]

When looking at the private sector, Slovakia's telecommunications infrastructure lags behind all its neighbours. Only 36.6% of enterprises with more than 10 employees operating in all areas except the financial sector have a fixed internet connection faster than 100 Mb/s, while in Hungary this figure is 37.9%, in Czechia 38.3%, in Poland 48.4% and in Germany 50.9%.

Figure 37: Enterprises with a fixed internet connection > 100Mb/s (% of enterprises)



Source: IHA calculations based on Eurostat (2023) [ISOC_CI_IT_EN2]

From the point of view of the use of services such as cloud computing and big data, which contribute mainly to strengthening business productivity, Slovakia lags slightly behind its neighbours. Only 5.6% of enterprises in Slovakia with more than 10 employees, operating in all areas except the financial sector, analyse big data, which is the smallest share compared to the surrounding countries. In this indicator, Czechia leads among neighbouring countries with 9.1%

[28] Eurostat (2022) [ISOC_CI_IN_H].

whereas of all the companies surveyed, Germany takes first place with 17.8% of enterprises using big data.

Slovak enterprises use cloud computing services in about the average amount for the region, with such use being reported by 36.1% of enterprises in Slovakia. This is a higher rate than in Hungary (26.4%) and Poland (28.7%). Czechia is the leader for this indicator among the monitored countries, with 43.8% of enterprises using these services.

Table 5: Big data and cloud computing use by firms

	Firms analysing big data (% of firms) 2020	Firms using cloud computing services (% of firms) 2021
Slovakia	5.6	36.1
Czechia	9.1	43.8
Germany	17.8	41.6
Hungary	7	26.4
Poland	8.5	28.7

Source: IHA calculations based on Eurostat (2023) [ISOC_EB_BD], [ISOC_CICCE_USE]

The quality of digital infrastructure and the innovative capacity of a country is also evaluated by the composite DESI index, which monitors digital capacity in society and the ability to make use of it. This index includes, among other things, data on the digital skills of the population, the coverage of broadband connections, and the digital intensity of enterprises and public services.

Slovakia ranks 23rd in the DESI ranking of EU countries, with a total score of 43.2 points. Hungary (22nd place), Czechia (19th place) and Germany (13th place) ranked better among the countries studied. Compared to other EU countries, Slovakia achieves the best score in the area of human capital (19th place).

3.4 Industrial parks

When investors decide on the location of an investment, minimising the time between the investment decision and the start of production is an important consideration. Countries that have enough fully built industrial parks with adequate free space thus acquire a competitive advantage in the eyes of investors. In the event of a lack of such parks, it is necessary to build new industrial sites on greenfield sites with corresponding settlement of land ownership, changes to the zoning plan, and construction of new utility supply networks and transport infrastructure, which may take longer due to lengthy approval processes.

In Slovakia, the construction of industrial parks is largely left to the private sector. The state gets involved on an ad hoc basis, without a comprehensive plan. Currently, the Ministry of Economy of the Slovak Republic registers a total of 126 industrial parks in the territory of Slovakia in private or state ownership, or in the ownership of municipalities, with a total area of over 7,000 ha[29], with several projects being beneficiaries of state support. Existing industrial parks in Slovakia tend to be on the small side, with just 12 of them declaring a usable area of more than 100 ha. In addition, not all of them are fully prepared for investment (land ownership is not settled, the transport infrastructure or utility supply networks are not completed, the free area is not consolidated). In

[29] The real number of industrial parks in all countries is likely to be higher than indicated, as several industrial zones may not meet national definitions of industrial parks, or the state may not have information about them.

the past, the state built four strategic parks with a total area of 677 ha. In recent years, the state has got more actively involved in the construction of larger-scale industrial parks, primarily in locations with higher rates of unemployment. Six strategic state parks with a total area of approximately 2,000 ha are currently under construction in Slovakia. Recent experience confirms that prepared industrial parks are likely to increase the chance of attracting investors, as shown, for example, by the Volvo Group's investment in the Valalika Strategic Park, which was announced in 2022.

Czechia supports the development of strategic industrial zones from the state budget. Their current number is 11, with a total area of over 2,600 ha, (Ministry of Industry and Trade of the Czech Republic, 2017). The construction of other industrial parks is in the hands of the private sector or local governments, and it is possible to obtain funds from the state budget and European Union funds for their construction and development. The Centre for Regional Development currently registers 161 important industrial zones with a total area of almost 10,900 ha (CzechInvest, 2023).

The Polish Ministry of Economy owns and actively develops industrial parks with an area of almost 20,000 ha in 14 special economic zones (Getsix, 2023). In addition to infrastructure, these special economic zones also offer tax benefits. In addition, the Polish government registers more than 70 large industrial and technology parks, which are characterized by a variety of tax exemptions for research and development expenditure (Healy Consultants, 2023).

In Hungary, the state-owned company INPARK is involved in the development of industrial parks, currently owning 18 projects with a total area of over 1,300 ha (InPark, 2023). Parks are almost evenly distributed geographically and, with some exceptions, are located near the largest towns and cities in the country. The development of smaller parks is in the hands of the private sector and local governments (Zilahy and Milton, 2008). The consulting company ABT reports a total of 210 industrial parks in Hungary, in which approximately 4,200 enterprises operate (ABT Treuhand, 2023).

Given the lack of comprehensive information on industrial parks in other V4 countries, in particular on the settlement of ownership, it is not possible to draw a clear conclusion on the competitiveness of Slovakia in respect of the availability of free industrial areas for potential investors. However, a cursory comparison with other countries shows that our competitors for investors in the region have more developed plans in the field of industrial park development. The objective lack of fully prepared industrial parks of a larger scale in Slovakia also remains a fact that could have a negative impact on inward investment.

4. Soft infrastructure

The selection of soft infrastructure components for this chapter reflected the need for digital transformation in Slovakia and upgrading the country from a screwdriver plant to an innovative economy.

Basic components of soft infrastructure supporting the growth of competitiveness and productivity include:

- the need for talent, a high level of education and human capital skills,
- the intensity of ICT use in households and enterprises,
- investment in research and development,
- the ability of enterprises to implement research and development results in products and processes.

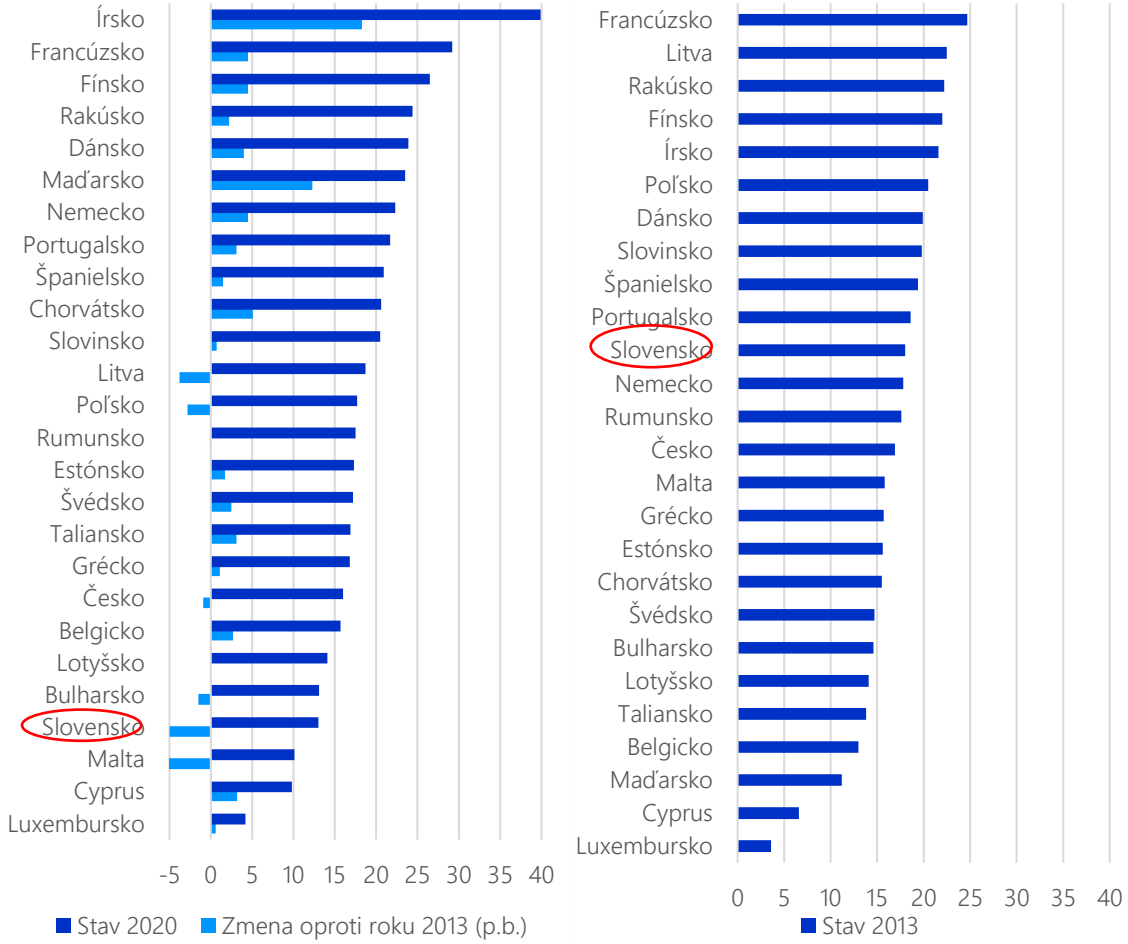
In addition to inputs, the chapter also includes result categories. The overall digital intensity of businesses and the size of the knowledge economy in Slovakia are compared with EU countries.

4.1 Human capital

The digital transformation of the economy and society depends on having sufficient talent and digital skills not only in the workforce, but across the entire population. The Slovak education system produces few ICT, mathematics, statistics, technology and natural science (STEM) graduates. Graduates of other fields, especially the humanities, often work outside their original field of study. Whereas the percentage of STEM graduates is among the lowest, the rate of mismatch between education and work is among the highest in the EU. The share of students studying abroad is growing. Although the overall brain drain has stopped, it still represents a higher economic loss than in the neighbouring countries. In terms of advanced digital skills, workers in Slovakia are below the EU average. The future workforce, today's 15-year-old students, have poorer results in mathematics literacy even compared to neighbouring countries. Migrants make up only a small part of the labour market and work in manufacturing industries rather than services with high digital intensity.

Slovakia is among the worst performers in the EU in educating STEM graduates and at the same time one of the countries with the most significant declines in technical education. There are 13 STEM graduates per thousand inhabitants aged 20 to 29. The only EU countries that do worse are those with special geographical or educational conditions (Cyprus, Malta, Luxembourg). Ten years ago, with 18 STEM graduates, Slovakia was approximately at the level of Germany. Slovakia thus loses the supply of technical graduates necessary for automation and digitalisation, i.e. the basic prerequisites for growing the productivity and competitiveness of the economy.

Figure 38: ICT, mathematics, technology and science graduates in the EU27 (number per thousand inhabitants aged 20–29)[30]



Source: Eurostat (2023) [EDUC_UOE_GRAD04], IHA calculations

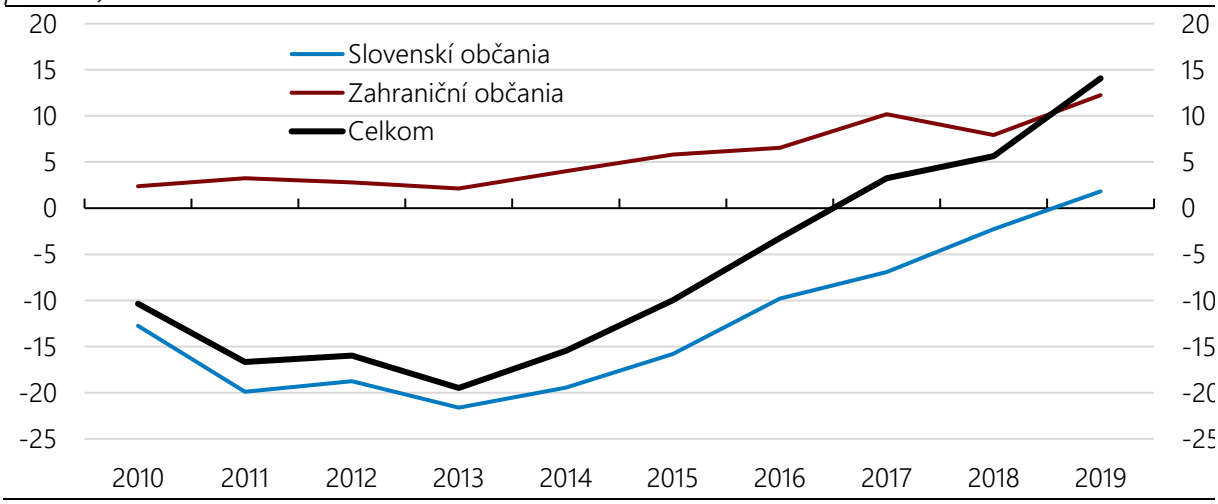
The problem is not only the declining number of STEM graduates, but also the lower level of higher education compared to Europe's digital leaders (Marciniak et al., 2020). Unreformed higher education in Slovakia has so far encouraged the mobility of Slovak students, and further contributed to the brain drain. The share of Slovaks studying abroad (17% in 2020) is far above the OECD average (2%). The most successful high school students go to universities abroad, where they study ICT, natural sciences and mathematics in greater numbers than at home (Martinák, Varsik, 2020). As soon as students go abroad, it increases the chance that they will also work abroad, especially if they are in countries with more advanced economies, higher incomes, a more innovative working environment and faster uptake of digital technologies.

[30]It is vital to look to the whole young population (including those not studying at university) to make up the shortfall in STEM workers for an industry-oriented economy to complete its digital transformation. This highlights how human capital is not being drawn from the entire young population. Looking at the percentage of graduates misses this because of differences in access to university education (minorities) and subject preferences. These areas represent additional challenges for public policy.

In the context of the European market, Slovakia is a source of talent for shrinking labour markets, not only in countries with faster digital growth. The National Strategy for Research, Development and Innovation 2030 estimates that up to 300,000 highly qualified Slovak citizens currently work abroad (Analysis of the Impacts of the National Strategy for Research, Development and Innovation, 2023). As countries in an ageing Europe seek to recruit their future workforce from the ranks of students, educational reform cannot come soon enough. In order to attract Slovak workers back from abroad, the OECD recommends involving the Slovak diaspora in close cooperation with representatives of the social partners and NGOs (OECD, 2020).

2019 was the first year in which the country did not record a net outflow of migration. On the contrary, Slovakia has not just stopped losing people through migration, but, when foreign immigrants are included, net migration has been positive in recent years. On the other hand, this development of the absolute number, even if positive, does not mean that the growing demand for talent in the economy and society will be saturated. The structure of immigration is also important. As can be seen from the ISA figures for 2020, the EU bloc was the origin of 77% of immigrants to Slovakia, while 23% came from outside the EU. Apart from Slovakia, only Luxembourg (72%) and Hungary (55%) received more than half of their immigrants from the EU in 2020. All other EU Member States have taken in more immigrants from third countries. As ISA observes, third-country immigrants face many obstacles in Slovakia. This is also confirmed by Slovakia's 10th worst place among 56 countries and 3rd worst in the EU in MIPEX (the Migrant Integration Policy Index). MIPEX describes the Slovak approach to integration as "equality on paper", which means that immigrants have the same fundamental rights, but not the same opportunities. According to the index, Slovakia is lagging behind in integration, especially in three areas – integration of immigrants in the labour market, inclusion in the education system, and political participation. The data does not capture the influx of immigrants from Ukraine after the outbreak of war there.

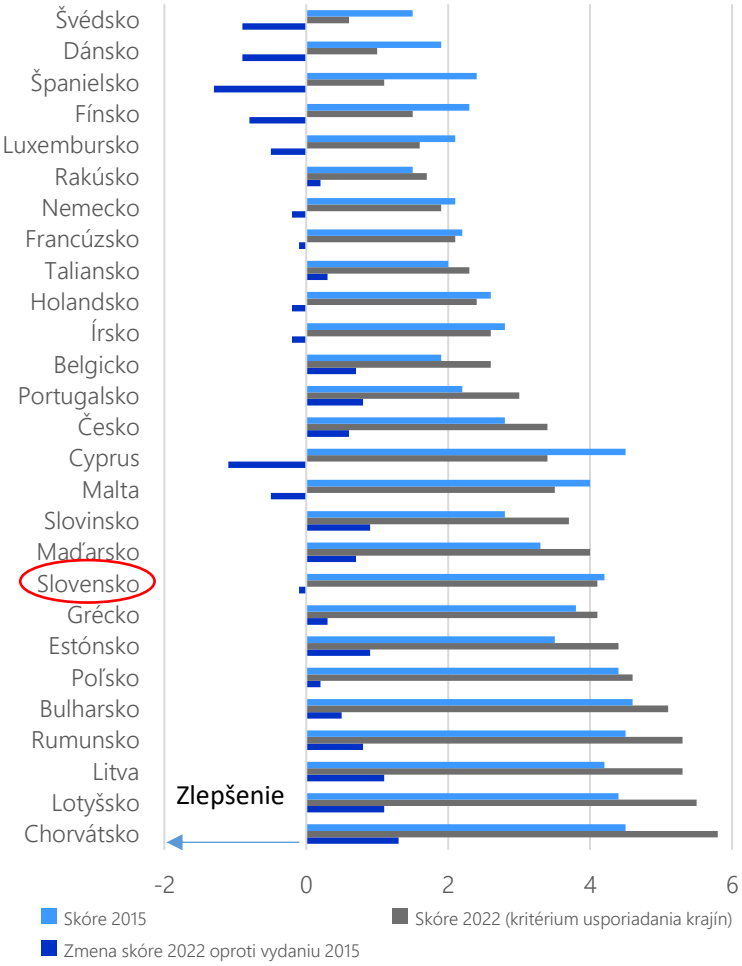
Figure 39: Net migration (difference between immigration and emigration rates in thousand persons)



Source: Ministry of Finance in OECD (2022)

The economic consequences of past emigration from Slovakia also persist, with consequences that limit the country's development. As can be seen from the scores[31] published by the Washington-based Fund for Peace, the impact of displacement on the economy is the 9th most serious in the EU. The consequences of the loss of productive and skilled labour in 2022 are comparable to 2015. However, unlike most countries, they have not deteriorated.

Figure 40: Impact of displacement on the economy (score based on the Country Stability Index)



Source: Fund for Peace

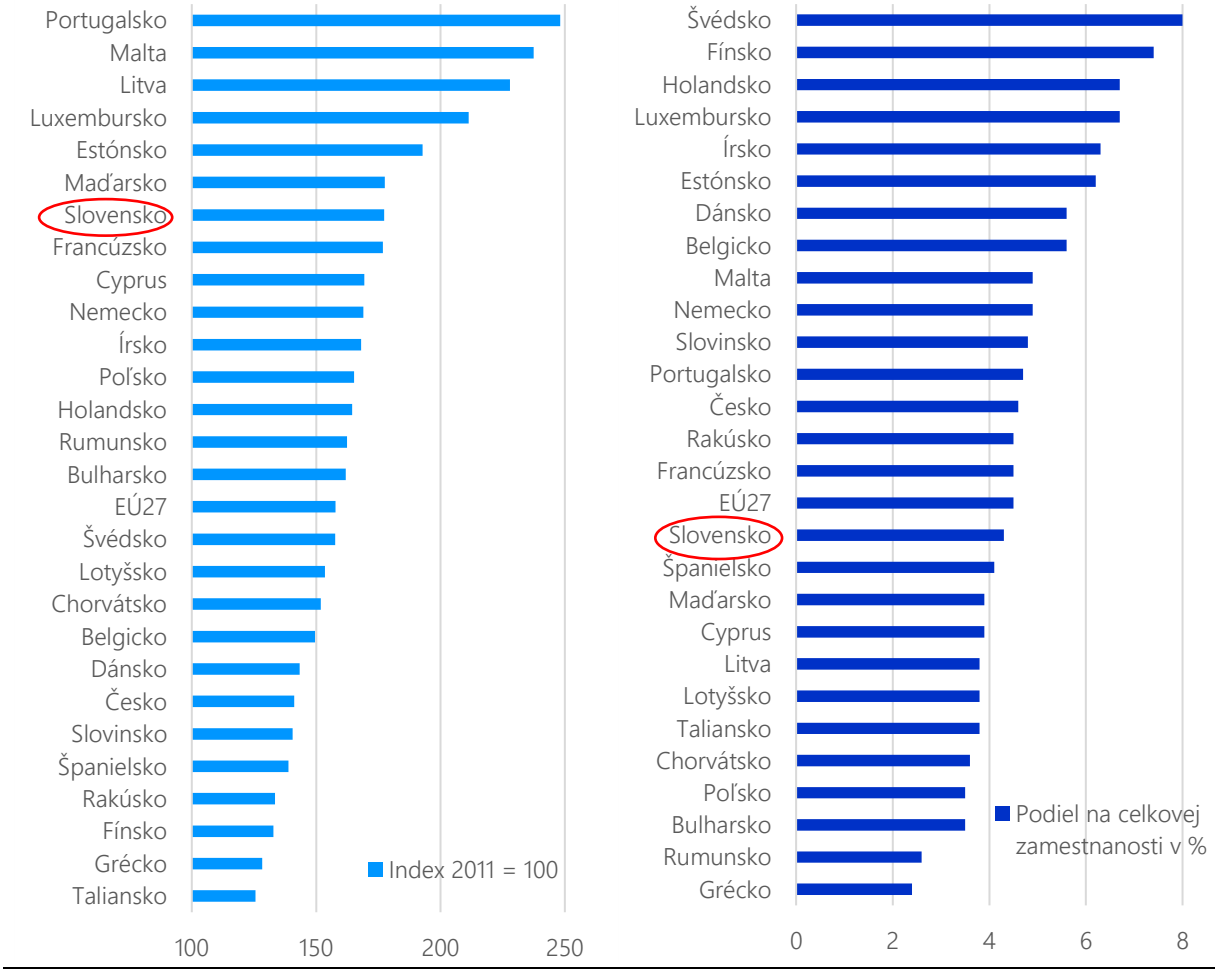
Note: The higher the score, the worse the economic impact

Inflows of foreign students with the prospect of employment in Slovakia, as well as skilled workers from abroad, are not sufficient. In the region, Poland leads in both the number and quality of immigrants for work. In 2018, more than half of immigrants to Poland had higher education compared to the Polish population. Economic policy should ensure that immigrants are adequately educated after overcoming language and cultural barriers and prevent them from being placed in low-skilled jobs.

[31] The score is based on three data streams: content analysis of articles and reports from which it is possible to determine the severity of the problem in the country; quantitative data; and qualitative research to eliminate false positive or negative results. It detects, for example, voluntary emigration of the middle class, especially economically productive persons, such as skilled workers, entrepreneurs or doctors who leave due to a deteriorating economic situation, but also forced displacement of experts or intellectuals. Founded in 1957, the Fund for Peace (FFP) is an independent non-profit organization.

One of the effects of the low number of STEM graduates, high one-way mobility of technical students and the brain drain in the past is the relatively low proportion of employed ICT specialists. Another reason is the willingness of the business and public sectors to invest in information and communication technologies. In the last decade, employment of ICT specialists in the Slovak labour market has grown relatively quickly from a low base. It filled the growing demand of companies with domestic and foreign capital for experts, especially in IT services requiring high levels of education. However, the share of total employment has not reached the EU average and is significantly behind Europe's digital leaders (Sweden, Finland).

Figure 41: Employment of ICT specialists in 2021



Source: Eurostat (2023) [ISOC_SKS_ITSPT], IHA calculations

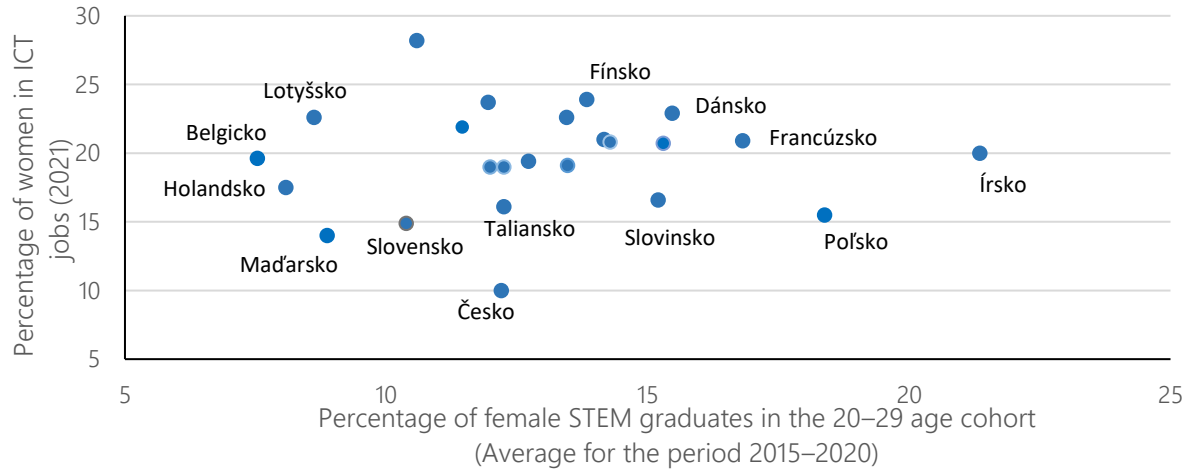
The multicultural ICT sector, where communication in English is usual, is a space where missing workers could be replenished with immigrants. In Slovakia, only 58% of immigrants[32] (aged 15 to 64) were employed in 2021, the lowest percentage in the region. In Poland, 77% of immigrants were employed. The Slovak employment rate for immigrants (0.2% of total employment) was the second lowest in Europe, after Croatia (0.1%). It is proportional to the low percentage of immigrants in the population. However, it also reflects obstacles that hinder the efforts of migrant

[32] Persons born abroad or persons with a nationality other than their country of residence residing in the reporting country for five years or less (source: Labour Force Survey, Eurostat).

job seekers. On the other hand, Slovakia has a functional system for labour immigration in the manufacturing industry. Nearly two-thirds of migrants (64%) find a paid job within three months, which is well above the EU average and indicates work is agreed in advance. Only Lithuania and Malta record higher shares.

There continues to be a wide gender gap in ICT employment. Women account for less than 15% of ICT positions in Slovakia, compared to a fifth in EU countries. Of EU countries, only the Czech Republic (10%) and Hungary (14%) have lower percentages of women. The problems include persistent stereotypes about the division of male and female work roles, weak motivation of the environment (EC, 2019), not only few female students. Belgium and the Netherlands have a higher proportion of women in ICT jobs, even with a lower rate of graduates.

Figure 42: Female graduates in ICT, mathematics, technology and science in the EU27



Source: Eurostat (2023) [EDUC_UOE_GRAD04], IHA calculations

The digital transformation of the economy depends not only on the availability of ICT specialists, but on the development of digital skills among all employees and the entire population. 26% of active workers and 21% of the population in Slovakia had advanced digital skills (2021, Eurostat). Slovakia is comparable to neighbouring countries in this regard but does not reach the EU average. In terms of advanced skills, Slovakia is well behind digital leaders, such as Finland or the Netherlands, where over half the population have such skills.

In addition to catching up on digital skills, Slovakia must also address the mismatch between formal education and the needs of the labour market. Nearly a third of graduates aged 25 to 34 (31.3% in 2020) work in a field other than the one they studied for. Although the growth of this horizontal mismatch has stalled in recent years, it is still among the highest in the EU. It brings additional financial and personnel costs for companies to train graduates in a new field. The humanities have long had a high and growing horizontal mismatch. Graduates of engineering and construction disciplines are the most successful in practice. There are growing opportunities for students of science, mathematics and programming. The incidence of horizontal mismatch among graduates of health professions is twice the EU average.

The functional literacy of the future workforce, 15-year-old pupils, lags behind the neighbouring countries. According to the Programme for International Student Assessment (PISA, 2018), Slovak pupils have results below the OECD and EU average in all three evaluated areas of literacy. In the reading area, their results are the weakest and the performance of pupils has decreased compared

to the findings in 2009. Pupils' science literacy has been below the OECD average since 2006. In mathematical literacy, pupils' performance is not declining, on the contrary, compared to the findings in 2015, it has improved and is close to the OECD average. However, it did not reach the level of mathematics in Czechia and Poland. In mathematics literacy, Slovak pupils overtook Hungary, but in other categories they remained in the last place of countries in the region. Even higher education levels are not competitive in international comparisons. Horňák and Valachyová (30 rokov samostatnosti Slovenska, 2022) cite as an example the QS World University Rankings from 2022, where the best Slovak university, UPJŠ in Košice, is below the 600th position, while the best Czech university, Charles University, is in 266th place.

In addition to the unsatisfactory PISA results determining the future labour supply, Slovakia is also lagging behind in the competences of adults. This is the finding of the PIAAC (Proficiency of adults, problem solving in technology-rich environment) survey for comparisons involving both the total workforce aged 16 to 65 years, as well as young people aged 16 to 24 years .

4.3 Gaps in the use of information and communication technologies in households

Measures imposed on commerce, work and social life to fight the pandemic have expanded the use of digital technologies in households in Slovakia. During the COVID-19 pandemic, the proportion of people who have never used the internet has fallen to the EU average. The proportion of people using the internet daily has increased Online shopping has flourished more intensively than in the Union as a whole and the sharing economy among private individuals has become the largest among the countries of the Union. After rapid growth during the pandemic, the intensity of ICT use has decreased.

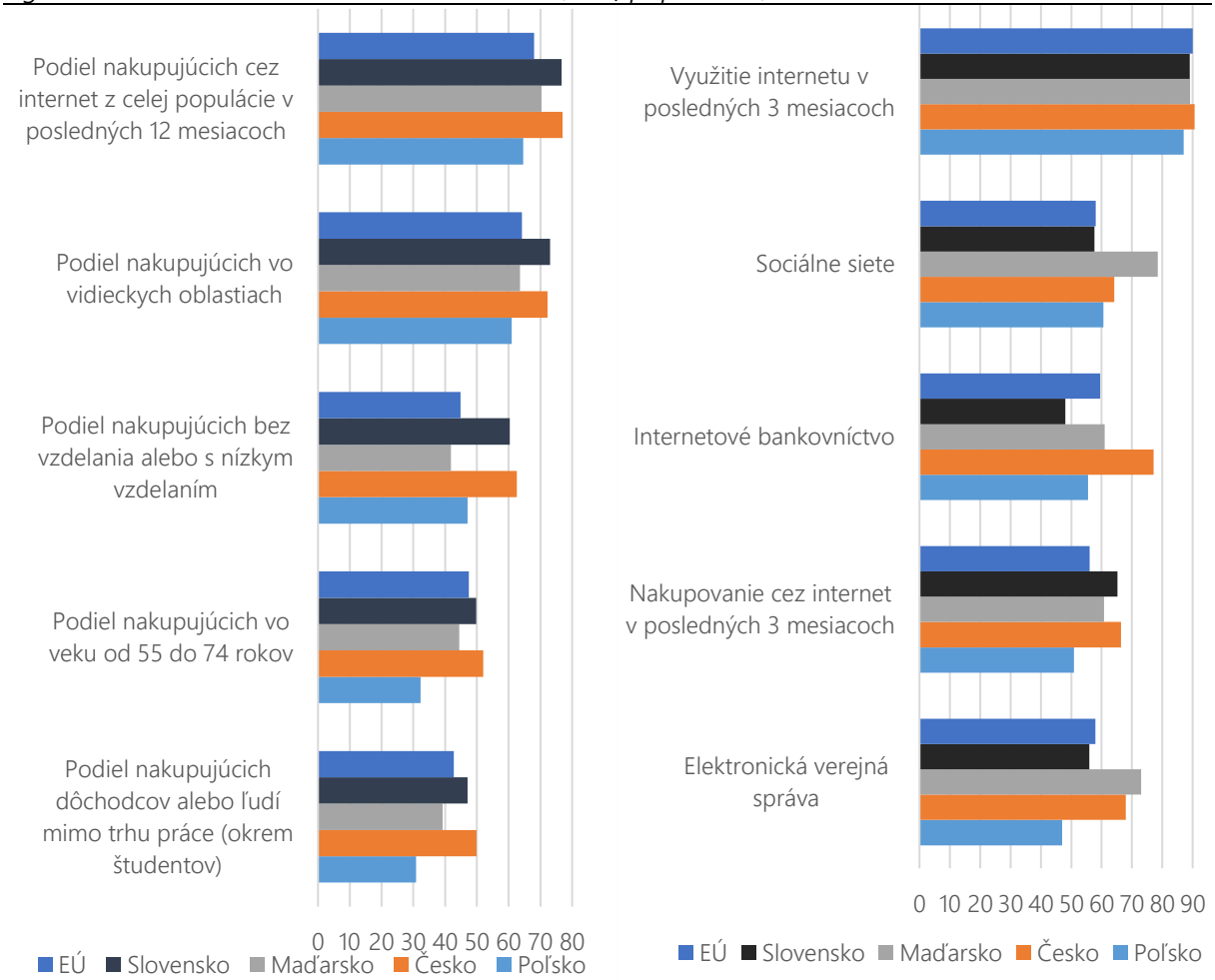
The rate of internet use in the Slovak population is comparable to both the surrounding countries and the EU average. Purposes of use vary. Slovak households were ahead of the EU average in online shopping, but in the use of social networks they were on the EU level. They lag behind the EU average in the use of public administration services and even more so in internet banking. Narrowing these gaps will require more efficient e-government services and greater confidence in the provision of e-government and banking services. Targeted interventions in selected social groups and regions are appropriate.

