Condemned to be left behind? Can Central and Eastern Europe emerge from its low-wage model?

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Introduction
Abandoning the FDI-based economic model driven by low wages

Béla Galgóczi and Jan Drahokoupil

The financial crisis marked a breaking point in the growth and development model of Central and Eastern European (CEE) middle-income economies. The period of high growth fuelled by external financing has apparently come to an end since the onset of the crisis in 2008, with the pace of convergence with the old EU members slowing significantly in a number of countries. The crisis has also exposed some structural weaknesses and vulnerabilities in these economies, earlier masked by high growth. These weaknesses have also called into question the role of foreign direct investment (FDI) as the main driver of modernisation and sustainable growth. At the same time, the crisis coincided with the end of a longer cycle marked by FDI expansion in Central and Eastern Europe linked to the opening up of the region and its subsequent EU accession. A former publication by the ETUI (Galgóczi *et al.* 2015) looked at the main FDI processes and patterns in both quantitative and qualitative terms, concluding that the 'golden era' of FDI was over: FDI flows from 2008 onwards have declined substantially in what seems to be more than just a cyclical effect. Questions were also raised in qualitative terms as to what extent FDI enables CEE economies to upgrade their position in the international division of labour, and to what extent domestic enterprises and in particular local SMEs are integrated into value chains.

The overall picture thus seemed to confirm the view that CEE middle-income economies need to redefine the future role of FDI and at the same time explore other growth engines in order to continue the process of convergence with the high-income countries.

The starting point for this work is the observation that since 2008 convergence in terms of GDP/capita has lost momentum, with convergence in nominal wages grinding to a standstill, overall growth rates far behind pre-crisis rates, investments collapsing and inward FDI flows lagging behind pre-2008 levels. The development of per capita GDP between 1997 and 2016 is shown in Table 1. It is not a simple or uniform picture and Poland seems to be the only country continuing to converge towards the EU-15 level at a similar pace before and after the crisis. It is also the country least dependent on FDI. For the rest of the four Visegrad[1] (V4) countries, as with all other EU CEE countries, the trend is generally still towards catching up, albeit not as rapidly as in the pre-crisis years. A trend break can well be recognised. While this does not prove that the FDI-driven strategy has run its course, it does raise questions about its lasting future potential. This needs to be assessed in a more detailed investigation of specific themes, taken up in the following chapters. It is also worth emphasising that FDI has been only one of the main growth drivers. Another has been EU funds, accounting for up to 5% of GDP in the

1. Poland, Czechia, Hungary and Slovakia.

last programming period (see the chapter by Ferry in this volume). One implication of this is that other (indigenous) growth drivers have played even less of a role, with their (declining) impact masked by this other benefit of EU membership. Another implication is that the eventual reduction in EU funding levels threatens a further slowdown in convergence, unless the resulting investment is well-used to develop future growth potential.

Table 1 **Gross domestic product at current prices per head of population, PPS, EU15=100**

	1997	2008	2016
Czechia	64.7	75.6	81.2
Hungary	43.1	56.3	63.6
Poland	39.6	50.0	64.1
Slovakia	44.3	64.4	72.6
Bulgaria	25.0	39.2	44.5
Estonia	34.4	61.9	69.1
Latvia	28.5	53.1	60.2
Lithuania	31.1	56.7	70.5
Romania	24.7	44.5	54.5
Slovenia	67.2	80.9	77.0

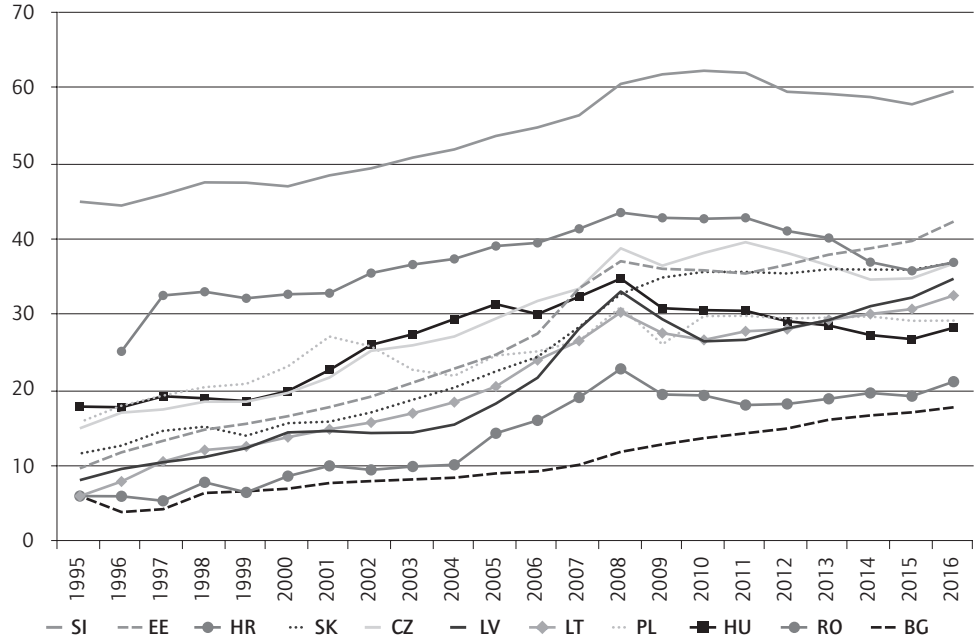
Source: AMECO (2017), http://ec.europa.eu/economy_finance/ameco/user/serie/ResultSerie.cfm

Figure 1 shows the development of nominal compensation on a Euro basis (most indicative for capital, labour and services mobility) for all CEE new member states (EU11) over the last twenty years. The trend break in 2008 is clear, and in certain countries (Croatia, Czechia, Hungary, Poland, Romania and Slovenia) wage convergence went into reverse gear. In most of the EU11, relative wage levels have hardly moved over the past decade (up to 2016), with only Estonia and Bulgaria the exceptions. At the same time, Bulgarian wages in 2016 were still just 17.7% of the EU15 average and, with the exception of Slovenia, wage levels of the rest of the EU11 were between 20% and 40% of this average. In this case, then, convergence has virtually ground to a standstill. Though the low-wage model was confirmed and continued, as indicated above, it was associated with slower convergence in real terms.

This publication follows up on the earlier one, focusing on the progress made towards developing future drivers of the economic catching-up process in Central and Eastern European transformation economies after more than 20 years of FDI-driven development. The geographical focus of this publication is generally on the Visegrad 4 (V4) countries, but in certain chapters covers the whole CEE region. The time horizon considered is the post-crisis period (2008 up to now), although longer trends are also looked at in individual cases.

Though academic studies and analyses conducted by international financial institutions have viewed and interpreted CEE growth prospects differently, they were generally bleak until 2015: e.g. 'convergence *to* Western European *growth rates* instead of *to income levels*', meaning that growth rates in the region tend to be aligned with the moderate EU-15 growth rates. This totally questions income convergence prospects (Podkaminer

Figure 1 **Average nominal compensation per employee in EU11 in % of the EU15 average (on EUR/ECU basis)**



Source: AMECO 2017, http://ec.europa.eu/economy_finance/ameco/user/serie/ResultSerie.cfm

2013). The World Bank (2014) used 'cloudy outlook for emerging Europe' as a headline for the region's growth prospects, emphasizing that 'in many countries of Central and Eastern Europe, the challenge is to finally put the economic crisis behind'. In early 2016 the IMF (2016) formulated its growth expectation for Central and South-Eastern Europe (CESEE), stating that: 'despite the strong cyclical rebound, growth in CESEE remains well below the pre-crisis level and the region is facing considerable challenges over the medium term'.

One of the most pessimistic interpretations of the region's growth and convergence chances is to be found in the cited study by Podkaminer:

> 'Of course, further progress can still be made even within the current growth model. Indigenous R&D sectors could develop in the CEECs, providing the CEEC economies with streams of unique technological innovations, creating scope for large-scale high value-added domestic production and employment. In the same vein, in some time perspective indigenous business classes could develop in CEECs to take advantage of new lucrative opportunities generated by the indigenous R&D. However, as things stand now, the CEEC R&D sectors are close to extinction, with the more creative personnel leaving for the United States or Western Europe, while production, banking and trade are firmly in foreign hands – as it used to be the case over a couple of recent centuries. Transition came much too late.'

Although the general tone has changed since 2016, questions about convergence and long-term sustainable growth prospects remain.

Concluding that the CEE region is off-track from its pre-crisis convergence trajectory towards advanced economy income levels, an IMF publication (2016) posed the question of how CEE countries could get back onto the fast convergence path. The main recommendations were to improve labour supply in terms of skills and in view of the demographic challenge; to boost investment, given that the per capita capital stock is still just one third of the Western European average; and to raise productivity by maintaining higher total factor productivity growth rates than advanced economies and by improving government efficiency. But the key question is whether this implies the need for a substantial shift from past policies and what priorities should be followed.

The McKinsey Global Institute (Labaye *et al.* 2013) proposed a new growth model for the CEE region that 'favours investment-led growth over consumption and increases the region's ability to finance its future growth and attract foreign investment'. Beside a continuing role for FDI, the report also emphasized that increasing the productivity of lagging domestic sectors would be necessary and that these economies need to improve their self-funding capabilities. 'Critical enablers' for a new growth model included investments in infrastructure, education and innovation, as well as regulatory and institutional reforms. Expanding high-value-added exports would be a pillar of sustained economic growth. At this general level, proposals like this have often been made, with policymakers speaking in these terms many times in the past. The question is how to bring it about in the context of a history of low public spending and wage levels that make it difficult to retain the most qualified people. What priorities need to be set and what policy changes are necessary?

In 2017 there were signs that the old model might still have some life left in it. There were indications of more dynamic economic growth in the region, with CEE growth in the first quarter reaching an annual 4.0% and with the forecasts for Hungary, Estonia and Slovenia being revised upwards. Some financial analysts were welcoming an era of new growth dynamics in the region. Multiple growth drivers were at play: first of all domestic consumption was helped by wage increases, low interest rates and tight labour markets; investments that were depressed since the crisis started to rebound primarily due to a more favourable cycle of EU investment funds; and FDI also seemed to pick up. Though this gives rise to a certain optimism, the drivers behind such a short-term revival in growth do not point to a return to sustained growth and convergence in the future.

Ernst &Young (2017) called the region 'competitive and attractive', pointing to signs of new dynamism in FDI. Based on an own survey conducted in 2016, it saw the CEE region showing a strong momentum in attracting FDI. Poland ranked fifth in the whole EU, attracting 256 projects, a 21% increase compared to 2015. Czechia had 110 projects (up 53%) and Hungary and Slovakia also achieved gains. The CEE region captured 23% of FDI projects but 52% of jobs, and attracted half of Europe's industrial FDI projects.

However, even with brighter short-term growth perspectives, it would be complacent to assume that the pre-crisis growth model is not in need of renewal to make catching up

with Western European developed economies a realistic perspective within a couple of decades. We need to take the following into account.

We certainly see a trend break in growth and convergence going beyond the prolonged cyclical effect of the crisis and the ill-designed crisis adjustment policies (see also the chapters by Hunya and Weresa in this volume). As far as FDI is concerned, the big wave of reorganising the division of labour in Europe after enlargement has come to the end of its cycle. Mass privatization programmes have finished and, in a number of countries, re-nationalisation strategies are even emerging (see also the chapter by Sass). Profit repatriation by foreign investment enterprises has become a major concern in the region.

In the wake of the crisis, the role of FDI was subjected to a critical rethinking with regard to the contribution of foreign investments to sustainable future growth, with a distinction being made between 'good' and 'bad' FDI. FDI focused on exploiting domestic markets (banking, retail, utilities) and possibly repatriating realised profits was seen as not welcome (Hungary and Poland have introduced specific taxes for these sectors), while FDI aimed at strengthening export capacities in mainly the manufacturing sector (automotive and ICT), but also business services, was seen as most welcome and enjoyed further support. At the same time, upgrading perspectives in terms of shifting activities by foreign affiliates towards higher value-added and more knowledge-intensive production became a declared policy focus, although, as the chapters by Ferry and Szent-Ivanyi show, without dedicated policy instruments and outcomes. Greater involvement of domestic suppliers in global value chains has also become a priority (as described in the chapter by Sass).

The economic model where the 'comparative advantage' of the region was based on low production costs (and thus wages) is no foundation for long-term development. The case of the automotive industry also demonstrates that the mostly low value-added subcontracting role played by the region in GVCs has reached its limits (Pavlinek *et al.* 2017). In Pavlinek's words, this model offers the perspective of 'truncated development'. With lower levels of FDI and with their limited and subordinated position in existing GVCs, CEE Member States need to embark on a more balanced 'high road' development model.

One of the major concerns in the CEE region is the existence of a dual economy featuring highly productive (mainly FDI-driven) export-oriented activities alongside mostly domestically-owned and domestic market-oriented sectors with low productivity (for the productivity gap between domestic and FDI-based sectors, see the chapter by Knell in this publication). This productivity gap is a hurdle for future development and catching up with developed economies. As Table 2 shows, the productivity divide between sectors of CEE economies is often greater that the productivity gap with Germany in the same sector. In Hungary for example productivity in motor vehicle manufacturing in 2015 was more than four times higher than in retail services, while German productivity in vehicle production was 'only' 2.4 times higher.

Table 2 **Labour productivity divide: apparent labour productivity in selected branches and countries ('000 EUR/employee)**

	Retail services		Manuf. of chemicals		Manuf. of motor vehicles		Info-communication	
GEO/TIME	2008	2015	2008	2015	2008	2015	2008	2015
European Union (28)	n.a.	26	n.a.	100	n.a.	77	n.a.	87
Germany	28.0	28.9	102.1	119.0	73.5	111.4	93.8	96.5
Czechia	13.5	14.2	34.7	50.9	29.0	44.5	57.6	48.1
Hungary	8.9	10.4	51.3	84.8	40.3	47.8	37.7	33.4
Poland	10.9	11.3	41.7	44.2	29.9	33.2	49.1	38.6
Slovakia	16.7	13.1	20.1	40.0	17.7	43.3	53.6	42.5

Note: Eu28 2015: 2014
Source: Eurostat (2017) Annual enterprise statistics (NACE Rev. 2) [sbs_na_sca_r2]
Apparent labour productivity is defined as value added at factor costs divided by the number of persons employed.

Table 2 also raises further questions that cannot be answered on the basis of available aggregate data. For example, productivity developments over time also suggest major differences among sectors and countries. Productivity in the automotive sector increased substantially between 2008 and 2015 in all V4 countries, and the chemical sector – a further sector benefiting from 'good' FDI – also performed well, with productivity greatly improving, especially in Hungary. On the other hand, in information and communication technology, productivity even decreased in all V4 countries between 2008 and 2015 – certainly not a sign of upgrading.

To enable sustainable convergence, the region needs more than just FDI: the quality and nature of FDI matters a lot and the huge productivity differentials within the CEE national economies need to be addressed.

This publication will address these issues in more detail, demonstrating the need for a comprehensive change in policies. The main issues to be dealt with are the following.

The chapters will discuss and analyse the state of play in terms of growth, investment, FDI and innovation capacity, matching this to convergence objectives.

The changing role of catching-up middle-income economies in the international division of labour is addressed by several chapters: How to generate more value-added content? Are there any signs of an 'upgrading' process, with corresponding government strategies emerging? What government policies on FDI are appearing, is the focus on attracting more FDI or more on upgrading local value added? What role do investment promotion agencies play and how are EU cohesion policy funds being used to promote sustainable catching-up? Are new developments in the strategies of multinational companies emerging? Does digitalisation and the concept of industry 4.0 involve new strategic approaches affecting the role of peripheral economies and supplier networks? Is the indigenous SME sector taking up the challenge in international competition and is it able to play a decisive role in the supplier networks of existing multinationals? Are locally-based multinationals emerging?

The role of innovation, R&D /public and private/ and human capital is also discussed in detail.

1. The end of the FDI-driven model

The chapter by *Gabor Hunya* takes a detailed look at the macroeconomic development of the CEE countries after the crisis, with an emphasis on investment and growth drivers.

Household consumption is currently the main growth driver in the EU-CEE (wiiw 2016), while within the V4 this was the case in Hungary and Poland. In Czechia and Slovakia by contrast, investment spending was the largest contributor to growth. Future economic growth is dependent on the ability to increase productivity and investment, regardless of whether the latter is foreign or domestic.

EU-CEE countries import capital not only in the form of FDI but also as transfers from EU structural funds, a source used to finance investments mainly in infrastructure but also in the private sector. The chapter compares these two major sources of foreign investment for financing projects in the EU-CEE.

Backed by data, the author shows that the current new wave of economic growth in the EU-CEE relies on more than just FDI. The ratio between gross fixed capital formation (GFCF) and value added (GDP) – the investment rate – started to recover in 2015 after a long period of decline, although pre-crisis rates are still out of sight. The share of new investment (net capital formation) in total investment in capacity expansion was higher in the CEE region than the EU-28 average (15%), being above 40% in Poland, around 20% in Hungary and Czechia, but below the EU average in Slovakia.

The author notes however that while any investment growth contributes positively to the GDP of a given year, the longer-term income generated by such investment will determine whether it promotes sustainable growth.

In terms of external investment financing, the chapter provides a balance of payments analysis discussing the balance of the capital account (including transfers from EU funds and from international financial institutions) and that of FDI as recorded on the financial account. Prior to the financial crisis, the EU-CEE was the target of soaring FDI inflows, while EU transfers remained rather small. The relationship between the two external financing channels changed after the crisis, with FDI decreasing and EU transfers allocated for the 2007-2013 financing period starting to flow. The two types of external financing differ a lot in their content. Capital transfers primarily finance infrastructure and other public investment projects or support SME development. FDI funds, on the other hand, generally flow to large private businesses.

FDI inflows recovered in 2016, reaching their highest level since 2008, primarily due to high inflows to Czechia, Hungary, Croatia and Romania (Hunya 2017). The 2016 recovery is in line with generally improving business sentiment and demand conditions throughout the European Union and is expected to continue in 2017.

The amount of FDI stock as a percentage of GDP is the highest in Bulgaria and Hungary, followed by Czechia and Slovakia (for 2015: 83, 70, 62 and 51 per cent respectively). In 2014 foreign penetration in terms of value added reached 53% in Hungary, more than 40% in Czechia, Romania and Slovakia, and less than 30% in Croatia, Poland and Slovenia. What is more important however is to compare the four foreign penetration indicators used in FATS. In terms of production value, Slovakia has a similar share of foreign affiliates as Hungary, namely close to 60%. But in terms of value added, the Hungarian figure is 10 percentage points higher. In fact, Slovakia has the biggest discrepancy between the shares in terms of production and value added, indicating that it specializes in assembly work with a high imported content. In Poland, foreign shares in value added are higher than in production, making it the most diverse economy, with much domestic sourcing.

A big decline in Hungary in the share of foreign corporate investments in 2013 and 2014 indicates the rising investment activity of domestic companies which enjoyed preferential treatment in the distribution of EU funds. By contrast, special taxes levied on part of the foreign-owned sector (retail and utility companies) decreased profitability and thus the funds available for investments. Alone among the countries under survey, the post-2010 Hungarian government has introduced several measures negatively discriminating against various foreign-dominated economic sectors engaged in non-tradable services. This has prompted certain investors to leave the country, and domestic ownership now dominates in the financial sector and utilities. At the same time, multinational companies signed so-called strategic agreements stipulating government support for additional investments in manufacturing and business services, for R&D activities and job creation. Selective benefits provided to certain domestic companies have engendered market segmentation and are giving rise to increasing cronyism. Nevertheless, the figures on foreign penetration do not show any decreasing role of foreign affiliates in the Hungarian economy as a whole.

As regards other external investment sources, project financing from the European Fund for Strategic Investments (EFSI) under near-market conditions may be less advantageous for EU-CEE countries than taking out a grant from the European structural and investment funds (ESIF), despite the delayed project financing. Regardless of this aspect, EFSI funding seems to be biased towards the EU core countries, an issue needing to be addressed in the future. As of August 2017, V4 countries were involved in a total of 25 projects, compared with 28 in Germany and 14 in the UK (EIB 2017).

The author concludes that the current investment mix can support average economic growth of about 3-4% in the EU-CEE, higher than in the past ten years, though still far below that preceding the financial crisis. Although more capital inflows – and especially FDI – may further accelerate growth, the pre-crisis years have taught the lesson of overheating. The conclusion of this chapter is that EU-CEE countries can expect to be on a more balanced albeit slower growth path in the years to come.

Based on a literature review and regional political debates, *Magdolna Sass* presents FDI-based models of the V4 countries and examines how the perceptions and policy objectives regarding the role of the local subsidiaries of multinational companies

has changed recently. The author then provides a reality check, looking at to what extent FDI-related policies have indeed changed and how domestic economies are performing.

The problem of convergence is of paramount economic and political importance for the V4 countries. Disenchantment with the performance of MNC subsidiaries in driving growth in the V4 economies and contributing to their catching-up with the core EU countries can be seen in all four countries. Furthermore, after the short inward FDI 'honeymoon', the crisis years showed that certain forms of FDI increased the vulnerability of the economies in question. In the ensuing low-FDI post-crisis environment with increased profit repatriation, the 'dark sides' of being exposed to foreign capital were witnessed in the region.

In this environment, V4 governments are increasingly looking to other potential candidates to drive their economic growth. The rhetoric has changed, with a differentiation increasingly being made between 'good' and 'bad' FDI. Efforts have been made in V4 countries, especially Hungary and Poland, to prioritise domestic capital accumulation. However, the generous incentives for and the good treatment of subsidiaries already operating in these countries, especially in export-oriented manufacturing industries, have not changed considerably.

Looking for evidence of this changing political and economic climate, the author looked at the OECD FDI regulatory index, finding that, up to 2015, apparent anti-FDI attitudes did not seem to have materialised in regulatory terms in the analysed countries. The data shows that, with the exception of Slovakia, FDI regulatory restrictiveness decreased in the Visegrad group between 2006 and 2010 and plateaued (with the exception of Czechia) between 2010 and 2015. However, compared with other countries examined by the OECD, the V4 countries still offer an outstandingly liberal FDI climate.

Otherwise very similar, V4 countries differ in terms of changes in their approach to FDI and in ways to help domestic enterprises catch up. The chapter shows that successful alternatives to foreign-owned subsidiaries are scarce, with no common pattern identified. Hungary (and Poland) seem to be the most active countries in trying to reduce the share of and reliance on foreign-owned companies in certain sectors of the economy. In search for alternative 'growth engines' the author looks at the share of state-owned enterprises, large domestic companies, regional multinationals and the SME sector in the V4 economies (in terms of output, productivity and employment). Hungary has a small group of strong regional multinational companies, dominating a few industries, while Czechia and especially Poland have a relatively high number of domestically-owned large companies. In terms of productivity, all enterprise categories have significantly lower levels than the EU28 average, with smaller enterprises lagging more. The data shows no significant differences between individual V4 economies, although Czech micro- and medium-sized and Polish and Slovakian small-sized firms were somewhat more productive than the rest in the group. However, up till now, none of these groups of companies have come to the fore, whether as subjects of economic policy or in economic performance.

The chapter also provides a comparative overview of outward foreign direct investment (OFDI) in the V4. While this country group is the most active in OFDI within the new member states, it remains much behind the OECD average. Detailed analysis also shows that, with regard to current OFDI, two factors play an important role: cross-border investments by foreign subsidiaries and OFDI by domestic enterprises in tax havens for tax optimisation.

Although there are some signs of change, with certain enterprise groups other than foreign subsidiaries making advances, the search for non-FDI growth drivers yields no convincing result.

2. Competitiveness: Low R&D intensity and missing innovation capacity

The chapter by *Marzenna Anna Weresa* examines how the competitiveness of V4 countries developed over the post-crisis 2008-2015 period and how these changes related to innovation and human capital development in the context of a digital world. The author presents a comparative overview of the main economic and social performance indicators of the V4: GDP/capita, productivity, human development index (HDI), the digitalisation of the economy and society index (DESI) and the Global Competitiveness Index (GCI) calculated by the World Economic Forum. While Czechia shows the best results among V4 countries in the majority of competitiveness indicators analyzed (GDP/capita, HDI, GCI and DESI), since 2008 GDP/capita convergence for the V4 has been rather limited and, except for Poland, productivity in the region has not improved. Looking at the V4's digital economy and society performance, the whole region lags behind the EU. The main picture emerging from the review is that low labour costs remain the main base for competitiveness in all V4 countries – a base no longer sufficient to keep up with other emerging economies and to catch up with developed countries.

The chapter also examines the V4's innovation capacity and performance, using average innovation performance as measured by the Summary Innovation Index. EU member states have been divided into four different performance groups: innovation leaders, strong innovators, moderate innovators and modest innovators. All V4 countries are below the EU average, being ranked in the category of moderate innovators with a stagnating or deteriorating trend since 2008. Nevertheless, detailed data still indicates certain niches where V4 countries perform well, e.g. 'youth upper secondary education'. The author also observes that all V4 countries base their innovation performance primarily on non-R&D expenditures. In all V4 countries, this indicator is above the EU average, while both public and private R&D expenditures in relation to GDP are much below the EU averages. The author concludes that the role of innovation in shaping competitiveness in V4 countries remains limited.

The main barriers preventing the V4 countries from switching to a new competitiveness model based on skills and innovation are: too low R&D levels (including business R&D); inefficient links between science and business; barriers to knowledge diffusion and learning processes; and the insufficient development of digital skills (for further details see also the chapter by Knell).