Slovaks had a high level of interest in online shopping even before the pandemic. The most likely reasons are the wider range of products offered online, poor access to brick-and-mortar stores in remote areas, limited transport links to city centres, or the search for lower prices. During the pandemic, online ordering of goods reached new heights. At the same time, the intergenerational and educational digital divide in online shopping has narrowed. Slovakia (and Czechia) recorded a higher propensity to shop online in the among the over 55s and those with little or no education. Online shopping was popular not only in the towns but also in the countryside. All four Slovak regions surpassed the EU average in online shopping. Only a tenth of people in Slovakia have never yet shopped online. There are only four countries in the EU with a lower proportion of people with no experience of online shopping.

Internet shopping was naturally more widespread in 2021, during the period when brick-and-mortar stores were closed, than last year. They did not set any new records for online shopping, which could not be expected in a period of declining purchasing power. There continued to be

high levels of use across all generations and regions. Social media use saw a similar downward correction after 2021.

Figure 43: Internet use in households in 2022 (% of population)



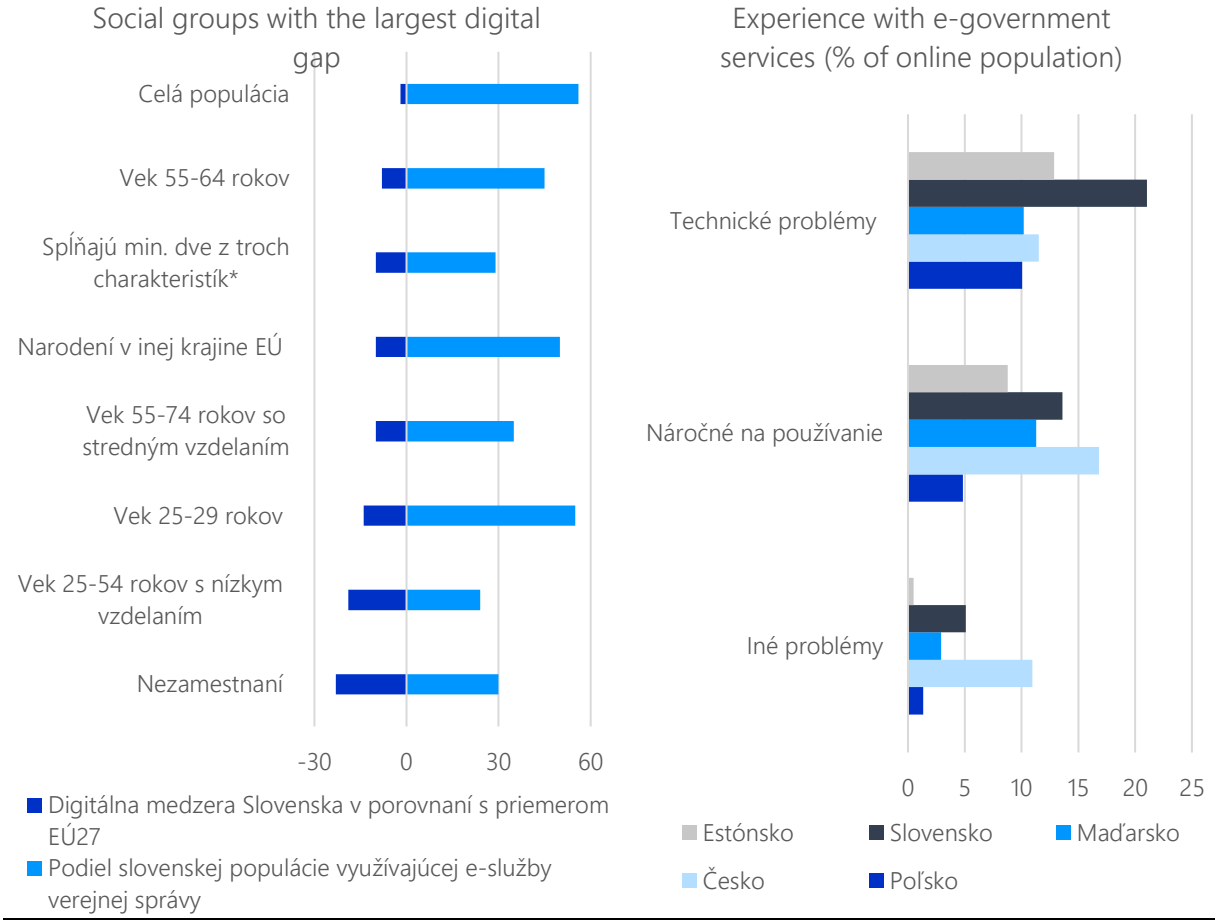
Source: Eurostat (2023) [ISOC_CI_AC_I], IHA calculations

Slovak households recorded an even more significant correction in online banking in 2022 than in the shopping and communication channels. Just half of the population use internet banking services. In the early days of the pandemic, it was almost 60%. The lowest rate is in the age category over 65 and among the unemployed. In addition, there are significant interregional differences. The importance of online banking increases with the gradual closure of brick-and-mortar branches and the introduction of charges for contact services at branches. Increasing usage rates depends on the availability of broadband internet access, but also on a significant increase in digital and financial literacy. It is also necessary to allay older generations' mistrust of the electronic banking system.

Slovaks are less likely than Hungarians and Czechs to use the internet to contact public institutions for private purposes. Eurostat shows a relatively small digital gap between more active online contact in the EU (58% of the population) and weaker contact in Slovakia (56%), but conceals several disparities. People with low education, people aged 25 to 29 and people born abroad have poorer online contacts with public administration compared to the EU. Wider access to

online e-government services can help to engage inactive people or people from abroad in the labour market.

Figure 44: Use of e-government services in households (%)



Source: Eurostat [ISOC_CI_AC_I], IHA calculations

** age 55 to 74, low education, inactive in the labour market (including unemployed and pensioners, excluding students)*

The barriers to the use of e-government are mainly technical problems, the range of e-services available and low user confidence. According to Eurostat, more than a fifth of Slovak internet users have experienced technical problems when using e-government services. This is more than double the rate in neighbouring countries. According to internet users, e-government services are among the least user-friendly. According to the European Commission, only 52% of Slovak internet users who send forms to public institutions do so online, while the EU average is 67%. According to the OECD, Slovakia lags behind in the extent to which it provides pre-filling of forms for citizens and open public administration data (OECD, 2022). 19% of the Slovak population expressed low confidence compared to 8% in the EU. To address the high level of mistrust and concerns about the security of digital public services, it is important to involve representatives of consumers, seniors and other stakeholders in the process of improving e-government services.

The proportion of people who have never used the internet has fallen from a pre-pandemic 12% to the EU average (7% in 2022). In most Slovak regions, the percentage of people without internet experience has decreased significantly. In the Bratislava region, it is just 2%, which is comparable to the administrative area of Luxembourg or Berlin. On the other hand, in eastern Slovakia 10%

of people still have no experience of the internet. According to most of their answers, they are excluded from the digital economy by their lack of skills. This 10% non-user rate in the population of eastern Slovakia is comparable to many other European regions, and the slow progress in the last decade is striking.

4.3 Gaps in the use of information and communication technologies in enterprises

Increased participation in the online space opened up opportunities for micro, small and medium enterprises that have lagged behind in the adoption of digital technologies. Businesses in Slovakia intensified their use of ICT during the pandemic. However, they have still not caught up to European standards in several categories. Digital gaps in the business sector persist mainly in the use of digital tools for information sharing, big data analysis, artificial intelligence and protection against cyberattacks. Companies in Slovakia pay less attention to ICT training for their employees. The country faces a shortage of STEM graduates and workers with advanced digital skills.

ICT use and digital intensity increase with company size. The most significant digital gaps compared to the EU average are in sectors with a preponderance of small and medium enterprises. The domestic computer programming sector and the entire information and communication technology sector also need faster implementation of digital innovations.

The contribution of e-commerce to the turnover of domestic enterprises is relatively high with only six EU countries having a higher share. In 2022, it reached 22.7% (EU average 17.6%). Multinational companies are one of the few digital success stories of the Slovak business sector. The contribution of e-commerce to the turnover of domestic enterprises is driven by export-oriented industries with predominantly foreign capital. Motor vehicle manufacturers sell 54% of their turnover electronically (the EU average is 32%), while electronics manufacturers sell more than a third (compared to a quarter for the EU). Business, accommodation and ICT have a share below the EU average.

The use of advanced cloud services in the business sector in Slovakia has caught up to the EU average (almost 30%). Among the comparable countries in the region, only Czechia has a higher rate. The transition to the cloud accelerated during the pandemic. After Czechia, Cyprus and the Netherlands, Slovakia was the country with the fastest cloud deployment in the business sector (excluding the public and financial sectors) in 2021. The best-secured sectors are those with predominantly foreign capital. Sectors dominated by small and medium enterprises are lagging behind. Mechanical engineering or metalworking have weaker results. One of the most significant gaps in cloud solutions compared to the EU average is the domestic ICT sector. The cloud is a good solution not only for providing a wide range of services, but also for security. Just 10% of enterprises had a cyber security policy in 2022. Of the surrounding countries, only Hungary had a lower rate (5.3%). At the EU level, one in four businesses are insured against cybersecurity risks.

The share of domestic enterprises using the Internet of Things (27%), which was close to the EU average (29% in 2021). The most companies, a larger proportion of the market than in the EU paid attention to the physical security of the premises. On the other hand, the Slovak business sector lagged behind in systems to improve customer service. The production of motor vehicles, beverages and food, the car trade, travel agencies and accommodation facilities are above-average.

In Slovakia, 5% of enterprises used artificial intelligence (AI) in 2021 (8% in the EU). The sectors with the largest gap compared to the EU sector average include telecommunications, science and research, as well as ICT. In telecommunications, 10% of companies work with AI, which is the lowest in the EU together with Hungary. Domestic telecommunications companies have reservations about the high acquisition costs, as well as concerns about data protection and privacy violations. Only 11% of scientific research companies in Slovakia use AI (a quarter in the EU, more than half in Ireland and Denmark). The main obstacle is a lack of specialist knowledge. Scientific research establishments assigned less importance to financial, data and legislative barriers. Only 13% of ICT companies in Slovakia use AI (25% in the EU). They consider the lack of specialist knowledge, unclear legal consequences and the absence of data to be obstacles. In car manufacturing, 10% of enterprises use AI. Germany, Czechia and Hungary make more intense use of artificial intelligence in automotive production.

In specialist ICT training, Slovak companies lag behind the EU average, as well as the comparable Czech economy. In 2022, 15.4% of enterprises in Slovakia, 23% in Czechia, and 22.4% in the EU as a whole provided ICT training to their employees.

4.4 Innovation capacity of enterprises, science and research

Expenditure on research and development remains low, especially in the business sector. At the same time, the super-deduction from the tax base, after increasing from 150% to 200% in 2020 and 2021, was one of the most generous tax concessions in the OECD (OECD, 2022). It appears that research and development expenditure will not increase without changes in the regulatory environment, the quality of human capital or the attitudes of the foreign parents of Slovak subsidiaries. While business expenditure on research and development oscillated around 0.4% of GDP until 2019, it increased slightly to 0.5% in the pandemic years. In Poland, it reached 0.9%, in Hungary and Czechia 1.2%. Average expenditure in the EU as a whole is 1.5% of GDP. Research and development spending in other sectors largely depends on the pay-out phase of the EU Structural Funds. After 2015, i.e. after a period of intense use of EU funds from the previous programming period, expenditure fell sharply.

The limited amount of private investment capital hinders the building of an innovative economy. Slovakia overtaxes capital revenues from investments in domestic companies; sufficient resources are not allocated in investment funds focused on high-risk high-reward projects with the potential to succeed on the world market; and the gap in risk capital is not sufficiently filled by Slovak Investment Holding (National Strategy for Research, Development and Innovation 2030, 2023).

The innovation ecosystem needs not only a stable and predictable supply of finance to kick-start innovation in the domestic sector, also support for turning innovations into real-world applications. The OECD recommends supporting small enterprises in particular, also in the form of refundable (cash) tax benefits instead of transferring the super-deduction to subsequent periods, and also providing direct grants. Cash support is especially vital in an economy with limited access to venture capital.

Although innovative start-ups benefit from government tax subsidies and other support, the regulatory burden may hinder them. This also explains the frequent closure of early-stage innovative companies.

Box 8: Super-deduction of R&D expenditure from the tax base

Taxpayers in Slovakia have had the option of deducting research and development expenses from the tax base since 2015 (in the Czechia since 2005). The original rate of 25% increased to 100% in 2018 and 150% in 2019. In 2020 and 2021, a rate of 200% applied. It was cut back to 100% in 2022. The super-deduction is applied by businesses with a positive tax base. (The National Strategy for Research, Development and Innovation 2023 proposed extending the super-deduction to loss-making businesses to support early-stage innovative companies that are not yet generating a profit.)

The number of taxpayers who applied a super-deduction rose from 83 in 2015 to 494 in 2021. The volume of the applied super-deduction increased from EUR 9 million in 2015 to EUR 283 million in 2021 (CRIF – Slovak Credit Bureau, 2023).

The use of tax relief by companies increased gradually, most steeply after the first two rate increases. The number of companies applying the super-deduction increased by 101 in 2018. In total, 264 businesses applied for deductions that were three times larger than the year before. Another 109 companies were added in 2019, but the total applied super-deductions were slightly below the level of the previous year. In 2019, there was greater interest in this form of tax relief in micro and small enterprises with a lower average super-deduction amount. The share of companies with 10 to 49 employees increased from 33% in 2018 to 38% in 2019 and remained at this level. The share of micro-enterprises with up to 10 employees increased from 22% to 26% of the enterprises applying a super-deduction. The interest of micro-enterprises in this tax relief increased in the following years, reaching a 29% share for micro-enterprises in 2021.

When the rate increased for the third time in 2020, it had a greater impact on the overall volume of the super-deduction than on attracting more firms. A total of 415 firms applied for a super-deduction, which was 42 more than the year before. The total amount of claimed deductible expenditure increased by more than 40% year on year. The results for 2021 were affected by the announced decrease in the super-deduction rate to 100% in the following year 2022. This also encouraged 79 more entities to apply a super-deduction, representing a year-on-year increase by 65%. Entities with predominantly foreign capital have a higher share of super-deductions than domestic firms. Foreign companies accounted for 60-70% of the total volume of super-deduction at a quarterly frequency in the years 2018–2021.

The national strategy for research, development and innovation envisages increasing the inflow of funds and changing the way they are invested. It proposes replacing scattered initiatives with a more coordinated approach. The plan should be to simplify the implementation of grant calls, reduce administrative burdens and remove barriers to entrepreneurship. Measures proposed to increase the availability of risk capital and provide systemic support for innovative firms include the exemption of capital revenues from income tax, reform of the super-deduction for research and development, redirection of part of pension funds' resources to alternative assets and sufficient state financial support for every stage of an innovative project.

Economies that invest in intangible assets record an increase in total factor productivity, which is one of the critical elements of long-term economic growth (Bergaud et al., 2016). Slovak firms are lagging in their ability to implement their own research and development or to transfer the results

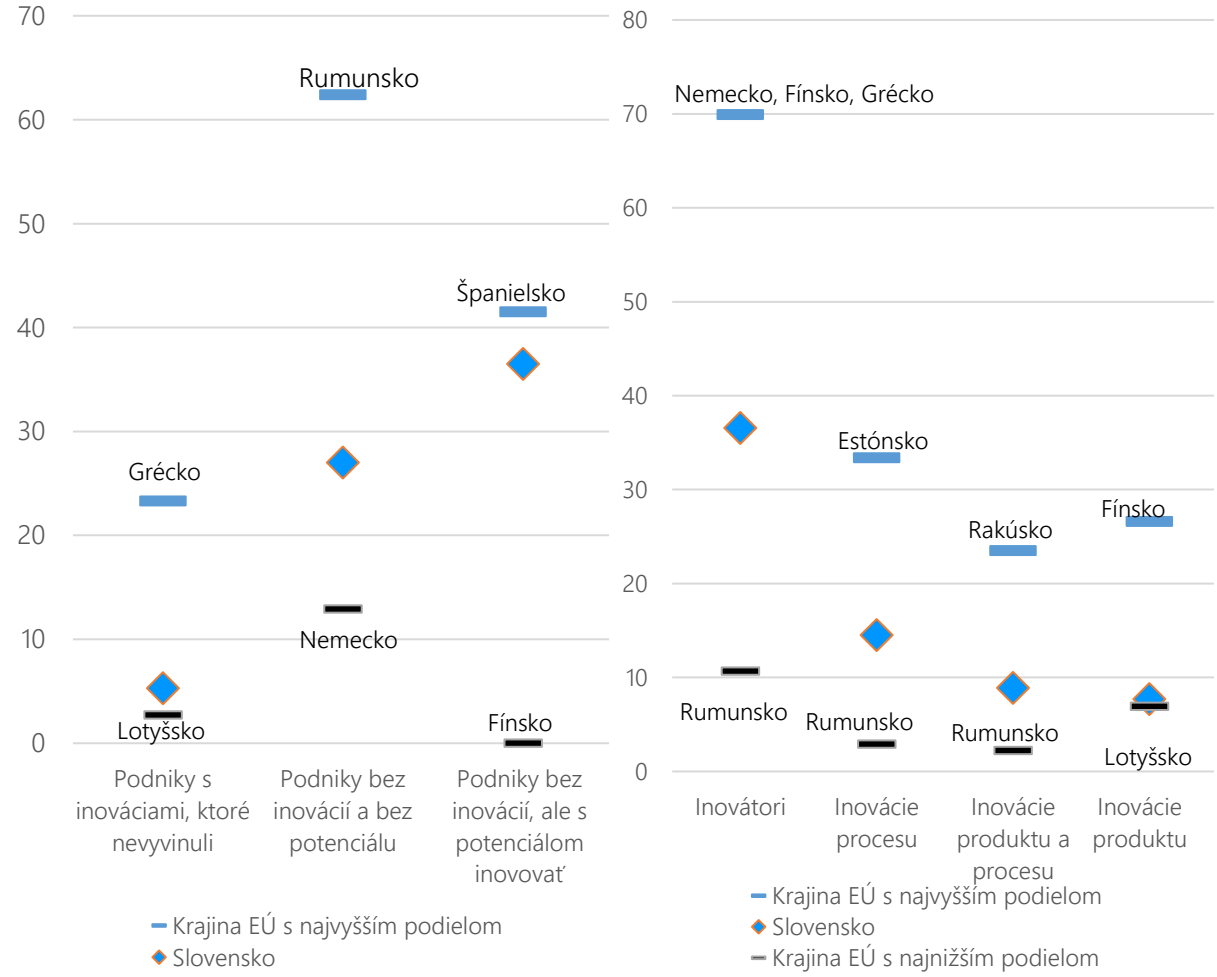
into products and processes. In the obliged group of business entities[33] in which Eurostat surveyed innovation activity in 2020, Slovakia had 37% innovators and 63% non-innovators. Only 6 of the 19 available countries had weaker results, including Hungary and Poland. In Czechia more than half the companies were innovators. As many as 36% of enterprises did not report any innovation but had the potential to innovate.

Innovators have a much bigger impact on the economy, in terms of sales and job creation, than their numbers suggest. Despite making up just 37% of firms, they account for 67% of total sales and 62% of jobs. The larger economic impact is a typical feature of innovators, but Slovakia (together with Poland) has one of the most pronounced dual differences between innovative and non-innovative enterprises. Non-innovative enterprises contribute significantly less to economic outturns for their number compared to other EU countries for which data are available. The duality of the Slovak economy manifests itself in innovative activity as well as in productivity, export performance and digital intensity.

Innovators reported fewer difficulties in obtaining state subsidies or grants for innovation. While 22% and 27% had problems in the previous two surveys (2016 and 2018), less than 20% of innovative enterprises said they had problems in the most recent survey in 2020. A quarter of enterprises were prevented from implementing innovations by unaffordable costs and a fifth by lack of funds. These barriers to more intensive innovation are closely related to the high fragmentation of the business environment into smaller enterprises.

[33] All industrial sectors and selected service sectors, excluding construction.

Figure 45: Innovative activity and innovation potential of enterprises (% of companies, 2020)



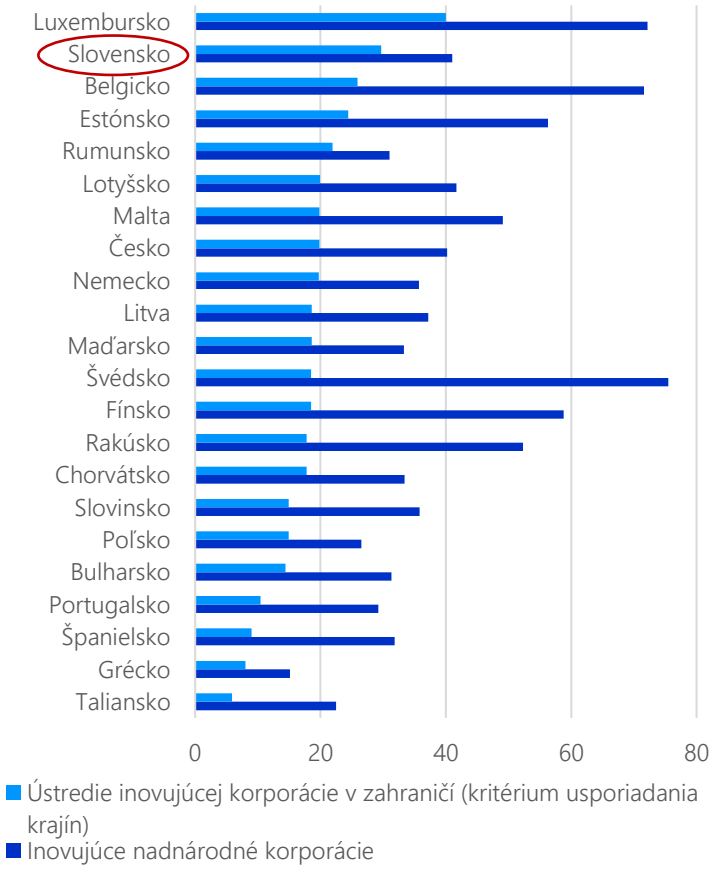
Source: Eurostat [INN_CIS12_INACT]

Slovakia lags behind mainly in product innovations (only Romania and Latvia rank lower in the EU). In revenues from innovative products, small enterprises with 10 to 49 employees in Slovakia have the lowest representation within the EU. Small enterprises are more focused on business process innovation.

A significant part of innovation in Slovakia comes from large enterprises belonging to multinational corporations. Innovators include 30% of the subsidiaries of multinational corporations based abroad. Only Luxembourg, a traditional headquarters of multinational corporations, has a higher share of innovating companies with a foreign owner. The activity of multinational corporations in the Slovak economy is concentrated mainly in large enterprises with 250 or more employees, and these account for the majority (62%) of the revenues of innovative enterprises. Large enterprises with multinational ownership are concentrated mainly in the manufacturing industry. The duality of the Slovak economy in innovations is the result of a

long-term economic policy favouring larger companies over smaller ones and anchoring foreign investors more in manufacturing industries than in highly innovative sectors of the economy.

Figure 46: Proportion of multinational corporations with innovation activity (% of innovating enterprises, 2020)



Source: Eurostat [INN_CIS12_GEN]

Slovakia is one of the countries that benefit from the territorial fragmentation of the activities of foreign corporations in the field of innovation and intellectual property rights. The domestic sector lags behind in the creation of intellectual property rights. An effective system of intellectual property rights[34] is a prerequisite for the dissemination of innovation and is an important factor in promoting competitiveness. A joint project of the European Patent Office and the European Union Intellectual Property Office in 2022 showed that Austria, Denmark, Germany and Italy are European leaders in the creation of intellectual property. Companies from these countries take advantage of the possibilities of the EU single market and locate production in other Member States, considering costs and other business considerations. The result is that employment in IP-intensive industries in "user" countries such as Slovakia is provided by foreign companies. Between 2017 and 2019, they created up to 57% of jobs in patent-intensive industries in Slovakia. Apart from Slovakia, only Hungary (53%) and Romania (56%) had an absolute majority of such jobs in

[34] Trademarks, patents, designs, copyrights, plant variety rights and geographical indications (according to a joint project of the European Patent Office and the European Union Intellectual Property Office).

foreign companies. In other EU countries, jobs in patent-intensive industries are mainly in domestic companies.

Box 9: Unlike the Czech Republic or Poland, Slovakia has still not produced a unicorn, and three companies in the field of computer programming have the potential for growth

Technology companies with a value of over a billion dollars (unicorns) are created in an environment where there are no limits from a lack of financial or human capital, technologies, barriers to business, low entrepreneurship or trust. Slovakia lags behind in venture capital investments and the number of innovative startups per capita and in cooperation with multinational corporations in comparison with other countries in Central and Eastern Europe (even though Slovaks are managers of, for example, German unicorns).

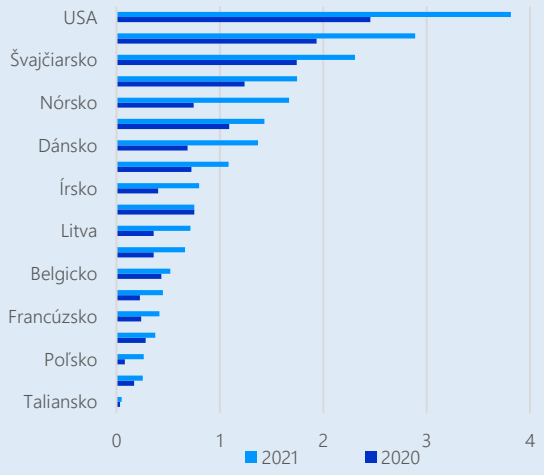
The highest number of unicorns has been in the USA for a long time, though the largest company is in China (Dealroom, 2022). The United Kingdom holds the European lead in the absolute number of unicorns, while Sweden has the most in proportion to population. In terms of European regions, unicorns are growing fastest in the Greater London metropolitan region, with 90 in 2021 (almost 80% of the national number). In the metropolitan area of Stockholm, Sweden, there were 25, or more than 80% of Swedish unicorns. In these regions, there were more than 10 billion-dollar companies per 1 million inhabitants. Regional concentration of talent and finance needs to be strengthened in Slovakia, which notes a serious disparity between the concentration of research capacity in the Bratislava Region and, for example, the limited use of EU funds.

By 2021, there were 10 billion-dollar companies in Poland and 4 billion-dollar companies in the Czech Republic. Slovakia, Croatia, Latvia, Bulgaria and Romania remain without a unicorn and no candidate is likely to achieve that status in the next year. Three computer programming companies in Slovakia were designated by Dealroom as rising stars (with a value from 1 to 800 million euros).

Table 6: Cumulative number of unicorns

	2015	2016	2017	2018	2019	2020	2021
USA	230	270	358	482	626	809	1266
Spojené kráľovstvo	29	37	50	60	72	83	117
Nemecko	12	13	13	22	26	30	55
Švédsko	5	5	6	8	11	20	30
Francúzsko	4	5	5	8	12	16	28
Holandsko	6	9	9	12	15	19	25
Švajčiarsko	3	5	9	11	13	15	20
Španielsko	2	2	4	5	6	8	12
Poľsko	1	2	2	2	2	3	10
Nórsko	0	1	1	1	2	4	9
Dánsko	1	1	2	2	4	4	8
Belgicko	1	1	3	3	5	5	6
Fínsko	2	2	2	2	2	4	6
Rakúsko	1	1	1	2	2	2	4
Írsko	1	1	1	1	1	2	4
Česko	2	2	2	2	2	3	4
Taliansko	0	1	1	1	2	2	3
Litva	0	0	0	0	1	1	2
Estónsko	0	0	0	1	1	1	1

Figure 47: Number of unicorns per million inhabitants

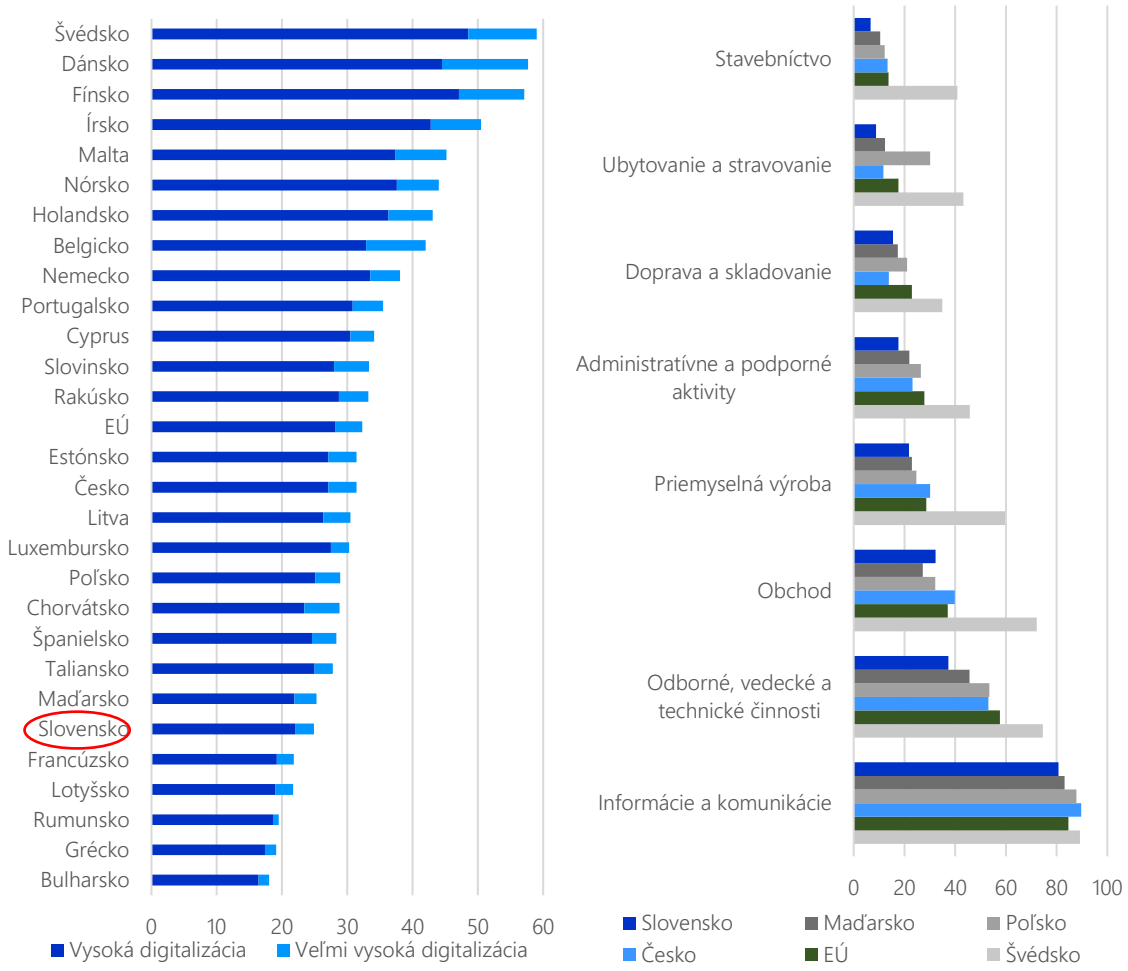


Sources: Dealroom, Eurostat (DEMO_GIND), IHA calculations

4.5 Digital transformation of the economy and its sectors

In the overall assessment of sectoral digital intensity in 2022, only five EU countries had weaker results than Slovakia. A quarter of enterprises in Slovakia have achieved high or very high digital intensity. The remaining three quarters of enterprises had low and very low intensity. Of the neighbouring countries, only Czechia was close to the EU average. The highest digital intensity is in the corporate sectors of Sweden, Denmark and Finland[35].

Figure 48: Enterprises with high and very high digitalisation intensity (% of enterprises with 10 or more employees excluding financial and public sectors, 2022)



Source: Eurostat [ISOC_E_DIIN2]

The ICT sector is the driving force behind digitalisation. However, in Slovakia, it lags behind the neighbouring countries and the EU average in digitalisation. Only 7.6% of companies have very high digital intensity (13% in the EU), which is the fourth worst result among EU countries. The problem is the high fragmentation in the sector and the missing layer of enterprises with 20 to 49 employees (within the EU, Slovakia has the lowest share of this size group in the structure of ICT enterprises).

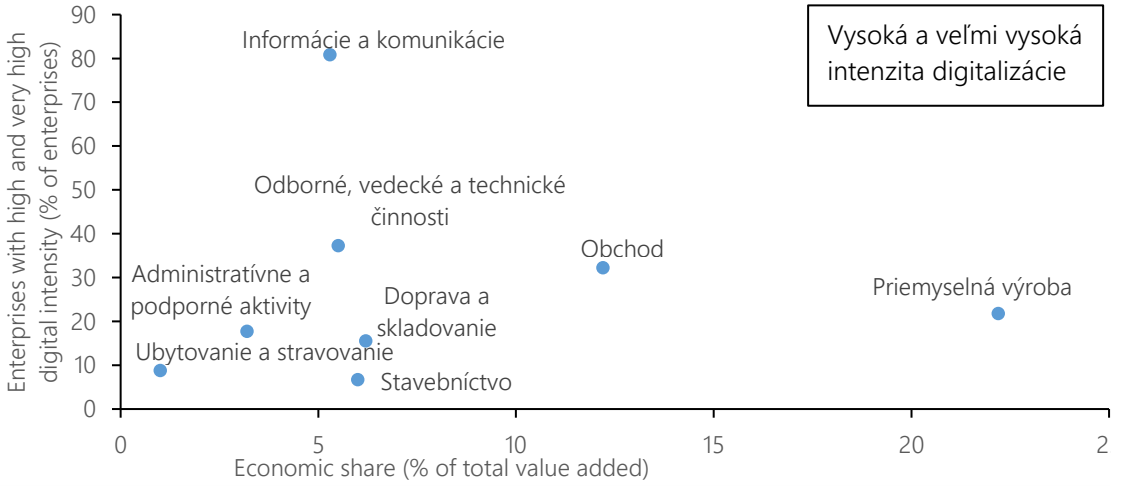
[35] Digital intensity data provide a multidimensional view of the overall degree of digitalisation in enterprises. In addition to the employment of ICT specialists, the speed and rate of Internet use, they take account of sales over the Internet, the use of robots, intelligent sensors and cybersecurity measures. Each business is ranked by intensity: very high, high, low and very low.

Industrial production is not one of the leading sectors in digitalisation, despite the high digital intensity of manufacturing enterprises with foreign capital. The rate of digitalisation of industrial production as a whole (22% of enterprises) lagged behind the EU average (29% of enterprises). As Slovakia seeks to maintain the competitiveness and exports of its tradable sector, the mismatch between its importance for the Slovak economy and the achieved digital intensity is worrying. The digitalisation of industry is progressing unevenly, with foreign-owned industries achieving better results. Enterprises producing motor vehicles, machinery, food and beverages have the highest digital intensity. Sectors in which domestic capital predominates are lagging behind.

The most significant digital gap compared to the EU average is in professional, scientific and technical enterprises. Only 37% of them have a high or very high digital intensity in Slovakia, compared to an EU average of 58%, and around 50% in the surrounding countries. At the same time, the differences in the size structure of the Slovak and European sectors are not significant. The sectors with the most catching up to do are legal and accounting activities, consulting, architectural companies and technical testing and analysis.

High fragmentation makes digitalisation in construction, accommodation and catering more difficult. Accelerated digitalisation of processes in which public authorities are involved would also be helped by legislation allowing digital elements (for example in construction proceedings or in public health proceedings).

Figure 49: The importance of selected sectors in the Slovak economy and their digital intensity (%)



Source: Eurostat [ISOC_E_DIIN2] [NAMA_10_A10]

To catch up with Sweden as one of Europe's digital leaders, Slovakia needs to step up the digital intensity of at least another third of businesses. The sectors where it is most needed are commerce, industrial production, professional, scientific and technical activities. In comparison with neighbouring countries, Slovakia lags behind the Czech business sector in the digital intensity of professional, administrative and support activities.

Countries of Central and Eastern Europe with highly open economies and similar challenges in the field of human and financial capital can catch up with the top EU economies by cooperating with each other. Digital transformation can be accelerated by cross-border infrastructure projects, making standardised public data available, and exchanging best national practices to achieve economies of scale (McKinsey, 2018).

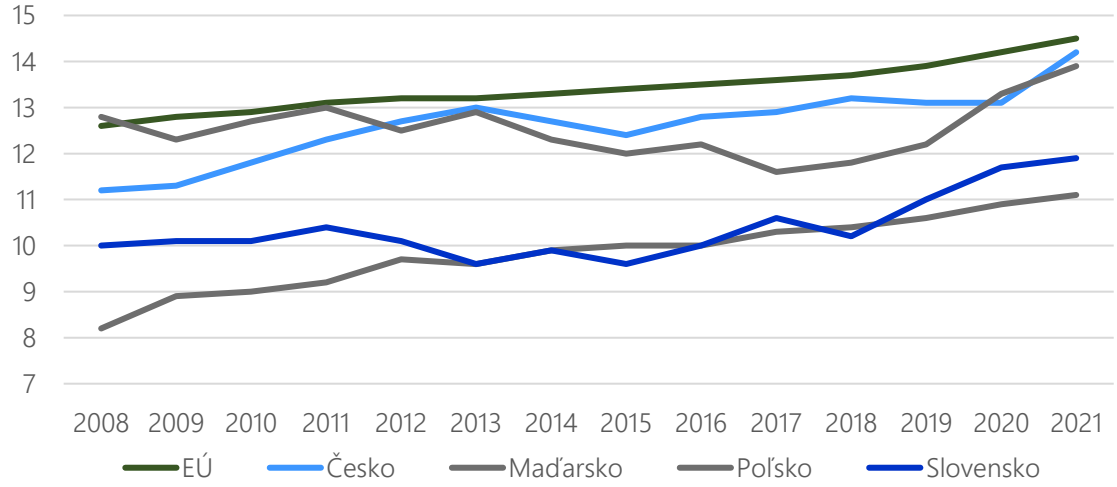
4.6 Moving towards a knowledge-based economy

The transformation of Slovakia into a knowledge-based economy is progressing slowly, with knowledge-intensive economic activities currently contributing relatively little. The high-tech sector is not developed enough to provide a wide range of jobs for highly qualified workers.

At the core of a knowledge economy are technologically advanced industries and knowledge-intensive services (high-tech area). The activity of an industry or services in which university graduates make up more than a third of the workforce measured at the aggregate EU27 level is considered to be knowledge-intensive[36]. In the context of a knowledge-based economy, the business enterprise sector is particularly important for the development of research and innovation systems.

The size of the knowledge economy, measured by employment in the high-tech business sector, is relatively small in Slovakia. In 2021, 11.9% of the total number of persons employed worked in business activities that are considered knowledge-intensive, compared to 14.5% across the EU as a whole. Only Bulgaria, Poland, Croatia and Romania had smaller knowledge-based business environments in the EU.

Figure 50: Employment in knowledge-intensive business activities (%)



Source: Eurostat [HTEC_KIA_EMP]

The goal of the European sustainable growth strategy, which is to support an economy based on people with advanced knowledge and high-level skills (European Commission, 2019), is only gradually being achieved. While in Slovakia, the share of persons employed in the knowledge-based business sector increased by 1.8 percentage points after the financial crisis, in Estonia it grew by 6 percentage points. (to 20%). These data suggest that consistent implementation of the Recovery and Resilience Plan and the National Strategy for Research, Development and Innovation is crucial.

[36] The knowledge-intensive economy includes the production of refinery, pharmaceutical and electronic products, specialised activities in mining, air transport, information and communication, financial and insurance activities, as well as professional, scientific and technical activities (legal, accounting, consulting, architectural and engineering activities, science and research, advertising and market research, veterinary and other professional activities), activities of employment and travel agencies, creative artistic and entertainment activities. The definition of employment is based on the average number of employed persons aged 25–64 at the aggregate EU-27 level.

5. Regulatory and legislative frameworks and costs of doing business

The regulatory and legislative framework of business primarily affects cost competitiveness, which can be stimulated, among other things, by the tax framework and which affects the amount of disposable income, return on investment and the total cost of labour. Traditionally, economies have tried to manage national competitiveness primarily by adjusting the exchange rate. The appreciation and depreciation, or revaluation and devaluation of a currency, are now levers that can be used only by economies that have an autonomous monetary policy. After the creation of the Eurozone, the only option for some countries was to influence the amount and level of costs and prices in the economy, so attention shifted to cost competitiveness (Albu, Joebges and Zwiener, 2022). Its indicators include real effective exchange rates or unit labour costs (Baranová, 2013; Turner, Van't dack, 1993). For example, Germany overcame the stagnation of the 1990s thanks to labour market flexibility and the favourable development of unit labour costs, going from being the "sick man of Europe" to an "economic superstar" (Dustmann et al., 2014).

This chapter looks at the amounts of the most important costs of doing business – the tax burden, labour costs and energy prices in the context of the region and the EU as a whole. Costs are an important consideration in a decision on where to locate an investment, especially for less sophisticated investments.

5.1 Tax environment

The new EU Member States usually use a tax competition strategy that is based on offering a more favourable tax environment than other countries, whereas the older Member States pursue a tax harmonisation strategy. According to empirical observations from 2013, the original Member States aim to promote the harmonisation of tax rules and rates within the Community, but the new Member States tend to apply a tax competition strategy and resist interference in their tax sovereignty. The reason is thought to be their effort to catch up economically, i.e. a more advantageous tax environment is a tool for less developed countries to achieve convergence with more advanced EU Member States (Teplická, Daubner, 2013).

Lower taxes in this case represent a competitive advantage that can be used to attract new direct investments from abroad. Another argument for maintaining tax autonomy is the use of tax policy to manage business cycles. The disadvantages of a tax competition strategy are an inefficient allocation of resources and the fact "*that the tax burden is shifted from mobile factors such as capital to less mobile factors such as labour and consumption*." (Teplická, Daubner, 2013) It is possible to distinguish between more and less harmful types of taxes in terms of their impact on economic growth (Gábik, 2011). Indirect taxes are less harmful while more harmful types of taxes discourage economic activity. These include corporate and personal income taxes, as well as compulsory contributions and other direct taxes. The literature uses the implicit tax rate (ITR) to measure tax burdens.

Box 10: Implicit tax rate (ITR) calculation methodology

Implicit tax rates generally measure the effective average tax burden on different types of economic income or activities as a percentage of income from a particular tax and its tax base.

[...] *In contrast to simple shares of GDP, they show the actual tax burden on consumption, labour and capital in a more faithful or detailed way.*" (Krajčír, Gábik, 2009)

It is also possible to use the effective tax rate, but this is designed to assess different investment decisions (Schmidt-Faber, 2004; Devereux, Griffith, 2003).

There are three basic types of ITR (Krajčír, Gábik, 2009):

- ITR on labour *"is defined as the share of the amount of direct and indirect taxes and social contributions of employees and employers that are levied on the employed workforce and the total amount of compensation of employees in the economy."*
- ITR on consumption *"is defined as the share of tax revenue from consumption and the final consumption expenditure of households."*
- ITR on capital (or on capital income or corporate income, as the case may be) *"is defined as the share of all taxable capital income and the amount of potentially taxable capital and business income in the economy (business income, interest income, dividend income and rental income)."*

The European Commission and the Directorate-General for Taxation and Customs Union (2022) publish an overview of the various types of taxes, including implicit tax rates, and in the case of the implicit tax rate on corporate income, it is a ratio indicator with the following structure:

- The numerator is the sum of corporate income tax - having their sites in the resident country (item D.51b) and taxes on holding gains of corporations (item D.51c2). Data can be obtained from the tax questionnaire published by the European Commission (2023).
- The denominator of the calculation includes all corporate income, including interest and dividends. Interest paid by financial and non-financial corporations, dividends paid and income from assets arising from the appreciation of insurance are deducted from this income (cf. European Customs Portal, 2019).

There are two variants of the implicit tax rate on corporate income, the so-called traditional version, which was previously included in the reports of the Directorate-General for Taxation and Customs Union, and the revised version. The revised version abstracts from dividends because dividends represent distributed after-tax profit and are therefore already tax-exempt in many jurisdictions.

However, it is also necessary to draw attention to the limitations associated with the international comparison of the tax burden, e.g. in Slovakia, compulsory contributions are higher than what is recorded in the official statistics. "*This is due to contributions paid to pension savings (Pillar II), which are not government income and are therefore not included in the calculation.*" (Krajčír, Gábik, 2009; Mikloš, 2021) In addition, as noted by J. Remet, R. Gábik and M. Alexová (2015), social benefits are taxed in some countries (e.g. Scandinavia).

According to Gábik (2011), it is also possible to estimate the possible amount of tax evasion using the implicit tax rates, which will be reflected in the low value of the implicit tax rate compared to the actual tax rate or compared to other states. However, tax discipline depends very much on the quality of the public services provided, which the taxpayer perceives as compensation for their taxes, as well as the quality of the tax system itself and confidence in the government (Nurkholis et al., 2020). According to J. Bukovina et al. (2020), insufficient and inappropriately targeted tax inspections can also cause a loosening of tax discipline.

The adaptability of taxpayers was demonstrated after Slovakia introduced "tax licenses", when many accounting units adjusted their tax bases to the level of a tax license: "*Such "flexibility" in the determination of corporate tax, or the long-term and regular achievement of a loss or zero profit, suggests that some entities consciously avoid paying taxes.*" Also, according to N. Artavanis (2021), some taxpayers consciously calculate the risk of their tax evasion being detected by the state authority and adjust their tax bases accordingly.

The tax competition strategy stimulates the inflow of mobile factors of production into the economy and leads to faster economic growth. According to a study by K. Teplická and M. Daubner (2013), such economies have limited tax revenues due to lower tax rates, which imposes a time limit on the use of this tax policy. Further, EU member countries with lower real gross domestic product per capita apply lower implicit tax burdens on corporate income, more open countries achieve lower implicit rates, and lower implicit tax rates lead to higher economic growth. This means that less developed and more open countries use a tax competition strategy, which leads to an influx of mobile factors of production and economic growth. Countries can only use the tax competition strategy for a limited period of time because it limits the budgetary possibilities of the economy and thus there is no risk of an endless race to the bottom in tax rates (Teplická and Daubner, 2013).

The tax burden in Slovakia has increased since 2013. The Slovak implicit tax rate on corporations is now among the highest in the EU. Under the traditional formula, Slovakia achieves the 5th highest ITR in the 2020[37]; in the revised version excluding dividends, it ranks 8th among the countries with the highest ITR.[38] In contrast, Estonia has one of the lowest ITRs in the EU. Figure 51 shows a comparison of the implicit tax rate (ITR) for 2020 between the two versions. High differences between the two ways of reporting ITR on corporate income are a characteristic of economies in which there is a higher income from investments in the form of dividends. These tend to be countries with a more developed financial and capital market. Luxembourg even achieves a negative tax rate after deducting dividends from the numerator of the ITR calculation equation.[39]

In the second chapter, Estonia was mentioned as a benchmark country for the assessment of competitiveness. Estonia is equally admired for its tax system among the EU Member States. Box 11 gives a brief description of the Estonian corporate income tax system.

Box 11: Estonian tax

Thanks to a high degree of digitalisation that reduces business administration costs, the Estonian tax system is extremely efficient (Kästik, 2019). According to Hájek (2017), the Estonian system can be seen as an inspiration for other tax jurisdictions, reducing tax collection costs,

[37] Note: There is no data on Bulgaria, Malta and Romania for 2020. Cyprus reports only the traditional ITR version.

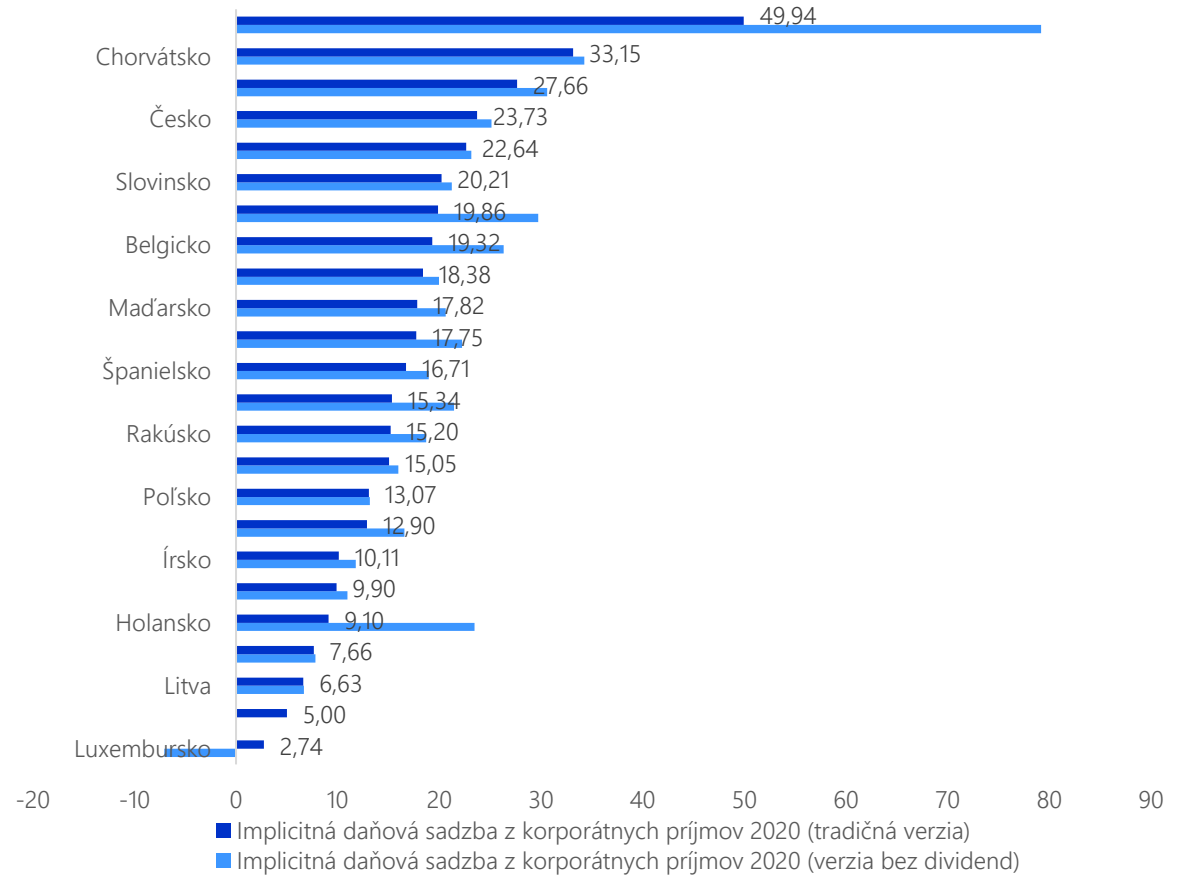
[38] In 2013, Slovakia had only the 15th highest ITR tax rate in the traditional version (i.e. the 12th lowest; excluding Malta), and in 2020 the 5th highest. This suggests that it might be useful to repeat Teplická and Daubner's empirical study from 2013 and test what tax strategies are being used in the present.

[39] The negative value of the Luxembourg tax rate could also be explained by the deduction of interest paid or income from assets obtained from investing insurance (premiums). It is widely known that Luxembourg is an economy in which the banking and insurance sectors predominate.

reducing tax evasion and stimulating the business environment. In the case of corporate income tax, the system focuses on income and expenses, not accrual accounting. Profit (economic outturn) is then not taxed until it is paid out of the entity. Reinvested or retained earnings are not taxed.

If profit is paid out, it is taxed at a rate of 20/80, so a 20% income tax applies. However, a reduced income tax rate (14/86) is also applied under certain conditions to encourage businesses to pay tax regularly (Pašek, 2021). In Estonia, the tax return is submitted on a monthly basis, and tax is likewise payable on a monthly basis (Pašek, 2021). However, the submission of a tax return is effective and quick thanks to its electronic form and the possibility of pre-filling many of the entries (Hájek, 2017).

Figure 51: ITR on corporate income in 2020 (%)

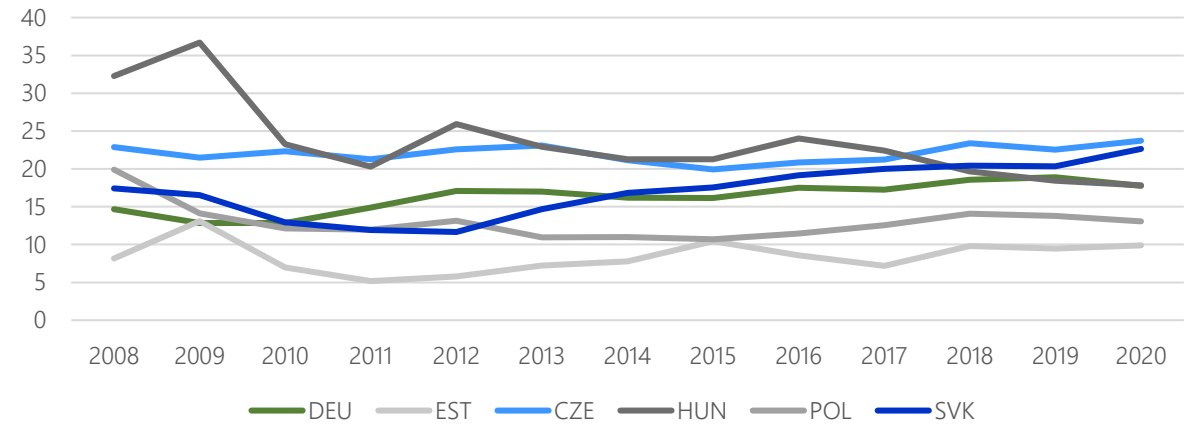


Sources: IHA calculations based on European Commission, Directorate-General for Taxation and Customs Union (2022)

ITRs have been relatively stable in the monitored countries since 2010, but a slight ITR increase can be observed in Slovakia between 2019 and 2020. Figure 52 shows the development of the traditional version of ITR in selected countries. Year-on-year changes depend on the change in revenue from corporate taxation and on changes in total corporate income. Hungary was able to reduce its corporate tax from values exceeding the 30% or 35% threshold to 17.82% in 2020. This value is only slightly higher than the German ITR on corporate income (17.75%). In Czechia and Slovakia, the ITR increased between 2019 and 2020, while in other countries it decreased year-on-year (Germany, Hungary, Poland) or remained stable (Estonia). Estonia is the country with the

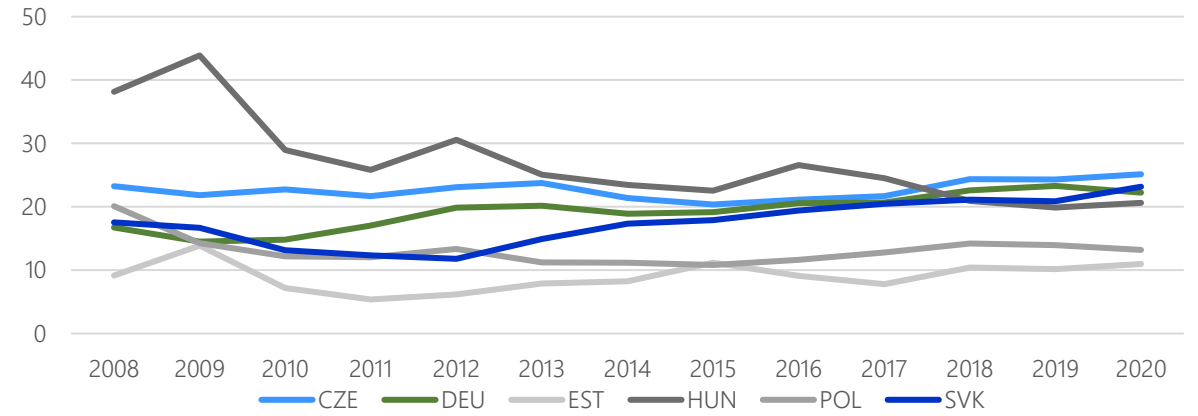
6th lowest ITR of corporate income, which is in line with the results of our competitiveness assessment based on trusted indicators (see Chapter 2).

Figure 52: ITR on corporate income in % (traditional version)



Sources: IHA calculations based on European Commission, Directorate-General for Taxation and Customs Union (2022)

Figure 53: ITR on corporate income in % (dividend-free version)



Sources: IHA calculations based on European Commission, Directorate-General for Taxation and Customs Union (2022)

The difference between the traditional and revised version of the ITR (excluding dividends) is only 0.5 p.p. for Slovakia, but up to 4.5 p.p. for Germany. In the revised version, which abstracts income from dividends, the highest implicit tax rate on corporate income (within the monitored countries) is still that imposed by Czechia, namely 25.1%, which is 1.4 p.p. higher than in the traditional version (figure 53). This is again followed by the Slovak implicit tax rate of 23.2%, which is, however, only raised by 0.5 p.p. Germany takes third place with 22.2%. In this case, the difference between the traditional version and the revised version is 4.5 p.p. The rest of the ranking is Hungary (20.6%; difference 2.8 pp.), Poland (13.2%; difference 0.1 p.p.) and Estonia (11.0%; difference 1.1 p.p.).

5. 2 Labour costs

Labour costs depend on many factors, including labour productivity and tax legislation. Due to the downward rigidity of gross wages, an increase in employers' contribution for employees' health and social insurance leads to an increase in labour costs. On the other hand, an increase

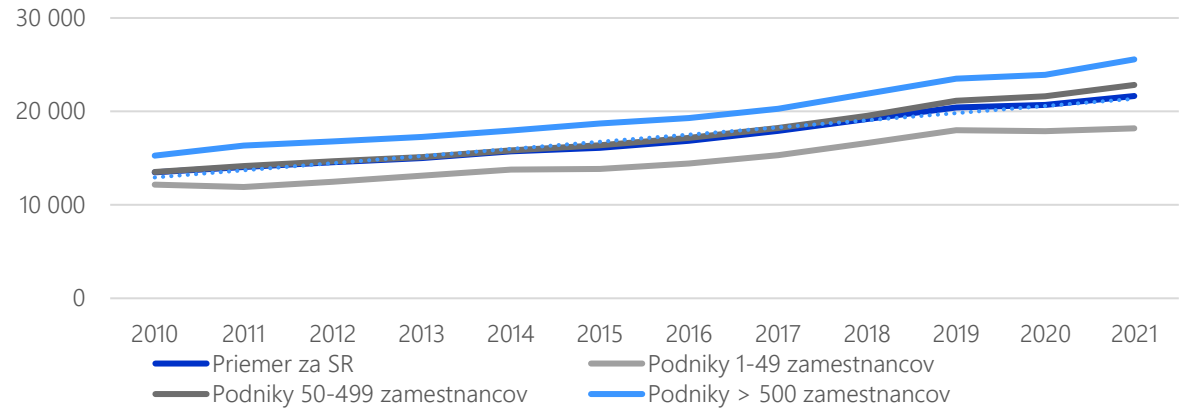
in the rate of personal income tax leads to a decrease in employees' disposable income and thus to a decrease in labour costs. An analysis of the elasticity of taxable income of employees and sole traders in Slovakia for the years 2004–2018 showed a low impact of tax changes on the motivation of employees to work or report higher income was confirmed. This does not apply to high-income employees and the self-employed. These two groups have more options for tax optimisation. An increase in employers' compulsory contributions for employees leads to an increase in labour costs due to the rigidity of gross wages. Employers do not pass increases in their own costs on to employees. In contrast, an increase in the rate of personal income tax leads to a decrease in disposable income and a decrease in labour costs. This relationship was confirmed by empirical observation after the 2013 tax reform (Mikloš, 2021b).

The Slovak tax and contribution mix is dominated by social security contributions, which results in higher labour costs. The Slovak tax mix differs significantly from the usual European model, in which it is possible to observe an even distribution of the burden between compulsory contributions, taxes on income, property, production and imports. On the other hand, self-employment is the least tax-intensive form of economic activity due to increases in flat-rate expenses (Výškrabka and Antalicová, 2018).

Between 2010 and 2021, total annual average labour costs per employee in Slovakia increased from EUR 13,482 to EUR 21,650, an increase of 60.6%. Figure 54 shows total annual labour costs in Slovakia calculated per employee in individual size categories of enterprises.[40] Although the increase in total average labour costs per employee slowed down in 2020, in the later period between 2020 and 2021 the increase was faster than in the period before the COVID-19 pandemic. A category that stands out is the development of total annual labour costs per employee of enterprises up to 49 employees. Total annual labour costs reached an above-average level in 2019 (above the level of the long-term trend) and thereafter year-on-year growth slowed down and returned to trend values. These above-average high values of total annual labour costs may reflect the overall situation on the labour market in 2019. At that time, the unemployment rate reached a historic minimum of 5% (MPSVR, 2020), which created natural pressure for an increase in the compensation of employees. Besides the situation in the market, increases in compensation also respond to regulation: "*There were increases in allowances for work on public holidays, Saturdays, Sundays and nights have increased (in two phases: with effect from 1 May 2018 and 1 May 2019). Allowances are tied to the minimum wage and increase at the same time as it on 1 January. Thus, the allowances increased twice during the year (as of 1 January due to a higher minimum wage and as of 1 May due to a change in rates)*" (Vladová, 2022 in Vladová et al., 2022).