Therefore, a long-term economic policy challenge for the V4 countries is to create a framework for achieving competitiveness through innovation and digitalization. These goals can only be achieved when a broader institutional environment is addressed by appropriate policy measures. Further institutional changes are needed, including reforms in the education and science sectors and support for entrepreneurship and establishing start-ups. Innovation should be enhanced as a primary driver of V4 competitiveness. The expansion of innovative companies requires reforms in the R&D sector, the introduction of new policies aimed at boosting business R&D as well as the injection of additional funds, and in particular higher investment in knowledge diffusion. The latter can be eased by incentives for venture capital market development. Improvements in innovative capacity should be supported by cluster development, including the strengthening of local supplier networks around foreign investments. Building innovation capacity is a cumulative, path-dependent activity that generates technical change, investment in new capacity and is very much a network-based activity (see also the chapter by Knell). It is also a complex and diverse activity that involves interaction between users and producers, and between companies and other organizations, engendering different patterns of technological accumulation and innovation depending on the learning structure. The chapter by Martin Ferry points also to the fact that even if a substantial share of EU cohesion policy funds is earmarked for innovation, V4 countries use these funds mainly for hardware and infrastructure investments, but not for enhancing their innovation capacity.

Looking at the internationalisation of R&D and innovation processes, the chapter by *Mark Knell* examines to what extent technology transfer contributes to economic growth and to convergence in the CEE region.

Foreign direct investment (FDI) can facilitate the cross-border transfer of a variety of resources, including R&D and innovation, with the potential of significant positive *spillovers* to the local economy.

R&D intensity is generally very low in the V4 group: in 2015 total R&D spending accounted for between 1.4% and 1.9% of GDP in Hungary and Czechia, and just 1.0% to 1.2% in Poland and Slovakia, while the EU 2020 target is 3% (see also the chapter by Marzenna Weresa in this volume).

Within this very low R&D intensity, business enterprise research and development (BERD) accounts for a significant share, the majority of which is driven by foreign investment. Nevertheless, the V4 has played only a marginal role in attracting foreign research and development (R&D) targeting the creation of new local competences.

R&D activity by foreign enterprises (inward BERD) is important for all four countries in the V4. In 2013, foreign enterprises accounted for almost three-quarters of BERD in manufacturing, or about €1.7bn, of which Czechia and Hungary had a share of more than two-thirds. While inward BERD increased significantly in all countries between 2009 to 2013, there appears to be little or no growth in domestic R&D activity in any of these countries except Poland.

An international comparison of R&D-related FDI shows that, despite increases in the last couple of years, the CEE region has a marginal share in global R&D-related FDI flows, indicating that FDI to the CEE region has a low R&D intensity. This intensity is largely dependent on sectoral patterns, with the dominant automotive industry characterised by medium R&D internationalisation. This follows a predominantly demand-driven strategy, as the industry tends to adapt products to satisfy local customers' preferences. In Europe, Germany accounts for two-thirds of total European R&D activity in the industry, while R&D-related FDI in the CEE region consists of secondary R&D activities with the main aim of adapting products to local markets. Even with this subordinated role, 90% of BERD in the CEE automotive industry is of foreign origin.

Going beyond R&D, the chapter also examines innovation in domestic and foreign enterprises based on an international innovation survey, classifying them as innovative or non-innovative. An innovative enterprise is one that introduced new or significantly improved goods or services or a new or significantly improved production process, distribution method or supporting activity between 2012 and 2014. The data confirms that the majority of enterprises with a head office abroad tend to be more innovative than domestic ones. Czechia appears to be the most innovative of the V4 countries, followed by Poland, Hungary and Slovakia.

When examining innovation networks, Germany appears to be the central node, with extensive interaction between it and its neighbours France, the Netherlands, Switzerland and Austria. This observation confirms the analysis of Scherngell (2014) that almost all European R&D activity is located in the centre of Europe, leaving very little in the periphery. Stehrer and Stöllinger (2015) suggest that European manufacturing is becoming increasingly concentrated around a Central European manufacturing core, centred in Germany but including Austria and the V4.

Multinational enterprises can transfer technology to the V4 in two ways: (1) directly, or internally, to local affiliates under their ownership and control; and (2) indirectly, or externally, to other firms in the V4.

The R&D intensity of a country determines its capacity to assimilate technical knowledge. The policy implication is that the V4 should continue to foster its indigenous R&D capability by creating and consolidating domestic research centres and networks, and also by making greater use of available EU funds.

The chapter by *Andrea Szalavetz* investigates the impact of new disruptive technologies, referred to as 'Industry 4.0', on the current geographical configuration of value chains from the perspective of FDI-hosting intermediate-level 'factory economies'. For factory economies – which according to Baldwin's typology provide labour input to international production networks –, the implications of certain Industry 4.0 technologies may represent a threat not only to future upgrading opportunities (in the field of manufacturing-related process development), but may also jeopardise prior upgrading achievements that could become digitalised through the new technology (e.g. production planning and scheduling).

Reviewing recent literature, the author sees the main challenge in how GVC headquarters realign their strategic locational choices to the emergence of the new manufacturing technologies: whether they keep their existing manufacturing facilities and upgrade them through installing Industry 4.0 technologies (*retention*); consolidate and concentrate manufacturing activities in specific locations (*selection*); or re-shore part of the activities, and at the same time establish new facilities, and/or outsource certain tasks (*reconfiguration*).

The main section of the chapter discusses possible developments associated with selected Industry 4.0 technologies based on interviews in a sample of MNC manufacturing subsidiaries in Hungary in the automotive and electronics sectors.

The author concludes that, in the short term, (beneficial) *retention mechanisms* have prevailed over such harmful scenarios as *specific location selection* or a *reconfiguration* option for the value chain. It remains to be seen, however, whether medium- and longer-term reconfigurations of GVC architectures triggered by technological change will reinforce or rather mark down these initial developments.

The main policy implication of the results is that immediate action is needed to reform education systems in factory economies. Delays in boosting the supply of adequately skilled workers and in aligning training with skill demands may eventually hinder the adoption of advanced manufacturing technologies, leading to activities being relocated. As one of the interviewees remarked, 'We badly need "vocational schools 4.0", where future workers are educated to use modern technologies, and will possess, at least, some basic programming skills.'

The author concludes that it is not technological progress in the field of Industry 4.0 per se that may hit factory economies hard: the lack of human capital coupled with a rigid education system would make them losers in the digital transformation of manufacturing. In addition to education (e.g. improving IT literacy and promoting lifelong learning) and public awareness-raising programmes, government policy should promote overall Industry 4.0 readiness by several means. The first is strategic planning: the elaboration of country-specific and indeed industry-specific Industry 4.0 development plans. Another general policy recommendation is to encourage companies to *use* the data generated by their state-of-the-art production systems, i.e. developing capabilities in data analytics. This would ensure that investment in Industry 4.0 technologies indeed results in improved productivity and resource efficiency.

Finally, policy should promote players' participation in European Industry 4.0 initiatives related to research, pilot programmes and demonstration projects. However, success in attracting and retaining 'good' FDI would clearly depend on addressing the problems related to human capital and education without which the CEE region's chances must be judged small.

The starting point of the chapter by *Martin Ferry* – in line with the overall objective of this book - is that the CEE region is facing a paradigm change, as its earlier 'comparative advantage' stemming from low production costs cannot provide a foundation for long-

term development. With the decline in their FDI levels and with their limited and subordinated position in existing GVCs, CEE Member States need to embark on a more balanced 'high road' development model. At the same time – as previous chapters of this book also show – CEE economies are low performers in the development of indigenous technological capabilities, as demonstrated by stagnant or even falling research and development (R&D) expenditures and a low innovation propensity.

The chapter assesses the extent to which EU Cohesion Policy (CP) addressed this development challenge in the CEE region during the 2007-2013 period: what did it achieve in strengthening innovative capacities and development potentials in these countries?

The 2014-2020 period is set to be the final phase of substantial CP transfers to the CEE region, and this programming period has an increased focus on innovation support. CP allocations to R&D and innovation, ICT, SMEs and a low-carbon economy show an increase of 6 percentage points in less developed Member States to 35 percent of total funding in 2014-20. Yet entrepreneurship, innovation and ICT policies are only effective when the region is endowed with human capital.

Evaluation evidence indicates that across the CEE region, EU innovation support in the period 2007-2013 was largely focused on 'hard' capital investments (the purchase of technology, new machines, new infrastructure etc.) rather than investment in the development of indigenous innovation capacities.

Up to now, 'innovation' has often been defined broadly to allow spending on infrastructure. There is a similar focus on research infrastructure, technology parks, research centres and buildings or fixed assets. This can absorb investment and is beneficial in boosting 'demand side' growth and higher consumption. However, there are sustainability issues, as infrastructure will have to be maintained after CP investment ends. Moreover, this approach means that less emphasis is put on 'supply-side' impacts that arise through the gradual build-up of 'stocks' of infrastructure, human capital and R&D.

The chapter shows that most progress in the CEE region's absorptive capacity has been made in strengthening capacity for procedural or operational compliance with Commission regulations and requirements, especially financial management and control. This has not been matched by progress in strategic development and policy learning. CP funding is often spent according to short-term considerations, responding to either urgent problems or political considerations rather than to long-term strategic development. Thus, CP innovation funding, in principle supporting the development of strategies and instruments based on partnership, the mobilisation of local stakeholders (including private players), decentralisation and bottom-up approaches, can be subsumed into a system that formally complies with EU regulations and procedures but in reality reflects traditional, hierarchical, redistribution and subsidy allocation patterns. This undermines the development opportunities offered by CP.

The author concludes that a key challenge in optimising the benefits offered to the CEE region by CP innovation support is to ensure sufficient investment in management

capacity. This applies to administrative capacity building for programme managers and stakeholders, particularly at sub-national levels.

3. The role of investment promotion and SME support

The chapter by *Balazs Szent-Ivanyi* analyses the challenges that investment promotion policies face in the V4 countries in the 'post-FDI' age. These challenges include the changing competitive advantages of the V4, the questionable nature of the long-term development impacts of FDI, and the changing nature of the business models adopted by multinationals. The main finding is that investment promotion policies in the region have only partially adapted to these. Despite some changes, like targeting higher value-added investments, these policies are still very much 'stuck in the past' and influenced by the legacies of the 1990s, remaining focused on generating new, large investments, primarily in the manufacturing sector. The author sets out policy recommendations for the V4 governments to better align their policies with the changing environment. Some of these, like improving the effectiveness of targeting policies or investing more in aftercare services, are within the realm of traditional investment promotion, and show how this policy area still has relevance in the post-FDI age. Many policies however are outside this realm, and the chapter argues that these have been neglected due to an excessive focus on FDI promotion. Industrial policy, education and innovation support are all policies which need a new lease of life in the region. Concrete policy proposals put forward by the author include the following.

Investment agencies should not only focus on attracting new FDI but should promote the upgrading of existing investments through aftercare and incentives.

The agencies should focus more on promoting linkages between foreign subsidiaries and domestic suppliers through specific 'supplier programmes' that boost spill-overs.

Support to SMEs for technological modernisation and R&D, but also focused on promoting foreign market entry with non-FDI modalities.

The chapter by *Zhelyu Vladimirov* examines the effects of EU industrial policy on small and medium-sized enterprise (SME) development in the new Member States (NMS) from Central and Eastern Europe. In a detailed analysis, the author identifies significant differences between the SME landscapes in the new and the old Member States, pointing out that SMEs in the NMS are younger, have less experience with internationalisation, and often work far from the technological frontier. A key section of the chapter is devoted to the role of SME clusters. Referring to academic literature, the author argues that improving SME performance will best succeed via cluster building, either in local clusters or in GVC-linked ones. As shown by the literature and case examples, SMEs in the CEE region face huge barriers in both forms of cluster building. In particular, captive inter-firm linkages in GVCs do not support SME upgrading as these are driven by the dominance of lead firms which provide just enough resources and market access to the subordinate firms to make exit an unattractive option.

He goes on to argue that the effects of an EU SME development policy applying uniform requirements to enterprises operating under unequal conditions leads to the reproduction, or even deepening, of the existing inequality. The chapter shows that the EU initiatives for SME clustering and participation in global value chains (GVC) have not sufficiently contributed to improving SME competitiveness in Eastern European countries. The participation of SMEs from these countries in GVCs is concentrated predominantly in labour-intensive, low value-added manufacturing and services activities, while in many cases project priorities favour existing clusters.

The weak technological capabilities and the lack of state support explain why CEE SMEs are less prepared to follow innovation-based EU policies under the 'industrial renaissance' concept. The NMS face significant challenges, with major weaknesses in innovation capacity and knowledge transfer, as they move towards more knowledge- and skills-oriented industries. Additionally, changes in the MNC approach to local suppliers (selecting and sticking to a few 'half-tier' suppliers) is limiting the impact on the host economy and on host country suppliers.

The author raises the question whether unconditional government support for FDI is justified or whether government resources could not be better used on more proactive policies aimed at building up *local industrial structures*. The identified low level of technology transfer from MNCs to local suppliers undermines one of the main policy arguments in favour of host governments encouraging FDI. CEE industrial policies will have to be *modified* to improve CEE positions in GVCs, for example by measures facilitating the inclusion of SMEs in the early (research, conception and product design) and final (sales, marketing and distribution services) stages of GVCs.

The chapter concludes that improving SME innovation capacity in CEE countries would require a *mix of policies* specifically addressing these local challenges rather than a single policy instrument for the whole EU, as it is currently the case.

CEE SMEs should be supported by *policies* oriented towards both improving the institutional environment and developing innovation capabilities. It is not enough to transpose EU directives into national legislation, as many CEE countries need additional measures to enforce this legislation. Moreover, support for SME innovativeness should be concentrated more on *innovation capacity development* rather than on immediate innovations. SMEs need simultaneous dual support – *for innovation itself and for their capacity to undertake innovation*. Therefore, accelerating the catching-up process in CEE countries presupposes the implementation of policies devoted primarily to *industrial upgrading, the adoption of new technologies and skills development*. Such policies were applied as state aid, regional cohesion and trade policies in advanced EU countries 10 or 20 years ago.

4. Conclusions

The concluding picture emerging from the chapters is rather bleak. They discuss the ongoing paradigm change in the CEE growth model from different angles, including the role of FDI and investment in general, digitalisation, upgrading and spill-overs to domestic economies, innovation and R&D, making use of EU cohesion policy funds, SME support and investment promotion.

Economic growth has picked up in the last two years, and investment has started to grow again, with FDI and EU funds playing the key role, suggesting that there is still some life in the old model. There is however not much evidence that the region is about to embark on a qualitative shift in its growth model. Both public and private R&D are among the lowest in the EU, innovation propensity is low and the region's high rate of internationalisation in production networks is not matched by a high internationalisation of R&D and innovation. Labour shortages and the scarcity of skilled labour are limiting economic development perspectives, and the region does not seem prepared for the digital age.

One finding common to four chapters of this publication as an obstacle to a high road development path is the lack of innovation capacity. This intangible factor, consisting mainly of the quality of institutions, networks between both domestic and international business and research, and human resources, cannot be addressed successfully without a coherent policy approach. It depends not only on private-sector players, but also on public-sector provision of education, skills development and research support, alongside support for the financing and development of innovative businesses. EU funds specifically targeting innovation have – as yet – mainly been used to install and upgrade hardware instead of raising the innovation capacity of players and institutions, reflecting the ancient development policy dilemma: 'give a man a fish or teach him to fish'.

The main picture painted in the review of competitiveness indicators is that low labour costs remain the main base for competitiveness in all V4 countries. This is no longer sufficient to keep up with other emerging economies and to catch up with developed countries.

The evidence from aggregate data on GDP and wages, shown in Table 1 and Figure 1, point to a slowdown in convergence. The evidence displayed in the following chapters shows more clearly that the competitiveness model based on low costs (above all for labour) clearly reached its limits after the crisis. Low wages cannot compensate for a lack of research activity and for low levels of innovativeness. In fact, higher wages might be important for retaining the necessary skilled employers and for encouraging MNCs to transfer higher value-added activities into these countries. However, wage increases are not sufficient preconditions for a sustainable high-road development path. Though the process of departing from this 'truncated' development model may already have started, where the journey is heading for and how long it will take remain unknown. No breakthrough or paradigm shift is yet on the horizon, though there are a few encouraging signs, such as higher growth and investment rates, growing R&D internationalisation in the V4, anecdotal evidence of the strengthening of domestic economic players in some

countries and in certain segments of the economy. Some countries are also doing better than others (Czechia in most of the examined indicators, Hungary in higher value-added levels in manufacturing and some progress in R&D intensity and internationalisation). None, however, have shown more than the first signs of a new dynamism and they remain unlikely to do so until they address the need for a comprehensive policy change to create innovation-based economies. Continued FDI can make a big contribution, but not if it is FDI encouraged by, and seeking no more than, a source of cheap labour to undertaken simple and routine tasks.

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Chapter 1
Conditions for an investment revival in Central and Eastern Europe

Gábor Hunya

1. Sustainable economic growth hinges on investment

Following setbacks in the wake of the global financial crisis and the euro crisis, economic growth recovered in most Central and Eastern European EU (EU-CEE) member states in 2015. But was this a one-off event and what are the prospects for the future? The more general question is how to make economic growth more dynamic and sustainable under the 'new normal' of sluggish global demand and high perceived risk in the financial sector? Consumption was depressed in the aftermath of the financial crisis and negatively impacted investment, but started to recover in 2015 in several countries, with investment slowly following suit. While household consumption is currently the main growth driver in the EU-CEE (wiiw 2016), future economic growth depends on the ability to increase productivity and investment. Both foreign and domestic investment may make recovery sustainable and help the EU-CEE in its efforts to catch up with the EU15.

The main factors affecting investment levels include the size and dynamism of markets, the business environment and the terms for financing investments. Provided foreign markets and domestic household consumption expand, investment in extending production capacities will be necessary to meet increased demand. In the case of investment-generated growth, investment boosts productivity, allowing wages to increase and in turn boosting domestic demand. Further, investments may improve the infrastructural network and drive technological progress, allowing for further productivity increases. In addition, increasing external demand may pull investment, in particular if exports grow on the basis of improved competitiveness. FDI and multinational supply chains can play a specific role in this process. Production networks of multinational enterprises (MNEs) provide access to markets, enhancing the specialization and integration of EU-CEE economies. They can also drive technological progress and foster competitiveness.

Beside demand constraints, financial constraints are also important determinants of investment levels. Domestic and foreign companies can finance investments by tapping capital and credit markets or relying on retained profits. Before the financial crisis, capital was abundant in Europe and flowed generously to the CEE region in the expectation of high returns. Large FDI inflows functioned as growth engines in the host economies, meeting expectations and improving profitability. However, the financial crisis and the euro crisis shook the European banking system, cutting or even reversing the credit flows used to finance the investment boom. While cheap credits available in the wake of the ECB's policy of very low policy rates have made capital abundant again,

the risk aversion of investors in the real sector prevented any surge in investment until demand for goods and services increased, and no recovery of FDI inflows to EU-CEE economies was registered until 2016.

EU-CEE countries import capital not only in the form of FDI but also as transfers from EU structural funds, a source used to finance investments mainly in infrastructure but also in the private sector. This chapter compares these two major sources of foreign investment for financing projects in the EU-CEE. While EU transfers constitute public money for public and private investments, FDI represents solely private investment.

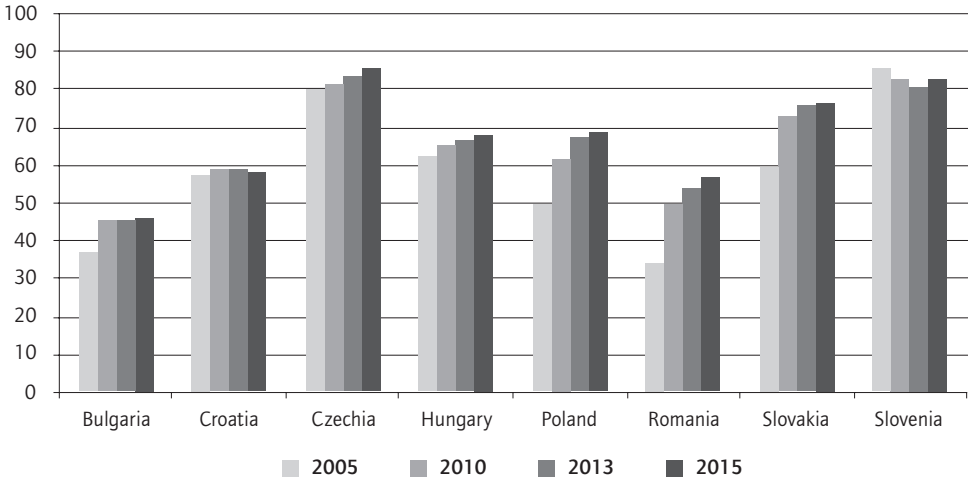
We take a macro-economic look at the foreign financing of investments (gross fixed capital formation). The approach is thus more limited than in those lines of research that explore the relationship between economic growth and capital inflows in general (Cardarelli *et al.* 2010, Ghosh *et al.* 2011). The findings of Aizenman *et al.* (2013) are especially insightful in this context: 'The relationship between growth and lagged capital flows depends on the type of flows, economic structure, and global growth patterns. We find a large and robust relationship between FDI – both inflows and outflows – and growth. The relationship between growth and equity flows is smaller and less stable. Finally, the relationship between growth and short-term debt is nil before the crisis, and negative during the crisis.' This and other econometric studies confirm that FDI and other equity inflows discussed in the current paper are the most important forms of capital inflows from a development point of view.

This chapter analyses one by one the main datasets on gross fixed capital formation, EU transfers, FDI inflows and cross-border greenfield investment projects (whereby EU transfers and FDI inflows feature in the balance of payments). As regards FDI, we use data based on the directional principle, as far as possible excluding transactions of special purpose entities and capital in transit in accordance with the IMF balance of payments manual BPM6. The chapter also explores the Financial Times FDI Market database to interpret greenfield investments.

The countries covered in this analysis are eight Central European EU member states (EU-CEE excluding the Baltics), namely Bulgaria, Croatia, Czechia, Hungary, Poland, Romania, Slovakia and Slovenia. While having several characteristics in common, they also have distinct ones. All are below the EU-28 average in terms of per capita GDP at purchasing power standards (PPS) (Figure 1). Six of them caught up with the EU average to various degrees between 2005 and 2015, while two fell back (Croatia and Slovenia). Croatia has been macroeconomically under pressure for a long time, while Slovenia became victim to the Euro crisis and only started recovering in 2015.

The analysis in this chapter mainly covers the 2010-2015 period. Considering the pre-crisis years as inconsequential, it focuses on the brief recent recovery period which was itself interrupted by the euro crisis. A forward-looking assessment of economic growth and investment based on preliminary 2016 data also allows certain future growth patterns to be forecast – with or without a recovery of FDI in the region.

Figure 1 **GDP per capita at PPS in % of the EU-28 average**



Source: Eurostat

2. The investment rate started to recover in 2015 after several years of decline

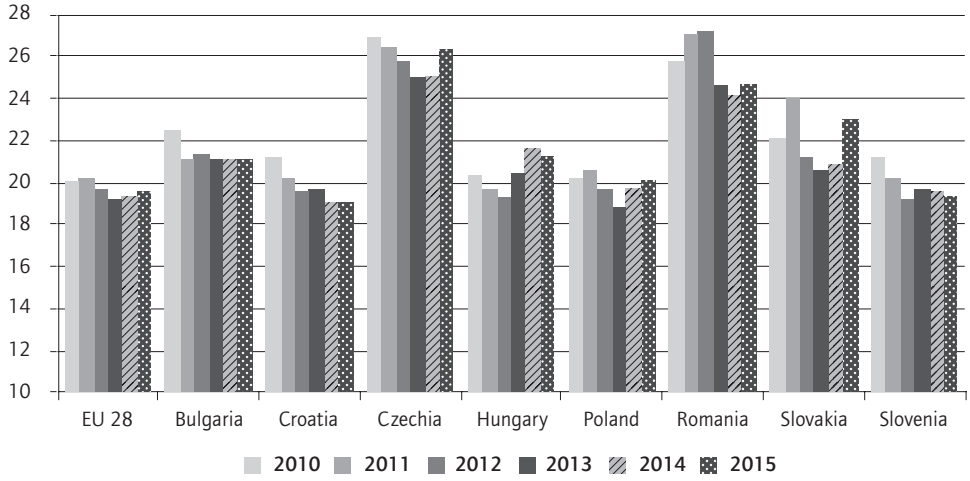
The gross fixed capital formation (GFCF) to value added (GDP) ratio indicates how much of total factor income is invested in fixed assets. It is given in gross terms as it includes both replacement investments (depreciation) and new additions to the capital stock. GFCF consists of resident producers' acquisitions, minus disposals, of fixed tangible or intangible assets. This covers in particular machinery and equipment, vehicles, dwellings and other buildings.'[1] The change in the investment rate reflects the expectations of economic agents regarding future market developments. If economic agents are not confident about their future output, they will not invest in fixed assets. Expectations can be self-fulfilling, as less spending on fixed assets would dampen the market for the producers thereof.

GFCF as a share of GDP was relatively high in the EU and especially in the CEE region before the financial crisis, mostly in the range of 25-30% of GDP; it was somewhat lower than 25% in Hungary and Poland and above 35% in Bulgaria and Romania in 2008. The investment rate declined to about 20% during the 2009-2013 crisis period, with only Czechia and Romania above 25%; it has since moved slightly upwards in some countries (Figure 2). The lowest rates, just below 20%, were found in Croatia, Hungary, Poland and Slovenia. With rates in Poland and Hungary recovering recently, only Croatia and

1. Eurostat definition; in detail: 'Gross fixed capital formation - GFCF (ESA95, 3.102) consists of resident producers' acquisitions, less disposals, of fixed assets during a given period plus certain additions to the value of non-produced assets realised by the productive activity of producer or institutional units. Fixed assets are tangible or intangible assets produced as outputs from processes of production that are themselves used repeatedly, or continuously, in processes of production for more than one year. Disposals of fixed assets are treated as negative acquisitions.' http://ec.europa.eu/eurostat/cache/metadata/en/nama_esms.htm

Slovenia under-performed, with investment rates below 20% in 2015. This pattern of change is in line with the boom-or-bust cycle of economic growth, indicating that investment levels react more to a crisis-related drop in demand than to the production of value added.

Figure 2 **Gross fixed capital formation in % of GDP**



Source: Eurostat

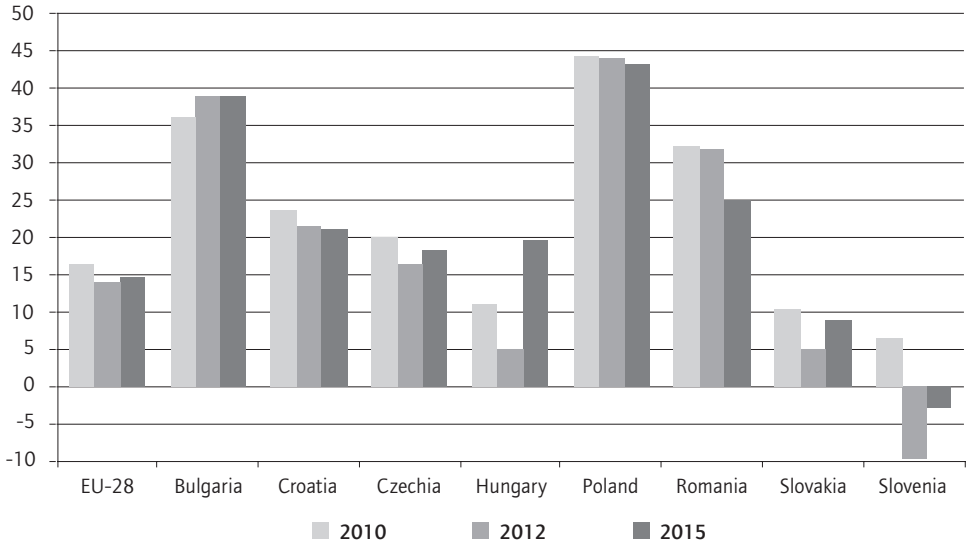
The majority of countries reported higher investment rates in 2015 than the year before, mainly on account of higher EU transfers. Hungary reported a recovered rate in 2014 on account of a jump in EU transfers, though a marginal correction took place in the subsequent year. The recovery did not persist in the following year, when the inflow of EU funds dropped throughout the region. Access to funds from the 2007-2013 financing period became unavailable in 2016, while access to funds under the 2014-2020 financial framework was only at its inception.

Typical long-term country differences between investment levels are noted. Czechia and Romania have had the highest investment rates in each year since 2010, the reason for which is not obvious. High investment rates can be associated with high saving rates of the Czech population and savings transferred by Romanians working abroad. The persistently low investment rate in Poland did not hinder positive economic growth throughout the post-crisis period, while similar rates in Hungary can be interpreted as crisis symptoms contributing to sluggish economic growth.

Deducting consumption of fixed capital (depreciation) from the GFCF, we arrive at net fixed capital formation (Figure 3). The higher the share of net versus gross, the more investment is spent on expanding capacity. While only 15% of GFCF was spent on net capital formation in the EU in 2015, the figure was close to 40% in Bulgaria, above 40% in Poland, well above 20% in Romania and at around 20% in Croatia, Hungary and Czechia; however, rates were below the EU average in Slovakia. Typically, higher investment rates and higher net investment ratios occur in countries with

lower development levels and more stable economies, indicating solid future growth prospects from an investment perspective. While these rates have been quite stable in some countries, crisis-related setbacks and recent recovery characterised Hungary and Slovakia. Slovenia was the only EU-CEE country with a negative ratio (-3%) of net investments in GFCF (i.e. depreciation higher than investment) in each year between 2012 and 2015. Not replacing worn-out capital stock entails its degradation, possibly to the detriment of recovery.

Figure 3 **Share of net fixed capital formation in GFCF (%)**



Source: AMECO

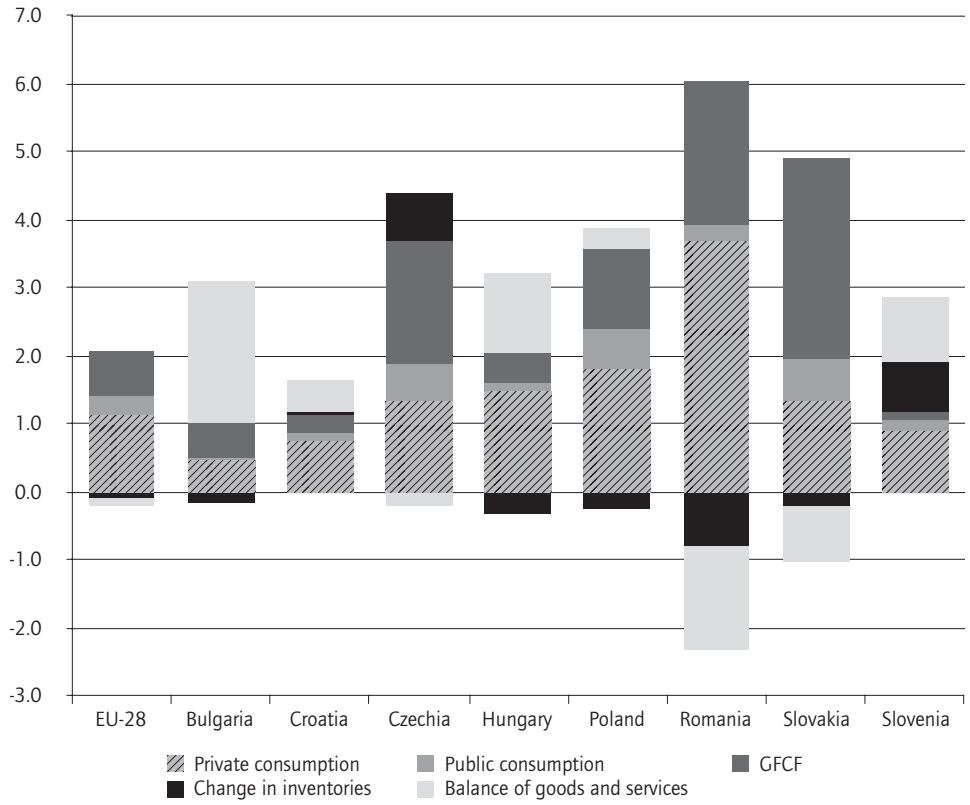
Even the multiple efforts of national governments, the EU and/or the EIB cannot close the gap between pre-crisis and current investment rates (Dauderstädt 2015). Most likely, pre-crisis investment activity had been overheated, one of the reasons for the crisis (Gros 2014). The current lower rate of potential growth may result in less investment to attain the same investment rate. In addition, the quality of investments may matter more than their quantity for long-term development. While any investment growth contributes positively to the GDP of a given year, the longer-term income generated by these investments will determine whether it promotes sustainable growth.

3. Contribution of investments to economic recovery

Assessing the role of GFCF in the demand side of GDP reveals the extent of investment-based economic growth. We measure the contribution in percentage points, whereby private consumption, public consumption, GFCF, changes in inventories and the balance of goods and services together determine the rate of growth (Figure 4). In half of the countries surveyed, the main driver of economic growth has been private consumption, the component with the highest share of GDP. High private consumption

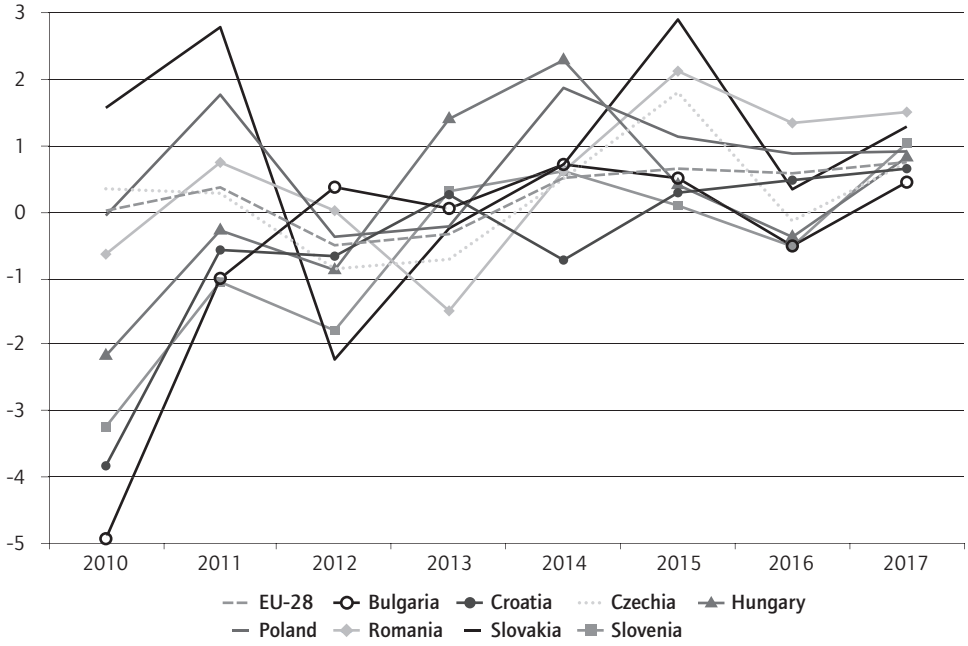
usually coincides with a negative external balance, and vice-versa, a characteristic of specialized open economies where any increase in demand generates imports. Similarly, a high GFCF often coincides with a negative external balance, meaning that most investment funding is imported. The impact on growth of increasing GFCF is positive. Countries where GFCF was the most robust contributor to growth, namely Czechia, Romania and Slovakia, experienced the most dynamic growth from 2010 to 2015. However, in Romania the GFCF contribution was lower than that of private demand when growth peaked in 2015. Slovenia, a country engaged in external stabilization, experienced a downturn in domestic demand components (including GFCF), meaning that the adjustment of the external balance was the main driver of the country's meagre economic growth.

Figure 4 **Contribution of individual demand components to GDP growth in percentage points in 2015**



Note: Components add up to the rate of economic growth
Source: AMECO

Figure 5 **Contribution of GFCF to GDP growth, 2010-2015 and EC forecast 2016-2017**



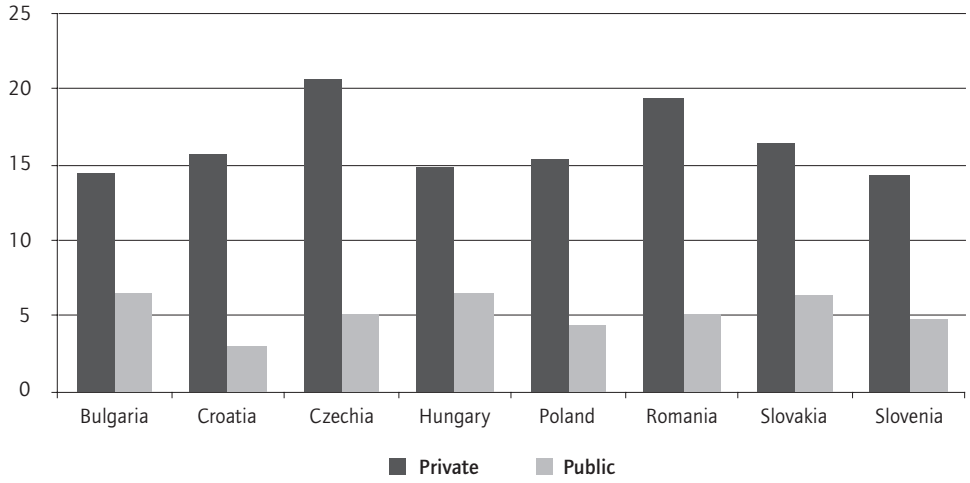
Source: AMECO

The contribution of GFCF to economic growth was negative in most of the economies under survey in 2012 due to the uncertainties triggered by the euro crisis. Subsequent recovery peaked in 2014 or 2015 and was fuelled by the investment boom marking the final EU transfers under the 2007-2013 funding period. Investments declined in 2016 due to lower EU transfers (Figure 5). The European Commission expects investment to play an increasing role in driving economic growth in the coming years when EU funds allocated for the 2014-2020 funding period start flowing at a high pace. While GDP is expected to grow by around 3% annually, the contribution of investments will be in the range of 0.5-1.5 percentage points. Higher values may again occur in countries with the most robust rates of economic growth, i.e. Romania and Slovakia, depending on their ability to tap EU funds.

4. Who invests – the private or the public sector?

On average, close to 80% of gross fixed capital formation derives from private-sector investment, making it much more important than government investment. Country-specific differences (see Figure 6) have been quite stable over time; countries with larger government sectors (viz. Hungary and Czechia) have a smaller share of private-sector investment in total gross fixed capital formation.

Figure 6 **Share of public and private GFCF investment in GDP (%), 2015**



Source: National and Eurostat statistics, wiiw estimations, own calculations

Conditions for financing private investments have improved in the latest post-crises years due to companies' better financial situation. Most of the investments are financed via retained profits, with credit funding playing only a secondary role. Falling input prices and increasing capacity utilisation in the manufacturing sector have generated higher profits. Private-sector indebtedness has declined and new credit has become more readily available on less restrictive terms. EU-CEE banks have largely finished restructuring their portfolios, reducing the volume of outstanding credits and the number of non-performing loans. Over the past few years, the stock of private-sector bank loans declined at a particularly rapid rate in Hungary and Romania, mainly due to working out non-performing loans. The size of the latter nonetheless remained a problem, as bank financing in terms of GDP in both countries has shrunk to the lowest level of all EU-CEE countries. Banking sector profits have since recovered and approvals of new credits were up in 2016. Slovenia and Bulgaria were two other countries set on a path towards deleveraging. Poland and Slovakia, however, found themselves in a completely different situation; loan volumes have been rising while non-performing loans are at a very low level, conditions conducive to business expansion. All these factors constitute an improvement over the credit conditions prevailing two or three years earlier, without entailing a return to the lax banking practices of the pre-crisis era which are unlikely to return.

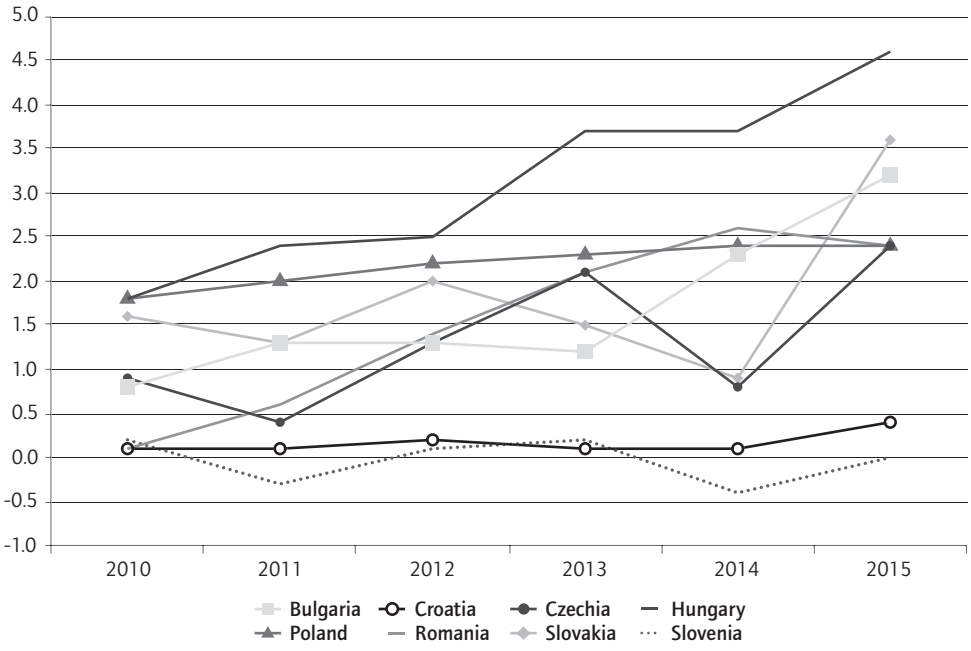
Conditions for public investment depend on fiscal constraints and policy choices. Fiscal policy is a tool for stimulating growth and structural change that governments often ignore. Eurozone countries and countries with a fixed exchange rate can only use fiscal policy, whereas other countries may also resort to monetary and exchange rate policies. In terms of scope, fiscal policy is often not a matter of choice. Its use is restricted in countries with high debts and onerous debt-service burdens or simply by virtue of EU regulations. Nevertheless, even countries with high government debt can structure their budgets to attain their economic or social goals, instead of being guided by inertia and vested interests.

The scope for fiscal expansion has recently widened. Government consumption made a minor, but positive contribution to growth in 2015, signalling the end of fiscal austerity in the EU-CEE. Highly indebted countries, including Croatia and Hungary, have recently managed to adopt a neutral fiscal stance, while most other countries have further room for government consumption as a positive contribution to growth. Well-balanced and low-debt countries, including Czechia and Poland, could well pursue a fiscal policy contributing 0.4–0.6 pp. to GDP growth. Most other countries are using the opportunity provided by low-cost debt financing and are not restricting government spending. The only country to embark on an expansionary path in 2016, Romania achieved a high rate of economic growth, albeit with signs of overheating.

5. External investment financing – a balance of payments analysis

In this section, we discuss the balance of the capital account and that of FDI as recorded on the financial account[2]. The capital account contains EU transfers and transfers from other international donors (e.g. World Bank) for capital investments. The FDI balance, the difference between assets and liabilities[3], refers to the net financing flows of direct investments, a good share of which finance real investments.

Figure 7 **Capital account net in % of GDP 2010-2015**

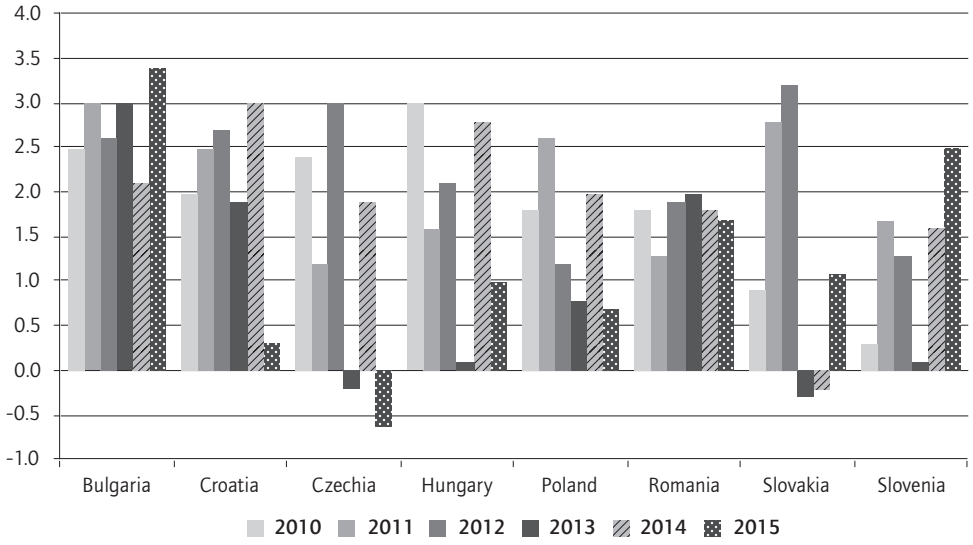


Source: Eurostat

2. Balance of payments data according to the asset-liability principle is used for both indicators. Net FDI is, in principle, identical both according to asset/liability and directional principles, though deviations exist in practice. Portfolio and other external resources are ignored due to their high volatility.

3. Net FDI by the asset/liability and the directional principle are principally of the same amount.

Figure 8 **Net FDI in % of GDP, 2010-2015**



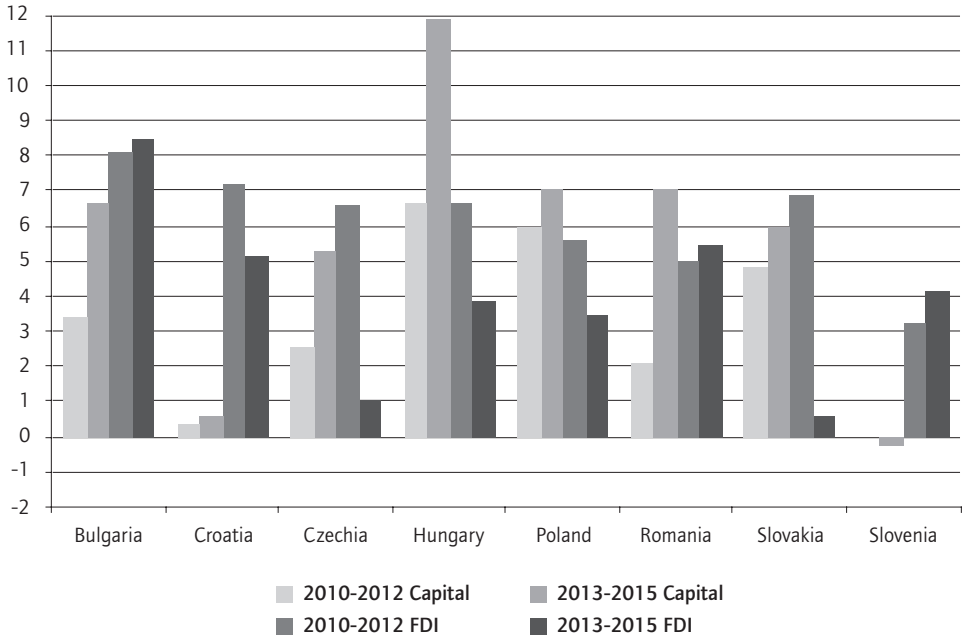
Source: Eurostat

Annual data on capital transfers (Figure 7) reveals a rising trend over the period, except in Croatia which joined the EU later than the other countries and Slovenia which had relatively high per capita GDP from the start, making it less eligible for funding. FDI net inflows (Figure 8) were flat (in the range of 1-3% of GDP) over the same period, but with noteworthy country-specific fluctuations. A detailed comparison of the two time series allows us to discuss the changing relationship between capital and FDI inflows.

Prior to the financial crisis, the EU-CEE was the target of soaring FDI inflows while EU transfers remained rather small. The relationship between the two external financing channels changed after the crisis, with FDI decreasing and EU transfers allocated for the 2007-2013 financing period starting to flow. The decline in FDI got worse as a result of the 2013-2015 euro crisis. At the same time, capital transfers moved in the opposite direction as the disbursement of EU funds peaked, fuelled by access to the funds of the 2007-2013 financing period (2014-2015).

Figure 9 shows the size of the two types of capital inflows as a percentage of GDP, revealing which of the two items was higher, capital transfers or FDI. It also shows the change between the two periods (before and after the euro crisis) corresponding to the middle and the final stage of receiving EU funds under the 2007-2013 financial framework.

Figure 9 **Net capital account and net FDI as a % of GDP cumulated for 2010-2012 and 2013-2015**



Source: Eurostat

Net FDI inflows were lower in the 2013-2015 period[4] than earlier in five countries and higher only in three, while capital transfers increased in all countries except Slovenia. In the first period, capital transfers were higher than FDI inflows in Poland, and equal in Hungary. In the second period, capital transfers surpassed FDI inflows in all countries but Bulgaria, Croatia and Slovenia. Thus, the two sources of external financing have swapped places, with EU and other multilateral funds taking over the position of private direct investments in external investment financing. FDI inflows thus dropped, with public and multilateral external financing making up for the loss.

Net FDI fell the most in Czechia and Slovakia, to less than 2% of GDP in 2013-2015. Bulgaria, Romania and Slovenia reported higher net FDI in the second period than in the first, with Slovenia switching from negative to positive. Capital account inflows accounted for less than 2% of GDP solely in Croatia which only joined the EU in 2015 and in Slovenia, a country too advanced in terms of per capita GDP to receive regional development funds in any substantial amount. The other countries received capital transfers accounting for 2-6% of GDP in the three-year period 2010-2012 and 4-12% of GDP in the 2013-2015 period, i.e. such transfers doubled. The increase was especially high in Hungary, Romania, Czechia and Bulgaria.

4. 2015 data are preliminary, subject to revision. Revisions for Hungary indicate very low net inflows.

The two types of external financing differ a lot in their content. Capital transfers primarily finance infrastructure and other public investments or support SME development. FDI funds, on the other hand, generally flow to large private businesses. Capital transfers typically finance sectors with low direct profits, long-term and indirect income generation, while FDI finances businesses with good profit expectations. The two are thus more complementary than substitutes. A shift in external financing thus also means a shift in the sector of investment. After a transfer-funded boom in infrastructure investments, a revival in FDI-financed private investments is even more necessary, and infrastructure and SME development projects funded by capital transfers are expected to trigger private investment.

To what extent future investments come from foreign investors depends of the size of the foreign sector in a country and its attractiveness for new FDI projects. The next section therefore looks at the relative size of the foreign sector, while the following one analyses the characteristics of new FDI projects.