[40] Note: The SO SR publishes statistics on labour costs at the end of the calendar year covering the previous calendar year. This means that the 2022 report includes data for 2021

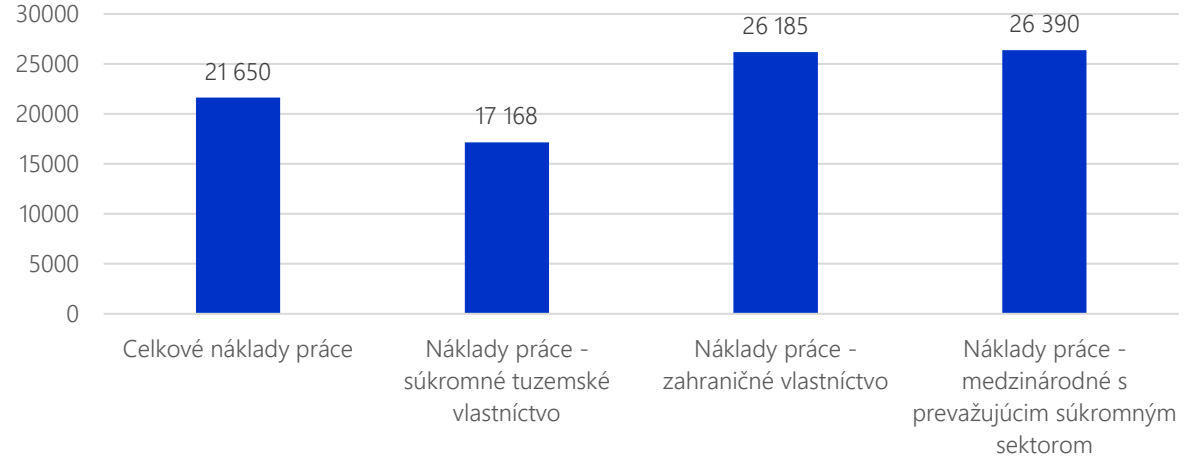
Figure 54: Total annual labour costs in Slovakia calculated per employee (2010–2021)



Sources: IHA calculations based on SO SR (2011–2022)

Undertakings in private domestic ownership achieve lower labour costs than total labour costs in Slovakia, but labour costs in undertakings with foreign or international ownership are significantly higher than total labour costs. Figure 55 compares total labour costs, labour costs in enterprises with private ownership of domestic entities and labour costs in enterprises with foreign or international ownership. The difference in labour costs per employee between domestic and foreign ownership amounts to EUR 9,017.

Figure 55: Annual labour costs per employee according for selected types of ownership in 2021



Sources: IHA calculations based on SO SR (2011–2022)

Box 12: Quantification of the impact of employee recreation allowances on labour costs

Since 2019, Act No 347/2018 has entitled employees to a recreation allowance equal to 55% of the costs of the total cost of recreation not exceeding EUR 500 (therefore up to EUR 275 per year). Entitlement to the allowance depends on meeting various conditions: the employee must work for his employer for at least 2 calendar years, and the recreation must take place for a minimum of two nights in Slovakia. An adjusted allowance is paid for part-time work. It is important to recall that the obligation to provide an employee recreation allowance arises only for firms with more than 49 employees.

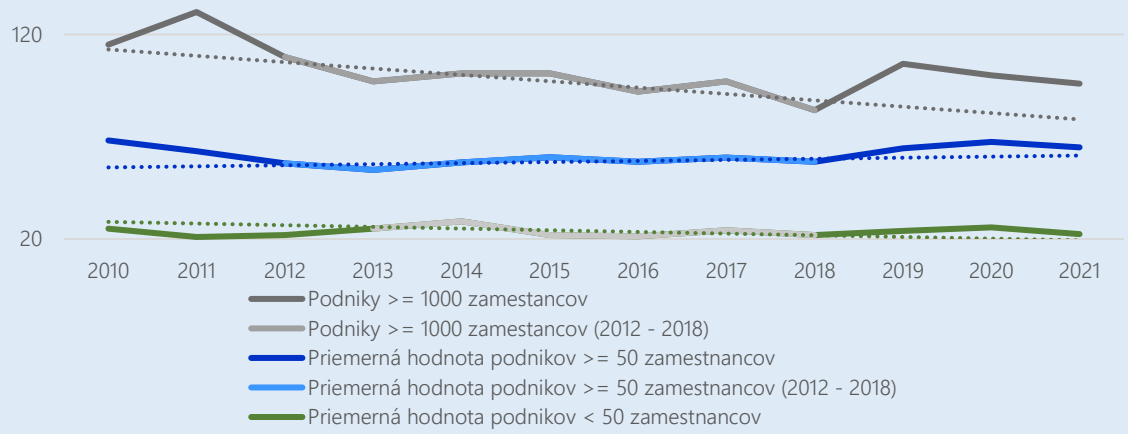
Assessing the per employee impact of recreational vouchers on annual labour costs is complicated because there are no publicly available data on the use of these vouchers. However, it is possible to monitor the item "other contributions to the social fund" in the framework of statistics on total labour costs, which include contributions to employee recreation amongst others (SO SR, 2023a)

The impact of recreational vouchers on the increase in annual labour costs per employee was estimated by monitoring the development of other social fund contributions between 2018 and 2019, in the categories of enterprises with over 50 and over 1,000 employees in comparison with enterprises with up to 49 employees.

In 2019, the private sector paid employee recreation allowances in the amount of €30.5 million. A review of subsidy expenditure (Haluš, Peciar and Bukovina et al., 2023) found that in 2019 the value of the total amount of paid recreation allowances was approximately EUR 45 million (which represents 0.11% of all compensation paid to employees; Eurostat, 2023 [TEC00013]). Of this, the public administration paid out €14.5 million. The value of contributions paid remained constant during the following years affected by the pandemic: 2020 (EUR 42 million; 0.10%) and 2021 (EUR 40 million; 0.09%).

A significant increase in other social fund contributions between 2018 and 2019 above the level of growth in total labour costs can be observed for enterprises in the size categories over 50 and over 1,000 employees, which was probably caused by the implementation of the recreation allowances. However, it should be noted that according to the data from the Statistical Office, other contributions to the social fund are still slightly below 2010 levels in all three processed size categories.

Figure 56: Annual labour costs per employee – other contributions to the social fund



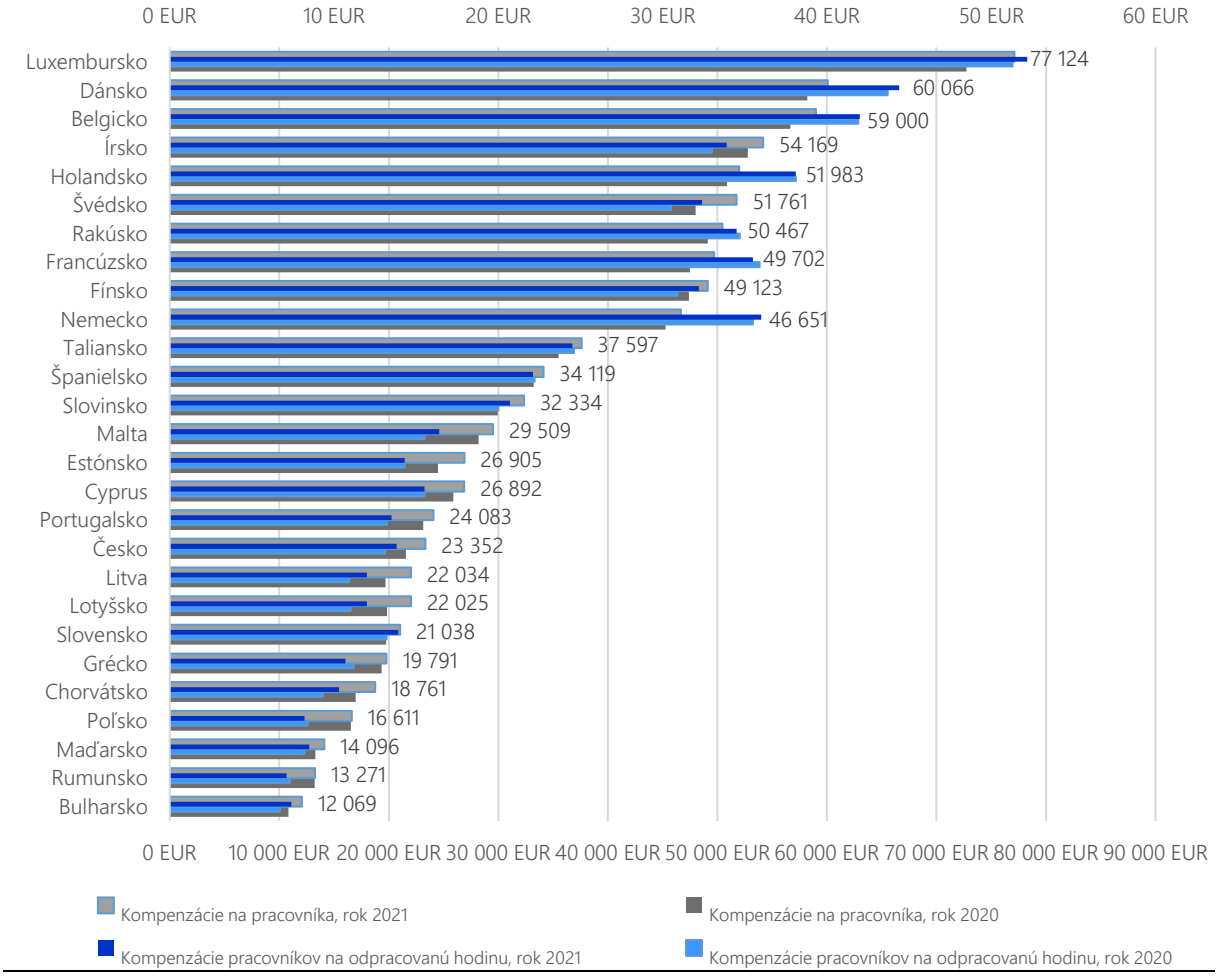
Sources: IHA calculations based on SO SR (2011–2022)

Figure 56 shows the development of other social fund contributions, which are monitored as part of indirect labour costs. In the category of small enterprises with up to 49 employees, the growth rate of other social fund contributions was 8.96% between 2018 and 2019 (the total labour costs of enterprises with up to 49 employees increased by 8.23%). In the same period, other contributions to the social fund increased by 11.23% for enterprises with more than 49 employees (total labour costs in this size category increased by 7.83% year-on-year) and there

was an increase of 27.35% for enterprises with more than 1,000 employees (the total cost of work increased by 7.35%).

In the comparison of compensation of employees in 2021, Slovakia had the seventh lowest labour costs of all EU Member States. Figure 57 compares the amount of compensation of employees on annual (bottom axis on the chart) and hourly (top axis on the chart) bases for the years 2020 to 2021 in EU Member States. In 2021, the highest level of employers' costs, i.e. compensation of workers per employee, was in Luxembourg, amounting to an average of EUR 77,000. At the other end of the scale, the lowest value was in Bulgaria, with around EUR 12,000 per worker. In this ranking, Slovakia ranked seventh with the value of compensations paid per worker amounting to EUR 21,000. The disparity between the value of compensation per worker and per hour worked may be caused, for example, by different levels of use of flexible working arrangements (agreements, student work, etc.; cf. Habrman, Habodászová and Šrámková, 2022).

Figure 57: Compensation of employees in 2020 and 2021

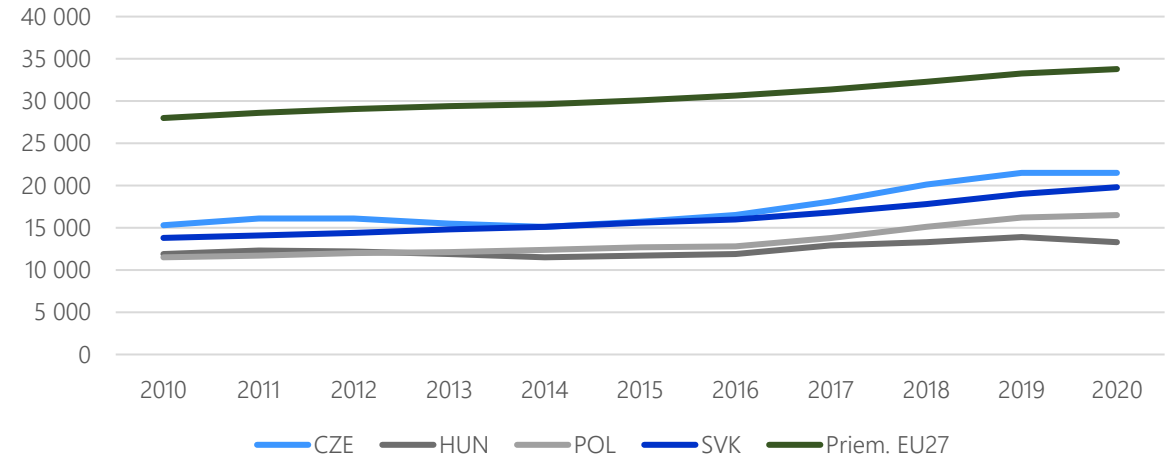


Sources: IHA calculations based on Eurostat (2023) [NAMA_10_LP_ULC]

In the V4 region, Slovakia has the second highest labour costs. Compensation of employees has grown faster since 2016 than in the previous period, and the gap between Slovak and Czech compensation of employees has widened. The development compensation of employees in the V4 region compared to the EU27 average is shown in figure 58. Two facts can be observed: until about 2016, compensation of employees was more or less flat in all the countries surveyed, but

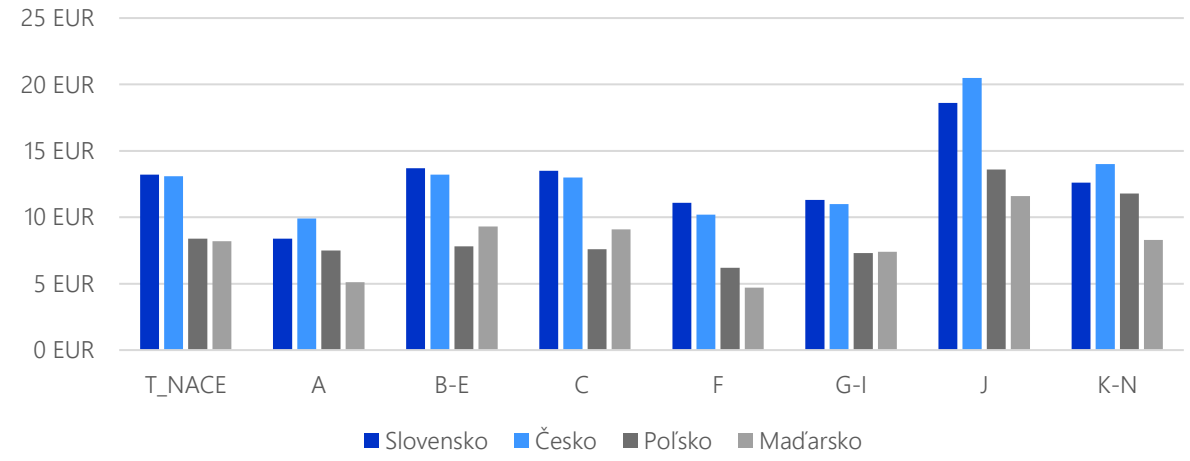
growth has accelerated since 2016. In the period from 2014 to 2016, Slovak and Czech compensation can be seen to be almost equal. The gap between them also began to widen after 2016.

Figure 58: Development of compensation of employees in the V4 countries and the EU27 average



Sources: IHA calculations based on Eurostat (2023) [NAMA_10R_2LP10]

Figure 59: Compensation of employees per hour worked in selected NACE sectors in 2020



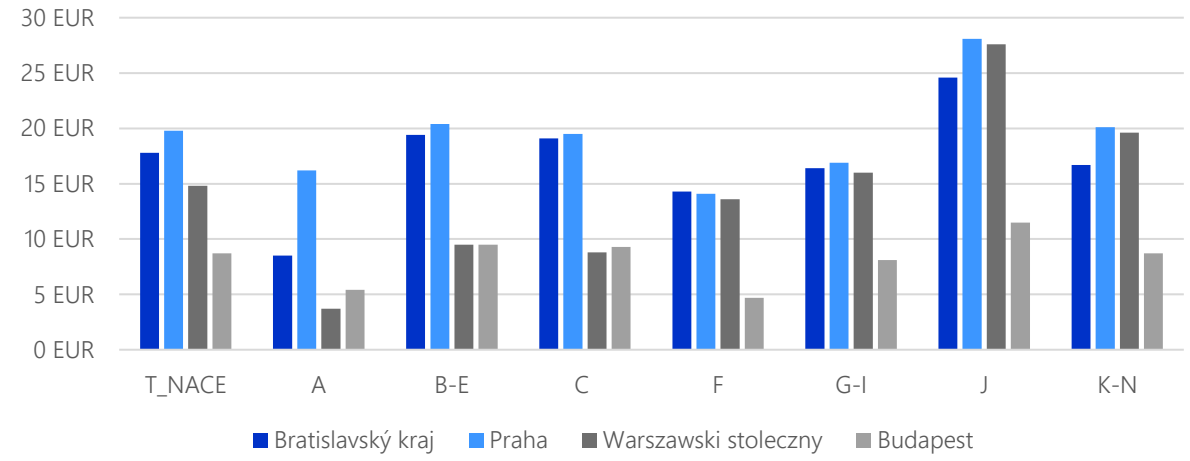
Sources: IHA calculations based on Eurostat (2023) [NAMA_10R_2LP10]; SO SR (2007)
Note: T_NACE – all sectors of the economy in NACE; A – Agriculture, forestry and fisheries; B – Mining and quarrying, C - Industrial production, D-E – Electricity, gas, water supply, etc.; F – Construction; G – Wholesale and retail trade, repair of motor vehicles and motorcycles; H – Transport and storage; I – Accommodation and catering services; J – Information and communication; K – Financial and insurance activities; L – Real estate activities; M – Professional, scientific and technical activities; N – Administrative and support services

Slovakia has the lowest hourly compensation of workers in the agriculture, forestry and fisheries sectors, and the highest in the information and communication sectors. Figure 59 shows a sector-by-sector comparison of compensation of employees However, in this case, the Eurostat database only allows for the comparison of hourly labour costs (compensation of employees per hour worked). Per hour, compensation of employees in Slovakia and Czechia, as well as in Poland and Hungary is at similar levels across all sectors.

Disparities between the V4 countries appear only in certain sectors of the economy. The common characteristic of all the countries surveyed is that the sector with the highest level of compensation

of employees is information and communication. As might be expected, farming, forestry and fisheries are the sectors with the lowest levels of hourly compensation. However, this is not the case for Poland and Hungary due to the strong representation of agriculture in these countries' economies. These countries have a lower level of compensation in the construction sector. While a more detailed regional overview of the V4 countries is included in Annex 3, figure 60 compares the capital city metro regions of the V4 countries.

Figure 60: Compensation of employees per hour worked in selected NACE sectors and V4 capital city metro regions in 2020



Sources: IHA calculations based on Eurostat (2023) [NAMA_10R_2LP10]; SO SR (2007)
Note: T_NACE – all sectors of the economy in NACE; A – Agriculture, forestry and fisheries; B – Mining and quarrying, C - Industrial production, D-E – Electricity, gas, water supply, etc.; F – Construction; G – Wholesale and retail trade, repair of motor vehicles and motorcycles; H – Transport and storage; I – Accommodation and catering services; J – Information and communication; K – Financial and insurance activities; L – Real estate activities; M – Professional, scientific and technical activities; N – Administrative and support services

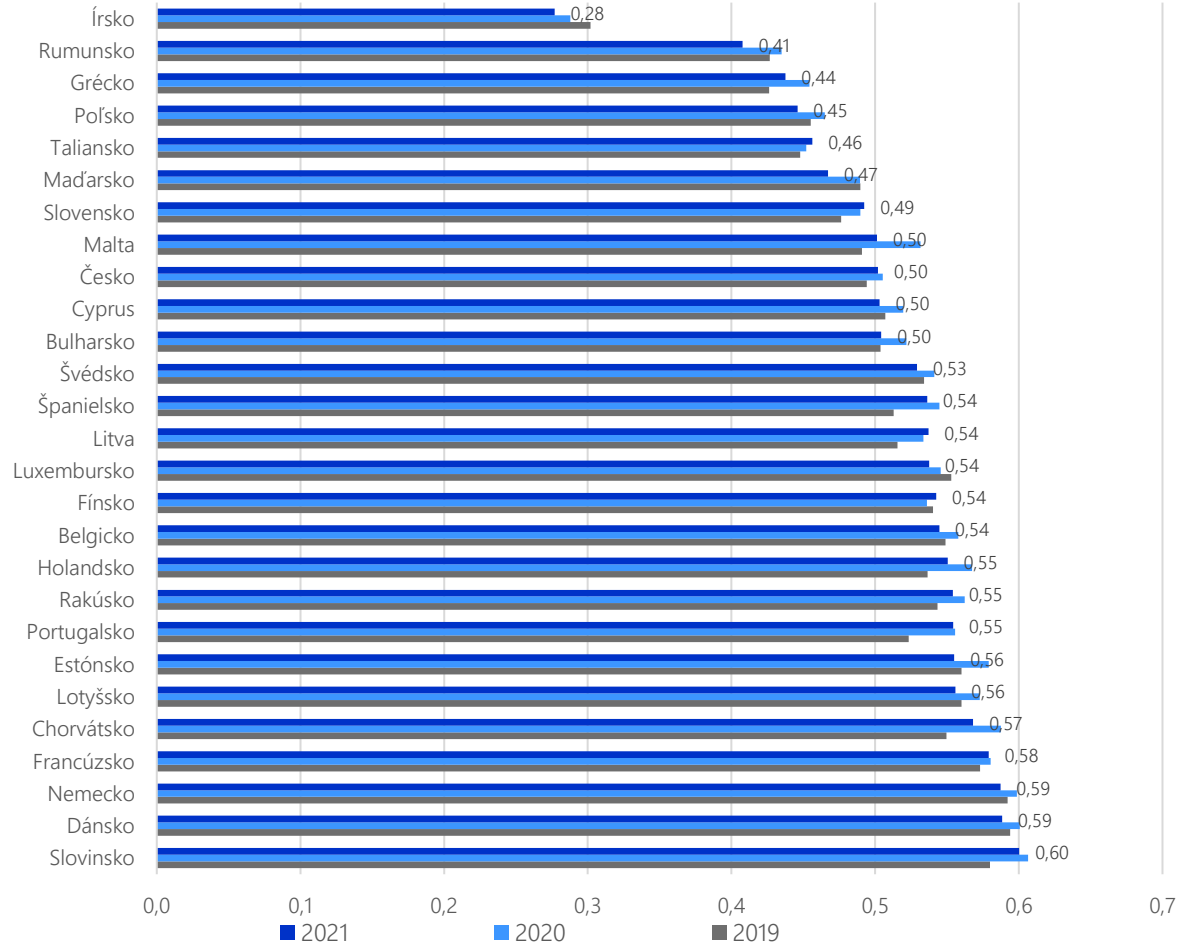
One of the key indicators of competitiveness in terms of labour costs is their share of value added. In this indicator, Slovakia ranks seventh lowest in the EU. The price of labour or the full cost of labour is significantly dependent on labour productivity (Duspivová, 2019).[41] However, there is a relationship between labour productivity and value added, as traditionally labour productivity is calculated as a proportion of gross value added and the number of employees or hours worked (ILO, 2021; Duspivová, 2019). Unit labour costs are then expressed as a share of compensation of employees per worker and labour productivity (European Commission – Eurostat, 2013, Lipská, Vlnková and Macková, 2005).[42] In this study, compensation of employees [TEC00013] has been compared based on its ratio to gross value added [NAMA_10_GDP] (cf. Duspivová, 2019). The lower the value of the indicator, the higher the cost competitiveness that the economy is expected to achieve. In the pandemic years, this indicator developed steadily (figure 61).

[41] In Czechia, there is an economic gap between domestic and foreign-owned enterprises. This applies to labour productivity, the level of remuneration and unit labour costs. Enterprises with foreign capital are more productive and provide a higher level of remuneration for employees, but their unit labour costs are still lower than in Czech-owned companies. The reason for this is the substitution of labour and capital as factors of production. This means foreign companies have a higher amount of capital and therefore their unit labour costs are lower (Duspivová, 2019).

[42] Unit Labour Costs (ULC). Eurostat presents a ULC development index in table [NAMA_10_LP_ULC].

In 2021, compensation of employees in Slovakia amounted to 49% of gross value added, putting it in seventh place.[43] In the V4 region, Hungary and Poland both have more cost-competitive positions. On the other hand, Czechia ranked ninth.

Figure 61: Comparison of compensation for employees as a share of gross value added



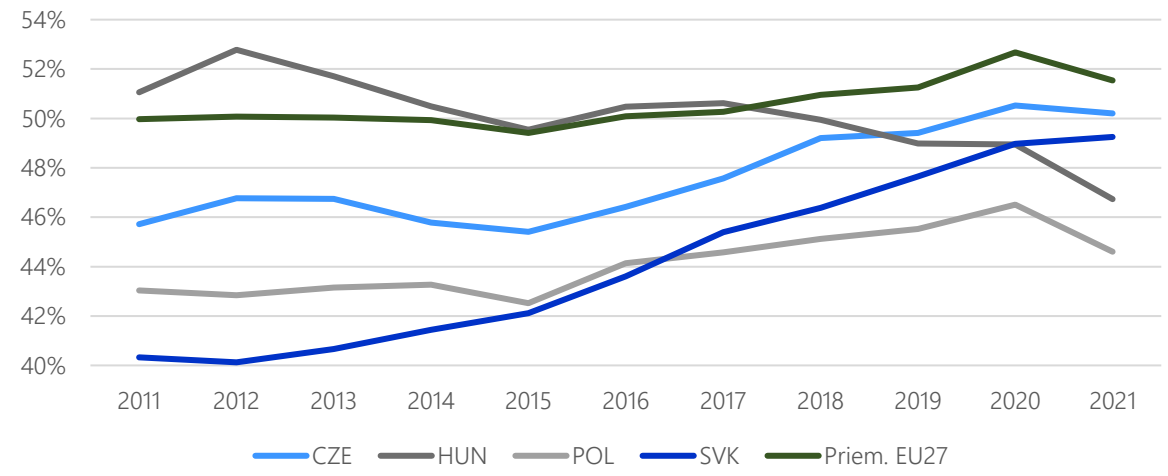
Sources: IHA calculations based on Eurostat (2023) [TEC00013]; [NAMA_10_GDP]

Between 2011 and 2021, Slovak compensation of employees as a share of gross value added recorded by far the highest growth among the V4 countries, even growing in the pandemic years of 2020 and 2021. Figure 62 shows the development of the V4 countries and the average value of the EU27. In 2021, there was a decrease in compensation as a share of gross value added in all the studied units, which was primarily caused by a decrease in gross value added and a slowdown in the growth rate of compensation of employees. However, despite the pandemic, there has been an increase in the share in Slovakia. On the other hand, since 2018, all the countries of the V4 region have achieved values of the indicator below the EU27 average, and Slovakia recorded

[43] In Slovakia, compensation of employees (TEC) makes up a 4.7% lower share of gross value added (GVA) than the EU27 average. In manufacturing, the Slovak TEC as a share of GVA is 4.3% lower. The share of the service sector is 1.6% lower than in the EU27. On the other hand there are wholesale, retail, catering and accommodation services, where TEC makes up a 6.5% higher share of GVA than in the EU-27 countries, and public services and defence (minus 1%). In the construction sector, TEC makes up a 23.3% lower share of GVA than in the EU27. There is another large difference in agriculture, forestry and fisheries, where TEC represents an 18.6% higher share of GVA (calculations by IHA based on data from Eurostat, 2023 [NAMA_10_A10]).

the lowest values of the monitored indicator until 2016, even compared to the average of the EU27 countries. Such an increase in Slovak compensation of employees as a share of gross value added could also be attributed to the ongoing convergence as the Slovak economy catches up to the older EU Member States.

Figure 62: Development of compensation for employees as a share of gross value added in selected countries



Sources: IHA calculations based on Eurostat (2023) [TEC00013]; [NAMA_10_GDP]

5.3 Energy costs

This subchapter deals with the comparison of electricity, gas and fuel prices for the business sector between Slovakia, the V4 countries, Germany and the EU average. In addition, in the context of the current high prices, it describes measures taken to mitigate their effects on the corporate sphere.

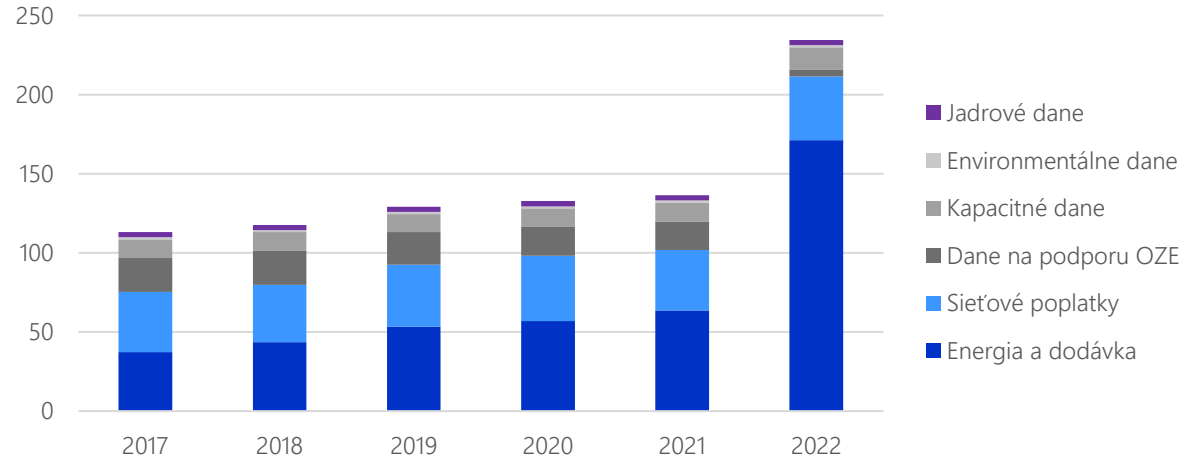
5.3.1 Electricity

In recent years, Slovakia has had the highest business electricity rates among the V4 countries. Compared to the region, but also to the EU average, prices are higher in all key components of electricity prices – energy and supply, network and regulated fees.

Average business electricity rates in Slovakia in 2022 reached EUR 234.5/MWh excluding VAT. The retail price of electricity has shown an increasing trend in recent years, mainly due to the increase in electricity market prices. The second-highest component was network costs, which were almost stable at around EUR 40/MWh. Regulated charges[44] had a gradual downward trend until 2021. In 2022, there was a significant decrease (from EUR 34.6/MWh to EUR 23.1/MWh) due to the reduction of the system operation tariff (TPS) and the introduction of the band tariff.

[44] The regulated charges include tax categories supporting renewable energy, capacity taxes, environmental taxes, nuclear taxes, and more.

Figure 63: Development of average business electricity rates (excluding VAT) in Slovakia

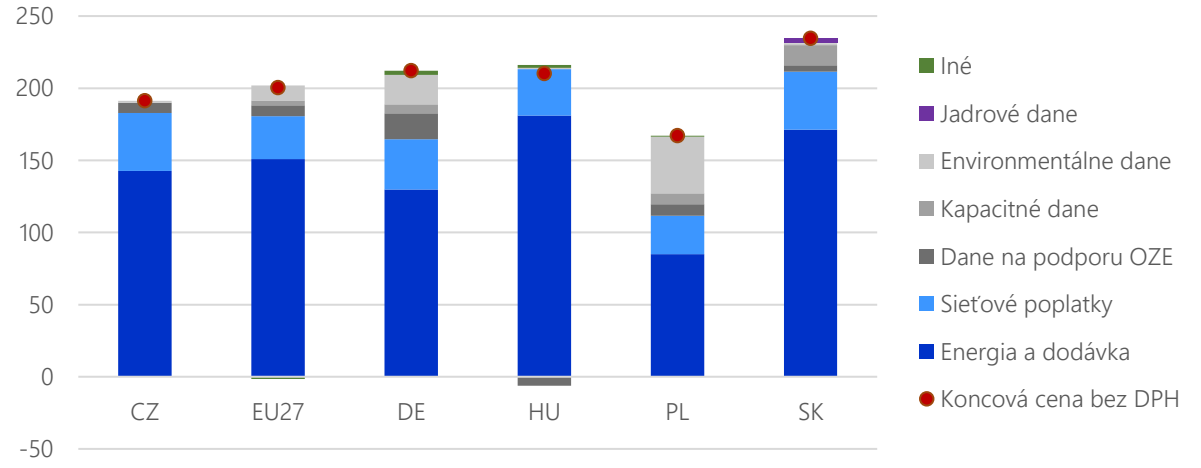


Source: Eurostat [NRG_PC_205_C]

The increase in electricity prices since 2020 was above average in the region (only Hungary reported higher growth). This is due to the way electricity is supplied to large customers[45], who, unlike small customers and customers of the regulated segment, also relied more heavily on purchases on the spot market, where prices have been rising sharply since the second half of 2021.