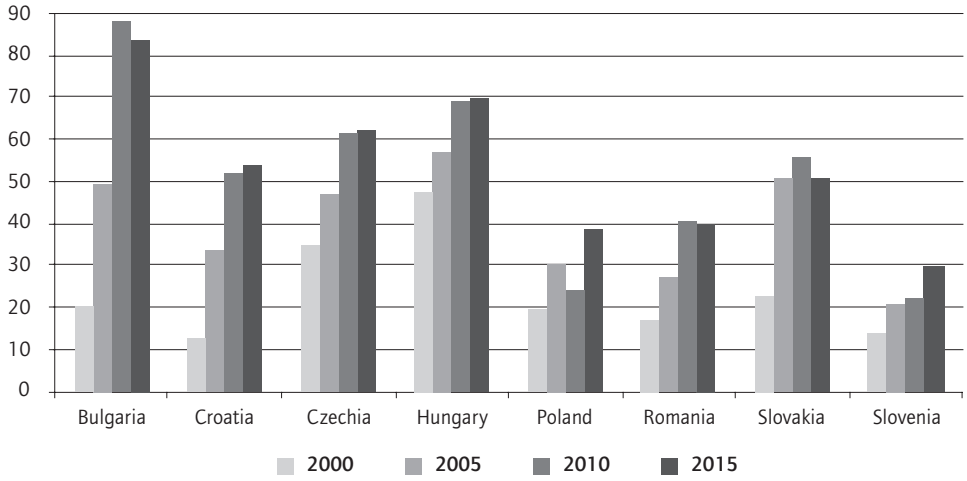
6. Characteristics of the foreign sector

Two indicators, the size of the accumulated FDI stock as a percentage of GDP (based on the international investment position) and the contribution of foreign controlled enterprises to GDP and various other economic indicators (based on the foreign affiliates statistics, FATS), measure the size and importance of the foreign sector in an economy. The two approaches lead to somewhat different results because of the different definition of the foreign sector – more than 10% foreign ownership in the case of FDI stock and 50% ownership in case of the FATS. Moreover, the structure of FDI may also matter as FDI in the financial sector and real estate are not covered by FATS.

The amount of FDI stock as a percentage of GDP indicates a country's exposure to FDI (Figure 10). Among the eight countries under survey, this indicator is the highest in the Bulgarian and Hungarian economies, followed by Czechia and Slovakia. Slovenia has the lowest FDI stock per GDP, meaning that FDI has little importance for this country.

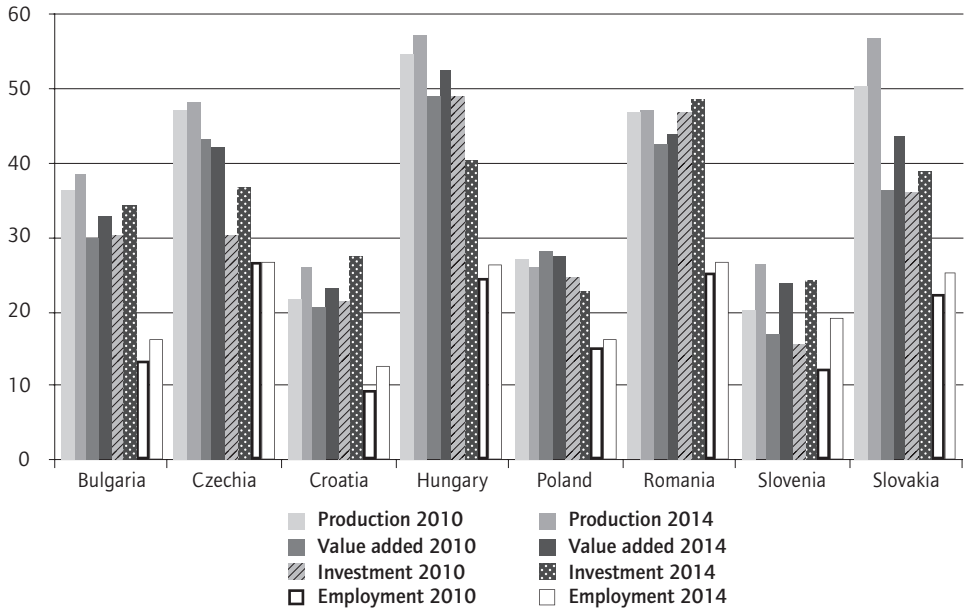
Developments over the past five years have been subject to separate changes in GDP and FDI, with each following its own dynamics. Nevertheless, the overall trend was that countries previously with a relatively low foreign penetration such as Poland and Slovenia experienced rising penetration, while the FDI to GDP rate hardly changed in countries with an already high penetration. Slovenia was the only country to change its policy, privatizing public property under the pressure of the fiscal crisis while GDP declined. FDI stock per GDP declined in some countries (e.g. Bulgaria) where the value of assets (mainly of banks and real estate) decreased even though inflows were positive.

Figure 10 **FDI inward stock as a percentage of GDP, 2000-2015**



Source: wiiw FDI database relying on national bank statistics

Figure 11 **Share of foreign-controlled enterprises in production, value added, investments and employment in 2010 and 2014**



Source: Eurostat FATS

FATS, the other indicator of foreign penetration, measures the contribution of majority foreign-owned enterprises (foreign affiliates) to various economic indicators in the non-financial business economy (Figure 11). Data from the most recent survey (2014) shows that foreign penetration in terms of value added reached 53% in Hungary, more

than 40% in Czechia, Romania and Slovakia, and less than 30% in Croatia, Poland and Slovenia. The low rate of foreign penetration in Poland indicates that economic growth is less dependent on FDI, as the country has a strong domestically owned corporate sector. In Croatia and Slovenia, economic policy was for long not FDI-friendly in terms of privatization and the business environment. However, in the wake of the economic crisis, both countries changed tack to allow greater foreign investment with a view to promoting restructuring and increasing efficiency. As a result, the share of foreign affiliates increased rapidly in Slovenia. Foreign penetration increased in all countries except Poland between 2010 and 2014.

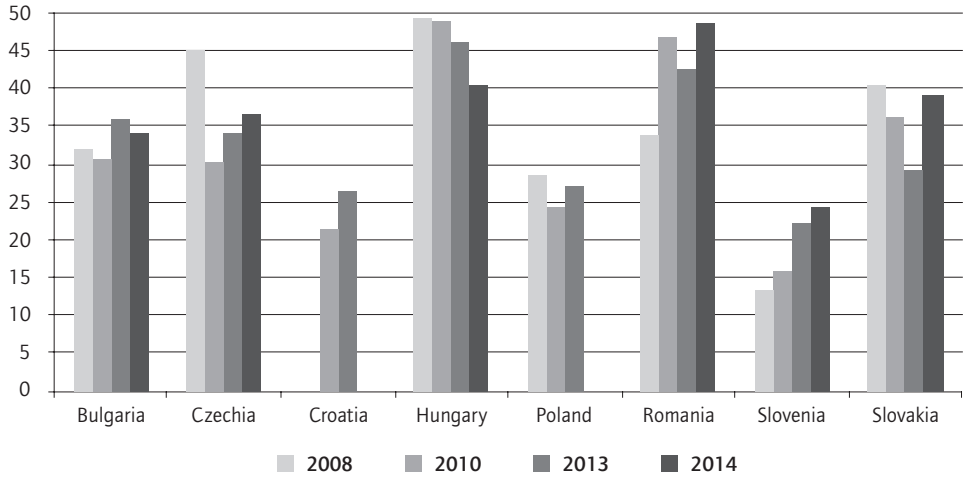
Compared with the FDI stock per GDP data, the size of the foreign sector measured by FATS is relatively small in Bulgaria (33%). This may be due to the absence of real estate and financial sector investments in the FATS data, two areas which have high shares in the Bulgarian FDI stock. In the case of Romania, the FATS statistics show higher foreign penetration (second to Hungary) than the FDI stock per GDP ratio suggests. One explanation could be the relatively low amount of FDI in sectors not covered by FATS (for example real estate). Nevertheless, such differences are not only due to the partly different coverage of FDI and FATS data.

What is more important is to compare the four foreign penetration indicators used in FATS. In terms of production value, Slovakia has a similar share of foreign affiliates as Hungary, namely close to 60%. But in terms of value added the Hungarian figure is 10 percentage points higher. In fact, Slovakia has the biggest discrepancy between the shares in terms of production and value added, indicating that it specializes in assembly work with a high imported content. In Poland, foreign shares in value added are higher than in production, making it the most diverse economy with much domestic sourcing.

The share of foreign affiliates in value added is generally higher than the foreign employment share, indicating that labour productivity in foreign subsidiaries is higher than in domestic companies. This can be explained by better technology and higher capital intensity in foreign affiliates but also by their narrower specialization on selected production processes. Domestic companies have full-fledged corporate structures including many labour-intensive activities such as management and marketing, areas which, in the case of foreign affiliates, are mostly concentrated in the parent companies.

The share of the foreign sector in corporate investments is similar or somewhat smaller than the foreign share in value added. It has changed only modestly in most surveyed countries over the past five years (Figure 12). A big decline in Hungary in 2013 and 2014 indicates the rising investment activity of domestic companies, which enjoyed preferential treatment in the distribution of EU funds. By contrast, special taxes levied on part of the foreign sector (retail and utility companies) decreased profitability and thus the funds available for investments.

Figure 12 **Gross investment in tangible goods, share of foreign affiliates in the non-financial business economy**



Source: Eurostat FATS

A high foreign penetration in an economy indicates both strength and weakness. It is certainly an advantage for a country to be attractive for foreign investors, enabling it to rely on all the benefits of FDI for development. But a foreign-capital-dominated economy will also have to live with the fact that a large part of profits are transferred abroad. Moreover, the relative strength of the foreign sector also highlights the relative weakness of the domestic sector. Imbalance appears where the domestic sector cannot keep pace with the foreign sector.

As the benefits of FDI are to a large extent attributed to technological spillovers from the foreign to the domestic sector, the size and efficiency of the domestic sector are of major importance. The domestic sector must be large enough and its productivity should not be too different from the foreign sector to allow spillovers to happen (for a summary of the literature on absorptive capacity and technological gap determining spillovers, see Crespo and Foutoura 2007). As in most sectors foreign subsidiaries tend to be larger and more productive than domestic companies, policy should attempt to maintain a balance between SME support benefiting mainly domestic companies and FDI incentives.

Fiscal and other benefits accorded to large investment projects due to increased international competition for greenfield investment projects impose a burden on the government budget, while other companies are disadvantaged if paying the standard corporate income tax rate. In principle, investment policies strengthening locational advantages should be equally beneficial for foreign and domestic investors, whatever their size and whatever the sector. While most countries subsidize large projects, small companies enjoy a number of facilities under EU programmes.

Alone among the countries under survey, the post-2010 Hungarian government has introduced several measures negatively discriminating against various foreign dominated economic sectors engaged in non-tradable services. Sensitivity to the profits or even assets of such companies made some investors leave the country, and domestic ownership now dominates in the financial sector and utilities. At the same time, multinational companies signed so-called strategic agreements stipulating government support for additional investments in manufacturing and business services, for R&D activities and job creation. Selective benefits provided to certain domestic companies have engendered market segmentation and are giving rise to increasing cronyism. Mihályi (2015) and Szanyi (2016a) have documented this increasing nationalism. Nevertheless, the figures on foreign penetration do not show a decreasing role of foreign affiliates in the Hungarian economy as a whole. It does show up, however, in individual economic activities such as electricity, gas and water supply, the primary targets of re-nationalisation. In fact, the main economic issue in these activities was not the foreign ownership but the lack of competition and quasi-monopolistic prices. Total centralization and politically motivated price-setting have not cured the problem but instead have eroded the quality of the capital stock and of services.

7. Preferred greenfield FDI locations

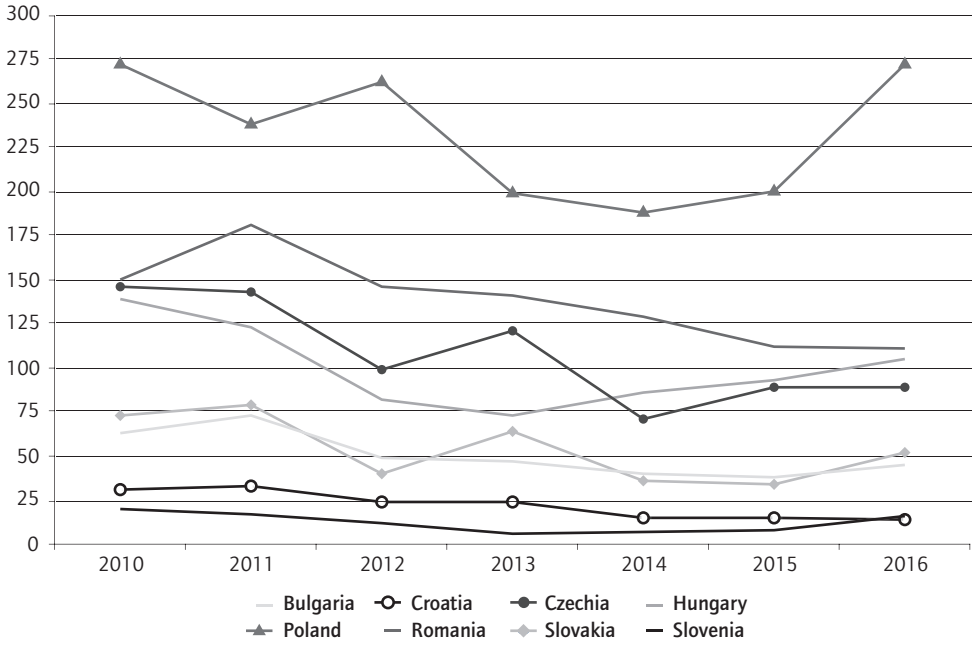
FDI can enter a country in two main forms: mergers and acquisitions (M&As) or greenfield investments. M&As do not initially bring new capital into the country and thus do not contribute to gross fixed capital formation. However, foreign investors entering by M&A usually make additional investments and increase efficiency and competitiveness. Greenfield investments, by contrast, bring in new capital and create new workplaces, making them the targets of public FDI policy and promotional activity.

Greenfield investors are sensitive to changes in demand conditions and production costs in home and host economies, to business legislation and investment incentives in host economies, and to the general perception of investment risk and the financing costs of investments. Conditions for greenfield investments deteriorated following the financial crisis due to the decline in overall demand and increasing investment risks and financing constraints in both home and host countries. EU-CEE economies are thus not per se responsible for the decline in greenfield FDI, being hit by the same factors as other locations.

Database on greenfield FDI projects

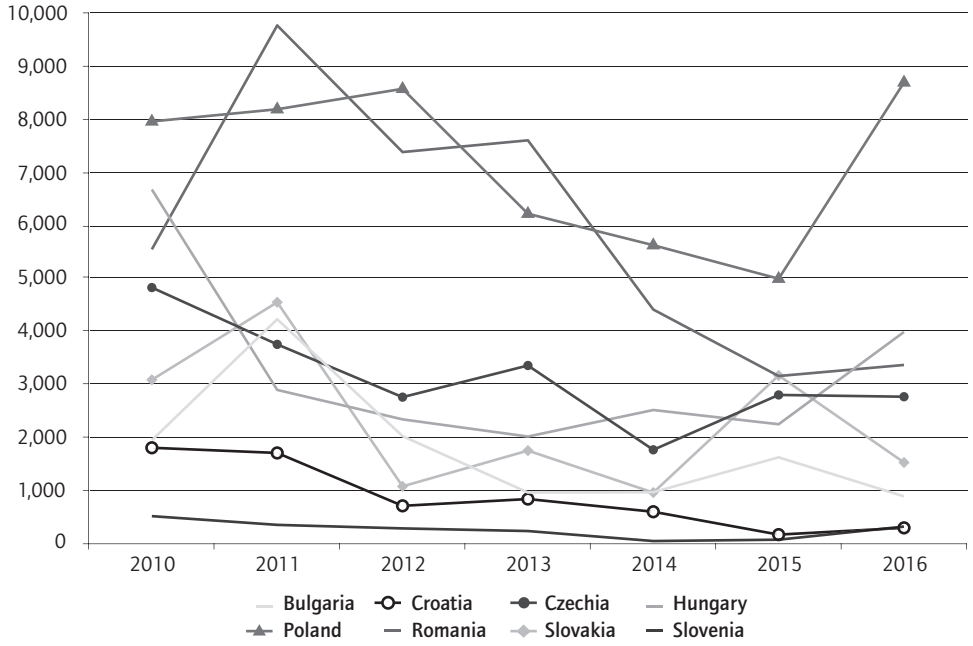
The data from fDiMarkets (www.fdimarkets.com, fDi Intelligence, a division of Financial Times Ltd) used in this report is based on media reports on individual investment projects. The database contains information on the number and value of investment commitments and the number of jobs to be created. Compared with the balance of payments, which records financial flows in a given period, fDiMarkets data refers to real investment projects that are to be realised over a longer period. The forward-looking character of this data may support forecasts, but there is a good deal of uncertainty, as realisation timeframes of individual projects may differ substantially. The database does not include financial sector investments, and we also exclude individual retail outlets and shops from the coverage. The investing country is the final home country of the investor, thus tax havens do not show up. Projects have been recorded by fDiMarkets since 2003 and are continuously updated.

Figure 13 **Number of reported greenfield investment projects, 2010-2016**



Source: fDi Intelligence, from the Financial Times Ltd 2016

Figure 14 **Capital investment pledged in greenfield projects, 2010-2016, EUR million**



Source: fDi Intelligence, from the Financial Times Ltd 2016

The number of greenfield projects and pledged investment capital declined after 2011, though a modest recovery occurred in several countries in 2015 and/or 2016 (Figures 13 and 14). The overall number of projects was about one third lower in 2014-2015 than in 2010-2011. There was a pronounced decline in pledged investment capital, on average halving between the two periods. As a result, average project size has become smaller over time. The Slovak figure was exceptionally high compared with previous years due to the announced car assembly plant planned by Jaguar. Poland attracted more and higher value projects in 2016 due to large new projects in construction and business services. Correcting for country size, the value of announced FDI projects in 2015 was the highest in Slovakia, followed by Czechia, Bulgaria and Hungary.

As greenfield commitments are volatile, it makes sense to look at the average of the past three years. Combining the number of projects and investment commitments, we can identify the most attractive greenfield locations as Slovakia and Czechia, followed by Romania and Hungary. Looking at fluctuations again, Hungary displayed the most even attractiveness to greenfield projects despite the government's selective policies deterring investors in certain economic sectors. Slovenia was the least attractive greenfield FDI destination by all indicators. Recovering FDI inflows in this country were the result of M&As triggered by the banking crisis while greenfield investors were deterred by the economic and political risk at least until 2016 when economic growth resumed.

8. European policies to stimulate investments

The low investment rate throughout the European Union gave rise to various stimulating measures both at national and EU level. The monetary policies of the ECB and various national investment banks or even central banks are providing cheap financing via low interest rates and extra liquidity. However, abundant liquidity has been ineffective overall, with companies saving instead of investing. The banking system is still sitting on bad debts and commercial credit conditions are tight. Companies' appetite for investments is also curtailed by low European and global economic growth rates. At the same time, fiscal restrictions have remained tough and fiscal prudency prevailed throughout 2015. Fiscal stimulus and public investments were thus unavailable in most EU member states until recently.

In 2015, the European Commission launched an investment subsidy programme, the European Fund for Strategic Investments (EFSI) – the so-called the Juncker Plan. Established under the auspices of the European Investment Bank (EIB), its aim is to generate EUR 315 billion of additional investment in the EU-28 over the 2015-2017 period[5]. Its mission is to make better use of public money and attract additional private investors. The EU provided for a loan guarantee of EUR 16 billion in its budget and the EIB committed an additional EUR 5 billion, with the rest supposed to come from private investors. The expectation was that the EFSI would add EUR 330-410 billion to EU GDP and create 1-1.3 million new jobs through (a) mobilising investment finance without creating new public debt; (b) supporting investment in infrastructure, education, research and innovation; and (c) removing sector-specific and other financial and non-financial barriers to investment. For the EU-CEE, a project funded via the EFSI under near-market conditions may be less advantageous than taking out a grant from the European structural and investment funds (ESIF), although, admittedly, the latter might involve a delay of one, two or three years. As of mid-July 2016, there was just one signed EFSI project in the EU-CEE (a motorway in Slovakia), but 6 in Spain[6]. Of the EU-CEE projects approved but not yet signed, Poland has six, Lithuania two, and Croatia and Romania one each. Project approval gained momentum in the following 11 months, adding four more projects in Poland and two in Latvia and Lithuania.[7]

Monetary policy has been relaxed in the US and all over Europe including the NMS. In the euro area, monetary policy has become even more accommodative than in the US. In March 2017, the ECB refinancing rate was set at 0% and the deposit rate at -0.4%, while the ECB's quantitative easing programme launched in March 2015 involves monthly purchases of government bonds worth EUR 80 billion. Extremely lax monetary policy helped bring down inflation, but deflation was not the goal. Increasing the pace of economic growth and investment would require a more accommodative fiscal policy, a view which gained prominence in 2016 not only in the IMF and OECD but also in the EU Commission. A positive fiscal stance is possible due to low interest rates to finance

5. https://ec.europa.eu/priorities/jobs-growth-and-investment/investment-plan_en and http://www.eib.org/efsi
6. http://www.eib.org/efsi/efsi-projects
7. *Ibid.*

government debt[8]. Currently EU-CEE national budget deficits do not exceed the 3% 'Maastricht benchmark' and thus formally comply with EU rules. Similarly, public debt is not excessively high except in Croatia, Hungary and Slovenia. This means that fiscal loosening could indeed fuel economic growth. For the last two years, Romania has been the only country using fiscal stimuli, albeit excessively, i.e. beyond those necessary to achieve a high economic growth rate. Cutting taxes and increasing expenditure on wages fostered GDP growth, but may prove unsustainable in the long run.

9. Conclusions and prospects: more balanced investment financing follows FDI-led growth

Economic growth in the EU-CEE region declined only modestly in 2016 compared with the previous year to an estimated 3%, mainly on account of growth coming down to a 'normal rate' in Czechia. Investment declined as both EU transfers and FDI inflows decreased. With a GDP growth rate of 4.8%, Romania was the 'star performer' in the EU-CEE region – primarily due to fiscal stimuli (VAT cut and minimum wage hike). The main driving force was strong consumer demand in connection with declining unemployment, rising wages, less restrictive fiscal policies and zero inflation. Low growth and low investment countries, i.e. Croatia and Hungary, were the exception in 2016. First quarter results for 2017 show that economic growth is accelerating in all countries under survey.

Household demand in the EU-CEE is fuelling a relatively fast rate of economic growth, in turn spurring investment in the private sector financed by retained profits rather than new credits. Restricted credit-taking for financing consumption and investments has reduced the risk of another 'boom-and-bust' development. Profit-making companies can invest while upcoming businesses can hope for public subsidies. Start-up and R&D financing via EU funds is abundant in most countries and the EFSI SME line provides loans at conditions unavailable on the market. Similarly, foreign investors are reporting higher profits, part of which are destined for reinvestment.

FDI inflows recovered in 2016, reaching their highest level since 2008, primarily on account of high inflows to Czechia, Hungary, Croatia and Romania (Hunya 2017). Although inflows may not necessarily reflect investors' locational preferences and may fluctuate due to adjustments of loans and assets within multinational conglomerates, the 2016 recovery is in line with generally improving business sentiment and demand conditions throughout the European Union. The trend is set to continue in 2017 when economic growth, investments and FDI are expected to grow more rapidly than before.

Capital shortages are no longer a major impediment to growth in the EU-CEE, as indicated by the small current account deficits (or surpluses). Economic growth is more demand-constrained than capital-constrained. If recovering European demand becomes more robust in the future, EU-CEE economies are set to prosper.

8. http://europa.eu/rapid/press-release_MEMO-16-3711_en.htm

The current new wave of economic growth in the EU-CEE relies on more than just FDI. Domestic private and public investments have gained strength and EU transfers are bound to flow more abundantly in 2017 and beyond. Domestic investors have become wealthy and skilled, and they are now in a position to initiate and finance large projects and win public procurement tenders. In addition, partly state-owned companies have become international investors, such as power companies in Czechia and Hungary.

Economic nationalism and patronage are on the rise, with diverse public policies supporting domestic champions. Certain governments have started distancing themselves from the interests of foreign investors or EU recommendations and are listening more to the domestic business elites that they try to control while representing their interests. The role of domestic business has increased in several sectors including banking (RZB 2017), construction, real estate and the media (the exception here is Slovenia which earlier had a low foreign penetration and is recovering from the banking crisis through privatisation to foreign investors). The development of economic nationalism has been most rapid in Hungary, resulting in growing cronyism (Szanyi 2016b).

It seems that the current investment mix can support average economic growth of about 3-4% in the EU-CEE, higher than in the past ten years, though still far below that preceding the financial crisis. Although more capital inflows – and especially FDI – may further accelerate growth, there is also a risk of them undermining the external balance. The pre-crisis years have taught the lesson of overheating. EU-CEE will be on a more balanced albeit slower growth path in the years to come.

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Chapter 2
Is a live dog better than a dead lion? Seeking alternative growth engines in the Visegrad countries

Magdolna Sass

1. Introduction[1]

After the crisis years, there was an overall disenchantment with the foreign direct investment (FDI)-based growth models in the Central European post-socialist countries. FDI resulted in lower than expected convergence and in over-high exposure to foreign economic and political forces, inducing Visegrad governments (and governing parties) to seek new economic policies, either to catch up or at least to achieve stable political success despite relatively low post-crisis economic growth. Obviously, the previous growth engines – foreign multinational companies and their local subsidiaries – are still expected to play albeit a smaller role in these new policies, and some of them are now discriminated. Alternative or supplementary 'growth-driving' (or 'growth-illusion-driving') companies are being sought by the governments, possibly groups of domestically-owned or -controlled enterprises. Their main role will be to stimulate growth or at least provide the illusion of catching up economically (or in welfare terms) with the core European Union countries.

In this chapter, I will concentrate on four Visegrad countries (Czechia, Hungary, Poland and Slovakia), the economies which opened up earliest and to the greatest extent to FDI in the Central and Eastern European (CEE) region. However, because the changes in the economic role foreign-owned subsidiaries are 'allowed' to play are the most pronounced in Hungary, the qualitative analysis will focus on this country.

I start by briefly presenting the FDI-based models of the Visegrad countries, moving on to look at how the emphasis on the role of the local subsidiaries of multinational companies has changed recently in the Visegrad countries. I then go through the possible other groups of economic players who could replace them in an attempt to stimulate these economies: state-owned enterprises (SOEs), regional multinationals, and large domestic companies and small and medium-sized enterprises (SMEs). The last section draws conclusions.