Slovakia is the most expensive country in the V4 in terms of business electricity prices. This was also the case in recent years. Poland had the lowest prices in 2022 (EUR 167.1/MWh). Prices in Slovakia are also higher compared to Germany and the EU average. (see figure 64).

Figure 64: Comparison of average business electricity rates (excluding VAT) in Slovakia and benchmark countries



Source: Eurostat [NRG_PC_205_C]

[45] In consumption bands with consumption of more than 19,999 MWh/year.

Box 13: Components of electricity and gas prices as defined by Eurostat

The starting point for comparing the competitiveness of Slovakia in terms of energy prices was the data on the unit price of the components of the retail electricity price for non-household customers from Eurostat and ÚRSO. Every EU Member State has a different composition of the components of the retail price of electricity and also defines different consumption bands with different levels of unit prices of the components of the retail price. In order to make the price levels comparable, Eurostat has introduced and applies a uniform methodology for the components of the final price, as well as the demarcation of consumption bands.

The total price consists of the following components: energy and supply, network costs, taxes for renewables and energy produced by high-efficiency co-generation, capacity taxes, environmental taxes, nuclear taxes (only applicable to electricity), and other taxes. The description of each item is given below.

The supra-category "regulated charges, excluding VAT" (applies only to electricity) includes all regulated components of the final price of electricity, network charges, taxes, fees and levies, excluding VAT and energy and supplies.

Energy and supply includes the following costs for final customers: 1. for electricity: generation, storage, balancing energy, supply costs, customer service, after-sales service management and other supply costs, and 2. for gas: the price of the commodity at the entry point to the transmission system, including, where relevant, storage costs and sales costs to retail customers.

Network costs include the following costs for final customers: transmission and distribution tariffs, transmission and distribution losses, network costs, costs related to post-warranty service, costs of operating the system and costs related to meter rental and metering.

Value added tax (VAT) within the meaning of Directive 2006/112/EC.

taxes for renewables and energy produced by high-efficiency co-generation are taxes, fees or levies related to the promotion of renewable energy sources, energy efficiency and combined heat and power production.

Capacity taxes are taxes, fees or levies relating to: 1. for electricity: capacity payments and energy security and adequacy of electricity production; taxes for the restructuring of the coal industry; taxes on electricity distribution; stranded costs and levies relating to the financing of energy regulators or market and system operators; and 2. for gas: strategic stocks, capacity payments and energy security, taxes on natural gas distribution, stranded costs and levies on the financing of energy regulators or the market operator and system operator.

Environmental taxes are taxes, fees or levies related to air quality and other environmental purposes; taxes on CO2 or other greenhouse gas emissions.

Nuclear tax (applies only to electricity) consists of taxes, fees or levies relating to the nuclear sector, including the decommissioning of nuclear installations, their inspections, and other charges related to nuclear installations.

Other taxes are all other taxes, fees or levies that do not belong to any of the previous four (for gas) or five (for electricity) categories: support for district heating; local or regional fiscal

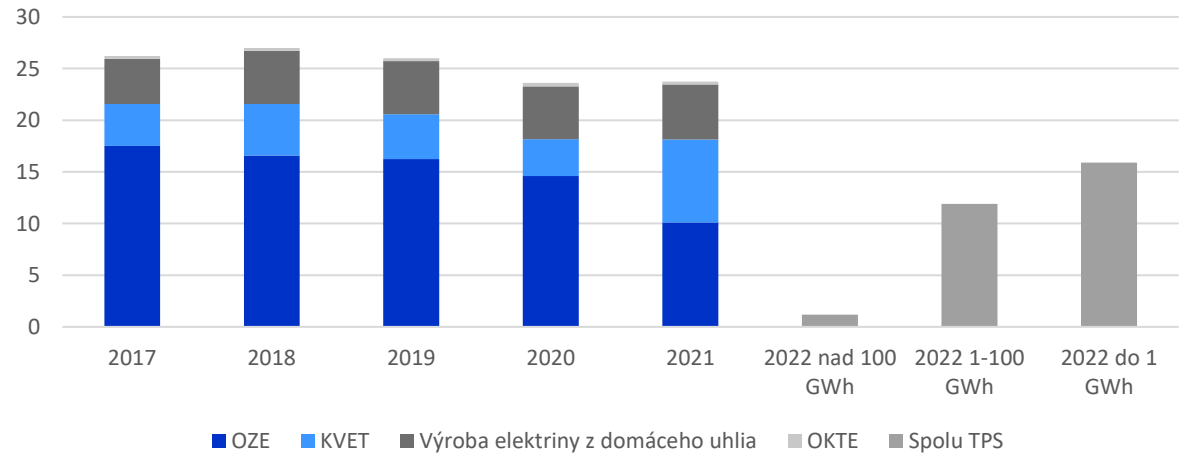
charges; compensation for energy islands; concessions relating to licenses and fees for the use of land and public or private property for the purposes of utilities or other installations.

In 2022, Slovakia had the second highest prices for electricity and its supply after Hungary among the monitored countries, at EUR 171.2/MWh, while the cheapest was in Poland (EUR 84.9/MWh). The German price was EUR 129.8/MWh. This is not just the impact of the energy crisis because Slovakia also had the highest electricity prices in previous years, together with Hungary. The situation is due to the physical and commercial flows of electricity, the quantities involved, and the specifics of the local market.

The network costs price component was the second highest in Slovakia (behind Czechia), at EUR 40.2/MWh. This component includes transmission and distribution, including losses. In terms of the volume of electricity used to cover losses in the network, the territory of Slovakia performs about the same as, or better than, other countries. The fact that, overall, the price component of network fees is the highest in Slovakia is therefore probably due to other factors[46].

Thanks to the reduction in the system operation tariff (TPS) and the introduction of three bands in 2022, there was a significant reduction in the tax component supporting renewables and high-efficiency co-generation. The TPS was reduced by 33%, mainly due to the prolongation of support for existing renewables and a state injection into the system in the amount of EUR 40 million, but also due to an overall increase in the wholesale price level, which reduced the financial requirements to cover payments to the operators of the supported resources. A system of volume discounts on TPS was also introduced for large customers by implementing TPS bands[47]. Thanks to this measure, Slovakia went from the highest to the third highest position in the V4. Companies pay the most in this category in Poland (EUR 7.9/MWh). In Hungary, this component is even negative (-6.20 EUR/MWh). In 2023, there was a 60% increase in TPS compared to 2022, but since May the government has compensated businesses for this increase.

Figure 65: Development of system operation tariff components in Slovakia



Sources: URSO annual reports, URSO

[46] E.g. existing infrastructure and its condition, geographic, demographic-settlement and geo-economic specifics.

[47] The basic band applies to most customers, with final electricity consumption up to 1 GWh. The second band covers businesses with consumption from 1 GWh to 100 GWh. This applies to approximately 1,600 of the largest delivery points. The most energy-intensive enterprises with consumption exceeding 100 GWh per year are included in the third band.

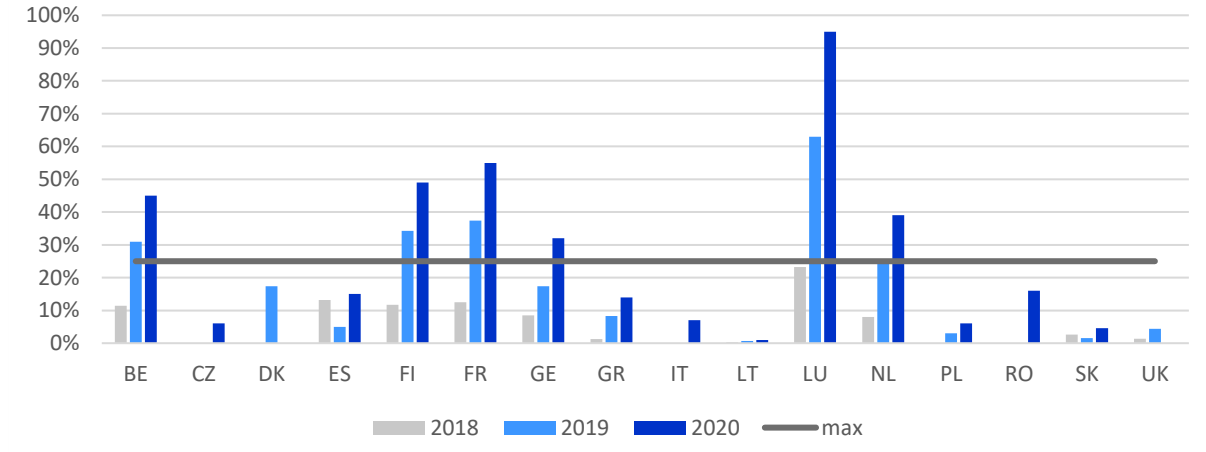
Only Poland, Slovakia and Germany have capacity taxes among the compared countries. Slovakia had the highest tax rate among the compared countries, at EUR 11.4/MWh. In Slovakia, they include TSS capacity taxes (support services, etc.), support for domestic coal mining - valid only until the end of 2023 and the operation of the electricity market operator – OKTE. In 2023, TSS (for support services) increased from EUR 6.3/MWh to EUR 10.1/MWh, but as in the case of TPS, the government has been compensating companies for this increase since May. From 2024, capacity taxes will be reduced with the removal of current support for domestic coal production. The reduction will be around EUR 5/MWh.

Environmental taxes in Slovakia consist only of an excise tax in the amount of EUR 1.32/MWh. They are at similarly low levels in the Czech Republic and Hungary, but in Poland they reached almost EUR 40/MWh in 2022. The nuclear tax is applied under a special regime[48] only in Slovakia, where its amount is EUR 3.3/MWh. Among the benchmark countries, the category of other taxes is applied Germany (EUR 2.7/MWh), Hungary (EUR 2.2/MWh) and Poland (EUR 0.7/MWh).

EU rules allow Member States to help their energy-intensive industries by compensating for indirect CO_2 costs. Slovakia is not making sufficient use of this option. The maximum permissible compensation for indirect carbon costs[49] at the economy-wide level is 25% of revenues from the sale of emission allowances and 75% of eligible costs per company.

Slovakia paid on average only 2.9% of revenues from the sale of allowances in the period 2018–2020 and in 2021 it went even lower reaching just 0.3%. For comparison, in the years 2018–2020, Germany paid more than 20% of the revenues from the sale of allowances as compensation for indirect CO_2 costs. At the same time, the environmental fund (Envirofond) holds more than EUR 1 billion from the sale of emission allowances, which can also be used retroactively under the law. From the point of view of environmental impact, it does not make sense to ignore such a compensation scheme, as Slovakia has one of the lowest carbon footprints in the world for electricity production.

Figure 66: International comparison of indirect compensation



Sources: European Roundtable on Climate Change and Sustainable Transition, Envirofond, IHA calculations

[48] There are two nuclear levies in the Slovak Republic – the first for existing and operated installations, and the second, which is established to cover the historical debt of already shutdown installations (A1 Jaslovské Bohunice).

[49] The purpose of compensation for indirect costs related to emission charging is to prevent the relocation of electricity-intensive production to countries that do not have such schemes.

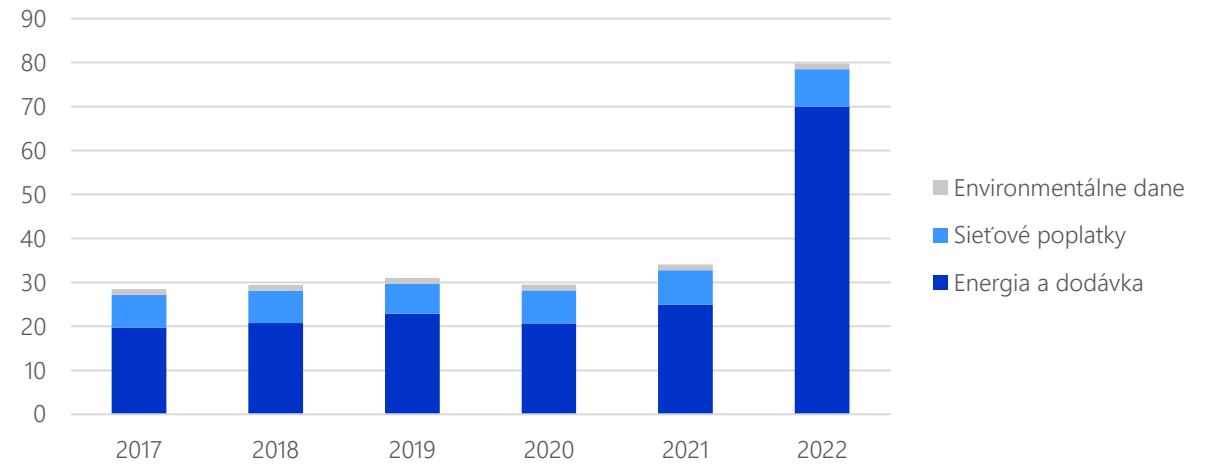
According to data collected by the European Roundtable on Climate Change and Sustainable Transition (ERCST, 2023), 15 countries used indirect carbon cost offsets between 2018 and 2020[50]. Several of them even exceeded the twenty-five percent limit, thanks to the possibility of an exemption applicable from 2018, according to which it is possible to exceed the limit with sufficient justification (Regulation 2018/410 of the European Parliament and of the Council, EUR-LEX, 2018). In 2020, six countries have already passed this threshold.

5.3.2 Gas

Among the V4 countries, Slovakia had the second lowest average retail gas price (excluding VAT) for the business sector in 2021 and 2022, but it was also higher than in Germany compared to the EU average. The lowest price was in Czechia. However, the differences in retail prices between the V4 countries are not large. For this reason, the order of countries changes over time, for example in 2020 the gas retail price in Slovakia was the highest.

Average gas prices for businesses in Slovakia reached EUR 79.8/MWh excluding VAT in 2022. Unlike electricity, the price of the commodity and the cost of gas supply represent the vast majority of the retail price of gas. Network charges and excise duties in 2022 amounted to just EUR 9.8/MWh. In recent years, there has been a gradual increase in regulated network charges, as the price of the commodity also has been going up to some extent. Average retail gas prices in Slovakia were the second lowest in the V4 countries in 2022. Similarly, Slovakia also had the second lowest commodity and supply price.

Figure 67: Development of average business gas prices in Slovakia (excluding VAT)

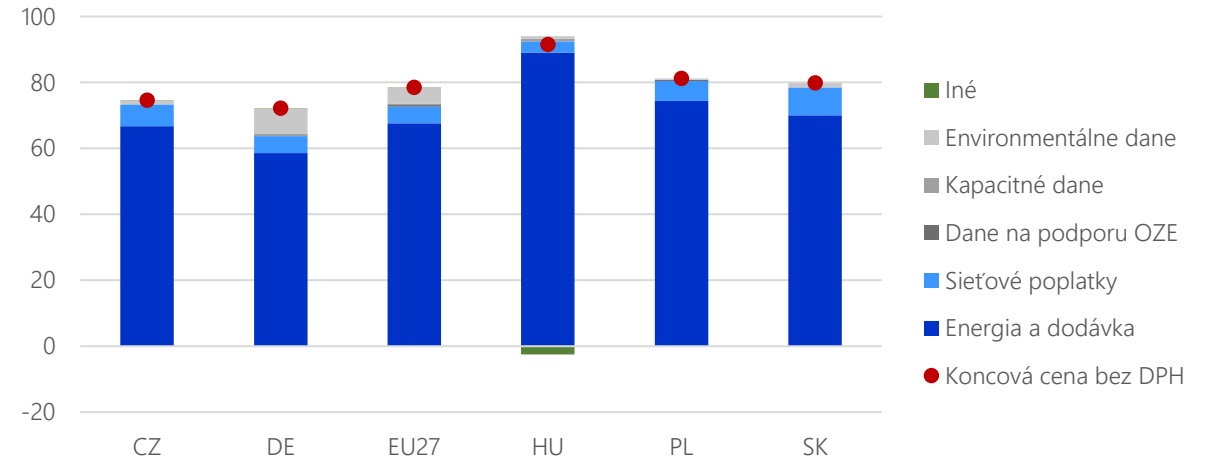


Source: Eurostat [NRG_PC_203_C]

The network charges of EUR 8.5/MWh are the highest in the region due to the higher cost of covering losses in the system compared to the neighbouring countries (see chapter 3.2.). Similarly, environmental taxes (in Slovakia, excise duties) are also the highest at EUR 1.3/MWh. Unlike other V4 countries, Slovakia does not apply other regulated charges.

[50] Compensation is paid one year retrospectively. Thus, the data for year t represent the amount paid in year t+1 based on the applicants' data from year t.

Figure 68: Comparison of average business gas prices for Slovakia and benchmark countries (excluding VAT)



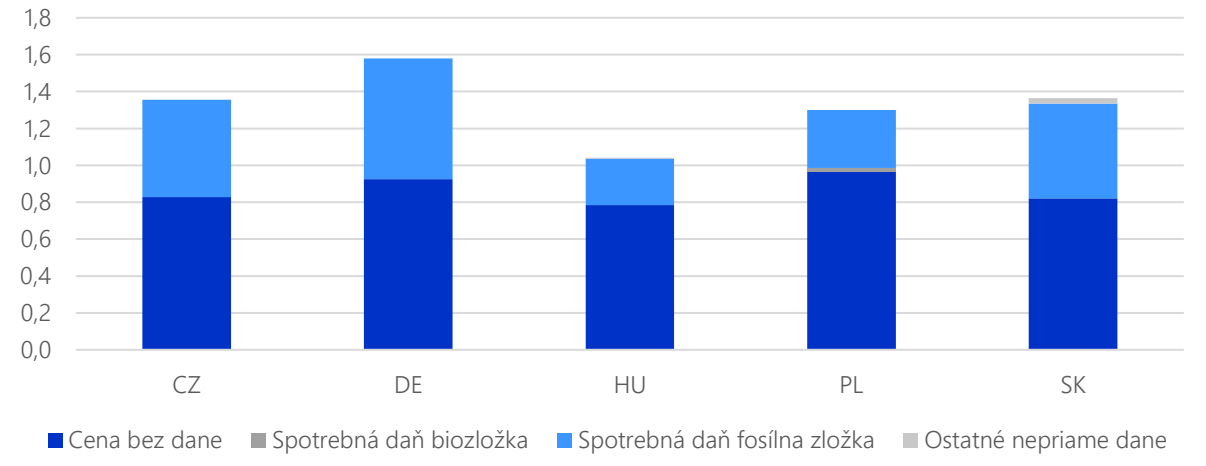
Source: Eurostat [NRG_PC_203_C]

5.3.3 Fuel

Among the V4 countries, Slovakia has the highest gasoline price and the second highest diesel price excluding VAT. The primary reason is the amount of excise duties. Fuel prices in Slovakia before tax were the second lowest in the region after Hungary. Average data for the fourth quarter of 2022 were compared. Hungarian prices are distorted by the cap on commodity prices that was in force until early December 2022.

The average retail price of gasoline excluding VAT in Slovakia was the highest in the V4 countries in the last quarter of 2022, though still lower than in Germany. Average retail gasoline prices reached EUR 1.364/l excluding VAT. The largest part of this was the excise duty on the fossil fuel component, for which Slovakia has the second highest in the V4 countries. Slovakia has the third highest price for gasoline as a commodity, EUR 0.820/l, after Poland and Czechia. Only Poland applies excise duty to the biofuel component, levying EUR 0.020/l. The other indirect taxes component is applied only by Slovakia (EUR 0.0297/l) and Hungary (EUR 0.005/l).

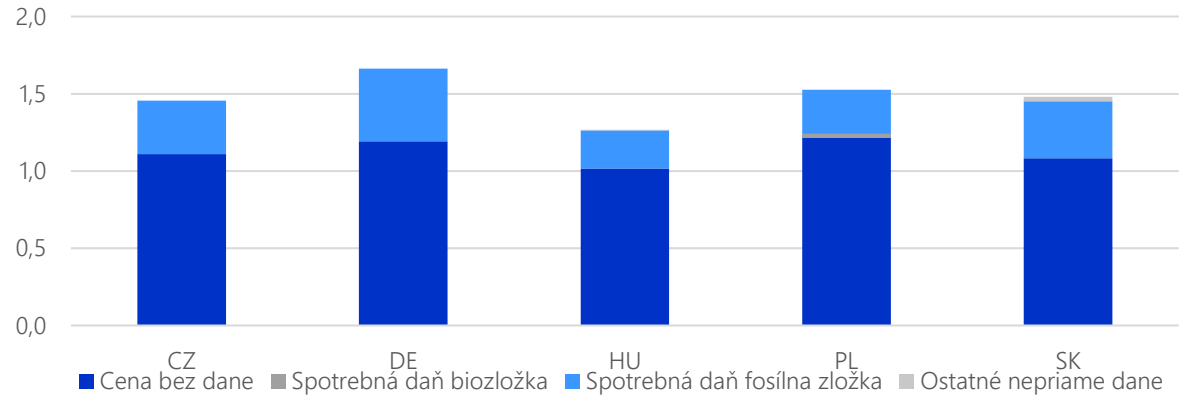
Figure 69: Comparison of average quarterly gasoline prices for Q4 2022 (excluding VAT)



Sources: European Commission, IHA calculations

The final price of diesel in Slovakia excluding VAT was the second highest in the V4 countries, but lower than in Germany. The retail price of diesel was EUR 1.481/l. The largest part of this was the excise duty on the fossil fuel component, for which Slovakia has the highest in the V4 countries. Slovakia has the third highest price for diesel as a commodity, EUR 1.082/l, after Poland with EUR 1.220/l and Czechia with EUR 1.109/l. Only Poland applies excise duty to the biofuel component, levying EUR 0.019/l. The other indirect taxes component is applied only by Slovakia (EUR 0.0297/l) and Hungary (EUR 0.0453/l).

Figure 70: Comparison of average quarterly diesel prices for Q4 2022 (excluding VAT)



Sources: European Commission, IHA calculations

5.3.4 Measures to mitigate the impact of the sharp rise in energy prices on business

In the Temporary Crisis Framework, the European Commission sets out the limits of permissible state aid for the business sector in response to high energy prices caused by Russian aggression in Ukraine. Non-repayable aid is permissible based on Articles 2.1 and 2.4 of the framework. Article 2.1. allows assistance according to any parameters up to EUR 2 million during the period of validity of the framework per economic unit. Article 2.4. allows higher limits per economic unit (up to EUR 150 million), while having strictly defined eligibility conditions and ceilings based on the economic outturn. Aid of more than EUR 4 million is limited to companies with a decrease in earnings before interest, taxes, depreciation, and amortization (EBITDA) of at least 30% compared to 2021, whereas the sum of EBITDA and the aid provided must not exceed 70% of EBITDA from 2021. In addition, depending on national legislation, Member States have the possibility to adopt measures that are not subject to State aid rules (e.g. changes in the level of taxes, regulated charges, etc.).

The following paragraphs summarize the measures taken to mitigate the effects of high energy prices on the corporate sphere in the V4 and in Germany. Price ceilings, unless otherwise stated, are quoted exclusive of VAT.

Under the scheme referred to in Article 2.1, Slovakia reimburses to the business sector 80% (for small consumers 100%) of the supply price of the commodity multiplied by the difference between the price of supply and EUR 199/MWh (electricity) or EUR 99/MWh (gas). In 2022, this scheme was applied in the two months with the highest spot commodity prices (August and September). In 2023, the scheme is still open from January to November for the eligible period January to September 2023. The notified maximum amount of aid under this scheme is EUR 600 million (0.55% of GDP). The maximum aid per economic unit is in line with the Temporary Crisis

Framework limit of EUR 2 million. In addition, from May 2023 to the end of the year, the state froze the prices of selected regulated charges (system operation tariff, system service tariff and system loss tariff) at the 2022-level for all enterprises. A scheme under paragraph 2.4. for large enterprises was notified for the amount of another EUR 600 million (0.55% of GDP), but no call under this scheme has yet been announced (EC, 2022 [IP/22/7229]; EC, 2023 [IP/23/362]).

Czechia capped prices for electricity supply at CZK 5,000/MWh (EUR 213/MWh) and gas supply at EUR 2,500/MWh (EUR 106/MWh). For small consumers, the state will cover costs above the ceilings in question for 100% of consumption, for other companies for 80% of the highest consumption in the last five years. The limits for the maximum amount of aid per company are set out in Article 2.4 of the Temporary Crisis Framework, under which the EC approved a maximum amount of EUR 1.23 billion (0.44% of GDP) for Czechia. In addition, the state covers the increase in the cost of losses in the transmission and distribution system, which therefore need not be borne by companies. As for fuel prices, the Czech Republic temporarily reduced the excise duty by CZK 1.5 per litre on petrol until September and on diesel until the end of 2023 (EC, 2022 [IP/22/6891]; ČTK, 2022; Energiezamene.cz, 2022; MPaO CR, 2023).

Poland introduced price ceilings for the supply of electricity to small and medium-sized enterprises at PLN 785/MWh (EUR 164/MWh) and a maximum of 90% of historical average consumption. For large industrial companies, Poland notified a scheme under Article 2.4. for EUR 1.1 billion (0.17% of GDP). To protect fuel prices, Poland reduced VAT from 23% to 8% between February and December 2023 (Zalewski, 2023; EC, 2022 [IP/22/7838]).

Hungary has not submitted to the European Commission a notification of any scheme providing non-repayable financial assistance to businesses due to high energy prices. Notified schemes responding to the energy crisis concern only the provision of loans and guarantees to the corporate sphere. To protect fuel prices, Hungary capped petrol and diesel prices at HUF 480/l (around EUR 1.22 / l). This measure was cancelled after one year due to fuel shortages (Than, 2022).

Germany introduced price ceilings for the supply of electricity to customers with annual consumption above 30 MWh at EUR 130/MWh and for the supply of gas to customers with annual consumption above 1500 MWh at EUR 70/MWh. In both cases, this ceiling applies only to 70% of consumption from the previous year. Ceilings for retail electricity and gas prices (including VAT) were set at EUR 400 and EUR 120/MWh, respectively, up to 80% of consumption from the previous year. The limits for the maximum amount of aid per company are set out in Article 2.4 of the Temporary Crisis Framework, under which the EC approved a maximum amount of EUR 49 billion (1.27% of GDP) for Germany. Another condition is that enterprises receiving more than EUR 2 million in aid must maintain at least 90% of their jobs until April 2025. To protect fuel prices, Germany temporarily reduced excise duties on petrol by 30 and 14 cents per litre for three months in 2022.

Data are not yet available to evaluate individual countries' actions in terms of the impact on their cost competitiveness at a time of energy crisis. In addition, aid above EUR 4 million for large companies is conditional on a significant fall in EBITDA, which means that it will affect only a small percentage of companies. As regards price ceilings and the volume of notified aid, Germany has the most generous aid among the benchmark countries. At the tail of the ranking is Hungary, which has not yet applied to the EC for notification of any grant scheme. Among the V4 countries,

Slovakia's notified aid is the largest as a share of GDP, but the aid under Article 2.4 has not yet been triggered. The price ceilings in Slovakia and Czechia are similar. Poland has lower ceilings for electricity (gas is not capped), but the amount of notified aid is significantly lower as a share of GDP compared to Czecha and Slovakia.

6. Conclusion

If we wish to achieve economic growth and catch up with more developed countries, productivity growth is critical. This cannot be expected to accelerate without the implementation of structural reforms. This report has described several areas where structural problems are holding Slovakia back. The production function serves well as a conceptual basis for the resulting findings. It explains the various channels through which the economic growth and competitiveness of the country can be increased. These are productivity (A), labour (L), capital (K) and material inputs (M):

$$\text{Output } Y = f(A, L, K, M)$$

Productivity is no longer accelerated by foreign direct investment, which operated as Slovak developed a more specialised economy focusing on the automotive and electrotechnical industries. Once their impact is exhausted, the focus must be innovation, new technologies and a regulatory and legislative framework that will significantly support innovative enterprises and entrepreneurship. The Slovak business sector has several aspects that hinder productivity growth. The most serious problem is the gap in innovation, technology and digitalisation between companies with domestic and foreign capital. There is a shortage of enterprises in the middle tier, which is associated with higher productivity, especially in digitally demanding sectors, which are dominated by micro-enterprises with low productivity and weak digitalisation. Digitisation is hampered by the way sectors are fragmented into micro and small enterprises. Only five EU countries have less digital intensity in enterprises and just six countries have a lower share of innovators than Slovakia. One of the factors holding back the adoption of new technologies in business is the lack of technical experts and general digital skills in the workforce. This, together with low entrepreneurship in the population, the mix of taxes and social contributions, regulatory burdens and e-government that is hard to use create an unfavourable combination for productivity that hinders the growth of talents and the most productive technologies in Slovakia. Talent actually flows the other way, as Slovakia feeds other ageing European and non-European labour markets.

- The challenge of maintaining productivity growth as the basis for Slovakia's economic convergence is reflected in the Slovak Recovery and Resilience Plan (RRP), which includes plans for structural reforms of institutions and targeted investment in research and innovation. It aims to improve the current weak performance in research and innovation by eliminating fragmented approaches and the lack of cooperation between the public and private sectors. The National Innovation Strategy has defined a new financing system and proposed ways to solve existing problems in research and innovation. An effective way to address digital challenges would be to intensify cooperation with countries in the Central European region. Small businesses need a state-supported digital transformation. Support for the productivity of the entire business sector requires further reductions in administrative and regulatory barriers, more user-friendly and accessible e-government,

less frequent changes in legislation, and revised tax mix that does not discourage entrepreneurship. In times of permanent crisis, the risk of productive companies leaving the market cannot be ignored. Economic policy should support productive companies that can contribute to the digital and green transformations.

The current education system prevents full use of the potential of human capital. After the steepest decline in technical education in any industrial country of the EU in the last decade, the Slovak economy has at its disposal almost the lowest share of young STEM (science, technology, engineering and mathematics) graduates in the EU. Another serious problem is the massive number of university students going abroad and then joining their host country's labour market. The rate of mismatch between field of study and work performed is among the highest in the Union. There is also a mismatch between demand and supply of skills, especially digital skills. Today's workforce lags behind in advanced digital skills, while the future workforce is falling behind in reading and science literacy (even behind the surrounding countries) and its mathematical literacy is also declining. The share of ICT specialists is only half of that of European digital leaders, and local companies do not pay enough attention to ICT training for their employees.

- The solution is to accelerate and complete education reform, increase the performance of universities, make science more efficient, attract and retain talents, in other words, the thorough implementation of the parts of the RRP and the National Innovation Strategy relating to human resources. In addition, it would be beneficial to examine the effectiveness of training programmes for future and start-up entrepreneurs in relation to the survival rate of enterprises in their first years of operation. New foreign direct investments should be oriented towards knowledge-intensive economic activities to support transformation of Slovakia's economic model to a knowledge-based economy. Structural reforms in the area of human capital, including education and training are critical to this change in the economic model. Only if this condition is met can better use of labour increase productivity. This will facilitate the desired change in the economic model, which will be able to compete even in an era of automation and digitalisation, as it will focus more on activities with high added value.

More must be done to generate private investment capital for building an innovative economy. Capital income from investments is overtaxed, there is a shortage of risk capital and the supply of finance to kick-start and support innovation has so far been unstable and unpredictable. Profits that could be used to finance investments, especially in small and medium enterprises, are concentrated in just a few sectors. This limits the ability of investment to boost productivity growth.

- The National Innovation Strategy proposed increasing the inflow of funds into science and research, reforming the super-deduction for research and development, redirecting a part of pension funds to alternative assets and supporting every stage of an innovative project, not only the beginning.

The state of physical infrastructure, which is largely determined by public investments (with substantial support from European sources) and the investments of large, regulated entities, performs better in comparison with the EU. Although Slovakia does not lag behind the surrounding countries in the density of physical transport infrastructure and in indicators such as

the length of roads of the highest quality or operated railway lines, considering the area and population, problems remain in its quality, technical condition and variable distribution.

- Future development and reconstruction of physical infrastructure should focus on minimising the waste of public resources to ensure that the agreed priorities and timetables for investment in road and rail transport are consistently followed. Similarly, better organised planning is needed for other types of public investment in infrastructure, such as in industrial parks. Firstly, focusing on investment projects with the highest social benefits brings benefits to competitiveness by developing physical infrastructure where it is most needed. Secondly, it has benefits for public finances, which can then be used for other priorities in promoting productivity and competitiveness.

Competitiveness in relation to business partners, or from the perspective of promising investors, also depends on material inputs. Cost competitiveness in Slovakia is adversely affected by energy prices. Slovakia has long had the highest business electricity rates in the V4 countries. Not even the introduction of system operation tariff bands has changed this. Likewise, some elements of the retail prices for other types of energy, such as network charges for gas or excise duty on diesel, are also the highest in the region.

- To improve competitiveness in the field of energy costs, it is necessary to examine the factors that affect the level of final electricity prices, or even other energy products. Subsequently, if it makes economic sense, measures can be drawn up to improve the current situation. At the same time, on the expenditure side, compensation for indirect CO_2 costs should be increased, in line with the practice in most EU countries. In terms of environmental impact, there is little sense in making so little use of this compensation scheme given the current state of Envirofond's financial assets, when Slovakia's carbon footprint in electricity production is amongst the lowest in the world. If energy-intensive industries were to relocate abroad, it would probably cause a greater increase in global emissions than if they were to remain in Slovakia.

References

ABT TREUHAND. *Doing Business in Hungary. For Investors: Industrial Parks in Hungary*. [online]. 2023 [Accessed on 2023-05-30]. Available at: https://doing-business-in-hungary.com/eng/for-investors/

AKIS, Elife. Innovation and Competitive Power. *Procedia - Social and Behavioral Sciences* [online]. 2015, 195, 1311-1320 [Accessed on 2023-01-11]. ISSN 18770428. DOI: 10.1016/j.sbspro.2015.06.304. Available at: https://www.sciencedirect.com/science/article/pii/S1877042815037830

ALBU, Nora, Heike JOEBGES and Rudolf ZWIENER. An input–output analysis of unit labour cost developments of the German manufacturing sector since the mid-1990s. *Journal for Labour Market Research* [online]. 2022, 56(1) [Accessed on 2023-02-17]. ISSN 2510-5019. DOI: 10.1186/s12651-022-00306-7. Available at: https://labourmarketresearch.springeropen.com/articles/10.1186/s12651-022-00306-7

ALPER, Alexantra. Exclusive: Russia's attack on Ukraine halts half of the world's neon output for chips. *Reuters* [online]. 2022. [Accessed on 2023-04-05]. Available at: https://www.reuters.com/technology/exclusive-ukraine-halts-half-worlds-neon-output-chips-clouding-outlook-2022-03-11/

ARTAVANIS, Nikolaos T. The Effect of the VAT Rate on Tax Evasion: Evidence from the Restaurant Industry in Greece. *SSRN Electronic Journal* [online]. 2021 [Accessed on 2022-02-04]. DOI: 10.1016/ssrn.2585147. ISSN 1556-5068. Available at: http://www.ssrn.com/abstract=2585147

BALÁŽ, Peter, Andrej Hamara and Gabriela SOPKOVÁ. *Konkurencieschopnosť a jej význam v národnej ekonomike: (zmeny a výzvy v období globálnej finančnej krízy)*. Bratislava: Sprint 2, 2015, 240 pp. [12.88 AH]. Economics. ISBN 978-80-89710-20-1.

BARANOVÁ, Veronika. The Impact of Price-Cost Competitiveness Factors on Economic Growth. Review of Economic Perspectives [online]. 2013, 13(2), 63-76 [Accessed on 2023-02-17]. ISSN 1804-1663. DOI: 10.2478/revecp-2013-0001 Available at: https://content.sciendo.com/doi/10.2478/revecp-2013-0001

BERNANKE, Ben S. Irreversibility, Uncertainty, and Cyclical Investment. *The Quarterly Journal of Economics*[Online]. 1983, 98(1) [Accessed on 2023-01-12]. ISSN 00335533. DOI: 10.2307/1885568. Available at: https://academic.oup.com/qje/article-abstract/98/1/85/1869115?redirectedFrom=fulltext#no-access-message.

BIGHELLI, Tommaso, Filippo DI MAURO, Marc J MELITZ and Matthias MERTENS. European Firm Concentration and Aggregate Productivity. *Journal of the European Economic Association* [online]. 2022 [Accessed on 2023-02-15]. ISSN 1542-4766. DOI: 10.1093/jeea/jvac040. Available at: https://academic.oup.com/jeea/advance-article-abstract/doi/10.1093/jeea/jvac040/6649211?redirectedFrom=fulltext

BIGHELLI, Tommaso, Tibor LALINSKY and CompNet Data Providers. Covid-19 government support and productivity: Micro-based cross-country evidence. *Policy Brief No.14*. 2021. [Accessed on 2022-11-10]. Available at: https://www.comp-net.org/fileadmin/_compnet/user_upload/Policy_Brief_14th_edition_Bighelli_Lalinsky_Covid_support_and_productivity_Micro_based_evidence.pdf

BOUDIER-BENSEBAA, Fabienne. FDI-assisted development in the light of the investment development path paradigm: Evidence from Central and Eastern European countries. *Transnational Corporations* [online]. 2008, 17(1), 37 – 67 [Accessed on 2022-11-03]. ISSN 1014-9562. Available at: https://digitallibrary.un.org/record/634814/files/iteiit20081_en.pdf

BUKOVINA, Jaroslav, Marek POOR, Rastislav GÁBIK and Lucia ŠRAMKOVÁ. Nikdy ich všetky neskontroluješ, ale máš sa snažiť. *15/2020 Ekonomický komentár Inštitútu finančnej politiky MF SR* [online]. Bratislava, 2020, 7 pp. [Accessed on 2023-01-25]. Available at: https://www.mfsr.sk/files/archiv/24/Komentar_gap_bottom-up.pdf

CAMARERO, Mariam, Antonia LÓPEZ-VILLAVICENCIO and Cecillio TAMARIT. Globalisation and unemployment in the EU: new insights on the role of global value chains and workforce composition. *Single Market Economics Papers* [online]. Luxembourg, 2022, 37 pp. [Accessed on 2023-02-15]. ISSN 2529-332X. DOI: 10.2873/147718. Available at: https://single-market-economy.ec.europa.eu/publications/globalisation-and-unemployment-eu-new-insights-role-global-value-chains-and-workforce-composition_en

CEDZOVÁ, Natália et al. Report on Productivity and Competitiveness of the Slovak Republic 2020. *Institute for Strategy and Analysis of the Government Office of the Slovak Republic* [online]. 2021, 108 pp. [Accessed on 2023-01-12]. Available at: https://www.vlada.gov.sk/share/uvsr/isa/npr-sr/23082021_Report_on_Productivity_and_Competitiveness_2020_FINAL.pdf

CRIF – Slovak Credit Bureau. Superodpočet výdavkov na výskum a vývoj 2021: konečné výsledky. [online]. 2023. [Accessed on 2023-03-23]. Available at: https://www.crif.sk//media/406100/analyza_superodpocet_2021.pdf

CZECHINVEST. *Průmyslové Zony. Definice pojmu „průmyslová zóna" a jejich vývoj v ČR. Průmyslové Zony v České republice.* [online]. 2023 [Accessed on 2023-05-09]. Available at: https://www.prumyslove-zony.cz/blog/prumyslove-zony-53

ČTK. Vláda schválila strop na ceny energií i pro velké firmy. *Novinky.cz* [online]. 2022. Available at: https://www.novinky.cz/clanek/ekonomika-strop-cen-pro-velke-firmy-40417443

Dealroom. Number of unicorns [online]. 2022. [Accessed on 2022-11-11]. Available at: https://dealroom.co

DEVEREUX, Michael P. and Rachel GRIFFITH. Evaluating Tax Policy for Location Decisions *International Tax and Public Finance* [online]. 2003, 10(2), 107-126 [Accessed on 2023-01-25]. ISSN 09275940. DOI: 10.1023/A:1023364421914. Available at: https://link.springer.com/article/10.1023/A:1023364421914

DJOKOTO, Justice Gameli. The investment development path theory and small states. *Research in Globalization* [online]. 2021, 3 [Accessed on 2022-10-26]. DOI: 10.1016/j.resglo.2021.100048. ISSN 2590051X. Available at: https://linkinghub.elsevier.com/retrieve/pii/S2590051X21000137

DUDÁŠ, Tomáš. Rozvojové teórie priamych zahraničných investícií. *Medzinárodné vzťahy: vedecký časopis pre medzinárodné politické, ekonomické, kultúrne a právne vzťahy*. Bratislava: Faculty of International Relations, University of Economics, 2005, 3(2), 91-97. ISSN 1336-1562. Available at: https://fmv.euba.sk/RePEc/brv/journl/MV2005-2.pdf

DUJAVA, Daniel and Branislav ŽÚDEL. O parite. *6/2020 Komentár Inštitútu finančnej politiky MF SR* [online]. 2020 [Accessed on 2023-03-27]. Available at: https://www.mfsr.sk/files/archiv/44/ppp_final_web.pdf

DUJAVA, Daniel and Vladimír PECIAR. Trh práce v karanténe: The impact of the coronavirus crisis on the labour market in Slovakia. *10/2020 Ekonomický komentár Inštitútu pre finančnú politiku MF SR* [online]. 2020 [Accessed on 2023-01-05]. Available at: https://www.mfsr.sk/files/archiv/4/Trhpracevkarantene.pdf

DUNNING, JOHN H. *The Determinants of International Production*. *Oxford Economic Papers* [online]. 1973, 1973-11-01, 25(3), 289-336 [Accessed on 2023-08-25]. ISSN 1464-3812. DOI: 10.1093/oxfordjournals.oep.a041261

DUSPIVOVÁ, Kateřina. Labour Productivity and Remuneration in a Dual Economy: The Role of Foreign Investment in the Czech Republic. Politická ekonomie [online]. 2019, 67(5), 511-529 [Accessed on 2023-02-17]. ISSN 00323233. DOI: 10.18267/j.polek.1254. Available at: http://polek.vse.cz/doi/10.18267/j.polek.1254.html

DUSTMANN, Christian, Bernd FITZENBERGER, Uta SCHÖNBERG and Alexandra SPITZ-OENER. From Sick Man of Europe to Economic Superstar: Germany's Resurgent Economy. *Journal of Economic Perspectives* [online]. 2014, 28(1), 167-188 [Accessed on 2023-02-17]. ISSN 0895-3309. DOI: 10.1257/jep.28.1.167 Dostupné na internete: https://pubs.aeaweb.org/doi/10.1257/jep.28.1.167

European Patent Office, European Union Intellectual Property Office. IPR-intensive industries and economic performance in the European Union *Spoločný projekt*. [online]. 2022. [Accessed on 2022-11-21]. Available at: https://documents.epo.org/projects/babylon/eponet.nsf/0/33DCE530D888258BC12588D7004539D1/$File/ipr-intensive_industries_and_economic_performance_in_the_EU_2022_en.pdf

European Commission European Innovation Scoreboard 2022. [Accessed on 2023-01-13]. Available at: https://ec.europa.eu/assets/rtd/eis/2022/ec_rtd_eis-country-profile-sk.pdf

EUROPEAN COMMISSION, DIRECTORATE-GENERAL FOR TAXATION AND CUSTOMS UNION. *Taxation Trends in the European Union: data for the EU Member States, Iceland, Norway: 2022 edition*. Luxembourg: Publications Office of the European Union, 2022. ISBN 978-92-76-49152-1. DOI 10.2778/417176. Available at: https://data.europa.eu/doi/10.2778/417176

European Commission Press release [IP/22/6891] [online]. 2022. Available at: https://ec.europa.eu/commission/presscorner/detail/en/ip_22_6891

European Commission Press release [IP/22/7229] [online]. 2022. Available at: https://ec.europa.eu/commission/presscorner/detail/en/ip_22_7229

European Commission Press release [IP/22/7838] [online]. 2022. Available at: https://ec.europa.eu/commission/presscorner/detail/en/ip_22_7838

European Commission Press release [IP/23/362] [online]. 2023. Available at: https://ec.europa.eu/commission/presscorner/detail/en/IP_23_362

ENERGIEZAMENE.CZ. *Opatření na pomoc domácnostem a firmám* [online]. 2022. Available at: https://www.energiezamene.cz/opatreni-na-pomoc-domacnostem-a-firmam

ENERGOKLUB. *Názor: Aké sú možnosti diverzifikácie zdrojov a trás dodávok zemného plynu pre Slovensko?* [online]. 2022 [Accessed on 2023-03-10]. Available at: https://energoklub.sk/sk/clanky/nazor-ake-su-moznosti-diverzifikacie-zdrojov-a-tras-dodavok-zemneho-plynu-pre-slovensko

ENTSOE. *European Power System 2040 Completing the map: System Needs Analysis, part of ENTSO-E's 2025, 2030, 2040 Network Development Plan 2018* [online]. 2019. Available at: https://eepublicdownloads.entsoe.eu/clean-documents/tyndp-documents/TYNDP2018/european_power_system_2040.pdf)

ERCST. *European Roundtable on Climate Change and Sustainable Transition* [online]. 2023. Available at: https://ercst.org/category/eu-ets/

EURELECTRIC. *Power Distribution in Europe Facts & Figures* [online]. Available at: https://cdn.eurelectric.org/media/1835/dso_report-web_final-2013-030-0764-01-e-h-D66B0486.pdf)

EUR-LEX. Regulation 2018/410 of the European Parliament and of the Council [online]. 2018. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L0410

EUROPEAN CUSTOMS PORTAL. *Definition: Property income attributed to insurance policy holders* [online]. 2019 [Accessed on 2023-03-10]. Available at: https://www.tariffnumber.com/info/abbreviations/6072

EUROPEAN COMMISSION - EUROSTAT. *European system of accounts — ESA 2010* [online]. 2013 [Accessed on 2023-02-17]. Available at: https://ec.europa.eu/eurostat/documents/3859598/5925693/KS-02-13-269-EN.PDF/44cd9d01-bc64-40e5-bd40-d17df0c69334

EUROPEAN COMMISSION *Data on taxation* [online]. 2023. [Accessed on 2023-03-03]. Available at: https://taxation-customs.ec.europa.eu/taxation-1/economic-analysis-taxation/data-taxation_en

EUROPEAN COMMISSION *Digital Economy and Society Index (DESI) 2022.* [online]. 2022. [Accessed on 2023-05-16]. Available at: https://digital-strategy.ec.europa.eu/en/library/digital-economy-and-society-index-desi-2022

EUROSTAT. *Compensation of employees [TEC00013]* [online]. 2023 [Accessed on 2023-03-17]. Available at: https://ec.europa.eu/eurostat/databrowser/view/tec00013/default/table?lang=en

EUROSTAT. *Compensation per employee and hours worked per employed person by nuts 2 regions and by industry [NAMA_10R_2LP10]* [online]. 2023 [Accessed on 2023-03-15]. Available at: https://ec.europa.eu/eurostat/databrowser/view/NAMA_10R_2LP10/default/table?lang=en&category=na10.nama10.nama_10_prod.nama_10r_lp

EUROSTAT. *EU direct investment positions, breakdown by country and economic activity (BPM6) [BOP_FDI6_POS]* [online]. 2022 [Accessed on 2022-10-20]. Available at: https://ec.europa.eu/eurostat/databrowser/view/BOP_FDI6_POS/default/table?lang=en

EUROSTAT. *EU direct investment positions, breakdown by country and economic activity (BPM6) [BOP_FDI6_POS]* [online]. 2023 [Accessed on 2022-08-14]. Available at: https://ec.europa.eu/eurostat/databrowser/view/BOP_FDI6_POS/default/table?lang=en

EUROSTAT. *GDP and main components (output, expenditure and income) [NAMA_10_GDP__custom_3640399]* [online]. 2022 [Accessed on 2022-10-20]. Available at https://ec.europa.eu/eurostat/databrowser/view/NAMA_10_GDP__custom_3640399/default/table?lang=en

EUROSTAT. *GDP and main components (output, expenditure and income) [NAMA_10_GDP]* [online]. 2023. [Accessed on 2023-03-10; 2023-08-14] Available at: https://ec.europa.eu/eurostat/databrowser/product/view/NAMA_10_GDP

EUROSTAT. *Labour productivity and unit labour costs [NAMA_10_LP_ULC]* [online]. 2023 [Accessed on 2023-03-10]. Available at: https://ec.europa.eu/eurostat/databrowser/product/view/NAMA_10_LP_ULC

EUROSTAT. *Gross value added and income by A*10 industry breakdowns [NAMA_10_A10]* [online]. 2023 [Accessed on 2023-08-31]. Available at: https://ec.europa.eu/eurostat/databrowser/product/page/NAMA_10_A10__custom_7250163

FRED. *U.S. Dollars to Euro Spot Exchange Rate* [online]. 2023 [Accessed on 2023-01-05]. Available at: https://fred.stlouisfed.org/series/DEXUSEU#0

FRED. *U.S. Dollars to Euro Spot Exchange Rate, annual, average* [online]. 2022 [Accessed on 2022-09-07]. Available at: https://fred.stlouisfed.org/series/DEXUSEU#0

FERENČÍKOVÁ, Soňa and Martina FIFEKOVÁ. Efekty „spillovers" z pôsobenia zahraničných firiem na Slovensku. *Ekonomický Časopis 56(9):855-872.* Bratislava, 2008 [Accessed on 2022-10-10]. Available at:https://www.researchgate.net/publication/289958447_Foreign_Direct_Investment_Spillovers_in_Slovakia

Finstat. *Najväčší platcovia dane z príjmu právnických osôb za rok 2021. Staršie online štatistiky* [Accessed on 2022-11-07]. Available at: https://finstat.sk/analyzy/najvacsi-platcovia-dane-2021

Fund for Peace. Fragile States Index. [online]. 2022. [Accessed on 2022-12-19]. Available at: https://fragilestatesindex.org/indicators/e3/

GÁBIK, Rastislav. Slovensko by malo zvýšiť podiel „dobrých" daní. *24/2011 Ekonomický komentár Inštitútu finančnej politiky MF SR* [online]. Bratislava, 2011, 6 pp. [Accessed on 2023-01-25]. Available at: https://www.mfsr.sk/files/sk/media/tlacove-spravy/slovensko-malo-zvysit-podiel-dobrych-dani/2011_24_Taxation_trends_2011_final.pdf

GDDKIA. *Podsumowanie 2021 roku.* [online]. 2021. [Accessed on 2023-05-16]. Available at: https://www.gov.pl/web/gddkia/podsumowanie-2021-roku

GEM *Entrepreneurial Behaviour and Attitudes* [online]. 2022a [Accessed on 21/09/2022–31/12/2014]. Available at: https://www.gemconsortium.org/data/key-aps

GEM *Entrepreneurial Framework Conditions* [online]. 2022b [Accessed on 21/09/2022–31/12/2014]. Available at: https://www.gemconsortium.org/data/key-nes

GETSIX. *Tax benefits from business activities within the Special Economic Zone (SEZ).* [online]. 2023 [Accessed on 2023-05-10]. Available at: https://getsix.eu/resources/doing-business-in-poland/special-economic-zones-sezs/

GIE AGSI. *Aggregated Gas Storage Inventory* [online]. Available at: https://agsi.gie.eu/

GIORNO, Claude. Increasing the benefits of Slovakia's integration in global value chains. Economics department working papers No. 1552. Paris, 2019. [Accessed on 2022-10-10]. Available online: https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ECO/WKP(2019)21&docLanguage=En

GRIMM, Veronika et al. Siebtes Kapitel: Wettbewerbsfähigkeit in Zeiten geopolitischer Veränderungen In *Energiekrise solidarisch bewältigen, neue Realität gestalten: Jahresgutachten 22/23* [online]. Paderborn: Bonifatius GmbH Druck-Buch-Verlag, 2022 [Accessed on 2023-01-18]. ISBN: 978-3-8246-1093-8. Available at: https://www.sachverstaendigenrat-wirtschaft.de/fileadmin/dateiablage/gutachten/jg202223/JG202223_Gesamtausgabe.pdf. Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung

GULEN, Huseyin and Mihai ION. Policy Uncertainty and Corporate Investment. *Review of Financial Studies* [online]. 2016 [Accessed on 2023-01-12]. ISSN 0893-9454. DOI: 10.1093/rfs/hhv050. Available at: https://academic.oup.com/rfs/article/29/3/523/1887688.

HABRMAN, Michal, Ľuba HABODÁSZOVÁ and Lucia ŠRÁMKOVÁ. Reformný kompas slovenskej ekonomiky. *59/2022 Ekonomická analýza Inštitútu finančnej politiky MF SR* [online]. Bratislava, 2022, 68 pp. [Accessed on 2022-11-30]. Available at: https://www.mfsr.sk/sk/financie/institut-financnej-politiky/publikacie-ifp/ekonomicke-analyzy/59-reformny-kompas-slovenskej-ekonomiky.html

HÁJEK, Ladislav. Estonian Tax System Analysis. In. *Hradec Economic Days: Double-blind peer-reviewed proceedings of the International Scientific Conference Hradec Economic Days 2017* [online]. 7. 2017, 2017, p. 255-262 [Accessed on 2023-03-31]. ISBN 978-80-7435-664-3. ISSN 2464-6067. Available at: https://uni.uhk.cz/hed/site/assets/files/1046/proceedings_2017_1.pdf

HALUŠ, Martin, Vladimír PECIAR, Jaroslav BUKOVINA et al. Revízia výdavkov na dotácie: Záverečná správa. *Value for Money Unit and Institute of Financial Policy of the Ministry of Finance of the Slovak Republic* [online]. 2023, 198 pp. [Accessed on 2023-03-22]. Available at: https://www.mfsr.sk/files/archiv/32/Zaverecna_dotacie_230228_zverejnenie.pdf

HAUSMANN, Ricardo et al. *The Atlas of Economic Complexity: Mapping Paths to Prosperity 2nd ed.* Cambridge: MIT Press, 2013, 71 pp. ISBN 978-0-262-52542-8. Available at: http://www.tinyurl.com/y67m6n72

HEALY CONSULTANTS. *Poland Special Economic Zones in 2023*. [online]. 2023 [Accessed on 2023-05-12]. Available at: https://www.healyconsultants.com/poland-company-registration/special-economic-zones/

HIDAS, Slavomír, Katarína VAĽKOVÁ, MACHLICA, Gabriel and Andrej BELÁK. Vplyv pandémie na marginalizované rómske komunity. *2022/1 Komentár Útvaru hodnoty za peniaze a Inštitútu finančnej politiky MF SR* [online]. Bratislava, 2022, 11 pp. [Accessed on 2023-05-23]. Available at: https://www.mfsr.sk/files/archiv/80/2022_1_Vplyv-pandemie-na-MRK_final.pdf

HLAVÁČ, Marek. Dobieha slovenské HDP na obyvateľa v parite kúpnej sily bohatšie krajiny EÚ? Diagnóza nepriaznivého vývoja oficiálnych štatistík 2010 – 2022. *Institute of Social Policy of the Ministry of Labour, Social Affairs and Family of the Slovak Republic*. Bratislava, 2023 [Accessed on 2023-28-09].

CENTRAL MINING OFFICE. *Správa o činnosti Hlavného banského úradu a obvodných banských úradov Slovenskej republiky* [online]. 2022. Available at: https://www.hbu.sk/files/documents/spravy/2022/hbu_rocna-sprava_2022.pdf

HORŇÁK Matej, Mária VALACHYOVÁ. 30 rokov samostatnosti Slovenska. 2022 [Accessed on 2022-02-09]. Available at: https://www.erstegroup.com/en/home

ILD. *ILD.ORG. De Soto Recognized By The World Bank In The 2017 Doing Business Report* [online]. 2017 [Accessed on 2019-09-30]. Available at: https://www.ild.org.pe/ild-in-the-news/174-2015/1176-de-soto-recognized-by-the-world-bank-in-the-2017-doing-business-report

ILO. *Description of Labour Productivity* [online]. 2021 [Accessed on 2021-05-21]. Available at: https://ilostat.ilo.org/resources/concepts-and-definitions/description-labour-productivity/

IMD. *IMD World Competitiveness Booklet* [online]. 2022 [Accessed on 2022-09-21]. Available at: https://www.imd.org/centers/world-competitiveness-center/rankings/world-competitiveness/

IMF. *Balance of Payments and International Investment Position Manual: Sixth Edition (BPM6)* [online]. 2009 [Accessed on 2023-01-05]. ISBN 978-1-58906-812-4. Available at: https://www.imf.org/external/pubs/ft/bop/2007/pdf/bpm6.pdf

IMF. *Slovak Republic: 2022 Article IV Consultation-Press Release; and Staff Report: June 2022* [online]. 2022a [Accessed on 2022-12-01]. Available at: https://www.imf.org/en/Publications/CR/Issues/2022/06/29/Slovak-Republic-2022-Article-IV-Consultation-Press-Release-and-Staff-Report-520147

IMF. *Table 4-i: Inward Direct Investment Position as Reported by All Reporting Economies by End-Year* [online]. 2022c. [Accessed on 2022-10-20]. Available at: https://www.imf.org/external/datamapper/NGDPD@WEO/WEOWORLD

IMF. *World Economic Outlook: GDP, current prices, Billions of U.S. dollars* [online]. 2022b. [Accessed on 2022-10-20]. Available at: https://data.imf.org/regular.aspx?key=60564263

INPARK. *NIPÜF Nemzeti Ipari Park Üzemeltető és Fejlesztő. Projects*. [online]. 2023 [Accessed on 2023-04-29]. Available at: https://inpark.hu/projects/

KAUFMANN, Daniel, Aart KRAAY and Massimo MASTRUZZI. *The Worldwide Governance Indicators: Methodology and Analytical Issues* [World Bank Policy Research Working Paper No. 5430]. World Bank, 2010. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1682130

KÄSTIK, Toomas. The Impact of Digital Governance on the Business Environment. In. *Proceedings of the 12th International Conference on Theory and Practice of Electronic Governance* [online]. New York, NY, USA: ACM, 2019, 2019-04-03, p. 472-474 [Accessed on 2023-03-03]. ISBN 9781450366441. DOI: 10.1145/3326365.3326430. Available at: https://dl.acm.org/doi/10.1145/3326365.3326430

KORDALSKA, Aleksandra and Magdalena OLCZYK. Upgrading low value-added activities in global value chains: a functional specialisation approach. *Economic Systems Research* [online]. 2020, 1-27 [Accessed on 2022-11-28]. DOI: 10.1080/09535314.2022.2047011. ISSN 0953-5314. Available at: https://www.tandfonline.com/doi/full/10.1080/09535314.2022.2047011

KORDALSKA, Aleksandra and Magdalena OLCZYK. *Determinants of Functional Specialisation in EU Countries* [Working Paper 228]. The Vienna Institute for International Economic Studies, 2023. Available at: https://wiiw.ac.at/determinants-of-functional-specialisation-in-eu-countries-dlp-6558.pdf

KOŠTA, Ján, Gabriela DOVÁĽOVÁ, Boris HOŠOFF, Martin HUDCOVSKÝ, Karol MORVAY and Jaroslav VOKOUN. Analýza produktivity práce, spôsobov jej výpočtu na národnej úrovni, porovnanie s krajinami EÚ v nadväznosti na mzdovú úroveň (minimálnu mzdu a priemernú mzdu) krajiny. KOZ [online]. 2020, 1-27 [Accessed on 2021-12-12]. Available at: https://www.kozsr.sk/wp-content/uploads/2021/02/AV11-Analyza-produktivity-prace-minimalna-priemerna-mzda.pdf

KRAJČÍR, Zdenko, and Rastislav GÁBIK. Tax trends in EU countries 200-2007. *14/2009 Ekonomický komentár Inštitútu finančnej politiky MF SR* [online]. Bratislava, 2009, 5 pp. [Accessed on 2023-01-25]. Available at: https://www.mfsr.sk/files/archiv/priloha-stranky/4792/17/2009_14_Danove_trendy_EU_2000-2007.pdf

KRUGMAN, Paul. Competitiveness: A Dangerous Obsession. *Foreign Affairs*. 1994, 73(2). DOI: 10.2307/20045917. Available at: https://www.pauldeng.com/teaching/intecon/Krugman%20competiveness%20a%20dangerous%20obsession.pdf

LIPSKÁ, Elena, Milada VLNKOVÁ and Ivana MACKOVÁ. Jednotkové náklady práce. *BIATEC: odborný bankový časopis. Bratislava: Národná banka Slovenska*, 2005, 13(2), 8-12. ISSN 1335-0900. Available at: https://sekarl.euba.sk/arl-eu/sk/csg/?repo=eurepo&key=24342878504

MAGYAR KÖZÚT. *Országos közúthálózat hossza 2005-2022.* [online]. 2022. [Accessed on 2023-05-16]. Available at: https://www.kozut.hu/download/orszagos-kozuthalozat-hossza-2005-2021/

MARCINIAK, Tomasz, Jurica NOVAK, Marcin PURTA. Central and Eastern Europe needs a new engine for growth. *McKinsey & Company*. 2018. [Accessed on 2023-01-11]. Available at: https://www.mckinsey.com/featured-insights/europe/central-and-eastern-europe-needs-a-new-engine-for-growth

MARCINIAK Tomasz, Jurica NOVAK, Boris PASTUSIAK and Marcin PURTA. Digital Challenges in the next normal in Central and Eastern Europe. 2020. [Accessed on 2023-02-09]. Available at: https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/digital-challengers-in-the-next-normal-in-central-and-eastern-europe

MARTINÁK Dávid, Samo VARSIK. Odliv mozgov I: Necestuj tým vlakom! 2020. [Accessed on 2022-11-10]. Available at: https://www.minedu.sk/data/att/18017.pdf. *Institute of Educational Policy. Ministry of Education, Science, Research and Sport of the Slovak Republic.* Komentár 03/2020.