1. Research on regional multinationals was supported by the Hungarian Research Fund OTKA (109294).

2. FDI-based growth models in the Visegrad economies

The problem of convergence and catching up with more developed countries has always been a key topic in Central and Eastern European (CEE) countries and among them in the four Visegrad countries. Throughout their history, their distance to the dynamic and wealthy European regions has constantly fluctuated.

After the post-1989 transition process, all countries opened up their economies to FDI, albeit at different times. FDI inflows accelerated shortly before they joined the European Union. Governments (and experts) expected that, besides providing capital and creating numerous jobs, FDI would contribute significantly to economic restructuring, boosting growth and helping the CEE countries catch up with their Western counterparts. This would be achieved directly through backward and forward linkages impacting domestic companies as well as indirectly through intensifying competition and thus raising company competitiveness and productivity. Early experiences in two countries, Estonia and Hungary, and later in other CEE economies, seemed to support that expectation (Neuhaus 2006; Kornecki and Raghavan 2011), although even then certain analyses questioned the size and thus the significance of the impact (see e.g. Mencinger 2003).

However, looked at from a longer-term perspective, while the inflow of FDI contributed considerably to the restructuring of the economies in question, most of the expectations concerning their beneficial impact on domestic companies and thus enhanced competitiveness, growth and convergence with the more developed member countries of the European Union were only partially fulfilled. This was due to a number of factors: over-high expectations, economic policy mistakes, the inability of domestic firms to become partners of local MNC subsidiaries, and last but not least the generally low inclination of MNCs to rely on local firms. Furthermore, other global economic developments connected to the appearance of mainly Asian competitor countries with substantially lower wages and the shrinking of distance due to technological developments further complicated their situation (more details in e.g. Bohle and Greskovits 2007; Galgóczi 2009; Narula and Bellak 2009; Farkas 2013 or Szanyi 2016). Furthermore, this FDI-based strategy resulted in changes in the economies which were not helpful from the point of view of longer-term growth (Lane and Myant 2007; Nölke and Vliegenhart 2009).

By the time the financial crisis broke out, there was overall disenchantment in the CEE region with the 'liberal' convergence strategy and its reliance on FDI (see e.g. Farkas 2013 or Hunya 2015). The main reason was that this did not result in a sustained high level of growth and thus in a perceptible (or even spectacular) narrowing of the income gap with developed EU Member States, and high-growth years were not numerous enough in all CEE countries for substantial catching up. The problems caused by the crisis further deepened this disillusionment, as many of them were related directly or indirectly to FDI, for example, the high integration of CEE companies in global or European value chains in hard-hit industries, or increased repatriation of profits by crisis-ridden multinational companies. Moreover, FDI inflows substantially declined during the crisis and post-crisis years, and this now seems to be a lasting phenomenon (Hunya 2015; Kalotay 2017).

3. Reducing the role of foreign-owned companies in the Visegrad economies

In this section, we analyse whether there have been efforts to reduce the role of MNC subsidiaries in the countries in question, taking a look at which sectors, industries or activities are targeted.

Already during the crisis years, over-high foreign exposure, including through FDI, emerged as a risk factor in numerous analyses, increasingly questioning the previously almost unequivocally positive approach to FDI. Profit repatriation and capital withdrawal hit certain CEE countries hard during the crisis years (see e.g. Mencinger 2013), leading to political debates about differentiating between 'good' and 'bad' FDI (see e.g. Zimny (2015) for Poland, or Drahokoupil and Galgóczi (2015)). These distinguished between 'bad' market-seeking, horizontal FDI aimed at replacing domestic producers or service providers and repatriating profits and thus 'not beneficial' for the host economy, and 'good' vertical FDI resulting in many new jobs and exports and allowing domestic companies to benefit from becoming part of global or European value chains.

In the post-crisis years, there have been various signs of the business environment turning against FDI in the analysed countries, as seen by an increase in governmental instability in the Czech Republic, in Poland and temporarily in Hungary. Moreover, governments are increasingly using anti-FDI rhetoric and populist tendencies are gaining ground (Havlík and Pinková 2012). Anecdotal evidence points to cases of anti-FDI measures where certain foreign-owned enterprises are discriminated against, for example in public tenders or when regulatory changes force them to 'voluntarily' leave the country. According to Becker (2016), the current Hungarian and Polish governments are striving to expand the role of domestic capital, primarily in the services sector, and within the latter, in the banking sector. Tóth (2014) has described the policy change as a turn towards selective economic policy nationalism, present everywhere except in industry and private-sector business services, where a neoliberal-leaning policy is still pursued. Other authors describe the changes in the region as moving in a 'national capitalist' direction (Szent-Iványi 2017) or in Hungary as 'corrupt crony capitalism' (Benczes 2016; Kornai 2015).

Nevertheless, aggregate data illustrating changes in the overall restrictiveness of government policies towards foreign investors and foreign-owned subsidiaries and in the overall deterioration of the business climate for foreign investors are hard to find.

3.1 Changes in FDI policies

It is not easy to compare the FDI policies of the various governments, in our case looking at the level of restrictiveness and changes made. In this section, we use various indexes to check for changes in the analysed countries. We then briefly present the case of Hungary, which – as already indicated – has made the most efforts to reduce the role of foreign subsidiaries in certain areas and activities.

The OECD's FDI Regulatory Restrictiveness Index facilitates international comparisons over time, looking at four main restrictions on FDI:

— foreign equity limitations;
— screening or approval mechanisms;
— restrictions on the employment of foreigners as key personnel;
— operational restrictions, e.g. restrictions on branching and on capital repatriation or on land ownership.[2]

Though obviously not giving a full picture, the index does provide a good indication of the main developments in FDI restrictiveness in a given country.[3] Figure 1 shows the index for the Visegrad countries and the unweighted OECD average in 2006, 2010 and 2015. We note that the index values for the analysed countries – with the exception of Poland – are well below the OECD average. Czechia stands out with an exceptionally non-restrictive FDI policy, while Hungarian restrictiveness has declined over the period analysed to approach the Czech level. With the exception of Slovakia, FDI regulatory restrictiveness decreased in the Visegrad group between 2006 and 2010, and plateaued (with the exception of Czechia) between 2010 and 2015. However, compared with other countries examined by the OECD, the Visegrad countries still offer an outstandingly liberal FDI climate, with the exception of Poland. There are few areas where restrictions remain in force: agriculture and forestry in Czechia and Poland; transportation, financial services, other finance and real estate investment in all four countries; and the media (radio & TV and other media) and telecommunications (fixed and mobile) in Poland. The latter explain the higher index level for Poland. At least according to this index, the apparent anti-FDI attitudes do not seem to be present or to have materialised in regulatory terms in the analysed countries up till 2015.

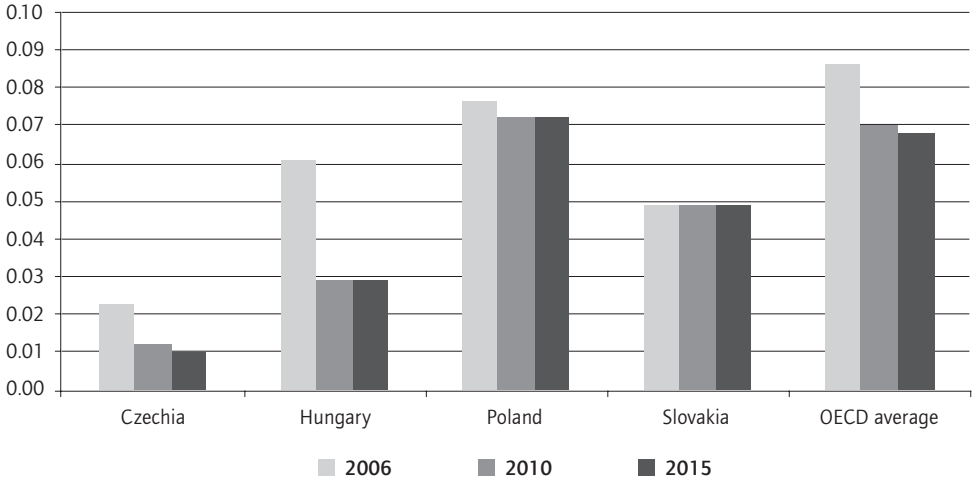
A similar index, part of the Product Market Regulations Index constructed by the OECD, tries to measure FDI barriers in an internationally comparable way (Figure 2), and arrives at results similar to those of the previous analysis. By 2013, FDI barriers were seen to reach a level significantly (Czechia, Hungary and Slovakia) or slightly below (Poland) the unweighted OECD average. This indicator shows a clearly declining trend between 1998 and 2013, i.e. even here we found no trace of an increased anti-FDI stance in Visegrad policies.

Provided by UNCTAD, another source of information looks at the number of international investment disputes. Problematic investment cases and disputes between states and foreign investors have clearly increased in the four Visegrad countries since the crisis (as seen in Figure 3), hinting that the business climate has worsened for certain foreign investors.

2. See http://www.oecd.org/investment/fdiindex.htm

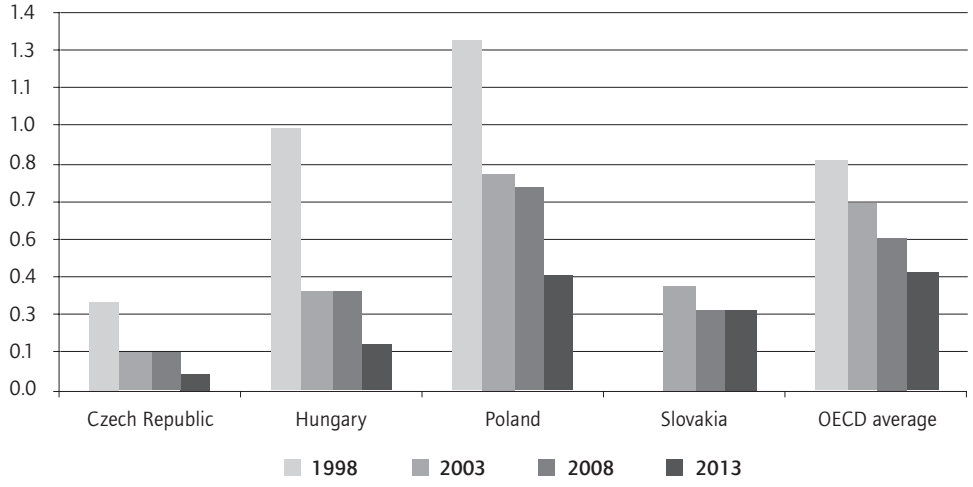
3. The difference between restrictiveness according to 'more visible' and 'less visible' measures may differ widely: 'less-visible' (i.e. internationally less regulated) measures may result in a different level of restrictiveness, see e.g. the comparison of UNCTAD on restrictions on FDI in services in developing countries and transition economies. Even in this international comparison, the Visegrad countries exhibit a low level of restrictiveness towards FDI in services in 2004, with Czechia being the least restrictive among 50 countries, Hungary ranked tenth and Poland sixteenth (UNCTAD 2006).

Figure 1 **FDI Regulatory Restrictiveness Index of the Visegrad countries, 2006, 2010, 2015**



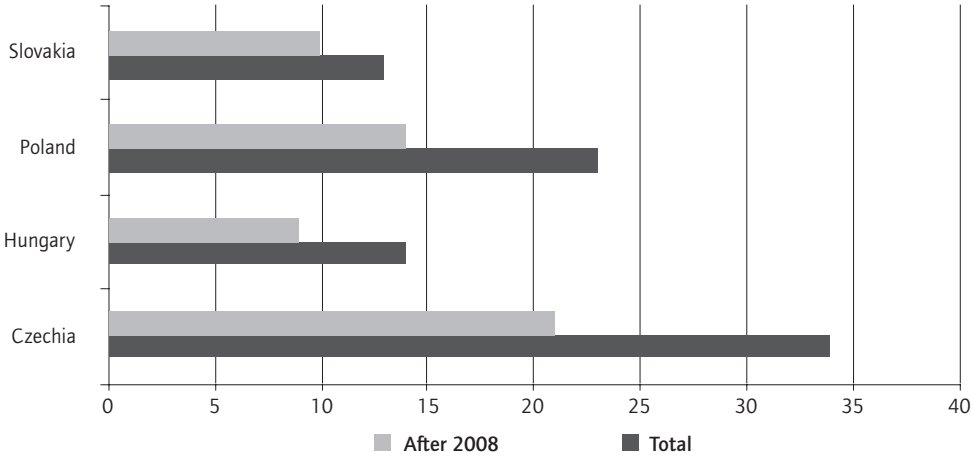
Note: higher values of the index indicate more restrictive FDI policies.
Source: OECD

Figure 2 **Development of the Barriers to FDI indicator in the four Visegrad countries, 1998, 2003, 2008, 2013**



Note: higher values of the index indicate higher barriers to FDI.
Source: OECD

Figure 3 **Number of investment disputes with the Visegrad countries as respondent states, 1994-2016**



Note: 'Total' refers to the number of disputes between 1994 and 2016 (22 years) ; 'After 2008' between 2008 and 2016 (8 years).
Source: http://investmentpolicyhub.unctad.org/ISDS/FilterByCaseName

The overall FDI environment is thus much less restrictive in the Visegrad countries than the OECD average and there have been no negative changes at macro level – at least until 2015. However, as already mentioned, anecdotal evidence and the increased number of state-foreign investor disputes may point to a worsening policy environment, at least for certain FDI projects.

3.1.1 The Hungarian case

The Hungarian case illustrates the ambiguity of this worsening FDI environment. Several legislative changes specifically target foreign-owned subsidiaries in certain sectors and industries[4], mainly those focused on the domestic market and operating in the services sector, and thus considered to be 'bad' FDI in government-speak. Changes in the laws meant *inter alia* that foreign-owned companies issuing social vouchers were forced out of business in Hungary.[5] In 2016, the EC ruled against the Hungarian government, as through this legislation it had infringed EC directives on freedom of establishment for service providers.[6] In the media sector, advertising revenues were taxed at 50%, hitting mainly foreign–owned companies.[7] In the same sector, the government commissioner in charge of the Hungarian film industry acquired one of the two large foreign-owned commercial TV channels.[8] Through not extending radio broadcasting licences to foreign or domestic privately owned channels, only state-run

4. See https://www.ft.com/content/e0c44550-0ad2-11e6-b0f1-61f222853ff3 or European Commission (2015) underlining the high frequency of legislative changes impacting negatively on certain economic actors.
5. See http://investmentpolicyhub.unctad.org/ISDS/Details/599
6. See http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=ecli:ECLI:EU:C:2016:108
7. See https://www.wsj.com/articles/hungary-adopts-tax-on-advertising-revenue-1402511876 or https://www.ft.com/content/b86018ca-2c7d-11e5-acfb-cbd2e1c81cca
8. See http://bbj.hu/business/report-andy-vajna-will-own-tv2_105497

radio stations (quite strictly controlled by the government) can broadcast nationally.[9] Banks have been taxed at high rates based on their assets and not on profits: changing the base from profit to assets and the special tax deductions rules for losses in Ukraine and Russia increased the tax burden for foreign-owned banks, while decreasing it for their domestically-owned or -controlled counterparts.[10] Due to the EC objection to their discriminatory nature, the bank tax rules had to be modified in 2016.[11] The introduction of government regulations on energy prices paid by households, setting price levels too low for profitable operations, forced foreign-owned service providers to sell their stakes in related companies to the state.[12] Changes in regulations caused and are planned to cause competitive disadvantages to foreign-owned retail chains vis-à-vis their domestically-owned counterparts.[13] It is important to note that two EC rulings have already underlined the discriminating nature of the new regulations targeting mainly foreign-owned subsidiaries. On the other hand, vertical, export-oriented manufacturing (in government-speak: 'productive' or 'good') FDI enjoys generous incentives, as witnessed by the automotive industry where foreign investment projects enjoy major privileges.[14]

The ambiguity of Hungarian government policy is underlined by the fact that, by lowering corporate tax, there are more and more incentives for multinational companies to transfer their profits to Hungary and thus save tax. One outstanding example was when the corporate tax paid by General Electric helped improve the Hungarian budget situation.[15] Certain foreign-owned subsidiaries pay corporate taxes at rates well below the 10% threshold characterizing tax constituencies as tax havens. 'German carmaker Audi, for example, did not pay any corporate tax in 2015, as it benefitted from R&D tax allowances. Wizz Air, Suzuki, GE, Mercedes and Bosch paid 1-2% corporate tax, while South Korean electronics producer Samsung was the only one out of the top 10 revenue companies in Hungary whose corporate tax payment (15.9%) was close to the headline corporate tax rate.'[16] At the same time, domestically-owned companies usually face a higher effective tax rate than large multinationals. In 2017, corporate tax rate was further reduced to 9%[17], benefitting mainly large companies[18] and incentivizing multinational companies to further indulge in tax optimisation.

9. See http://budapestbeacon.com/media-issues/ly-state-run-radio-to-broadcast-nationally-in-hungary-from-today/42191

10. See http://www.reuters.com/article/hungary-banks-idUSLDE6AB05520101112 or https://www.ft.com/content/e0c44550-0ad2-11e6-b0f1-61f222853ff3 , and on rate cuts in 2017: http://www.reuters.com/article/hungary-tax-banks-idUSB3N14Q026

11. See https://bbj.hu/economy/hungary-to-change-bank-levy-rules-following-ec-objection_107595

12. See http://bbj.hu/economy/eon-sells-hungary-natural-gas-firms-to-state-owned-mvm_65251 and Szanyi (2016).

13. See http://www.euractiv.com/section/central-europe/news/foreign-supermarket-chains-threatened-by-hungary/ and http://bbj.hu/business/multinational-food-retailers-to-face-strict-regulations-in-hungary_129928

14. See https://www.ft.com/content/e0c44550-0ad2-11e6-b0f1-61f222853ff3

15. See https://bbj.hu/business/ge-hungary-details-impact-of-involvement-in-alstom-acquisition-in-report_117072 and http://bbj.hu/business/ge-hungary-revenue-huf-4452-tln-last-year-following-alstom-merger_116978 and http://www.mkik.hu/en/magyar-kereskedelmi-es-iparkamara/cikkek/hungary-ecomin-secret-revealed-a-single-company-pays-giant-tax-91826

16. See http://www.intellinews.com/hungary-aims-to-become-central-europe-s-tax-haven-110896/

17. See https://www.ft.com/content/302fa4b4-acda-11e6-9cb3-bb8207902122

18. European Commission (2017).

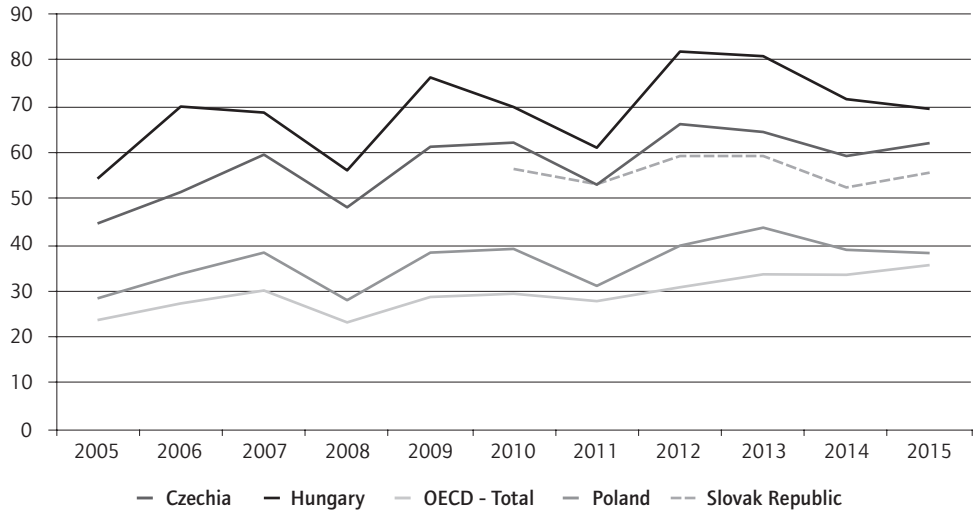
3.2 Changes in FDI inflows

Changes in FDI inflows may indicate that the attractiveness of the countries in question has changed, including the 'welcoming' stance of government policies, or conversely reflect changes in the supply side when less FDI is available to the analysed countries. According to Hunya's chapter in the present book, FDI inflows to the CEE region have clearly decreased. He shows that between 2010 and 2015 the FDI/GDP rate hardly changed in countries with high FDI penetration, but increased in Poland, a country with previously lower exposure to FDI. Furthermore, uniform changes in the Visegrad countries (Figure 4) give a hint of the dominance of the supply-side factor in the smaller FDI inflows. This is supported by the World Investment Report (UNCTAD 2016), which showed that world FDI flows have not regained their pre-crisis levels, or, when they have, that this was due to corporate reconfigurations.[19]

Another important change reported by Hunya in the present book is that domestic private and public investments are becoming more important throughout the CEE region (with the possible exception of Slovakia), meaning that the share of FDI in investment is declining.

However, we call attention to a fact relativizing the role of FDI in the Visegrad countries: the FDI stock/GDP ratio is still much higher than the OECD average in Hungary, Czechia and Slovakia (Figure 4).

Figure 4 **Inward FDI stocks in % of GDP in the analysed countries and in OECD, 2005-2015**



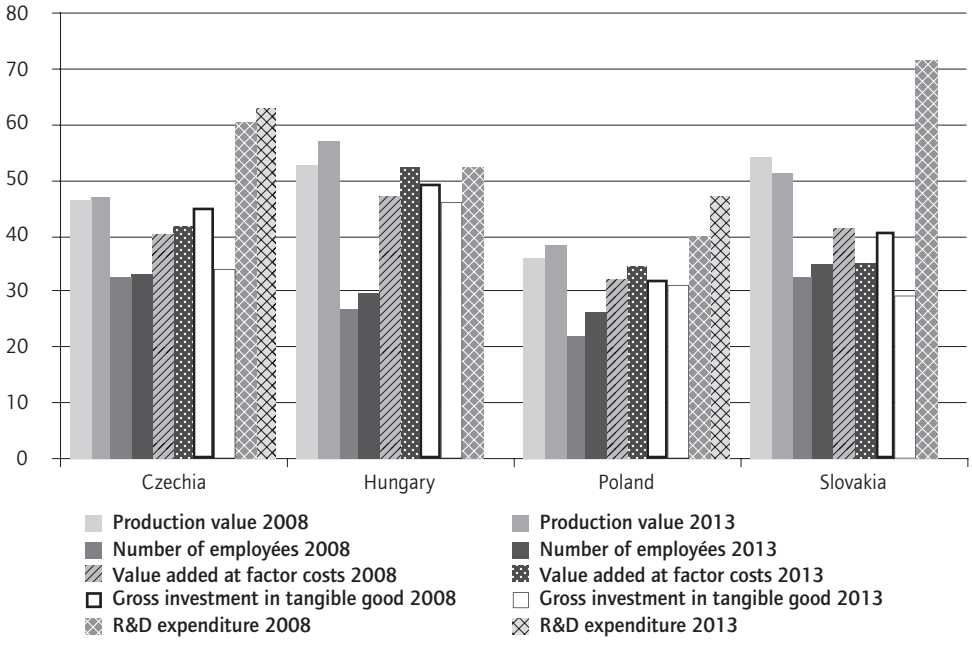
Source: OECD

19. These should be recorded as FDI but they do not comply with the definition of FDI in a strict sense.

Furthermore, the share of foreign-owned companies in production value, employment and value added increased in the analysed countries during the crisis – as already mentioned in the Gábor Hunya chapter (Figure 5). Foreign-owned companies are dominant (i.e. with a share above 50%) in certain areas, e.g. in R&D expenditure, in Hungarian and Slovakian production value, etc. Thus, even with smaller FDI inflows, the better during-crisis performance of foreign-owned subsidiaries compared to domestic companies led to these higher shares and thus greater dominance in the analysed economies. However, it is important to note that by 2013 the share of foreign-owned companies in gross investment in tangible goods declined in all analysed countries, and significantly in Slovakia and Czechia. This underlines the decrease in FDI inflows.

From the point of view of economic growth, it is also apparent from Figure 5 that foreign-owned companies are – and have always been - dominant in R&D in all Visegrad countries – pointing to the relatively low inclination of domestic firms to invest in R&D and innovation. In Hungary for example, domestic companies differ significantly from their foreign-owned counterparts in their inclination to innovate, with their focus solely on low-technology sectors, but not on high- to medium-technology industries. Thus, the different industry composition of subsidiaries and domestic companies may explain the differences in their inclination to innovate (Halpern, Muraközy 2012). This explanation may also apply to the other Visegrad countries.

Figure 5 **The share of foreign-owned enterprises in total production value, number of employees, value added, gross investment in tangible goods and R&D expenditure in the analysed countries, 2008 and 2013 (%)**



Note: ISIC B to N (basically all activities excluding Agriculture and certain Service activities), excluding K (Financial and insurance activities).
Source: OECD AMNE

Overall, FDI inflows to Visegrad countries declined after the crisis, though seemingly as a result of a worldwide decline in FDI flows. On the other hand, the significant – and in certain activities outstandingly high – role of foreign-owned companies has not changed considerably since the crisis. Overall, the FDI climate is still very liberal in OECD comparison. However, anecdotal evidence points at increased pressure being put on 'bad' FDI – as seen in Hungary.

4. Other potential 'growth engines' for the economies

In this section, we look at those groups of companies with the potential to replace – at least partly in certain sectors and industries – foreign-owned companies as economic growth engines. We will take a closer look at state-owned enterprises, (regional) multinationals originating in the analysed countries, large domestic companies and domestic SMEs in terms of their share in the economy and of their performance.