McKINSEY GERMANY. Energy: A key to competitive advantage, 2009. [Accessed on 2023-09-23]. Available at:

https://www.mckinsey.com/~/media/mckinsey/dotcom/client_service/sustainability/pdfs/energy_competitive_advantage_in_germany.ashx

MINSTRY OF ECONOMY *Správa o výsledkoch monitorovania bezpečnosti dodávok elektriny za rok 2021* [online]. 2022a. Available at: https://www.mhsr.sk/energetika/energeticka-politika/sprava-o-vysledkoch-monitorovania-bezpecnosti-dodavok

MINSTRY OF ECONOMY *Správa o výsledkoch monitorovania bezpečnosti dodávok plynu* [online]. 2022b. Available at: https://www.economy.gov.sk/uploads/files/7saJ6QH4.pdf?csrt=12493515898023916380

MIKLOŠ, Martin. Čo ste možno ešte nepočuli o raste zdanenia miezd. *15/2021 Ekonomický komentár Inštitútu finančnej politiky MF SR* [online]. Bratislava, 2021a, 8 pp. [Accessed on 2023-01-25]. Available at: https://www.mfsr.sk/files/archiv/33/2021_15_Fiscal_drag_final.pdf

MIKLOŠ, Martin. The Elasticity of Taxable Income in Slovakia. *55/2021 Ekonomická analýza Inštitútu finančne politiky MF SR* [online]. Bratislava, 2021b, 31 pp. [Accessed on 2023-01-25]. Working Paper, 55. Available at: https://www.mfsr.sk/files/archiv/82/ETI_paper_draft_v6.pdf

MINISTRY OF TRANSPORT AND CONSTRUCTION OF THE SLOVAK REPUBLIC *Harmonogram prípravy a výstavby projektov cestnej infraštruktúry.* [online]. 2021. [Accessed on 2023-05-16]. Available at: https://rokovania.gov.sk/RVL/Material/26964/1

MINISTRY OF TRANSPORT OF THE CZECH REPUBLIC. *Ročenka dopravy České republiky 2021.* [online]. 2021. [Accessed on 2023-05-16]. Available at: https://www.sydos.cz/cs/rocenka_pdf/Rocenka_dopravy_2021.pdf

MINISTRY OF INDUSTRY AND TRADE OF THE CZECH REPUBLIC. *Důvodová zpráva*. 36pp. [online]. 2017. [Accessed on 2023-05-23]. Available at: https://www.vlada.cz/assets/urad-vlady/poskytovani-informaci/poskytnute-informace-na-zadost/Priloha_2_Duvodova_zprava.pdf

MNB *Quarterly time series Excluding Special Purpose Entities Components of flows and stocks of Foreign Direct Investments in Euros* [online]. 2023a. [Accessed on 2023-01-05]. Available at: https://www.mnb.hu/letoltes/fdiaggreuren.xlsx

MNB FDI flows; FDI closing position [online]. 2023b. [Accessed on 2023-08-14]. Available at: https://statisztika.mnb.hu/statistical-topics/balance-of-payments-and-related-statistics/foreign-direct-investments/fdi-flows; https://statisztika.mnb.hu/statistical-topics/balance-of-payments-and-rlated-statistics/foreign-direct-investments/fdi-closing-positions

MONTVAI, Beata. FDI statistics excluding special purpose entities, capital-in-transit and financial restructuring – Hungarian practice. In. *BCB / CEMLA / IFC Satellite meeting at the ISI 60th World Statistical Congress "Assessing international capital flows after the crisis"* [online]. 2015, 28 pp. [Accessed on 2023-01-05]. Available at: https://www.bis.org/ifc/publ/ifcb42_h.pdf

MORVAY, Karol. *Ekonomické recesie na Slovensku: dramatické momenty aj blikajúce kontrolky nových príležitostí*. Bratislava: EKONÓM, 2022, 100 pp. ISBN 978-80-225-5022-2. Available at: https://nhf.euba.sk/katedry/katedra-hospodarskej-politiky/oznamy/1861-ekonomicke-recesie-na-slovensku

MINISTRY OF INDUSTRY AND TRADE OF THE CZECH REPUBLIC. *ČEPS získá dotaci na ztráty energie v přenosové soustavě a na zajištění systémových služeb* [online]. 2023. Available at:

https://www.mpo.cz/cz/rozcestnik/pro-media/tiskove-zpravy/ceps-ziska-dotaci-na-ztraty-energie-v-prenosove-soustave-a-na-zajisteni-systemovych-sluzeb--272691/

MINISTRY OF LABOUR, SOCIAL AFFAIRS AND FAMILY OF THE SLOVAK REPUBLIC *Trh práce v minulom roku na maxime* [online]. 2020. [Accessed on 2023-05-30]. Available at: https://www.employment.gov.sk/sk/informacie-media/aktuality/trh-prace-minulom-roku-maxime.html

NARULA, Rajneesh and Irina JORMANAINEN. When a good science base is not enough to create competitive industries: Lock-in and inertia in Russian systems of innovation. *MERIT Working Papers from United Nations University No 2008-059*. [Working Paper Series]. *Maastricht Economic and Social Research Institute on Innovation and Technology (MERIT)*, 2010, Available at: https://www.merit.unu.edu/publications/wppdf/2008/wp2008-059.pdf

NARULA, Rajneesh, and John H. DUNNING. Multinational Enterprises, Development and Globalization: Some Clarifications and a Research Agenda. *Oxford Development Studies* [Online]. 2010, 38(3), 263-287 [Accessed on 2022-11-03]. DOI: 10.1080/13600818.2010.505684. ISSN 1360-0818. Available at: http://www.tandfonline.com/doi/abs/10.1080/13600818.2010.505684

NARULA, Rajneesh and José GUIMÓN. The investment development path in a globalised world: implications for Eastern Europe. *Eastern Journal of European Studies* [Online]. 2010, 1(2), 5-19 [Accessed on 2022-11-28]. ISSN 2068-6633. Available at: https://www.researchgate.net/publication/49599033_The_Investment_Development_Path_in_a_Globalised_World_Implications_for_Eastern_Europe

NBS. *Priame zahraničné investície* [online]. 2022a [Accessed on 2022-06-15 and 2022-10-22]. Available at: https://nbs.sk/statisticke-udaje/statistika-platobnej-bilancie/priame-zahranicne-investicie/

NBS. *Priame zahraničné investície* [online]. 2023a. [Accessed on 2023-08-02]. Available at: https://nbs.sk/statisticke-udaje/statistika-platobnej-bilancie/priame-zahranicne-investicie/

NBS. *Foreign indebtedness* [online]. 2023b. [Accessed on 2023-08-02]. Available at: https://nbs.sk/statisticke-udaje/statistika-platobnej-bilancie/zahranicna-zadlzenost/

NBS. *Financial stability report, May 2022.* [Accessed on 2022-10-10]. Available at: https://nbs.sk/publikacie/sprava-o-financnej-stabilite/sprava-o-financnej-stabilite-maj-2022/

NBS. *Zahraničná zadlženosť* [online]. 2022b [Accessed on 2022-06-15]. Available at: https://nbs.sk/statisticke-udaje/statistika-platobnej-bilancie/zahranicna-zadlzenost/

NURKHOLIS, Nurkholis, Muh DULARIF, Ni Wayan RUSTIARINI a Collins G. NTIM. Tax evasion and service-trust paradigm: A meta-analysis. *Cogent Business & Management* [online]. 2020, 7(1) [Accessed on 2023-02-15]. ISSN 2331-1975. DOI: 10.1080/23311975.2020.1827699. Available at: https://www.tandfonline.com/doi/full/10.1080/23311975.2020.1827699

OECD. *Economic Survey of the Slovak Republic (January 2022): Executive Summary* [online]. 2022a [Accessed on 2022-11-30]. Available at: https://issuu.com/oecd.publishing/docs/slovak-republic-oecd-economic-outlook-projection-n

OECD. *Economic Survey of the Slovak Republic (2019)* [online]. 2019 [Accessed on 2022-12-11]. Available at: https://doi.org/10.1787/78ef10f8-en

OECD. *Indicators of Product Market Regulation: Economy-wide PMR* Indicators [online]. 2022 [Accessed on 2022-10-05]. Available at: https://www.oecd.org/economy/reform/indicators-of-product-market-regulation/

OECD. *OECD Compendium of Productivity Indicators 2021, OECD Publishing, Paris. [*Accessed on 2022-09-22]. Available at: https://doi.org/10.1787/f25cdb25-en

OECD. *OECD Compendium of Productivity Indicators 2018, OECD Publishing, Paris.* [Accessed on 2022-09-22]. Available at: https://doi.org/10.1787/pdtvy-2018-en

OECD. *Productivity and the COVID-19 pandemic.* in *OECD Compendium of Productivity Indicators 2021*, OECD Publishing, Paris. [Accessed on 2022-11-10]. Available at: https://doi.org/10.1787/495e70d8-en

OECD. *Strengthening FDI and SME Linkages in the Slovak Republic, OECD Publishing, Paris.* [Accessed on 2022-12-30]. Available at: https://doi.org/10.1787/972046f5-en

OECD. *OECD Economic Surveys: SLOVAK REPUBLIC 2019.* Paris: OECD Publishing Paris, pp. 153-154, 2019 [Accessed on 2023-09-07]. ISBN 978-92-64-31135-0

OECD. *Pension Markets in Focus 2020*. [online]. 2020. [Accessed on 2022-12-15]. Available at: https://www.oecd.org/finance/pensionmarketsinfocus.htm

OECD. *PRODUCT MARKET REGULATION: A detailed explanation of the Methodology used to build the OECD PMR Indicators* [online]. 2020 [Accessed on 2022-11-24]. Available at: https://www.oecd.org/economy/reform/A%20detailed%20explanation%20of%20the%20methodology%20used%20to%20build%20the%20OECD%20PMR%20indicators_FINAL.pdf

OECD. *Slovak Republic projection note OECD Economic Outlook November 2022* [online]. 2022b [Accessed on 2022-11-30]. Available at: https://issuu.com/oecd.publishing/docs/slovak-republic-oecd-economic-outlook-projection-n

OECD. *Trade in Value Added (TiVA) 2021 ed: Principal Indicators* [online]. 2021 [Accessed on 2022-11-30]. Available at: https://stats.oecd.org/Index.aspx?DataSetCode=TIVA_2021_C1

PAŠEK, Peter. Estónsky model zdanenia je na Slovensku v nedohľadne. *Trend.sk* [online]. 2021 [Accessed on 2023-03-31]. Available at: https://www.trend.sk/financie/estonsky-model-zdanenia-je-slovensku-nedohladne

PECIAR, Vladimír, Peter WITTEMANN. O firmách a ľuďoch: Determinanty produktivity a efektívnej alokácie zdrojov medzi slovenskými firmami. *14/2019 Ekonomický komentár Inštitútu finančne politiky MF SR* [online]. Bratislava, 2019, 13 pp. [Accessed on 2023-01-11]. Available at: https://www.mfsr.sk/files/archiv/94/Ofirmachaludoch.pdf

PIAAC. National report PIAAC Slovakia 2013. Survey of Adult Skills (PIAAC). https://www.oecd.org/skills/piaac/Slovakia_in%20English.pdf

PILKOVÁ, Anna, Marian HOLIENKA, Zuzana KOVAČIČOVÁ, Juraj MIKUŠ and Ján REHÁK. *Podnikanie na Slovensku: potenciálu chýba talent* [online]. Bratislava: Comenius University in Bratislava, Faculty of Management and GEM Slovakia 2019, 178 pp, 2020 [Accessed on 2022-12-07]. ISBN 978-80-223-5067. Available at: https://www.gemconsortium.org/report

PISA. Programme for International Student Assessment. [online]. 2018 [Accessed on 2023-02-10]. Available at: https://www.oecd.org/pisa/data/2018database/

PORTER, Michael E. The Competitive Advantage of Nations. *Harward Business Review*. New York: Free Press, 1990. Available at: http://www.economie.ens.fr/IMG/pdf/porter_1990_-_the_competitive_advantage_of_nations.pdf

EU COUNCIL. *Council Recommendation of 12 July 2022 on the 2022 National Reform Programme of Slovakia and delivering a Council opinion on the 2022 Stability Programme of Slovakia* [online]. 2022 [Accessed on 2022-12-01]. Available at: https://data.consilium.europa.eu/doc/document/ST-9773-2022-INIT/sk/pdf

RUŽEKOVÁ, Viera, Zuzana KITTOVÁ and Dušan STEINHAUSER. Export Performance as a Measurement of Competitiveness. *Journal of Competitiveness: Scientific Journal from the Field of Management and Economics*. Zlín: Faculty of Management and Economics of Tomas Bata University in Zlín, 2020, (1), 145-160. DOI: 10.7441/joc.2020.01.09. ISSN 1804-1728. Available at: https://doi.org/10.7441/joc.2020.01.09

SBA. *Postoje MSP k zmenám v podnikateľskom prostredí Správa z kvantitatívneho prieskumu 2021* [online]. 2022. [Accessed on 2023-04-28]. Available at: https://www.sbagency.sk/sites/default/files/sprava_z_prieskumu_postojemsp_k_pp.pdf

SCHMIDT-FABER, Claudius. An implicit tax rate for non-financial corporations: Definition and comparison with other tax indicators [online]. *Luxembourg: European Commission Taxation Papers*, 2004 [Accessed on 2023-02-03]. Working paper, 5/2004. ISBN 92-894-7959-0. ISSN 1725-7557. Available at: https://www.oecd.org/tax/public-finance/36897927.pdf

SLOVENSKÁ SPRÁVA CIEST. *Celkový prehľad stavu vozoviek diaľnic a ciest SR – Stav cestnej siete k 1.1.2022.* [online]. 2022. [Accessed on 2023-05-16]. Available at: https://www.cdb.sk/files/documents/cestna-databanka/vystupy-cdb/2022/kniha_celkovy-prehlad-stavu-vozoviek_01-01-2022.pdf

SPP DISTRIBÚCIA. *Mesačné spotreby* [online]. Available at: https://www.spp-distribucia.sk/dodavatelia/informacie/mesacne-spotreby/

STEINHAUSER, Dušan and Kamil BOROS. 2022/12 Kam tečú slovenské exporty, pán Newton? *Analýza Inštitútu hospodárskych analýz MH SR* [online]. 2022. [Accessed on 2023-05-24]. Available at: https://www.mhsr.sk/ministerstvo/centrum-pre-hospodarske-otazky/publikacie/analyzy/kam-tecu-slovenske-exporty-pan-newton?csrt=7376486130118269909

SO SR, CHRAPPA, Ivan. *Personal correspondence with Mgr. Ivan Chrappa, Director of the Department of Labor and Education Statistics in the Section of Social Statistics and Demography*, 2023a

SO SR. *Oddiely_SITC4.* 2023. Document provided by the SO SR, Director General of the Section of Business Statistics of the SO SR on February 22, 2023b. Also available at: https://datacube.statistics.sk/#!/view/sk/VBD_INTERN/zo0019rs/v_zo0019rs_00_00_00_sk

SO SR. *Personal consultation, Department of Foreign Trade Statistics*, 2023c.

SO SR. *Štatistická klasifikácia ekonomických činností SK NACE Rev. 2* [online]. 2007. [Accessed on 2023-03-17]. Available at: https://www.financnasprava.sk/_img/pfsedit/Dokumenty_PFS/Podnikatelia/Clo_obchodny_tovar/EORI/StatistickaKlasifikaciaEkonomickychCinnosti.pdf

SO SR. Údaje o slovenskom exporte v eurách, databáza EVEREST, 28. 04. 2023d.

SO SR. *Úplné náklady práce v SR 2010 – 2021* [online]. 2011–2022 [Accessed on 2023-02-01]. Available at: https://datacube.statistics.sk/#!/view/sk/VBD_SLOVSTAT/np2010rs/v_np2010rs_00_00_00_sk

TEPLICKÁ, Katarína and Michal DAUBNER. Štúdia závislosti daňovej konkurencie a daňového zaťaženia členských štátov Európskej únie. *Ekonomický časopis*. Bratislava: Institute of Economics of the Slovak Academy of Sciences: Institute for Forecasting of SAS, 2013, 61(2), 172-186. ISSN 0013-3035. Available at: https://www.sav.sk/journals/uploads/0621144102%2013%20Teplicka-Daubner-RS.pdf

THAN, Krisztina. Hungarian government scraps price cap on fuels as shortage worsens. *Reuters* [online] Available at: https://www.reuters.com/business/energy/hungary-government-scraps-price-cap-fuels-2022-12-06/

FRASER INSTITUTE. *Economic Freedom of the World: 2022 Annual Report* [Online]. 2022 [Accessed on 2022-09-14]. Available at: https://www.fraserinstitute.org/economic-freedom/dataset?geozone=world&page=dataset&min-year=2&max-year=0&filter=0; https://www.fraserinstitute.org/studies/economic-freedom-of-the-world-2022-annual-report

GROWTH LAB AT HARVARD UNIVERSITY. *Growth Projections and Complexity Rankings, Harvard Dataverse, V3* [online]. 2019. [Accessed on 2023-05-24]. DOI: 10.7910/DVN/XTAQMC. Available at: https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/XTAQMC

HERITAGE FOUNDATION. *2022 Index of Economic Freedom* [Online]. 2022 [Accessed on 2022-09-14]. Available at: https://www.heritage.org/index/download

LEGATUM INSTITUTE. *Prosperity Index 2021* (The 2021 Legatum Prosperity Index Overview report; 2021 Full Data Set - Legatum Prosperity Index) [online]. 2021 [Accessed on 2022-09-21]. Available at: https://www.prosperity.com/about/resources

TURNER, Philip and Jozef VAN 'T DACK. Measuring International Price and Cost Competitiveness. BIS Economic Papers No. 39[online]. 1993, 152 pp. [Accessed on 2023-02-17]. ISSN 1021-2515. Available at: https://www.bis.org/publ/econ39.pdf

ÚHP (Value for Money Unit). *Lepšie fungovanie ŽSR*. [online]. 2019. [Accessed on 2023-05-16]. Available at: https://www.mfsr.sk/files/archiv/48/PrezentaciaZSR_20191016.pdf

ÚHP (Value for Money Unit). *Priority v obnove a rozvoji železničnej infraštruktúry*. [online]. 2021. [Accessed on 2023-05-16]. Available at: https://www.mindop.sk/uploads/Sch%C3%A9ma%20pomoci/prioritizacia_ZI_20210301_final_web.pdf

ÚHP (Value for Money Unit). *Priority vo výstavbe cestnej infraštruktúry*. [online]. 2020. [Accessed on 2023-05-16]. Available at: https://www.mfsr.sk/files/archiv/80/prioritizacia_vlada_20200916.pdf

UIC. *Railway Statistics Synopsis 2022 edition*. [online]. 2022. [Accessed on 2023-05-16]. Available at: https://uic.org/IMG/pdf/uic-railway-statistics-synopsis-2022.pdf

UN COMTRADE. *UN Comtrade Databese* [online]. 2023. [Accessed on 2023-04-06]. Available at: https://comtradeplus.un.org/

UNESCO Institute for Statistics. International mobile students [online]. 2018 [Accessed on 2022-12-01]. Available at: http://data.uis.unesco.org/index.aspx?queryid=3810

UNCTAD. *Manufactured goods by degree of manufacturing groups (SITC Rev. 3)* [online]. 2022 [Accessed on 2022-09-07]. Available at: https://unctadstat.unctad.org/en/classifications/dimsitcrev3products_tdr_hierarchy.pdf

UNCTADStat. *Foreign direct investment: Inward and outward flows and stock, annual; US dollars at current prices in millions; Stock* [online]. 2022 [2022-09-06]. Available at: https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx

UNCTADStat. *Foreign direct investment: Inward and outward flows and stock, annual; US dollars at current prices in millions; Stock* [online]. 2023 [2023-01-04]. Available at: https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx

UNCTADStat. *Merchandise trade matrix in thousands of United States dollars, annual* [online]. 2022b [2022-09-07]. Available at: https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx

UNCTADStat. *Merchandise trade matrix in thousands of United States dollars, annual* [online]. 2023 [2023-04-06]. Available at: https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx

UNCTADStat. *Revealed comparative advantage index, annual (methodology)* [online]. 2022c [2022-09-07]. Available at: https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx

Office of the Government of the Slovak Republic. Návrh Národnej stratégie výskumu, vývoja a inovácií. [online]. 2022. [Accessed on 2023-03-22]. Available at: https://rokovania.gov.sk/RVL/Material/28188/1

US DEPARTMENT OF STATE. *2022 Investment Climate Statements: Estonia* [online]. 2022. [Accessed on 2023-08-25]. Available at: https://www.state.gov/reports/2022-investment-climate-statements/estonia/

DUJAVA, Katarína and Vladimír PECIAR. Zásady poskytovania Prvej pomoci (na trhu práce). Analýza vplyvov Prvej pomoci na zamestnanosť počas prvej vlny šírenia koronavírusu. *Value for Money Unit and Institute of Financial Policy of the Ministry of Finance of the Slovak Republic. 4/2022* [online] Available at: https://www.mfsr.sk/files/archiv/37/Prva_pomoc_hodnotenie_UHP_IFP.pdf

VLADOVÁ, Anna. Vývoj v priemyselnej výrobe a službách na Slovensku. In. VLADOVÁ, Anna et al. Analýza kľúčových odvetví hospodárstva SR za roky 2019 a 2020. *Centire* [online]. 2022. [Accessed on 2023-05-31]. ISBN: 978-80-570-3809-2.

Committee on fiscal forecasting of the Institute for Financial Policy. MINISTRY OF FINANCE OF THE SLOVAK REPUBLIC *69th session of the Committee on fiscal forecasting (September 2022). Presentation*. [Accessed on 2022-10-10]. Available at: https://www.mfsr.sk/files/archiv/62/VpDP_prezentacia_SEPT_22_21_25_web.pdf

VYŠKRABKA, Milan and Jana ANTALICOVÁ. Daňový report Slovenskej republiky 2018. *Ekonomická analýza Inštitútu finančne politiky MF SR* [online]. Bratislava, 2018, 53 pp. [Accessed on 2023-01-25]. Available at: https://www.mfsr.sk/files/archiv/priloha-stranky/19959/52/Danovy_report_2018_final.pdf

WBG *Alternative Existing Indicators* [online]. 2023a. [Accessed on 2023-04-28]. Available at: https://www.worldbank.org/en/businessready/alternative-existing-indicators

WBG *Alternative Indicators Source* [Online]. 2022a [Accessed on 2022-08-10]. Available at: https://www.worldbank.org/content/dam/doingBusiness/excel/db-2021/Alternative-Indicators-Source.xlsx

WBG *Business ready (B-READY)* [online]. 2023b [Accessed on 2022-08-31]. Available at: https://www.worldbank.org/en/programs/business-enabling-environment/bee

WBG *Wage and salaried workers, total (% of total employment) (modeled ILO estimate)* [online]. 2022 [Accessed on 2022-11-16]. Available at: https://data.worldbank.org/indicator/SL.EMP.WORK.ZS

WBG *World Bank Group to Discontinue Doing Business Report* [online]. 2021 [Accessed on 2022-01-10]. Available at: https://www.worldbank.org/en/news/statement/2021/09/16/world-bank-group-to-discontinue-doing-business-report

WBG World Development Indicators [online]. 2023c. [Accessed on 2023-05-24]. Available at: https://databank.worldbank.org/source/world-development-indicators#

WBG Exports of goods and services (% of GDP) [online]. 2023d. [Accessed on 2023-08-25]. Available at: https://data.worldbank.org/indicator/NE.EXP.GNFS.ZS?end=2021&start=1960

WBG *World Governance Indicators – Documentation* [online]. 2022c [Accessed on 2022-08-31]. Available at: https://info.worldbank.org/governance/wgi/Home/Documents

WBG *World Governor Indicators* [online]. 2022d [Accessed on 2022-12-01]. Available at: https://databank.worldbank.org/source/worldwide-governance-indicators#advancedDownloadOptions

WEF *The global competitiveness report 2019*. [online]. 2019. [Accessed on 2023-05-16]. Available at: https://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf

WEF What is competitiveness? [online]. 2016. [Accessed on 2023-04-05]. Available at: https://www.weforum.org/agenda/2016/09/what-is-competitiveness/

WEF *GCI 4.0: Global Competitiveness Index 20 Doing Business 4. 0*[online]. 2022 [Accessed on 2022-09-21]. Available at: https://tcdata360.worldbank.org/indicators/h9de5a263?country=BRA&indicator=41472&viz=line_chart&years=2017,2019

WEF *The global competitiveness report 2019*[Online 2019 [Accessed on 2022-09-14]. Available at: https://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf

XU, Zhaoxia. Economic policy uncertainty, cost of capital, and corporate innovation. *Journal of Banking & Finance* [Online]. 2020, 111 [Accessed on 2023-01-11]. ISSN 03784266. DOI

10.1016/j.jbankfin.2019.105698. Available at: https://www.sciencedirect.com/science/article/abs/pii/S0378426619302729

ZÁBOJNÍK, Stanislav, Denisa ČIDEROVÁ and Daniel KRAJČÍK. *Competitiveness in International Business: Challenges for the EU Economies*. Prague: Wolters Kluwer CZ, 2020, 272 pp. ISBN 978-80-7676-006-6. Available at: https://www.researchgate.net/publication/351060419_competitiveness_in_international_business_challenges_for_the_eu_economies

ZALEWSKI, Michał. Power Shield for energy-intensive sectors in Poland: News Flash. *ACCACE* [online]. 2023. Available at: https://accace.com/aid-for-energy-intensive-sectors-in-poland/

ZILAHY, Gyula, MILTON, Simon. *The environmental activities of industrial park organisations in Hungary. In. Progress in Industrial Ecology – An International Journal. 56(5)*: p.422-447 DOI: 10.1504/PIE.2008.023409. [online]. 2008 [Accessed on 2023-05-01]. Available at: https://www.researchgate.net/publication/228870072_The_environmental_activities_of_industrial_park_organisations_in_Hungary

ŽSR. *Výročná správa 2021*. [online]. 2019. [Accessed on 2023-05-16]. Available at: https://www.zsr.sk/files/o-nas/vyrocne-spravy/vyrocnasprava2021.pdf

List of Acronyms and Abbreviations

AI – artificial intelligence
EBITDA – Earnings before interest, taxes, depreciation, and amortization
EU – European Union
GEM – Global Entrepreneurship Monitor
GVC – global value chain
GDP – gross domestic product
IFP – Institute of Financial Policy at the Ministry of Finance of the Slovak Republic
IHA – Institute of Economic Analysis (in Slovak, *Inštitút hospodárskych analýz*) at the Ministry of Economy of the Slovak Republic
ICT – Information and communication technologies
ISA – Institute for Strategy and Analysis at the Office of the Government of the Slovak Republic
ITR – implicit tax rate
MNB – Hungarian National Bank (in Hungarian, *Magyar Nemzeti Bank*)
MEcon. SR – Ministry of Economy of the Slovak Republic
MMF – International Monetary Fund
NBS – Národná banka Slovenska
NOFDI – net outward foreign direct investment
OECD – Organisation for Economic Co-operation and Development
p.p. – percentage points
PISA – Programme for International Student Assessment (measures the performance of 15-year-old students)
PPP – purchasing power parity
FDI – Foreign direct investment
RCA – Revealed Comparative Advantage Index

SPEs – special purpose entities
STEM – science, technology, engineering, mathematics
TFP – total factor productivity
V4 – Poland, Czechia, Hungary and Slovakia
VAIA – Research and Innovation Authority (in Slovak, *Výskumná a inovačná autorita*) at the Office of the Government of the Slovak Republic
WBG – World Bank Group
WGI – Worldwide Governance Indicators
CC – Control of Corruption
GE – Government Effectiveness
PV – Political Stability and Absence of Violence/Terrorism
RL – Rule of Law
RQ – Regulatory Quality
VA – Voice and Accountability

Annexes

Annex 1: Methodology for assessing the competitiveness of European Union Member States

The Doing Business Index, compiled by the World Bank Group, was a popular way to make international assessments of countries' competitiveness. Unfortunately, this indicator has not been updated since 2021 (WBG, 2021), and the replacement index is still being prepared. The planned indicator should be called Business Ready or B-READY (WBG, 2023b). However, the World Bank Group has collected alternative indicators to Doing Business (WBG, 2022a), most of which come from the Global Entrepreneurship Monitor (GEM) project.

Apart from the problems of Doing Business, behind the very philosophy of the ranking lies a concept formulated by the Peruvian economist H. de Soto (ILD, 2017), who wanted to set up a clothing company in Peru in 1983 together with his colleagues. His intention was to measure the bureaucratic and administrative burden of starting a new business. Today, this process is no longer a significant obstacle for a start-up Peruvian entrepreneur, because thanks to its measurement and international comparison, it has been reduced from the original 289 days in 1983 to 1 day (ILD, 2017). This shows the importance of evaluating and monitoring the quality of the business environment as H. de Soto did. However, there are other theoretical concepts in the idea of national competitiveness, which represents the quality of life of the population in a given country and which can be improved by increasing productivity (Porter, 1990).

Our assessment of the competitiveness of European Union Member States is based on the following reports and sources:

1. Global Entrepreneurship Monitor (GEM, 2022a-b);
2. Global Competitiveness Report by the World Economic Forum (WEF, 2019);
3. Legatum Prosperity Index compiled by the Legatum Institute (2021);
4. World Competitiveness Yearbook by the Institute for Management Development (IMD, 2022);
5. Index of Economic Freedom by the Heritage Foundation (2022);
6. Economic Freedom of the World report by the Fraser Institute (2022) and
7. Indicators of Product Market Regulation by the Organisation for Economic Co-operation and Development (OECD, 2022).

In compiling our ranking, selected pillars and sub-indices were assigned to eight pre-defined categories:

1. Governance
2. Regulation
3. Technology infrastructure
4. Entrepreneurship
5. Innovations
6. Labour market
7. Human capital
8. Physical infrastructure

Our ranking is based on the weighted average value of countries' ranking in selected pillars, sub-indices or elements. The calculation could not treat pillars and sub-indices equally. It was decided

that a pillar would have a weight of 1 and a sub-index, an element or indicator would have a weight of 0.2. The sources were based on different methodologies which are subject to frequent change. Therefore, the rankings of countries under individual pillars and sub-indices were averaged. The ranking considers 26 European Union countries, with Malta being omitted for lack of data.

The aim was to draw on the most recent data, but the Global Competitiveness Report was not updated during the global COVID-19 pandemic and therefore the 2019 material was used. The Global Entrepreneurship Monitor targets the previous year (at the time of writing, 2021) but if data for individual countries are not available, the most recent published data are processed. The oldest figures date back to 2006 (the indicator of entrepreneurship as a good career choice for Czechia). In 2019, Czechia is no longer listed among the countries participating in the Global Entrepreneurship Monitor (Pilková et al., 2022).

Table 7 to table 14 set out the individual elements of the categories with a brief description.

Table 7: Physical infrastructure

Source	Indicator	Description
GEM	Physical and services infrastructure	This indicator evaluates ease of access to physical infrastructure at a price that does not discriminate against SMEs (communications, services, transport, land and space).
WEF	GCI 4.0: Pillar 2: Infrastructure	This pillar of the Global Competitiveness Index infrastructure evaluates the quality, density and efficiency of road, rail and shipping transport (including maritime transport) and the quality of access to electricity and water (drinking water). The World Economic Forum drew on data from many sources, including the International Energy Agency, UNCTAD, the World Bank Group, and others. However, the primary sources are the WEF's own survey.
Legatum Institute	Transport	The transport element within the infrastructure and market access pillar of the Legatum Prosperity Index. The element is evaluated on the basis of indicators taken from the World Bank Group (Logistics Performance Index), UNCTAD (Liner shipping connectivity), the International Union of Railways (Rail density) or the FAO Aquastat database. A disadvantage of this element is the content overlap with the World Economic Forum (WEF) database in the indices for airport connectivity, efficiency of seaport services and the quality of road infrastructure.
Legatum Institute	Energy	The energy element within the infrastructure and market access pillar of the Legatum Prosperity Index. The element is calculated using the United Nations Energy Statistics (installed electric capacity) and two Doing Business sub-indices (time to obtain an electrical connection and reliability of electrical supply).
Legatum Institute	Water	The water element within the infrastructure and market access pillar of the Legatum Prosperity Index. The element is based on the statistics taken from the International Benchmarking Network for Water and Sanitation Services (gross fixed water assets and water production) and the World Economic Forum (reliability of water supply).
IMD	Basic Infrastructure	This sub-index within the infrastructure pillar of the Institute for Management Development (land area, arable land, size and growth of the population, dependency ratio (ratio of children under 15 years of age and seniors over 64 years of age to the active population), water resources, road, rail transport, access to electricity, its costs, production, consumption, etc.)

Sources: IHA's own calculations and translations based on GEM (2022b), WEF (2019), Legatum Institute (2021) and IMD (2022)

Table 8: Innovations

Source	Indicator	Description
WEF	GCI 4.0: Pillar 12: Innovation capability	This is Pillar 12 of the Global Competitiveness Index. The Pillar evaluates 3 sub-indices called diversity and collaboration (diversity of the workforce, state of cluster development, international co-inventions and multi-stakeholder collaboration), research and development (scientific publications, patent applications, R&D expenditures and research institutions prominence index) and commercialisation (sophistication of consumers and trademark applications). In addition to the data from the WEF's own survey, the construction of Pillar 12 also used data from, for example, the OECD, SCImago, the World Bank Group, etc.
IMD	Scientific Infrastructure	This indicator evaluates total and business expenditure on research and development in nominal terms, but also in relative terms as a share in GDP and per capita, the number of R&D personnel, graduates, the number of scientific articles, and Nobel Prize winners.