4.1 Changing role of state-owned enterprises

State-owned enterprises (SOEs) allow direct government intervention in the economy on economic and non-economic grounds. Such companies were expected to disappear after the socialist economies of Central and Eastern Europe started embracing capitalism through massive privatisation. However, certain SOEs have survived and have been playing an increasingly important role in the national economies – and some of them even internationally. In certain countries, their role has even increased, alleviating the negative effects of the financial crisis (Götz and Jankowska 2016; PWC 2015).

4.1.1 Importance of SOEs in the Visegrad economies

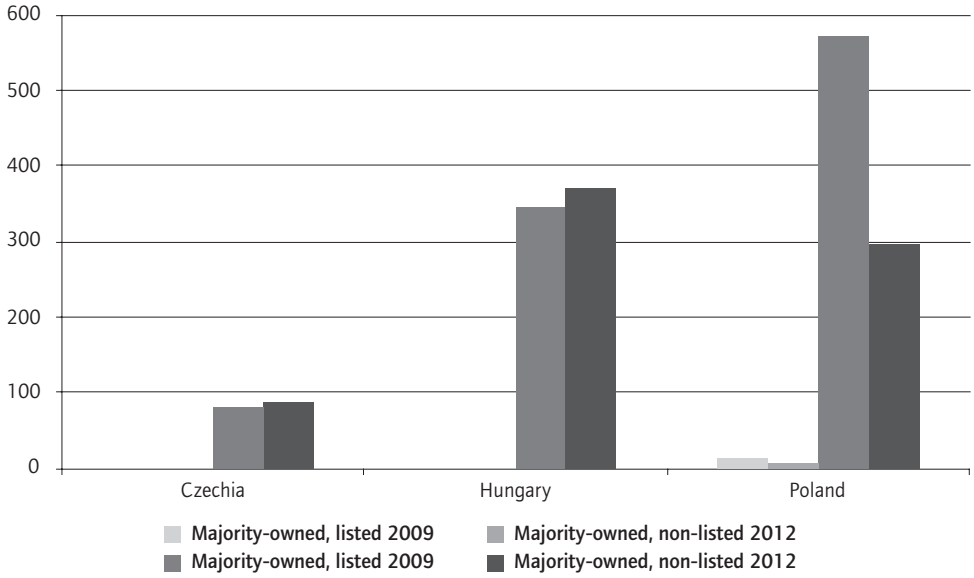
There are different definitions used for determining whether a company can be considered as state-owned or not. According to the OECD, SOEs are enterprises where the state has significant control through full, majority, or significant minority ownership. This can be realised by the central or federal government, as well as by regional and local governments.[20]

Overall, the number and share of SOEs in the Visegrad economies is relatively low, especially considering their recent histories as socialist economies. Based on an analysis of the largest companies (Forbes Global 2000), Kowalski *et al.* (2013) found that the share of SOEs in sales, profits, assets and market values as a % of GNI is not exceptional

20. For analytical purposes, other definitions may be used. For example, in the empirical analysis presented, firms where the state holds at least 20% of the shares are considered as SOEs. However, the authors note that changing to a 50% threshold would not significantly change the results of their calculations. The OECD uses a 50% threshold, distinguishing majority and minority state-owned companies and including both groups of companies in the analysis. (Christiansen 2011) Furthermore, Büge *et al.* (2013) show that a more nuanced analysis may take into account both direct and indirect state ownership. They also use the 50% threshold of (combined direct and indirect) ownership share.

in Poland and Czechia in OECD comparison and is lower than in the BRIICS[21] countries.[22] In the OECD, in terms of the 'economic weight' of SOEs, the Visegrad countries are similar to Scandinavian countries – with a declining trend since 2005 (Christiansen 2011). In the European Union[23], Hungary was ranked sixth, Czechia seventh, Slovakia eighth and Poland 13th based on the share of government participation in the capital of corporations as a % of GDP in 2014. Their shares were not substantially higher than those of the Netherlands, Austria or Ireland from the EU-15. (European Commission (2016) Graph I.2.1, p. 12).

Figure 6 **Number of majority-owned, listed and non-listed SOEs in Czechia, Hungary and Poland, 2009 and 2012**



Note: listed companies: their shares are traded on a stock exchange; non-listed: shares are not traded on a stock exchange; the OECD presents data for listed and non-listed companies separately.
Source: own calculations based on the OECD database, available at http://www.oecd.org/corporate/oecd-dataset-size-composition-soe-sectors.htm

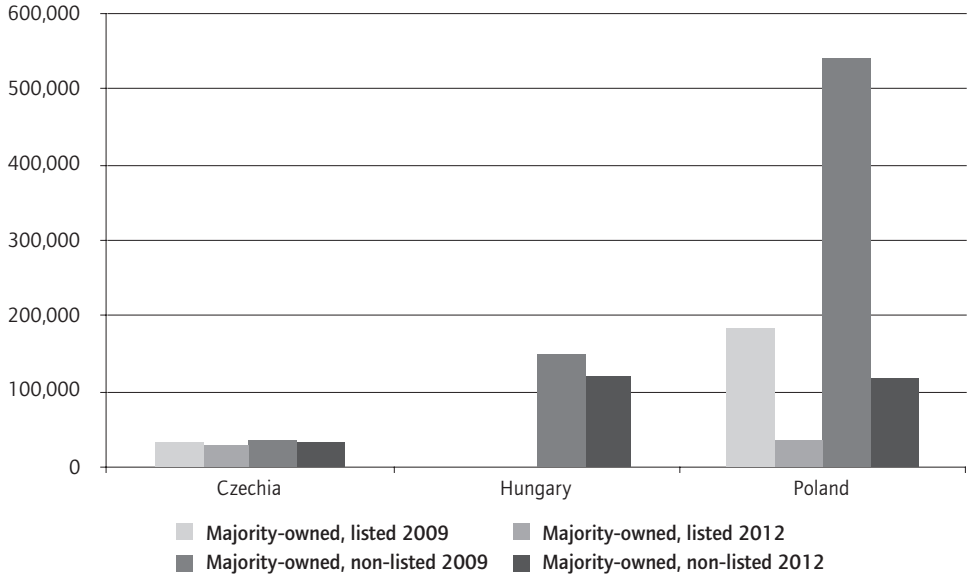
Pre-2010 privatisation, carried out using different methods, led to a decline in the number of non-listed SOEs in Czechia, Poland and Hungary.[24] At that time, SOEs were basically those enterprises which had not been privatised. Furthermore, the state had a minority stake in a number of companies (Christiansen 2013). The number of SOEs dropped further in Poland after 2010, but increased in Hungary, with the result that Hungary, by 2012, had the highest number of SOEs compared to the other two countries (Figure 6) – but their economic significance was still not high in OECD comparison, as many of these companies were quite small and economically insignificant (Christiansen

21. Brazil, Russia, India, Indonesia, China and South Africa.
22. Tables 3 and 4 on pp. 21 and 22 in Kowalski *et al.* (2013).
23. Without data for Belgium, Cyprus, Croatia, France, Greece and Luxemburg.
24. Slovakia did not provide data.

2013). Looking at their market value, they are tiny compared to for example the GDP of the analysed countries. In the case of Hungary, the one majority-owned, listed enterprise accounts for no more than 0.04% of 2012 GDP. In the case of Czechia and Poland, understandably, these shares are even lower: 0.014% and 0.005%, respectively.

Declining between 2009 and 2012, the economic 'weight' of the SOEs is negligible with regard to the number of employees, especially in Czechia and Hungary (Figure 7).

Figure 7 **Number of employees of listed and non-listed SOEs in Czechia, Hungary and Poland, 2009 and 2012**



Source: own calculations based on OECD database, available at http://www.oecd.org/corporate/oecd-dataset-size-composition-soe-sectors.htm

As for more recent developments, Deloitte (2016) points to a continuing decrease in the number of SOEs among the top 500 firms in 18 countries in Central Europe[25]. In 2015, their number was nine in Czechia, nine in Hungary, 34 in Poland and five in Slovakia – altogether 57 enterprises, representing more than two-thirds of the total 85 SOEs in the 18 analysed Central, Eastern and South-East European countries. In Hungary after 2010, their increase was the most pronounced in certain sectors (banking and public utilities), with explicit political aims targeting the 're-nationalisation' of these industries (Mihályi 2015).

The role of SOEs is suspected to be similar to or even higher in Slovakia than in the other three countries. As we see, Slovakia is not usually covered by the OECD analysis

25. The 18 analysed countries are: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czechia, Estonia, Hungary, Kosovo, Latvia, Lithuania, Moldova, Montenegro, Poland, Macedonia, Romania, Serbia, Slovakia, Slovenia and Ukraine.

of SOEs. The non-transparent nature of SOEs in this country is however underlined in various publications.[26] According to Transparency International, five of the ten biggest employers in Slovakia are SOEs, while the 80 most important SOEs manage assets totalling EUR 9.5 billion, equal to about half of state budget expenditure.

Overall, with the possible exception of Slovakia, the number and especially the economic significance of SOEs tends to be low in the Visegrad countries, meaning that they cannot be considered as alternative growth engines.

4.1.2 Hybrid Visegrad SOEs

The various databases use the traditional definition of SOEs as presented above. However, an important feature of today's SOEs is that the state has a much smaller share of ownership and private entities a much larger share than was previously the case. Furthermore, a new type of SOE has emerged, where state ownership does not necessarily result in state control, and where the latter may be exercised without significant state ownership (Diefenbach and Sillence 2011; Bruton *et al.* 2015). These changes are also to be seen in the Visegrad countries (see e.g. for Poland Baltowski and Kozarzewski 2016, for Hungary Szanyi 2016 or, for one Hungarian state-owned company, Antalóczy and Sass 2016). Why is this distinction important? SOEs were previously established for certain social or economic purposes (employment creation in general or for certain groups of people, carrying out R&D of strategic importance, providing public services etc.). Nowadays, with the higher share of private ownership, certain SOEs operate as if they were completely private, with a focus on profit maximisation. Overall, SOEs often combine commercial and non-commercial objectives (European Commission 2016).

These recent changes justify why SOEs are defined on the basis of state control rather than state ownership. According to the European Commission (2016), direct state control over business enterprises has decreased significantly in Czechia and Hungary among the analysed countries. We can thus assume that at least part of Visegrad SOEs are operating on lines more similar to private enterprises. On the other hand, we have anecdotal evidence that Visegrad governments have strengthened their influence on the governance structure in mixed ownership companies (Szanyi 2016). Hybrid SOEs – in circumstances of changing regulations and policy stances – consequently provide, in countries with less strong protection of minority ownership rights, an opportunity to increase government influence in the SOE sector and the role of the state as proprietor.

4.1.3 Concentration in sectors – industries

SOEs are generally active in certain sectors providing public services, including health and social insurance, and in 'natural monopolies' such as railways and electricity

26. See e.g. the report of the Transparency International Slovakia http://www.transparency.sk/en/slovenske-statne-firmy-su-netransparentne-a-spolitizovane/ or Nechala *et al.* (2015), which concentrated on the operational transparency of publicly-owned companies in Slovakia. In the various fields related to transparency, the score was lowest for Slovak SOEs compared to Czech, Slovak private and foreign companies. 81 state-, city- or county-owned companies were analysed. State-owned ones dominate (a total of 43), followed by city-owned (34) and county-owned (4).

transmission, and Visegrad countries are no exceptions to this rule. In 2015, the overwhelming majority of the 85 large Visegrad SOEs were active in the energy and resources sector (59 companies) and consumer business and transportation (15 companies) (Deloitte 2016).

Other information sources further highlight the dominance of these sectors. Looking at data on listed entities, we find for example that CEZ, a Czech company in which the state has a 63+% stake, operates in the generation, trading and distribution of power and heat, as well as coal mining.[27] According to the Czech Ministry of Finance[28], Eximbank and the Export Guarantee Agency, CEZ, the Congress Centre Prague, CEPRO (fuel trade), Czech Airlines and MERO (crude oil pipelines) are by far the largest Czech SOEs based on their base capital. All these companies are focused on the domestic market, with negligible exports.

In Hungary, two important listed minority SOEs are significant exporters and foreign investors: MOL (oil and gas) and Richter Gedeon (pharmaceutical industry). The other companies mainly serve the domestic market. Despite the high level of internationalisation of the industry in which it operates, Rába Holding, a company with 74.34% state ownership and producing (parts for) commercial vehicles, agricultural machinery and earthmovers as well as automotive components and specialty vehicles, only operates on the domestic market.[29] There are 370 majority-owned, non-listed SOEs with negligible market values, except those in finance (mainly EXIMBank-MEHIB), electricity and gas (mainly the Paks nuclear plant and other power stations) and transportation (Hungarian Railways, bus companies) (OECD 2014), again mainly serving the domestic market.

In the case of Poland, according to the OECD database (2014), among the six majority state-owned listed entities in 2012, three operated in the primary sector, one in manufacturing and two in electricity and gas. Among the ten minority-owned and listed firms, two were active in mining, three in manufacturing, three in finance, one in electricity and gas and one in other utilities. Companies in the primary sector and in finance have the highest market value.

In Slovakia, it is mainly public services which are operated by the state. We have detailed information on the energy sector, where combined state and private ownership is common. The state owns 100% of the shares of the national gas supplier Slovak Gas Industry, 51% in all electricity distribution companies, and 49 % in the gas transmission system operator.[30] As stated by Nechala *et al.* (2015), the 'usual' public services (transport, forests, water and electricity management, power plants, post, the exim- and

27. https://www.cez.cz/en/cez-group/cez-group.html

28. http://www.mfcr.cz/en/themes/state-property-management/2016/the-shareholdings-of-the-czech-republic-26340

29. http://www.raba.hu/english/our_profile.html, according to its balance sheet, the company had no exports in 2015, while 0.3% of sales were realised abroad in 2014.

30. Furthermore, in December 2015 the Italian (actually state-owned) utility company Enel signed an agreement with the Ministry of Economy granting the state an option to increase its stake in Slovenske Elektrarne, which controls 73% of the domestic electricity generation market, by an additional 17% (thus reaching a 51% majority), see https://www.export.gov/article?id=Slovakia-Competition-from-State-Owned-Enterprises

development bank, radio and television, the national lottery, airports etc.) can be found among state-owned companies.[31]

Overall, SOEs in the Visegrad countries are active in certain public services and utilities, with a few exceptions, especially in Poland and Hungary.

4.1.4 Performance of SOEs

Looking at country-level data for the Visegrad economies (European Commission 2016), SOEs perform considerably worse than their private counterparts, limiting – together with their sector and industry distribution and export intensity - their potential role as growth engines. This is to be expected given the *raison-d'être* of SOEs, as some of them have motives other than profit. In the period between 2004 and 2013, the return on equity in private firms was in most cases substantially higher than in SOEs, though the difference narrowed during the crisis years, due to a severe decline in private company profits. Furthermore, the average return on equity for SOEs turned negative during the crisis years in Hungary and Poland. For the same period, another sectoral analysis[32] (European Commission 2016) showed that the return on equity for SOEs was significantly lower in all industries, except for transport and storage. Underlining political influence, one interesting finding is that the profitability of state-owned enterprises in energy and public utilities is significantly lower in election years. Using TFP[33], SOEs perform worse than private companies in certain industries where their presence is not common: in consumer staples, chemicals and metal processing, i.e. mainly in manufacturing industries. However, in other industries the difference is either small or basically disappeared during the crisis. At country level, Visegrad SOEs underperform private ones in consumer staples in Hungary, and in public utilities in Czechia. This is backed by the result of an analysis of Hungary, where in 2015, the majority of SOEs were still loss-making.[34] In Czechia, CEZ Group is the most profitable and the least indebted power company.[35] Looking at labour productivity, the situation was similar to TFP. This analysis also showed that improved governance has a positive effect on both SOE productivity and profitability. SOEs negatively impact allocative efficiency in the industries where they are present, especially in Hungary and Slovakia. According to one analysis, similar to those of the other three Visegrad countries, Slovakian SOEs perform weakly.[36]

As for their impact on exporting, the industry breakdown of SOEs and their limited presence among manufacturing companies in the Visegrad countries indicate that their share in total exports is quite low, except for certain industries, especially in Hungary.

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31. http://www.transparency.sk/wp-content/uploads/2015/12/statne_firmy_web_a5_eng.pdf
32. This analysis was carried out on eight countries, the Visegrad countries + Bulgaria, Croatia, Romania and Slovenia.
33. TFP: total factor productivity, measures the efficiency of the contribution of the inputs (labour and capital) to production.
34. https://www.opten.hu/kozlemenyek/javuloban-az-allami-cegek-eredmenyessege-de-donto-tobbseguk-meg-mindig-veszteseges
35. https://www.cez.cz/en/cez-group/cez-group.html
36. https://www.export.gov/article?id=Slovakia-Competition-from-State-Owned-Enterprises

4.1.5 The regulatory role of SOEs

As stated by Christiansen (2013) in an interesting analysis, the main purpose of state ownership in Hungary is as an alternative to overregulation, and in certain sectors this assures sufficient investment. This contrasts substantially with the other, more developed countries analysed in the cited paper (Israel, the Netherlands, New Zealand and Norway), but may be similar in other Visegrad countries. It is also stated that Hungarian SOEs are directly monitored by the state (in contrast to other developed OECD countries), with specific targets set for them and possibly with instructions to depart from normal earnings targets (i.e. fulfilling non-commercial aims). This points to the hybrid nature of Hungarian SOEs, allowing them to be classified as for-profit or non-profit organisations. For–profit organisations are expected to perform well compared to comparable private firms, while non-profit companies can supplement their market earnings with various sources, including subsidies and levies. 'Hungary is very transparent about non-commercial objectives in designated public interest companies, but much less so in the case of for-profit SOEs with certain non-profit assignments' (Christiansen 2013: 15). We can suspect this increased state involvement to be found in the other three Visegrad countries as well, leading us to the next 'role' played by government: as a regulator.

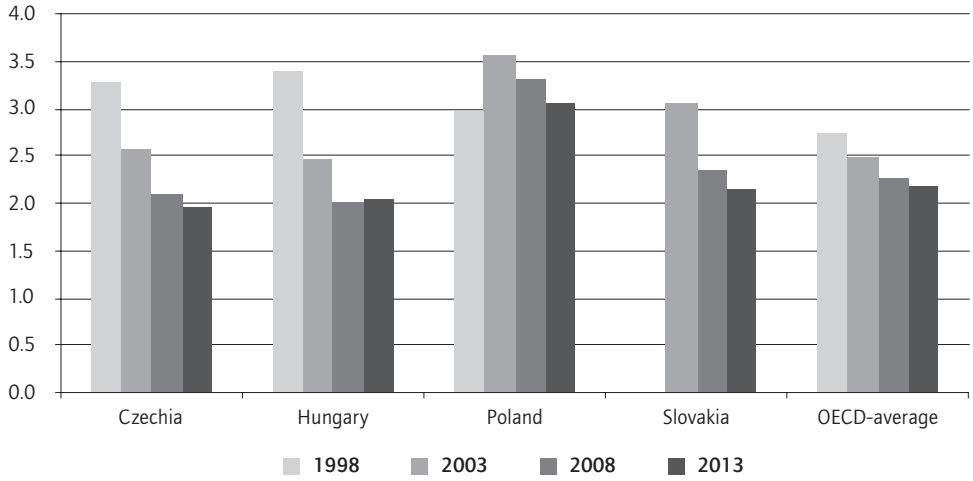
The role of the state as a regulator, shaping the business environment of the individual Visegrad economies, may also be important – as it indirectly impacts FDI and foreign-owned companies operating in the countries in question[37]. The higher state activity in this area can partly be attributed to the heritage of the socialist era. Measuring and comparing the extent of the regulatory role of the state are problematic, given the lack of aggregated data. However, the OECD Indicators of Product Market Regulation provide a comprehensive and internationally comparable set of indicators,[38] measuring the degree to which government policies hinder or promote competition in various product markets. They are currently available for 4 years: 1998, 2003, 2008 and 2013 and for all four analysed countries. We look specifically at the indicator on state control (Figure 8), an index based on two sets of data: data on public ownership (sub-indicators: scope of SOEs, government involvement in network sectors, direct control over enterprises, governance of SOEs) and involvement in business operations (price controls, command and control regulations). It thus partly reflects the role of SOEs in the economies in question, and partly the role of the state.

In terms of trends between 1998/2003 and 2013, all four countries significantly diminished state control in product markets, though this trend seems to have been broken (maybe reversed?) in 2013 in the case of Hungary. However, it is important to note that in 2013, Czechia and Hungary were below, Slovakia around the unweighted OECD average, while Poland's indicator was substantially higher.

Thus, in an OECD comparison, the 'level' of state control can be assessed as low or average (with the exception of Poland) in the Visegrad countries.

37. As could be seen in the section on anti-FDI regulatory government measures in Hungary.
38. See http://www.oecd.org/economy/growth/indicatorsofproductmarketregulationhomepage.htm

Figure 8 **Product market regulation: indicator of state control**



Note: index scale 0 to 6 from least to most restrictive.
Source: OECD

4.2 Visegrad multinationals

Multinational companies are by definition especially competitive, as they can internationalise successfully and perform well in international competition.

4.2.1 Limited outward FDI

According to data on outward foreign direct investment (OFDI), the Visegrad countries can be considered as the most active outward investor countries among the New EU Member States. However, compared to developed countries, their OFDI stock is quite small (Table 1). With the exception of Slovakia, around one quarter of the total outward FDI stock went to other New Member States, pointing to the existence of regional multinationals, while also indicating the importance of non-CEE markets for Visegrad investors. For Slovakia, that share is much higher, mainly due to the high value of OFDI stock in Czechia, partly 'inherited' from the pre-secession period, partly explained by remaining strong economic and cultural ties between the two countries. (Ferencik 2012 or Sass 2017).

However, not all FDI stock can be considered as foreign investments by domestic companies. The data of the national banks on outward foreign direct investments contain values of transactions realised by resident entities, regardless of their ultimate controlling owners. Thus, both direct and indirect (i.e. realised by local subsidiaries of foreign multinational companies) OFDI is included in these data. For example, in Sass (2015) I showed that, of the outward FDI in the electronics sector, the share of domestically-owned companies was around one-third in Hungary and Poland. The majority of OFDI in this industry is realised by local subsidiaries of foreign multinational

companies, such as the Korean company Samsung, the Taiwanese Foxconn or the US General Electric in the case of Hungary. According to Rugraff (2010), in the case of Poland, it may be more domestically-owned and -controlled companies which invest abroad, whereas, in the case of Czechia and Hungary, the share of indirect OFDI, i.e. OFDI realised by local subsidiaries of foreign multinationals, is higher than that of domestically-controlled firms.

Table 1 **Outward foreign direct investments of the Visegrad countries in international comparison, 2012**

	Total OFDI stock (million euros, 2012)	Per capita (euros)	OFDI stock in NMS12	NMS11 in % of total
Czechia	13158	1253	4085	31
Hungary	26592	2686	7217	27
Poland	43644	1143	9875	23
Slovakia	3612	669	2495	69
Austria	158806	18683	...	...
Estonia	4548	3498	3127	69
Latvia	850	425	365	43
Lithuania	1903	595	942	50
Slovenia	5676	2703	212	4

Note: NMS11: Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia.
Source: calculations based on Eurostat data (for Hungary, data of the Hungarian National Bank were used due to missing Eurostat data)

To identify 'real' Visegrad multinationals, we have to go down to company level. For Hungary and Poland, this is easier, because the EMGP[39] reports, respectively Sass and Kovács (2015) for Hungary and Kaliszuk and Wancio (2013) for Poland, of the Columbia Center on Sustainable Investment prepared on the domestic multinationals of these countries list the largest domestic(ally controlled) multinational non-financial companies, based on the size of their foreign assets.

4.2.2 Few domestic multinationals

Overall, relatively large-sized companies with foreign subsidiaries are quite rare in the Visegrad countries. In Czechia, CEZ constitutes a state-owned regional multinational, with subsidiaries in Bulgaria (4 acquisitions in 2005 and 2006), Romania (since 2005), Poland (since 2006), Hungary (close to 8% ownership share in MOL, the petrol company), Slovakia, Turkey and Albania.[40] Other important foreign investors include Zentiva in the pharmaceutical industry and Skoda in the automotive industry, both of which were originally Czech companies, but are now respectively owned by the French Sanofi and the German Volkswagen, i.e. they are no longer Czech-controlled companies (Zemplinerova 2012).

39. Emerging Markets Global Players project at the Columbia Center on Sustainable Investment, see http://ccsi.columbia.edu/publications/emgp/ , analysing multinational enterprises from emerging markets.
40. https://www.cez.cz/en/cez-group/cez-group.html

Turning to Hungary, the OTP bank, the petrol company MOL, the pharma company Richter Gedeon and electrical manufacturer Videoton are multinational companies with substantial foreign assets (more than 100 million USD) (Sass *et al.* 2012; Sass and Kovács 2015). Lowering the threshold to 20 million USD, they are joined by eight other companies (Waberer's and MPF in transportation, Mediso, a manufacturer of medical instruments, Masterplast, producing building materials, Jász-Plasztik in plastics production, Arcadom in construction and Vajda-Papír in paper production). They are however much smaller in both total size and foreign assets than their developed-country counterparts. Expressed in terms of GDP, the foreign assets of the top 20 foreign-investing Hungarian firms represent less than 0.02%.

In Poland, multinational companies are on average larger. There are 12 companies with more than 100 million USD foreign assets (Kaliszuk and Wancio 2013). The two largest and the fifth are active in oil and gas exploration and distribution. The third, Asseco, provides software and IT services. The rest are two chemical and one pharmaceutical companies, two machinery manufacturers, two building materials producers and one wholesale trade and IT services company. Eight more companies have foreign assets exceeding 20 million USD, among them mining, metallurgy, building materials, pharma, software-IT and machinery companies. In terms of GDP, the foreign assets of the top 30 foreign-investing firms represent less than 0.002%.

Small multinationals, among them born globals or international new ventures, exist in all Visegrad countries. They differ from the above-described firms in terms of their target countries, often developed countries. However, their size is much smaller than the above-mentioned top Visegrad multinationals (See e.g. Nowinski and Rialp 2013; Kiss *et al.* 2012; Lamotte and Colovic 2015; Danik *et al.* 2016).

Why do Visegrad companies go abroad? Most often in search of new markets (see e.g. Svetlicic *et al.* (2007) for SMEs or the overview of the literature in Trąpczyński (2016)). As a basis for internationalisation, Visegrad companies can rely on their specialist knowledge on restructuring enterprises previously operating in a planned or an evolving market economy environment, or on brands known from the pre-transition era. Some of them rely on efficiency-seeking investments in geographically close countries with significantly lower wages, transferring labour-intensive activities there. The existence of the efficiency-seeking motive points to the probability of a stronger impact on exports in the analysed countries. The existence of this type of domestic multinationals is featured in a few articles for all four countries (see e.g. Zemplinerova (2012) for Czechia; Sass *et al.* (2012) for Hungary; Gorynia *et al.* (2014); Gorynia *et al.* (2015) or Trąpczyński (2015) for Poland; Ferencik (2012) for Slovakia or Sass (2016) for the electronics industry in Hungary, Poland and Slovenia). However, they are in a clear minority compared to market-seeking firms.

4.2.3 The impact of Visegrad multinationals on their home economies

While relatively understudied, especially in economics literature, certain political economy approaches underline the national character of multinational companies and their positive impact on the development of their home country (see e.g. Doremus *et al.* (1998) or Gilpin (2001)).

First of all, of course, OFDI must be relatively high in order for it to have any sizeable impact on the home economy, which is not really the case in any Visegrad country. Furthermore, the impact on the home economy is rarely analysed, especially in the case of emerging economies and even less in the case of the former transition economies. Empirical evidence is also lacking (Gorynia *et al.* 2015).

Multinational companies can have various positive and negative impacts on their respective home economies. An important beneficial impact can be the increase in the productivity of the investing company through reverse spillovers (Gorynia *et al.* 2015), the extent of which depends on the absorptive capacity of the company in question. There is no conclusive empirical evidence on the existence of these benefits and no analysis exists for the Visegrad countries.

Furthermore, profit repatriation may positively affect the balance of payments of the sending countries. A closer look at the host country composition of OFDI from the four Visegrad countries (Table 2) however reveals that the foreign-investing Visegrad companies quite often target tax havens. This indicates that OFDI can lead to the erosion of the domestic capital and tax base: Visegrad companies and subsidiaries of foreign multinationals investing in third countries are increasingly relying on the tax optimisation opportunities offered by various countries, such as the Netherlands, Cyprus, the Dutch Antilles or Luxemburg (in the Czech statistics, a separate row deals with OFDI to offshore financial centres). However, this is in line with worldwide trends, as pointed out by the 2016 World Investment Report (UNCTAD 2016). Nevertheless, Visegrad OFDI is so tiny compared to that of developed countries or the BRICS that it is hardly visible in global comparison.[41] Though such tax 'optimisation' efforts by multinationals are no new phenomenon, they increased during the crisis years, as pointed out by Hunya (2015) or Antalóczy and Sass (2015). The tax erosion problem is similarly indicated by UNCTAD (UNCTAD 2016), calling attention to the fact that ratios of income attributed to foreign subsidiaries of outward-investing countries to the gross domestic product (GDP) of the economy where these subsidiaries are domiciled reveal profits out-of-line with economic fundamentals.

Thus overall, OFDI is possibly leading to the erosion of the tax base in Visegrad countries, with the possible exception of Hungary which itself acts as a quasi tax haven due to its exceptionally low corporate tax rate.

41. In Hungary, besides this type of 'tax optimisation' OFDI, Special Purpose Entities play a significant role in both inward and outward direct investments, but the Hungarian National Bank calculates FDI data both with and without such entities (Antalóczy, Sass 2015).

Table 2 **Top 10 host countries of Visegrad OFDI and their shares in total OFDI in %**

	Czechia		Hungary		Poland		Slovakia	
	Top host countries	In % of total OFDI stock	Top host countries	In % of total OFDI stock	Top host countries	In % of total OFDI stock	Top host countries	In % of total OFDI stock
1	Netherlands	34.23	Central America (Dutch Antilles)	29.47	Cyprus	37.50	Czechia	31.50
2	Slovakia	18.35	Israel	12.99	Luxembourg	20.63	Cyprus	24.52
3	Germany	7.10	Belgium	10.06	Czechia	7.80	Luxembourg	13.94
4	Cyprus	5.87	Cyprus	7.79	Netherlands	7.54	Poland	7.40
5	Greece	5.43	Croatia	6.95	Switzerland	7.13	Turkey	5.25
6	Ireland	4.15	Slovakia	6.28	Germany	5.43	Netherlands	3.36
7	Offshore financial centres	3.87	Luxemburg	3.48	United Kingdom	4.51	France	2.49
8	Bulgaria	3.12	Bulgaria	2.74	Lithuania	3.61	Austria	2.37
9	Romania	2.01	United States	2.67	Canada	3.14	Hungary	1.72
10	Croatia	1.92	Netherlands	2.38	United States	2.97	Belgium	1.36

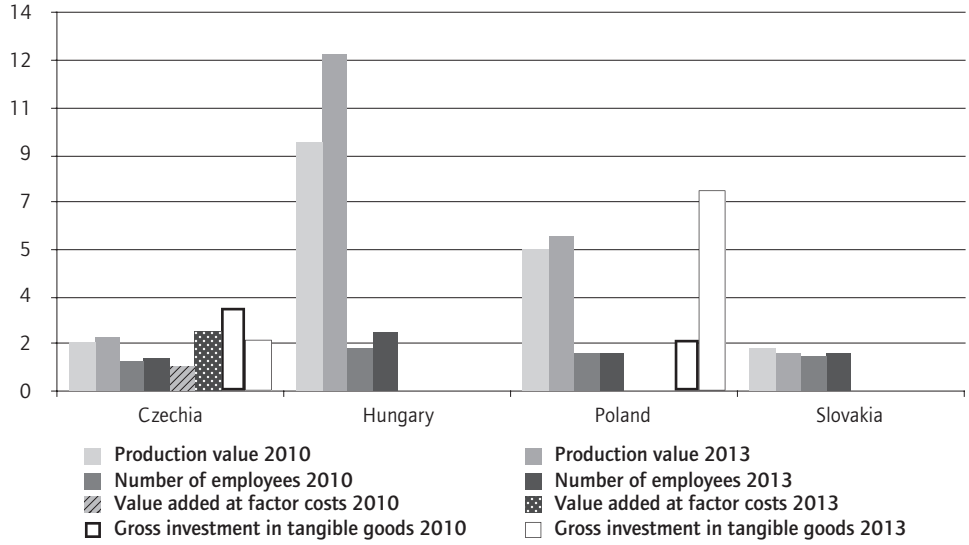
Notes: Czechia: 2014; Hungary: 2015; Poland: 2015; Slovakia: 2014.
Source: national banks of the analysed countries, data on foreign direct investments for Slovakia: OECD FDI database (http://stats.oecd.org/Index.aspx?QueryId=64238#)

One positive effect identified in the case of emerging multinational companies is that, through outward investment, they can acquire hitherto lacking ownership advantages, thus making them more competitive internationally (see e.g. Child and Rodrigues 2005 in the case of Chinese multinationals). Given the characteristics of the companies, such foreign investments may be present in the Visegrad countries as well, though this aspect has not (yet) been examined.

Another impact of OFDI on the home country is the possible reduction of capital available for investment in the home country and the transfer of jobs abroad. However, on the one hand the relatively limited size of OFDI, on the other hand the dominance of the market-seeking motivation over the efficiency-seeking one leads us to the assumption that job losses may be very limited.

The potential magnitude of the impact on domestic economic development can be assessed on the basis of the sporadic data available on foreign subsidiaries of Visegrad MNCs (Figure 9). Their shares are only non-negligible in the case of Hungary's production value and Poland's production value and investment.

Figure 9 **Visegrad-owned foreign subsidiaries' production value, number of employees, value added and gross investment in tangible goods compared to domestic totals, 2010 and 2013 (%)**



Source: own calculations based on data from OECD AMNE

Thus, while the existence of Visegrad multinationals is a fact, they remain quite small compared to their respective economies, with the possible exception of Hungary and maybe Poland, while their characteristics are such that they have yet to have a sizeable overall growth impact on their home economies. Nevertheless, given their concentration in certain industries, they may positively impact these industries in the individual Visegrad countries.

4.3 Are there signs of an increasing role of domestically-owned companies?

These companies may be 'natural' candidates for taking over the driving seat from the foreign-owned subsidiaries of multinational companies – especially if the latter are now less welcome in certain sectors, industries or activities. In this section, two sub-groups of 'natural' candidates are looked at: domestically-owned or -controlled large companies and small and medium-sized companies (SMEs).

4.3.1 Large domestically-owned (or -controlled) companies

There is considerable overlap between large companies on the one hand and state-owned companies and Visegrad multinationals on the other hand, as demonstrated by the Deloitte study (2016) on large (based on their revenues) companies. The following table (Table 3) contains the Deloitte data for the four Visegrad countries. Out of the

500 largest companies of the CEE and SEE region[42], 355 (71%) come from the Visegrad countries (74 from Czechia (14.8%), 67 from Hungary (13.4%), 182 from Poland (36.4%) and 32 from Slovakia (6.4%)), underlining the dominant economic role of these countries in the region.

Furthermore, among large companies, local subsidiaries of foreign-owned multinationals dominate in all four countries, with their share among large-sized companies outstandingly high in Hungary and Slovakia (almost 80%), relatively high in Czechia (more than 60%) and slightly more than half in Poland.

Among domestically-owned companies, SOEs are very important. The share of domestically-owned companies is the highest in Poland (87 firms (48%), of which 34 are SOEs (19% of total)), followed by Czechia (25 firms, 34%, including 9 SOEs (12% of total)). By contrast, domestically-owned companies are almost exclusively SOEs in Hungary (11 firms, 16 %, of which 9 are SOEs (13% of total)) and exclusively SOEs in Slovakia (5 firms, 16%). Different privatisation schemes and speeds clearly have an impact in this respect.

In the cases of Hungary and Poland, a few foreign majority-owned companies can be considered as domestically-controlled and thus as indigenous companies. The reason is that their shares are traded on the local stock exchanges and, though in majority foreign ownership, their ownership structure is dispersed, i.e. no single foreign owner owns more than 10 per cent of the shares. A few of them feature among the top companies as well, such as MOL, Richter Gedeon or OTP Bank in the case of Hungary (Sass *et al.* 2012). However, even with these, the number of domestically-controlled, but not state-owned firms is very low in Hungary and Slovakia, moderate in Czechia and relatively high solely in Poland.

Table 3 **Breakdown of the top companies by ownership (number of companies)**

	Central European company	Foreign individual	Local company	Local individual	Multinational company from outside Central Europe	State-owned	Central European individual	Total
Czechia	3	0	4	12	45	9	1	74
Hungary	3	0	0	2	53	9	0	67
Poland	0	3	21	32	92	34	0	182
Slovakia	2	0	0	0	25	5	0	32

Source: based on Deloitte (2016)

42. The analysis covers the Visegrad countries, the Baltic countries (Estonia, Latvia, Lithuania), Bosnia-Herzegovina, Bulgaria, Croatia, Macedonia, Romania, Serbia, Slovenia and Ukraine.

In the financial services sector, Visegrad countries similarly dominate the list of the top 50 banks in the region with a total of 33 banks (two-thirds of the total). Poland has 15, the Czech Republic 8, Hungary 6 and Slovakia 4. Here again, foreign-owned banks dominate. Only two domestically-owned banks stand out. While the second-placed bank, the Hungarian OTP, can be classified as the only regional multinational (Raiffeisen Research 2016), the top bank, PKO Bank Polski, is 30% state-owned and has the highest market share in the CEE region with 8.2% (mainly due to domestic operations) (OTP Bank 2.9%) (Raiffeisen Research 2016: 63).

Similarly, in the manufacturing sector, the Visegrad dominance is clear among the top 10 firms in the CEE region: we find only two non-Visegrad-based ones. Of the Visegrad companies, three are Czech, three Hungarian and two Slovakian, with subsidiaries of foreign automotive multinationals dominant (Skoda Auto and Hyundai in Czechia, Audi and Mercedes-Benz in Hungary and Volkswagen and Kia in Slovakia). The privately-owned Agrofert from Czechia (food, chemicals and other industries) and the Hungarian subsidiary of the US General Electric also feature in the list of top manufacturing firms.

Overall, 2015 data show the overwhelming dominance of foreign subsidiaries among large companies. Domestic, privately-owned companies are only present in Czechia and especially in Poland in significant numbers.

4.3.2 Domestic(ally-owned) small and medium-sized enterprises

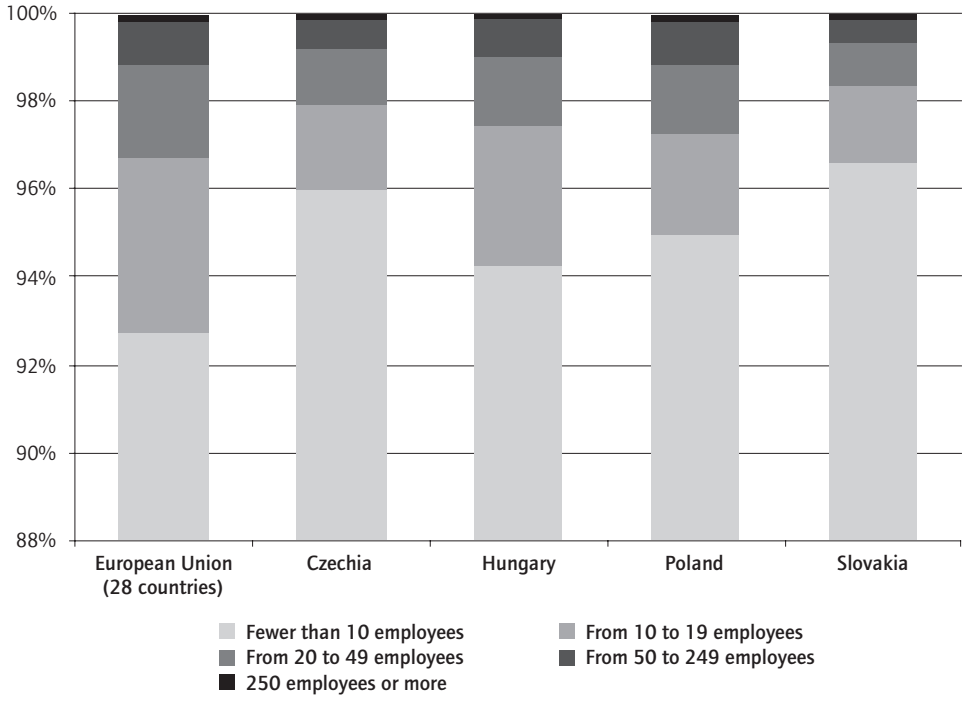
The experience of certain countries and regions shows that the activities of dynamically growing, competitive SMEs can be a basis for dynamic economic growth. In terms of the distribution of the number of companies, the Visegrad countries have a large SME sector, even in an EU comparison (Figure 10).

However, the company population of all four Visegrad countries is skewed towards the dominance of micro-companies with less than ten employees. Compared with the EU, it is apparent that in all four countries the share of micro-companies accounts for more than 94 % of the total number of companies. It is also apparent that the number of companies with 10 to 19 and 20 to 49 employees is less than in the EU28 as a whole. With the exception of Poland, the share of the medium-sized (50 to 249 employees) and large companies (> 250 employees) is also slightly smaller than in the EU28 (Figure 10).

Concerning the sector-industry composition of SMEs in the Visegrad countries, it differs greatly from that of the EU-28 overall (Figure 11). The share of manufacturing and construction SMEs is relatively high (substantially higher than the EU-28 average) in all Visegrad countries except Hungary. Everywhere, the number of wholesale and retail trade companies is the highest, though in Czechia and Hungary it is below the EU average. The number of companies in information and communication, in professional, scientific and technical activities and especially in administrative and support service activities and their share in total is by far the highest in Hungary. Especially in the two latter categories, this high share can be attributed to micro-companies (below 10 employees) in Hungary. Another analysis drew similar conclusions, seeing Czech SMEs as skewed towards manufacturing, Hungarian ones as being mainly involved

in wholesale and retail trade, manufacturing, professional activities and construction, Polish ones concentrated in lower value-added sectors, and Slovakian ones in manufacturing (Daszkiewicz 2014).

Figure 10 **The size composition of companies in the Visegrad countries, 2013**

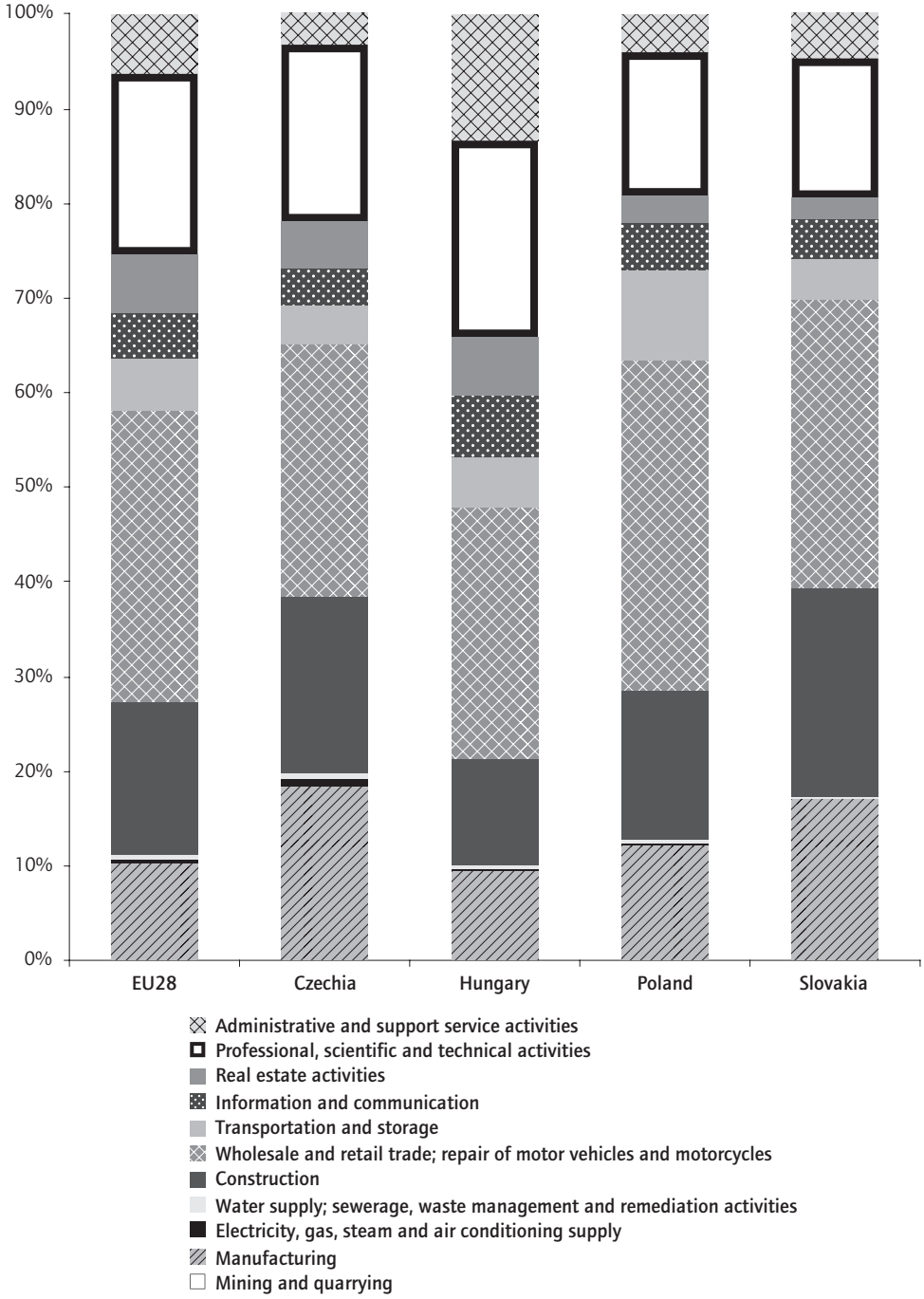


Source: author's calculations based on Eurostat data

The sector-industry composition determines to a great extent the exporting potential of SMEs, meaning that there are wide differences within the country group in the extent to which SMEs contribute to exports. For example, the share of manufacturing SMEs is the highest in Czechia, with Czech SMEs representing more than 50 % of total exports in 2011 (Helisek 2013). In Poland, SMEs were responsible for around 44-45% of total exports in 2012 (45 % to EU and 43 % to non-EU countries) (Lapinski 2013: 38, Figure 5), maybe a result of their relatively high shares in manufacturing. On the other hand, the SMEs of the other two countries perform differently: in Hungary, their share of exports is 26.4% (Mikesy 2013), while in Slovakia – in spite of their relatively frequent presence in manufacturing - it is just 18 %.[43] Part of SME exports can be attributed to foreign-owned enterprises. Unfortunately, the breakdown of the SME group into foreign-owned and domestically-owned was not available for the analysed countries. One reason for the low export contribution could be that micro-enterprises, the dominant company size in all Visegrad countries, generally exhibit very low export/sales rates throughout the European Union (European Commission 2014).

43. http://spectator.sme.sk/c/20049699/sme-exports-remain-low.html

Figure 11 **The sector-industry composition of SMEs (0-249 employees), according to the number of companies, 2013**

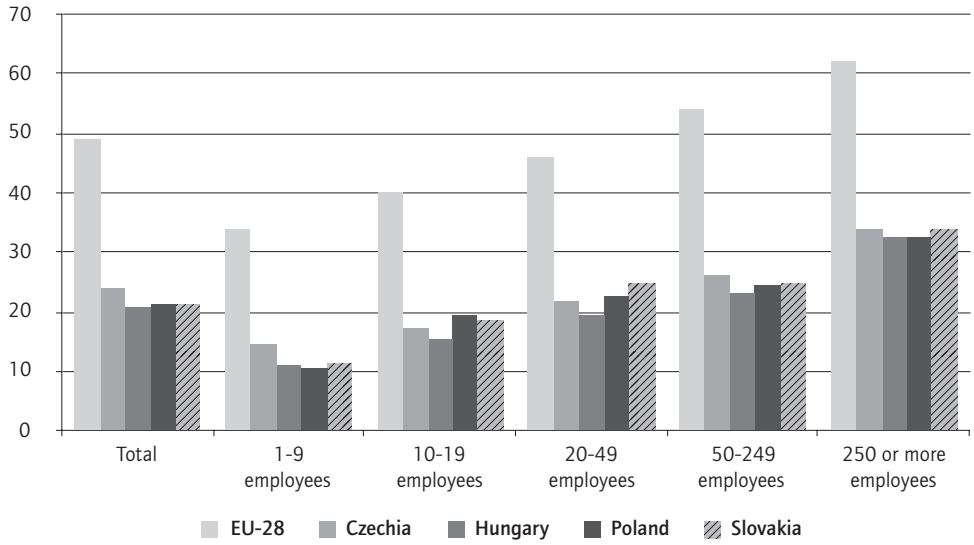


Note: EU-28: 2012 data.
Source: own calculations based on Eurostat data

Overall, the internationalisation of Visegrad SMEs is relatively low. One of the few comparative studies in this area, Gubik and Bartha (2014) base their findings on a survey of Visegrad SMEs resulting in a database on 1124 companies. Important findings in our view are that company size and foreign ownership positively influence internationalisation.

Finally, the performance indicators of SMEs point to their potential role in driving growth in the economies in question. However, the lack of internationally comparable data makes this exercise quite problematic.

Figure 12 **Gross value added per person employed (thousand euros, 2014)**



Source: Eurostat, structural business indicators, Annual enterprise statistics by size class for special aggregates of activities (NACE Rev. 2)

The productivity of all company groups, based on their size, is well below the EU28 average in the Visegrad countries. Productivity correlates with the size of the company (Figure 12), as in other countries. However, beside the similarities, there are some country differences: Hungarian SMEs seem to be the lowest performers of the four Visegrad countries. Czech micro, medium- and large-sized enterprises perform relatively well, together with Polish and Slovakian small-sized ones.

5. Conclusions

The problem of convergence is of paramount economic and political importance for the Visegrad countries. After 1989, with different starting times, all of them relied to a great extent on FDI to catch up with the more developed countries of Europe. In this process, the share of foreign-owned subsidiaries in the respective economies grew well above the OECD averages, with the exception of Poland. Disenchantment with the performance of these MNC subsidiaries in driving growth in the Visegrad economies and accelerating their catching-up with the core EU countries within a foreseeable period can be seen in all four countries. Furthermore, after the short inward FDI 'honeymoon', the crisis years showed that certain forms of FDI increased the vulnerability of the economies in question. In the ensuing low-FDI post-crisis environment with increased profit repatriation, the 'dark sides' of being exposed to foreign capital were witnessed in the region.

In this environment, Visegrad governments are increasingly looking to other potential candidates to drive their economic growth. The rhetoric has changed, with a differentiation increasingly being made between 'good' and 'bad' FDI. However, the generous incentives for and the good treatment of subsidiaries already operating in these countries, especially in export-oriented manufacturing industries, have not changed considerably.

Otherwise very similar, Visegrad countries differ in terms of changes in their approach to FDI and the availability of a 'non-FDI' group of companies to help them catch up. We have shown that there are not many alternatives to foreign-owned subsidiaries and that even these may work differently in the four Visegrad countries. Hungary (and Poland) seem to be the most active countries in trying to reduce the share of and reliance on foreign-owned companies in certain sectors of the economies. As for alternative 'growth engine' groups of companies, Hungary has a small group of strong regional multinational companies, dominating a few industries, while Czechia and especially Poland have a relatively high number of domestically-owned large companies. Czech micro- and medium-sized and Polish and Slovakian small-sized firms seem to be quite competitive.