Sources: IHA's own calculations and translations based on WEF (2021) and IMD (2022)

Table 9: Technology infrastructure

Source	Indicator	Description
GEM	R&D transfer	the indicator measures the extent to which national research and development will lead to new commercial opportunities and is available to SMEs.
WEF	GCI 4.0: Pillar 3: ICT adoption	This is Pillar 3 of the Global Competitiveness Index, which quantifies mobile phones, mobile and fixed broadband, and internet users. The data source of Pillar 3 is the International Telecommunication Union (ITU).
Legatum Institute	Communications	This element of the infrastructure and market access pillar is compiled using primary sources from two organizations. The first is the International Telecommunication Organisation (international internet bandwidth, fixed broadband subscriptions and internet usage) and the second is the Groupe Spéciale Mobile Association (2G, 3G and 4G coverage),
IMD	Technological infrastructure	This is part of the infrastructure pillar of the Institute for Management Development (IMD). The sub-index is based on survey data and hard macroeconomic and statistical data. This indicator evaluates investments in telecommunications as a percentage of GDP, 4G and 5G networks as a percentage of the mobile market, the quality of telecommunications services provided, the share of high-tech exports, international trade in services, cybersecurity and many other variables. According to the IMD, the number of secure servers and Internet users per 1 000 inhabitants comes from the Computer Industry Almanac.

Sources: IHA's own calculations and translations based on GEM (2022b), WEF (2019), Legatum Institute (2021) and IMD (2022)

Table 10: Human capital

Source	Indicator	Description
GEM	Entrepreneurial education at school stage	This indicator measures the extent to which training in creating or managing SMEs is incorporated within the education and training system at primary and secondary levels.
GEM	Entrepreneurial education at post school stage	This indicator quantifies the extent to which training in creating or managing SMEs is incorporated within the education and training system in higher education such as vocational, college, business schools, etc.
WEF	GCI 4.0: Pillar 6: Skills	This indicator is Pillar 6 of the Global Competitiveness Index, which is divided into two groups – the education and skills of the workforce currently (mean years of schooling, training, graduates, digital skills and ease of finding skilled employees) and in the future (school life expectancy, critical thinking and the pupil-teacher ratio). The data comes from the Institute for Health Metrics and Evaluation, UNESCO, the World Bank Group, and other sources, including the WEF's own survey.
Legatum Institute	Secondary Education	This element of the education pillar is an calculated from UNESCO's secondary sources (secondary school enrolment and completion), Varieties of Democracy, V-DEM (access to quality education), and the Global Data Set on Education Quality (1965-2015) by Altinoco, Angristo, and Patrinos (secondary education)
Legatum Institute	Tertiary Education	This element of the education pillar is based on UNESCO's secondary sources (tertiary enrolment and completion), the QS World University Ranking, and the Times World University Ranking (the average quality of higher education institutions), as well as the World Economic Forum's indicators (skillset of university graduates and the quality of vocational training).
Legatum Institute	Adult Skills	The adult literacy element, as part of the education pillar, evaluates adult literacy (UNESCO), the education level of the adult education (BarroLeeDataSet), women's average years in school (Institute for Health Metrics and Evaluation), education inequality (article by Castello-Climent and Domains), and digital skills (WEF).
IMD	Education	This sub-index evaluates literacy, public expenditure on education expressed as a percentage of GDP, population or per student, the pupil-teacher ratio in primary and secondary education, Pisa test results, university education, etc.

Sources: IHA's own calculations and translations based on GEM (2022b), WEF (2019), Legatum Institute (2021) and IMD (2022)

Table 11: Entrepreneurship

Source	Indicator	Description
GEM	Perceived opportunities	the percentage of the adult population (aged 18 to 64) who sees good opportunities to start a firm in the area where they live.
GEM	Perceived capabilities	the percentage of the adult population who believe they have the required skills and knowledge to start a business.
GEM	Fear of failure rate *	The percentage of those who see an opportunity to set up a business but who indicate that fear of failure would prevent them from this.
GEM	Entrepreneurial intentions	The percentage of the population who intend to start a business within three years.
GEM	Total early-stage Entrepreneurial Activity (TEA)	The share of the adult population who are either a nascent entrepreneur or owner-manager of a new business
GEM	Established Business Ownership	The percentage of the adult population who own and manage a running business that has paid salaries, bonuses and other payments to the owners for more than 42 months
GEM	Entrepreneurial Employee Activity	Rate of involvement of employees in entrepreneurial activities, such as developing or launching new goods or services, or setting up a new business unit, a new establishment or subsidiary.
GEM	Motivational Index (recent)	The percentage those involved in total early-stage entrepreneurial activity (TEA) that are improvement-driven opportunity motivated, divided by the percentage of TEA that is necessity-motivated
GEM	Female/Male TEA	The percentage of female 18-64 population who are either a nascent entrepreneur or owner-manager of a 'new business', divided by the equivalent percentage for their male counterparts.
GEM	Female/Male Opportunity-Driven TEA	The percentage of females involved in TEA who claim to be driven by opportunity as opposed to necessity (inability to find work, to maintain income) divided by the equivalent percentage of their male counterparts.
GEM	High Job Creation Expectation	Percentage of those involved in total early-stage entrepreneurial activity who expect to create 6 or more jobs in 5 years
GEM	Innovation (recent)	The percentage of those involved in TEA who indicate that their product or service is new to at least some customers and that few/no businesses offer the same product.
GEM	Business Services Sector	The percentage of those involved in early-stage entrepreneurial activity (TEA) who do business in the business services sector (information and communication, financial intermediation and real estate, professional or administrative services)
GEM	High Status to Successful Entrepreneurs	The percentage of the adult population who agree with the statement that successful entrepreneurs receive high status (recognition).
GEM	Entrepreneurship as a Good Career Choice	The percentage of the adult population who agree that entrepreneurship is the right career choice.
WEF	GCI 4.0: 11.B Entrepreneurship	This sub-index of Business Dynamics, Pillar 11 of the Global Competitiveness Index, is referred to in the Report as an entrepreneurial culture and in the adopted database of the World Bank Group as 11.B Entrepreneurship. The sub-index includes the evaluation of attitudes towards entrepreneurial risk, the willingness to delegate authority, the growth of innovative companies, and companies embracing disruptive (risky) ideas. The data comes exclusively from the WEF's own survey.
Legatum Institute	Environment for Business Creation	This is an element of the Legatum Prosperity Index, within the pillar of Enterprise Conditions. The element is calculated on the basis of the resources taken, e.g. from The Bertelsmann Foundation's Transformation Index (Private companies are protected and permitted), but also from the World Economic Forum (clusters and skilled workers) and the World Bank Group (Doing Business and Enterprise Surveys – Labour skill a business constraint).

Source	Indicator	Description
IMD	Management Practices	This is part of the Business Efficiency Pillar of the Institute for Management Development (IMD). The indicator evaluates the agility of companies, awareness of change, readiness to respond to opportunities and threats, quality of management, but also social responsibility. The disadvantage of the sub-index is the fact that there is a small content overlap with GEM indicators (e.g. rate of fear of failure and overall entrepreneurial activity at an early stage).

Sources: IHA's own calculations and translations based on GEM (2022a), WEF (2019), Legatum Institute (2021) and IMD (2022)

Table 12: Regulation

Source	Indicator	Description
GEM	Governmental support and policies	Extent of public support for entrepreneurship.
GEM	Governmental programs	The existence and quality of programmes to support small and medium enterprises (at national, regional and municipal level).
WEF	GCI 4.0: 1.F Property rights	The sub-index of property rights evaluates property rights (including financial assets, WEF survey result), intellectual rights protection (WEF survey result) and quality of land administration (World Bank Group – Doing Business).
WEF	GCI 4.0: 1.G Corporate governance	The sub-index of corporate governance reflects the strength of auditing and accounting standards, regulation of conflict of interest and shareholder management (WEF's own survey and World Bank Group – Doing Business).
WEF	GCI 4.0: 11. Administrative requirements	The sub-index of administrative requirements evaluates the cost and time requirements of starting a business, insolvency recovery rates and insolvency regulatory frameworks. The information comes from the World Bank Group – Doing Business.
WEF	GCI 4.0: Pillar 7: Product market	Domestic market competition and trade openness are part of Pillar 7 of the Global Competitiveness Index, called the product market. The sub-index quantifies the distortive effect of taxes and subsidies on competition, market dominance, competition in the services sector, non-tariff and tariff trade barriers and border clearance efficiency (as part of the Logistics Performance Index). Data is drawn from the WEF's own survey, which is based on communication with the International Trade Centre. The logistics performance index is a product of the World Bank Group and the Turku School of Economics.
Legatum Institute	Regulatory Quality	The Legatum Institute evaluates regulatory quality under the pillar of Governance. The source of data is the World Justice Project (right to information, publicised laws and government data, enforcement of regulation and delay in administrative procedures), the World Economic Forum (transparency of government policies and effectiveness of the legal framework in competition regulation – the indicator is also part of our governance category), the International Budget Partnership (budget transparency) and the World Bank Group as part of the Worldwide Governance Indicators (sub-index Regulatory Quality).
Legatum Institute	Property Rights	The element of property rights is part of the Investment Environment pillar. In this case, too, it is a secondary indicator calculated on the basis of data from the World Economic Forum (protection of property rights, intellectual property protection), the World Justice Project (lawful process of expropriation), Doing Business from the World Bank Group (quality of land administration – part of sub-index 1.F of the World Economic Forum's Global Competitiveness Index, as above, and asset registration procedures) and from The Bertelsmann Foundation's Transformation Index (regulation of property possession and exchange).
Legatum Institute	Investor Protection	Like property rights, the element of investor protection is part of the Investment Environment pillar. This element is calculated from two primary

Source	Indicator	Description
		sources: Doing Business of the World Bank Group (strength of the insolvency framework, recovery rate on insolvency, shareholder governance and regulation of conflict of interest) and the World Economic Forum (audit and reporting standards). Even in the case of this element, some variables overlap with the World Economic Forum, which we draw attention to as a limitation.
Legatum Institute	Contract Enforcement	This element is part of the pillar of Investment Environment. The element consists of four indicators and two primary sources. From the World Bank (Doing Business) comes an indicator of the quality of judicial administration, time to solve business cases and legal costs. An alternative dispute resolution mechanism indicator comes from the World Justice Project.
Legatum Institute	Restrictions on International Investment	This element is part of the pillar Investment Environment. From the World Bank Group come indicators of the business impact of the rules on foreign direct investment and the prevalence of foreign ownership of companies. The Chinn-Ito Index provided data on financial transaction restrictions. The Fraser Institute is the source of sub-indices of capital control, the freedom to own a foreign bank accounts and the freedom of foreigners to visit the country. In this case too, attention should be drawn to the limitation of overlap with the 4th sub-index from the Fraser Institute (Freedom to Trade Internationally).
Legatum Institute	Domestic market Contestability	This is an element of the pillar Enterprise Conditions. The two primary indicators used in the preparation of this index come from the Bertelsmann Foundation's Transformation Index (market-based competition and anti-monopoly policy) and one from the World Economic Forum (Extent of market dominance).
Legatum Institute	Burden of Regulation	This is an element of the pillar Enterprise Conditions. The element comes from three sources: World Economic Forum (burden of government regulation); Enterprise Survey of the World Bank Group (time spent complying with regulation) and Doing Business of the World Bank Group (number of tax payments, time burden of taxes, days to obtain a construction-related permit and Building Quality Control Index).
Legatum Institute	Border Administration	This is an element of the Infrastructure and Market Access pillar. The element reflects the sub-index of the Logistics Performance Index of the World Bank Group and the Turku School of Economics (efficiency of customs clearance process) and the Doing Business of the World Bank Group (time needed to clear customs documentation and procedures, costs of customs clearance and procedures).
Legatum Institute	Open Market Scale	This is an element of the Infrastructure and Market Access pillar. The element is based on two indicators of the World Trade Organization (domestic and international market access (1) of goods and (2) of services) and the World Economic Forum (trade-weighted average tariff faced in destination markets and margin of preference in destination markets).
Legatum Institute	Import Tariff Barriers	This is an element of the Infrastructure and Market Access pillar. The entire element comes from the World Economic Forum (share of imports free from tariff duties, average applied tariff rate and complexity of tariffs).
Legatum Institute	Market Distortions	This is an element of the Infrastructure and Market Access pillar. The information comes from The Bertelsmann Foundation's Transformation Index (extent of liberalisation of foreign trade), the World Economic Forum (prevalence of non-tariff barriers to trade) and non-tariff measures (UNCTAD)
IMD	Business Legislation	This sub-index from the Institute for Management Development (IMD) consists of three areas – openness (tariffs, protectionism, public sector contracts and its openness to foreign bidders, foreign investors and capital markets, attractiveness of incentives for foreign investors), competition and regulation (government subsidies to public and private companies expressed as a percentage of GDP and their impact on competition and economic

Source	Indicator	Description
		development, state ownership of enterprises and their impact on business activities, competition legislation, the parallel (black-market) economy, number of start-ups and number of operations when setting up a business) and regulation of labour relations (labour market regulations do not hinder business activities, unemployment legislation provides an incentive to look for work, the possibility of employing foreigners and the costs of dismissing employees expressed in the number of weekly wages). Including the labour market within the sub-index of business legislation could be considered a limitation, because our approach evaluates the labour market in a separate category.
Heritage Foundation	Property Rights	In this component, The Heritage Foundation assesses the risk of expropriation, respect for intellectual property rights, and the quality of contract enforcement, property rights and law enforcement. The Heritage Foundation's data sources include Credento's Country Risk and Insights report, the US Chamber of Commerce's Intellectual Property Index, and the World Bank Group's Worldwide Governance Indicators.
Heritage Foundation	Business Freedom	In this component, the Heritage Foundation quantifies access to electricity, business environment risk, regulatory quality and women's economic inclusion. The data source is Credendo's Country Risk and Insights report and the World Bank Group (Worldwide Governance Indicators, World Development Indicators, and Women, Business and the Law).
Heritage Foundation	Trade Freedom	In this case, The Heritage Foundation measures the extent of restrictions such as quotas, embargoes, countertrade, etc., regulatory restrictions in the form of licenses, sanitary and phytosanitary standards, safety etc. It also measures tariff restrictions and direct government intervention. The index is based on several sources including the World Trade Organization, the World Bank Group, the US Chamber of Commerce, and official government publications of each country.
Heritage Foundation	Investment Freedom	This component assesses such practices as national treatment of foreign investment, restrictions on ownership, sectoral restrictions, expropriations, capital controls, restrictions on repatriation of profits, etc. Data is taken from a range of databases and documents of institutions including the US Department of the Interior and the Economist Intelligence Unit.
Heritage Foundation	Financial Freedom	This component assesses the extent of government regulation and the degree of intervention in the banking and financial sector, the government's impact on credit allocation, the development of the financial and capital markets, and openness to competition. Data sources include the Economist Intelligence Unit, the International Monetary Fund, and a range of other institutions.
Fraser Institute	5C Business regulations	This is a sub-index of the Fraser Institute's Economic Freedom of the World index which evaluates the administrative burden and costs of bureaucracy, requirements for setting up a new business, impartiality of public institutions, licensing restrictions and tax compliance. The sub-index is based on indicators from the World Economic Forum, IHS Markit, the World Bank Group and Varieties of Democracy (V-DEM). Also in the case of the Fraser Institute and Economic Freedom in the World, it is necessary to draw attention to the overlapping content and use of data from other sources, e.g. from the World Economic Forum.
Fraser Institute	2C Protection of Property rights	This sub-index forms part of the Fraser Institute's second pillar, Legal System and Property Rights, assessing the level of protection accorded to ownership rights. The indicator is based on data from the World Economic Forum survey and the World Bank Group's Country Policy and Institutional Assessment database. Also in the case of the Fraser Institute and Economic Freedom in the World, it is necessary to draw attention to the overlapping content and use of data from other sources, e.g. from the World Economic Forum.

Source	Indicator	Description
Fraser Institute	2G Regulatory restrictions on the sale of real property	Regulatory restrictions on the sale of real estate are measured using data from the World Bank Group (Doing Business).
Fraser Institute	4 Freedom to trade internationally	In this area, the Fraser Institute considers the state's revenues from trade taxes, the average tariff rate and non-tariff barriers to trade, the costs of importing and exporting, unofficial exchange rates, financial openness, capital controls and the freedom of foreigners to visit. The pillar draws from many sources including the International Monetary Fund and the World Trade Organisation.
OECD	Involvement in Business Operations	This sub-index of the OECD Indicators of Product Market Regulation (PMR) evaluates the retail price controls, command and control regulation and public procurement according to the methodology of the indicator.
OECD	Simplification and Evaluation of Regulations	This is a subindex of the OECD's PMR indicator. The sub-index quantifies the impact on competition, interaction with interest groups and the complexity of regulatory procedures.
OECD	Admin. Burden on Start-ups	This OECD PMR indicator evaluates the administrative requirements for start-ups in terms of the right conditions for limited liability companies and person-owned enterprises, licenses and permits.
OECD	Barriers in Service & Network Sectors	This subindex of the OECD's PMR indicator reflects just two types of barriers: in services sectors and in network sectors.
OECD	Barriers to Trade and Investment	This subindex of the OECD's PMR indicator evaluates barriers to foreign direct investment, tariff barriers, differential treatment of foreign suppliers and barriers to trade facilitation. According to OECD (2020), barriers to trade facilitation constitute barriers in the form of technical and legal requirements in international trade.

Sources: IHA's own calculations and translations based on GEM (2022b), WEF (2019), Legatum (2021), IMD (2022), Heritage Foundation (2022), Fraser Institute (2022) and OECD (2022)

Table 13: Labour market

Source	Indicator	Description
WEF	GCI 4.0: Pillar 8: Labour market	Pillar 8 of the Global Competitiveness Index of the World Economic Forum (WEF) evaluates flexibility, meritocracy (focus on results) and incentivization (stimulation and motivation) in the labour market. Flexibility includes redundancy costs, hiring and firing practices, wage flexibility, ease of hiring foreign labour and internal labour mobility. Meritocracy and incentivisation covers the degree of reliance on professional management, wages and productivity, differences between male and female wages, and labour tax rates. The data was obtained from the WEF's own survey, from the International Labour Organization, the World Bank Group, etc.
Legatum Institute	Labour Market Flexibility	The Legatum Institute considers this as an element under the pillar of Enterprise Conditions, drawing on secondary data from the World Bank Group's Doing Business index (flexibility of employment contracts) and the World Economic Forum. The overlap with three sub-indices of the WEF's Pillar 8 can be considered a limitation of the use of this index.
Legatum Institute	Labour Force Engagement	The Legatum Institute considers labour force engagement under the pillar Economic Quality. The entire element is calculated on the basis of data from the International Labour Organisation (ILO): labour force participation, female labour force participation, waged and salaried workers whose wages do not depend on the income of the employer for which they work (WBG, 2022), unemployment rate and youth unemployment.
IMD	Labour Market	The Institute for Management Development (IMD) assesses the labour market in three aspects: costs (remuneration in manufacturing, change in unit labour costs for production, remuneration of workers in services, management, etc.), relationships (average number of working hours per year, worker motivation, implementation of vocational education and training of employees)

Source	Indicator	Description
		and availability of skills (workforce, part-time employees, qualifications, talent, management, etc.).
Heritage Foundation	Labour Freedom	Under this pillar, the Heritage Foundation evaluates the amount of the minimum wage, leave, severance pay, labour productivity, associational rights, notice period, total employment, restrictions on overtime work, and redundancy dismissal permitted by law. The data comes from the World Bank Group (Worldwide Governance Indicators, World Development Indicators, the Employing Workers project), Freedom House (Freedom in the World) and ILO data.
Fraser Institute	5B Labour market regulation	Under this sub-index, the Fraser Institute evaluates regulation in the areas of hiring and firing of employees, minimum wage, collective bargaining, working time regulation and social contributions.

Sources: IHA's own calculations and translations based on WEF (2019), Legatum Institute (2021), IMD (2022), Heritage Foundation (2022) and Fraser Institute (2022)

Table 14: Governance

Source	Indicator	Description
WEF	GCI 4.0: 1.C Checks and balances	This sub-index evaluates budget transparency, judicial independence, the efficiency of the legal framework in challenging regulations and the freedom of the press. The data comes from the International Budget Partnership, data from the WEF's own survey and from Reporters Without Borders.
WEF	GCI 4.0: 1.D Public-sector performance	This sub-index evaluates the burden of government regulation, the efficiency of the legal framework in settling disputes and digital participation (E-Participation Index). The data comes from the WEF's own survey and the UN (Department of Economic and Social Affairs).
WEF	GCI 4.0: 1.E Transparency	This sub-index evaluates the incidence of corruption (Transparency International).
WEF	GCI 4.0: Future orientation of government	This sub-index evaluates government adaptability (policy stability, the government's responsiveness to change, the legal framework's adaptability to digital business models and the government's long-term vision) and sustainability (energy efficiency regulation, renewables, environment-related treaties). It takes data from the results of the WEF's own survey as well as other data from institutions, e.g. the World Bank Group.
Legatum Institute	Political Accountability	As an element of the Governance pillar, it evaluates primary data from the Bertelsmann Foundation's Transformation Index (consensus on democracy and a market economy as a goal), the Fraser Institute (political participation and rights), the Center for Systemic Peace (democracy level) and the World Justice Project (complaint mechanisms).
Legatum Institute	Rule of Law	This is an element of the Governance pillar. This element assesses the independence of the judiciary based on data from the World Economic Forum and the efficiency of dispute settlement. It is also assesses civil justice based on the World Justice Project and integrity of the legal system based on data from the Fraser Institute. In this case, it should be noted that the effectiveness of the legal system is evaluated within the category of regulation. There is also an overlap with sub-index 1.C of the World Economic Forum (the Judicial Independence indicator).
Legatum Institute	Government Integrity	This is an element of the Legatum Institute's pillar on Governance. It consists of eight indicators from four sources: World Justice Project (using public office for personal gain); World Economic Forum (diversion of public funds), The Bertelsmann Foundation's Transformation Index (anti-corruption policy) and Varieties of Democracy, V-DEM (clientelism, legislative corruption, judicial corruption, executive corruption and public sector corruption).
Legatum Institute	Government Effectiveness	This is an element of the Governance pillar. It is based on the following primary sources: World Bank Group's Worldwide Governance Indicators (government quality and credibility), The Bertelsmann Foundation's Transformation Index (prioritisation, efficient use of assets, implementation, policy learning and policy coordination) and the World Economic Forum (efficiency of government spending).
Legatum Institute	Institutional Trust	This is an element of the Social Capital pillar. It is compiled from two primary sources: World Economic Forum (public trust in politicians) and Gallup (confidence in local police, confidence in financial institutions and banks, confidence in judicial systems and courts, confidence in the national government and confidence in military).
IMD	Institutional Framework	This sub-index is part of the government efficiency pillar of the Institute for Management Development (IMD) and further consists of an area related to the central bank (real short-term interest rate, cost of capital supporting business development, difference between the interest rate on loans and deposits, index of three rating agencies – Fitch, Moody's and S&P, foreign exchange reserves and many other variables) and the efficiency of the state (legal and regulatory framework supporting business competitiveness,

Source	Indicator	Description
		adaptability of government policies to changes, transparency, bureaucracy, corruption, but also the Index of Democracy of The Economist Intelligence Unit Limited and others).
Heritage Foundation	Judicial Effectiveness	In this pillar, the Heritage Foundation evaluates judicial independence, the quality of the judicial process and perceptions of the quality of public services and the independence of the civil service. The data is drawn from Freedom House (Freedom in the World) and the World Bank Group (Worldwide Governance Indicators).
Heritage Foundation	Government Integrity	In this component, the Heritage Foundation evaluates the perception of corruption, the risk of bribery and control of corruption (including state capture). The databases come from Transparency International (Corruption Perception Index), trace International (Trace Bribery Risk Matrix) and again the World Bank Group (Worldwide Governance Indicators).
Fraser Institute	2A Judicial independence	The independence of the judiciary was evaluated on the basis of data from the World Economic Forum (Global Competitiveness Report), Varieties of Democracy (V-DEM) and the authors Staton, Linzer, Reenock and Holsinder from 2019.
Fraser Institute	2B Impartial courts	The evaluation of the impartiality of the courts is based on data from the World Economic Forum (Global Competitiveness Report), the World Bank Group's Worldwide Governance Indicators and Varieties of Democracy (V-DEM).
Fraser Institute	2D Military interference in the rule of law and politics	This indicator is evaluated on the basis of data from the PRS Group (International Country Risk Guide).
Fraser Institute	2E Integrity of the legal system	This sub-index is calculated using data from the PRS Group (International Country Risk Guide) and Varieties of Democracy (V-DEM).
Fraser Institute	2F Legal enforcement of contracts	The sources for this sub-index are the World Bank Group and the index Doing Business and Business Risk Intelligence (Historical Rating Research Package).
Fraser Institute	2H Reliability of police	Police reliability is assessed based on the World Economic Forum's Global Competitiveness Report.

Sources: IHA's own calculations and translations based on WEF (2019), Legatum Institute (2021), IMD (2022) and Heritage Foundation (2022)

Annex 2: Positions of EU Member States in the IHA competitiveness ranking

Table 15: Positions of EU Member States in the IHA competitiveness ranking

	Physical infrastructure	Innovations	Human capital	Entrepreneurship	Regulation	Technology infrastructure	Labour market	Governance
AUT	5	7	9	12	8	20	4	7
BEL	10	8	8	19	11	13	18	9
BGR	25	23	23	25	25	12	10	26
CYP	24	20	17	15	19	23	8	17
CZE	11	13	15	16	15	17	17	16
DEU	4	1	6	14	7	11	12	6
DNK	6	5	2	6	1	2	1	4
ESP	2	12	14	23	13	7	18	13
EST	19	16	4	2	6	6	9	10
FIN	8	6	1	4	3	3	2	1
FRA	3	3	16	9	10	10	21	11
GRC	22	22	21	20	26	21	24	22
HRV	21	26	25	17	24	26	25	23
HUN	14	18	24	24	22	24	18	25
IRL	20	9	7	3	9	18	3	8
ITA	13	11	19	22	17	22	16	19
LTU	17	19	12	13	12	3	11	15
LUX	9	9	10	8	5	8	13	3
LVA	23	24	11	10	14	8	7	18
NLD	1	4	3	1	2	5	6	2
POL	16	17	20	18	20	25	26	20
PRT	12	15	18	11	16	14	22	12
ROU	26	25	26	21	23	16	15	24
SVK	15	21	22	26	21	19	22	21
SVN	18	13	13	5	18	15	14	14
SWE	7	2	5	7	4	1	5	5

Sources: IHA calculations based on WEF (2022), WEF (2019); IMD (2022); GEM (2022a-b), Legatum Institute (2021), Fraser Institute (2022), Heritage Foundation (2022) and OECD (2018)

Annex 3: Compensation of employees in regional and sectoral breakdowns

Table 16: Compensation of employees in regional and sectoral breakdowns

Region	T_NACE	A	B-E	C	F	G-I	J	K-N
Czechia	13.1	9.9	13.2	13	10.2	11	20.5	14
Prague	19.8	16.2	20.4	19.5	14.1	16.9	28.1	20.1
Střední Cechy	12.5	9.3	15.4	15.6	8.9	10.6	11.2	10.5
Jihozápad	11.7	10.4	12.6	12.4	9.6	9.3	13	9.9
Severozápad	10.3	8.2	11.4	11.1	8.3	8.3	9	8.2
Severovýchod	11.5	9.8	12.4	12.3	9.5	9.2	11.6	10.2
Jihovýchod	12.4	10	12.8	12.6	10	10	17.3	12
Střední Morava	11.5	9.9	12.2	12.1	9.8	9.3	11.3	10.1
Moravskoslezsko	11.7	9.8	12.8	12.4	9.2	9.2	13.6	9.9
Hungary	8.2	5.1	9.3	9.1	4.7	7.4	11.6	8.3
Közép-Magyarország	8.5	5.5	9.3	9.2	4.7	7.9	11.6	8.5
Budapest	8.7	5.4	9.5	9.3	4.7	8.1	11.5	8.7
Pest	7.8	5.6	9.1	9.1	4.7	7.4	12.6	7.2
Dunántúl	8	5	9.7	9.6	4.6	6.8	11.8	7.6
Közép-Dunántúl	8.2	5	9.8	9.8	4.6	6.8	11.7	7.4
Nyugat-Dunántúl	8.1	4.9	9.7	9.7	4.6	7	11.5	7.7
Dél-Dunántúl	7.7	5.2	9.1	8.5	4.7	6.4	12.3	7.8
Alföld és Észak	7.8	5.1	8.8	8.7	4.7	6.9	12.3	8
Észak-Magyarország	7.9	5.1	9.2	9	4.7	6.8	14.7	7.2
Észak-Alföld	7.7	5.2	8.5	8.3	4.7	6.9	11.4	8.4
Dél-Alföld	7.8	5.1	8.7	8.6	4.7	7	12.2	8.4
Poland	8.4	7.5	7.8	7.6	6.2	7.3	13.6	11.8
Makroregion Poludniowy	8.4	6.2	8.3	8.1	6.4	7	10.3	11.9
Małopolskie	8.5	7.1	7.3	7.4	5.9	7	11.7	13.9
Slaskie	8.4	5.4	8.8	8.4	7	6.9	8.6	10.2
Makroregion Pólnocno-Zachodni	7.7	5.8	7.6	7.4	5.4	6.6	13.4	10
Wielkopolskie	8.3	6.7	7.7	7.6	5.9	7.1	16.8	11.9
Zachodniopomorskie	6.8	5.8	6.9	6.5	4.2	5.9	12	7.9
Lubuskie	6.8	3.5	7.8	7.5	5.2	5.7	4.4	6.6
Makroregion Poludniowo-Zachodni	8.9	5.5	9.6	9	8.9	7.2	10.6	10.5
Dolnoslaskie	9.4	5.3	10.1	9.5	8.8	7.9	11.5	11
Opolskie	7.4	5.8	7.8	7.7	9	5.3	3.7	7
Makroregion Pólnocny	7.2	7.7	7.4	7.3	4.6	6.2	11	8.5
Kujawsko-Pomorskie	7	6.7	7.2	7	4.1	6.1	5.6	7.7

Region	T_NACE	A	B-E	C	F	G-I	J	K-N
Warminsko-Mazurskie	6.2	8.3	6.6	6.5	3.7	5	6.1	5.9
Pomorskie	8	8.3	8.1	8.1	5.5	6.8	15.7	9.9
Makroregion Centralny	7.1	12.8	7	6.6	4.4	5.5	6.8	8.1
Lódzkie	7.3	16.2	7	6.4	4.6	5.7	7	8.5
Swietokrzyskie	6.5	8.8	7	7.1	3.9	4.9	5.4	6.6
Makroregion Wschodni	6.6	9.9	6.5	6.4	4.6	5.3	5.4	6.9
Lubelskie	6.6	7.6	6.1	5.8	5.7	5.4	6.4	6.2
Podkarpackie	6.5	6.2	6.6	6.6	3.7	5.2	4.4	7.4
Podlaskie	7	24	6.8	6.7	5	5.6	6.6	7.1
Makroregion Województwo Mazowieckie	12.2	9.4	8.4	8.1	9.5	12.5	26.3	17.6
Warszawski stoleczny	14.8	3.7	9.5	8.8	13.6	16	27.6	19.6
Mazowiecki regionalny	7.1	11.2	7.4	7.4	4	5.8	5.5	6.3
Slovakia	13.2	8.4	13.7	13.5	11.1	11.3	18.6	12.6
Bratislavský kraj	17.8	8.5	19.4	19.1	14.3	16.4	24.6	16.7
Západné Slovensko	11.8	8.6	13.4	13.2	10.1	9.8	16.2	8.4
Stredné Slovensko	12.2	9.1	12.8	12.7	11	10.2	15.8	10.4
Východné Slovensko	11.7	7.3	12	12	10.9	9.6	15.1	10.5

Sources: IHA calculations based on Eurostat (2023) [NAMA_10R_2LP10]; SO SR (2007)

Note: T_NACE – all sectors of the economy in NACE; A – Agriculture, forestry and fisheries; B – Mining and quarrying, C - Industrial production, D-E – Electricity, gas, water supply, etc.; F – Construction; G – Wholesale and retail trade, repair of motor vehicles and motorcycles; H – Transport and storage; I – Accommodation and catering services; J – Information and communication; K – Financial and insurance activities; L – Real estate activities; M – Professional, scientific and technical activities; N – Administrative and support services