However, up till now, none of these groups of companies have come to the fore, whether as subjects of economic policy or in economic performance.

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Chapter 3
Innovation, human capital and competitiveness in Central and Eastern Europe with regard to the challenges of a digital economy

Marzenna Anna Weresa

1. Introduction

The objective of this paper is to examine how the competitiveness of the four Central Eastern European EU members states (the four Visegrad countries – the V4, namely Poland, Czechia, Slovakia and Hungary) developed over the post-crisis 2008-2015 period and how these changes were related to innovation and human capital development. In particular, changes in the competitive position of these countries will be discussed in the context of the development of a digital economy. The focus is on two pillars of competitiveness, innovation and human capital, and how they facilitate the development of a digital economy.

Competitiveness has been at the heart of economic debates among academics and policymakers since the 1980's. The concept of competitiveness is discussed in the literature at three levels at least, including:

1. The competitiveness of countries (macro level);
2. The competitiveness of regions, sectors or industries (meso level);
3. The competitiveness of companies (micro level).

This paper focuses on the macro-level competitiveness of the four Visegrad countries (V4), building on the definition of the competitiveness of nations introduced by Michael Porter in 1990 (Porter 1990). However, even after narrowing down this broad category to macroeconomic aspects there are still a lot of facets that have to be taken into account, such as prices, productivity changes, technological specialization, structure of the economy, etc. (Aiginger *et al.* 2013). The traditional approach to the assessment of a country's competitiveness focuses on cost-based productivity measurements, such as unit labour costs or labour productivity, while the real exchange rate measures the development of cost-price competitiveness (Rozmahel *et al.* 2014).

According to the broad approach taking all these elements into account, national competitiveness can be defined as a country's ability to achieve sustainable growth of the living standard of its citizens, mainly through productivity increases (Porter 2008: 176). This definition will be used in this paper as a general framework for assessing various economic and social issues that define an economy's competitive position. However, there are some other elements that reflect competitiveness and in particular its international dimension. In recent years, the definition of competitiveness has been re-interpreted by adding social and environmental factors determining the quality of life. This goes beyond GDP growth, capturing such development goals as social inclusion

and environmental protection (Blanke *et al.* 2011; Aiginger *et al.* 2013; Corrigan *et al.* 2014; Weresa 2015). As there can be no doubt that inclusive and sustainable growth is extremely important nowadays, the notion of sustainable competitiveness seems to be relevant as a response to the major challenges the world faces today. This so-called 'sustainable competitiveness' encompasses institutions, policies and other factors that help increase a country's productivity and ensure social and environmental sustainability over the longer term (Blanke *et al.* 2011: 63; Corrigan *et al.* 2014: 55).

Furthermore, in today's knowledge-based economy further challenges could be included in the analysis of country competitiveness. Digitalization for instance is penetrating all areas of the world economy from manufacturing, construction, trade or transportation to education, health, social interactions and culture. The rapid development of information and communication technologies (ICT) is creating growing convergence between ICT and the economy. New features of the economy nowadays include Industry 4.0 and 'the Internet of Things' (OECD 2015: 240). This new phenomenon is thus also included in our analysis of V4 competitiveness.

This paper aims to answer the following research questions:

— What are the sources of V4 competitiveness in the post-FDI period?
— To what extent did innovation and human capital become the basis for competitive capacity building in the 2008-2015 period?
— Does digitalization affect the competitiveness of V4 economies?
— What policies are needed to support innovation and economic convergence in the V4 countries?

The paper is structured as follows. This first introductory section is followed by a short literature review showing how innovation, human capital and competitiveness are interrelated. Next, digital competitiveness and how it is measured are discussed. This theoretical background is used as a framework for empirically analysing how the competitiveness of V4 countries developed over the 2008-2015 period. The last section concludes by presenting policy recommendations derived from theoretical and empirical analyses.

2. Innovation, human capital and competitiveness: an interface

Theoretical and empirical studies confirm that innovation and human capital are key determinants of the competitiveness of enterprises, regions and countries (see for instance: Porter 1990; 2008; Edquist and McKelvey 2000; Solleiro and Castanon 2005; Weresa 2014). The concept of national innovative capacity developed by J. Furman *et al.* (2002) allows us to examine the role of innovation and human capital in shaping a country's competitiveness. National innovation capacity is defined as a country's ability to produce and commercialize a flow of innovative technologies and ideas over the long term (Furman *et al.* 2002). The framework we present here is an attempt to integrate macro- and microeconomic perspectives regarding the sources of innovation. It draws on the following strands of prior research:

— models of ideas-driven growth (Romer 1989; 1990),
— the cluster approach (Porter 1990),
— the innovation systems concept (Nelson and Rosenberg, 1993).

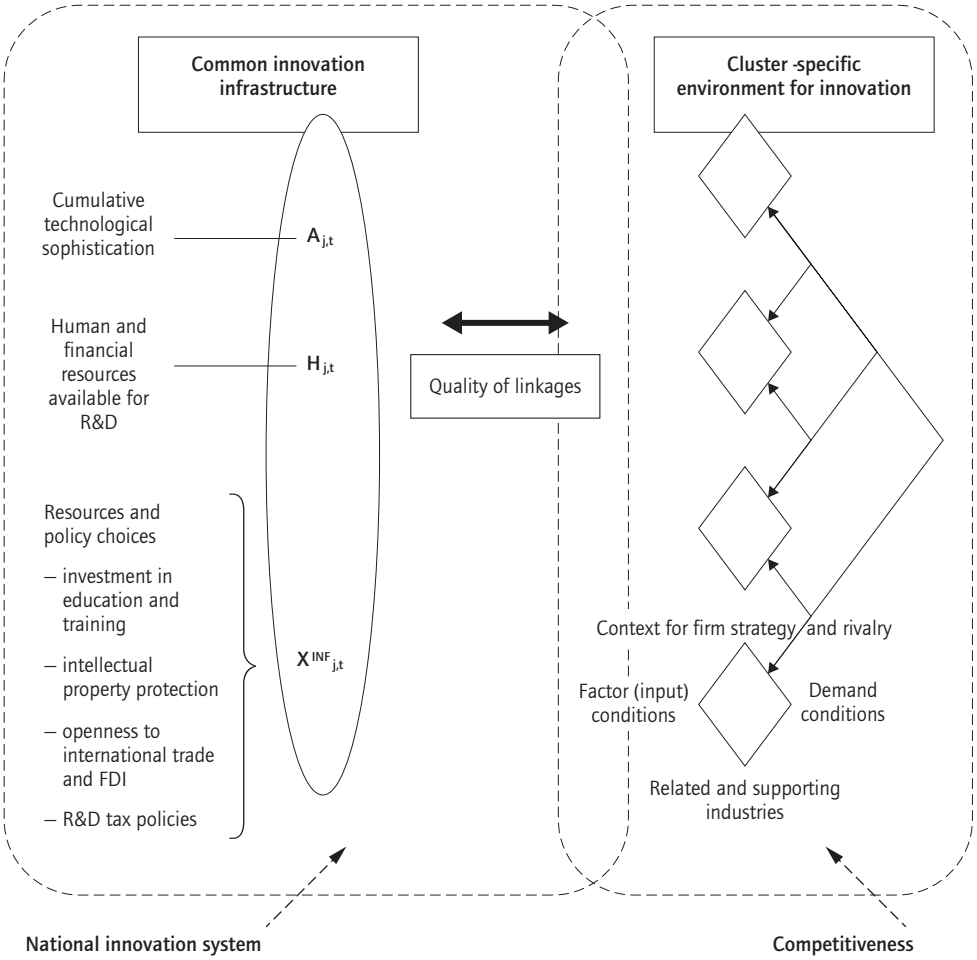
These three perspectives provide common insights into the creation of knowledge and the commercialization of new ideas. Their integration indicates that the determinants of national innovative capacity can be divided into three broad areas: (1) a common innovation infrastructure, (2) a cluster-specific environment for innovation, and (3) the quality of linkages (Furman *et al.* 2002: 905-906).

This approach has been applied empirically by different scholars, using various indicators to measure these three determinants of innovation capacity. Nevertheless, all scholars agree that this concept includes not only the creation of new ideas and their flow into the economy, but also human capital development. The strength of a nation's common innovation infrastructure can be measured empirically using such indicators as aggregate research and development (R&D) expenditure, investment in higher education (in particular, the share of GDP spent on secondary and tertiary education) as well as human resources (for instance: aggregate personnel employed in R&D, share of the population with tertiary education, or employment in the high-tech sector). These elements are supplemented by policy choices regarding the tax system, trade openness and intellectual property protection. Openness to foreign direct investment (FDI) can also be added as a factor shaping innovation in a country as it is commonly admitted in the literature that FDI inflows affect innovation performance (see for instance: Lipsey 2002; Dunning and Narula 2004; Narula and Pineli 2016).

The second area, a 'cluster-specific innovation environment', is reflected in the financing of R&D by the private sector. The third determinant of innovation capacity concerns the quality of linkages between the common innovation infrastructure and clusters. These linkages depend to some extent on the organization of a country's university system as well as the funding mechanism for new ventures. They determine the ability of a country to commercialize new ideas and can be measured as the percentage of R&D performed by universities (Furman *et al.* 2002: 914; Furman and Hayes 2004: 1338; Mouhallab and Jianguo 2016: 54).

The framework of national innovation capacity shows how innovation and human capital are interrelated. However, it does not precisely explain the relationship between a country's innovation capacity and the competitive advantages described by Michael Porter's so-called diamond model (Porter 1990). Nevertheless, this concept shows that there is a link between the ability to innovate and competitiveness, as Porter concluded 'A nation's competitiveness depends on the capacity of its industry to innovate and upgrade' (Porter 2008: 171). Furthermore, innovation infrastructure and linkages can be regarded as elements of innovation systems, while clusters are related to a country's competitiveness. Therefore, it can be concluded that the framework of national innovation capacity integrates innovation, human capital and national competitiveness. Figure 1 shows the national innovation capacity framework and how it is related to competitiveness.

Figure 1 **National innovation capacity and competitiveness**



Note: $A_{j,t}$ - the total stock of knowledge held by an economy; $H_{j,t}$ - the total level of capital and labour resources in the ideas sector of the economy; $X^{INF}_{j,t}$ - Resources and policy choices related to innovation.
Source: adapted from Furman *et al.* 2002, p. 906-908

3. Competitiveness in a digital world

We are currently observing the rapid transformation of economies and society induced by the growing use of information and communication technologies (ICT), a process referred to as digitalization (OECD 2016a: 66). Involving the use of ICT to create new value opportunities, in its broadest understanding digitalization refers to a way in which technology connects people, machines and information.

In this context a question arises: how should a country's competitiveness be understood in the digital world?

Recent studies show that there is a need to supplement the notion of competitiveness with new elements reflecting the development of the digital economy. Digitalization brings new business models and changes the ways in which organizations communicate with the market, produce and innovate. The Internet economy is defined 'as the value generated by undertaking economic activities either supporting the Internet or purely based on the Internet' (OECD 2013: 18). Thus, this definition covers:

— value added generated in activities that support the development of Internet (e.g. production of broadband equipment);
— value added generated in activities based on the Internet (e.g. e-commerce, web services).

This approach shows that the Internet impacts competitiveness and thus should be reflected in productivity developments. However, evidence on the magnitude of such productivity effects is mixed. In the 1990s, empirical research pointed to a so-called productivity paradox, i.e. not confirming any significant contribution of ICT to productivity growth (Brynjolfsson 1993; Brynjolfsson and Yang 1996). Further research showed some positive productivity effects, though results varied across sectors and also depended on the methodology employed (see for instance: Dedrick *et al.* 2003; Kretschmer 2012; Belloc and Guerrieri 2015). Recent studies point to an overall positive influence, showing that digitalization contributes directly to economic growth through the ICT supply side (OECD 2016a: 6). However, certain components are needed to achieve these positive effects. The effective use of ICT and data requires not only investment in ICT, but also additional investments in complementary knowledge-based capital, such as skills development, organizational changes and new business models. Thus, digitalization is connected with the introduction of so-called 'digital innovation', understood narrowly 'as the implementation of a new or significantly improved ICT product, i.e. ICT product innovation' or broadly, as ICT-enabled innovation, i.e. any product, process, marketing or organizational innovation which occurs as a result of the use of ICT (OECD 2016a: 14).

Furthermore, the increasing use of digital technologies is creating demand for new skills to develop new applications, use ICT for professional purposes and perform new tasks necessary for using ICT at work (such as information processing, communication, e-marketing) (OECD, 2016b: 6). Thus, competitiveness in a digital world is associated with digital innovation and the necessary digital skills on the input side, together with productivity developments resulting from the introduction of ICT. This implies that the measurement of competitiveness should be adjusted accordingly, as has been widely pointed out in the literature (see for instance: Coyle 2015; 2016; OECD 2015; Pearson and Theofilou 2016; Lacy *et al.* 2016; Ahmad and Schreyer 2016; European Commission 2015b). Attempts have been made to find new competitiveness indicators of relevance in the digital economy. This is no straightforward task, with problems associated not only with methodology, but also at the data level. It is extremely difficult to provide a single measurement capturing the whole digital economy. The role of Internet has changed from being a service to becoming a fundamental business infrastructure impacting most economic activities and short- and long-term economic processes.

The Digital Economy and Society Index (DESI) has been introduced to monitor the development of the digital economy and society, and thus measure digital competitiveness. It is a composite index featuring five dimensions: connectivity, human capital, use of Internet, integration of digital technology and digital public services (European Commission 2015b: 4). These five dimensions are used in the competitiveness assessment of the V4 countries conducted in the next sections of this paper.

4. Competitive performance of V4 economies over the 2008-2015 period

The aim of this section is to analyze the competitive positions of the Visegrad countries, assessing how they developed over the 2008-2015 period. This assessment uses the definition of sustainable competitiveness discussed in the introductory section of this paper, supplemented by the digital dimension of competitiveness described above. Three basic competitiveness dimensions are thus taken into account:

1. From an output perspective, a country's prosperity measured by a set of indicators reflecting economic and social progress, such as GDP growth, real GDP per capita level;

2. From a combined input and output perspective, social and environmental aspects of development reflected in the Human Development Index (HDI) and the Social Progress Index (SPI);

3. The digital economy and society development measured by the Digital Economy and Society Index (DESI) and its five dimensions, which might be treated as competitiveness drivers.

These three perspectives allow us to examine the current competitive positions of the V4 countries in a more complex way, covering aspects of both the input and output side of this complex phenomenon.

4.1 Developments in the economic prosperity of the V4 countries over the 2008-2015 period

The first step of this analysis is to show the economic potential of the V4 countries based on the size of their national income. Gross domestic product (GDP) is the basic measure of the size of an economy. It is often used in macroeconomic analyses as a comprehensive measure of economic activity. To compare countries, GDP values in local currencies are converted to an international currency, such as USD or EUR using current exchange rates or the purchasing power standard (PPS[1]). It should be noted that a GDP converted at the market exchange rate may be affected by exchange rate fluctuations, while PPS

1. According to the Eurostat definition, Purchasing Power Standards (PPS) is a weighted average of relative price ratios in respect to a homogeneous basket of goods and services, both comparable and representative for each country.

conversion factors may overestimate the value of GDP in relatively less developed countries compared to more developed economies. Therefore, any conversion has its shortcomings and needs to be taken into account while interpreting results.

In 2015, the GDP of the V4 countries measured at current prices amounted to 5.4% of total EU28 GDP, with this share remaining stable over the 2008-2015 period. Poland was the largest country among the V4 group in terms of GDP, and its share of total V4 GDP grew from 52.3% in 2008 to 54.7% in 2015. Czechia occupied second place in 2015, with a share of 21.3%, a slight decrease (-1.7 percentage points) compared to 2008. Hungary also had a decreasing share of total V4 GDP, dropping from 15.4% in 2008 to 14.0% in 2015. Slovakia experienced mild gains; with its share in total V4 GDP increasing slightly from 9.4% in 2008 to 10.0% in 2015 (Table 1).

While the size of the economy measured by total GDP converted into EUR using the current exchange rate allows us to estimate the position of the V4 group and its individual countries in the EU, GDP per capita measured by the purchasing power standard (PPS) can provide a more precise picture of competitiveness as it is a proxy for the standard of living (prosperity). It also allows us to examine changes in the relative development level, i.e. convergence or divergence with more developed European countries or the EU average. In the 2008-2015 period, all V4 countries improved their position vis-à-vis the EU28 average with regard to the GDP per capita when measured by PPS. However, the gap vis-à-vis the EU average remained the highest for Hungary and Poland, with 2015 GDP per capita constituting 68% of the EU28 average in Hungary and 69% in Poland, despite the fact that both countries increased their GDP per capita in 2008-2015 measured as a percentage of the EU average by 6 p.p. and 14 p.p. respectively. Over the same period, Czechia managed to decrease the distance to the EU average by 3 p.p., reaching the 87% of average GDP per capita in the EU, while Slovakia caught up by 6 p.p. (77% of the EU average in 2015) (Tables 2 and 3).

Economic literature proves that a more competitive economy is likely to grow faster over time (Porter, 2008; WEF, 2015). Therefore, it is worth analysing the competitive position of V4 countries, looking at their GDP growth rate and how it is related to GDP per capita. A faster growth rate allows a country to catch up faster in terms of GDP per capita. Figure 2 relates the average GDP growth rates for the 2008-2015 period to GDP per capita in 2015 in the V4 countries. We see that all V4 countries grew at a relatively higher rate than the EU28 average in the post-crisis period, moving forward in terms of competitiveness measured by GDP per capita in PPS, but still behind EU28 average GDP per capita in PPS terms in 2015 (Table 2). There were however differences between the V4 countries with regard to both average real GDP growth rate and GDP per capita in the post-crisis period (Figure 2).

A comparison of the real GDP growth rates of the V4 countries and the EU average in 2008-2015 and how these growth rates are related to GDP per capita shows the V4 relative development position within the European Union (measured by GDP per capita) in 2015 and how fast it developed over the 2008-2015 period.

Table 1 **GDP of the V4 countries in current prices in 2008-2015 (million euro and percentage)**

	2008	2009	2010	2011	2012	2013	2014	2015
European Union (28 countries)	13 054 560.5	12 297 013.4	12 817 343.1	13 192 520.4	13 448 619.5	13 558 617.4	14 001 004.1	14 710 625.9
Czechia	160 961.5	148 357.4	156 369.7	164 040.5	161 434.3	157 741.6	156 660.0	166 964.1
Hungary	107 637.3	93 808.8	98 322.6	100 820.1	99 085.6	101 483.3	104 953.3	109 674.2
Poland	366 182.3	317 082.9	361 803.6	380 239.0	389 368.9	394 721.1	410 989.7	429 794.2
Slovakia	66 002.8	64 023.1	67 577.3	70 627.2	72 703.5	74 169.9	75 946.4	78 685.6
Total V4 GDP	700 783.9	623 272.2	684 073.2	715 726.8	722 592.3	728 115.9	748 549.4	785 118.1
V4 as % of EU28	5.4%	5.1%	5.3%	5.4%	5.4%	5.4%	5.3%	5.3%
Share of countries in total V4 GDP (in percentage)								
	2008	2009	2010	2011	2012	2013	2014	2015
Czechia	23.0%	23.8%	22.9%	22.9%	22.3%	21.7%	20.9%	21.3%
Hungary	15.4%	15.1%	14.4%	14.1%	13.7%	13.9%	14.0%	14.0%
Poland	52.3%	50.9%	52.9%	53.1%	53.9%	54.2%	54.9%	54.7%
Slovakia	9.4%	10.3%	9.9%	9.9%	10.1%	10.2%	10.1%	10.0%

Source: own elaboration based on Eurostat data, http://ec.europa.eu/eurostat/data/database, accessed 20 January 2017

Table 2 **GDP per capita in the V4 countries in 2008-2015 (in euro, current prices, PPS per capita)**

	2008	2009	2010	2011	2012	2013	2014	2015
European Union (28 countries)	26 100	24 500	25 400	26 100	26 600	26 700	27 500	28 800
European Union (15 countries)	29 000	27 100	28 100	28 700	29 100	29 200	29 900	31 300
Czechia	21 100	20 200	20 600	21 600	21 800	22 300	23 500	25 000
Hungary	16 300	15 700	16 500	17 100	17 200	17 700	18 600	19 500
Poland	14 200	14 500	15 700	16 800	17 600	17 900	18 600	19 700
Slovakia	18 500	17 300	18 600	19 000	19 700	20 200	21 100	22 000

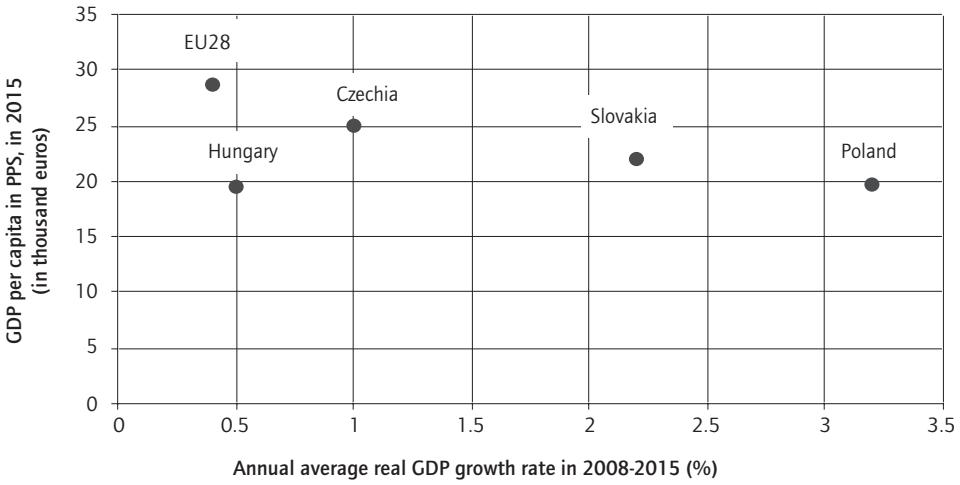
Source: own elaboration based on Eurostat data, http://ec.europa.eu/eurostat/data/database, accessed 15 September 2016

Table 3 **GDP per capita in the V4 countries as a percentage of the EU average (%)**

GEO/TIME	2008	2009	2010	2011	2012	2013	2014	2015
European Union (28 countries)	100	100	100	100	100	100	100	100
Czechia	84	85	83	83	83	84	86	87
Hungary	62	64	64	66	65	67	68	68
Poland	55	60	62	65	67	67	68	69
Slovakia	71	71	74	75	76	77	77	77

Source: Eurostat data, http://ec.europa.eu/eurostat/data/database, accessed 12 February 2017

Figure 2 **Competitiveness of the V4 countries measured by GDP per capita (in euro in PPS terms) in 2015 and real annual average GDP growth rate in 2008-2015 (in %)**

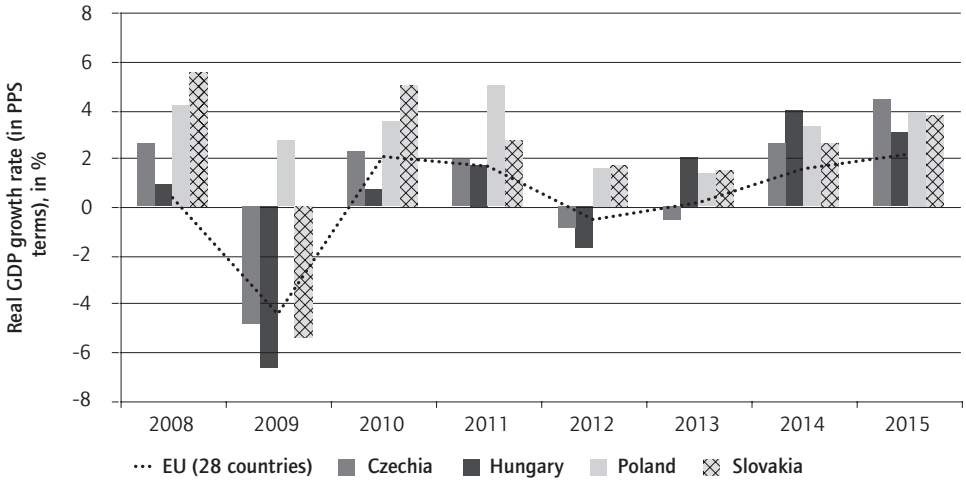


Source: own elaboration based on Eurostat data and Weresa (2016), p. 245

Though Poland led the way in terms of annual average real GDP growth in 2008-2015, it nevertheless lagged behind Czechia and Slovakia in 2015 in terms of GDP per capita (in PPS). However, since 2012 it has been outpacing Hungary in this respect. Slovakia also had a relatively high annual average real GDP growth rate in 2008-2015, lower than Poland but higher than Czechia and Hungary, and held second place in the V4 group (after Czechia) when ranking living standards in GDP per capita in PPS terms. It should also be noted that both Poland and Slovakia slightly lost their growth momentum in 2012-2013 before recovering in 2015. However, Poland has not regained the peak level noted in 2011 (Figure 3).

Over the whole 2008-2015 period, Czechia led the V4 group in terms of competitiveness measured by GDP per capita in PPS, though its real GDP growth rate was the second lowest (after Hungary) until 2015, when it achieved the highest growth rate (4.5%) in the V4 group. Hungary was the laggard in terms of annual real GDP growth rate over the period and since 2012 also in terms of GDP per capita.

Figure 3 **Real annual GDP growth rate in the V4 countries, 2008-2015 (in %)**



Source: own elaboration based on Eurostat data, http://ec.europa.eu/eurostat/data/database, accessed 7, February, 2017

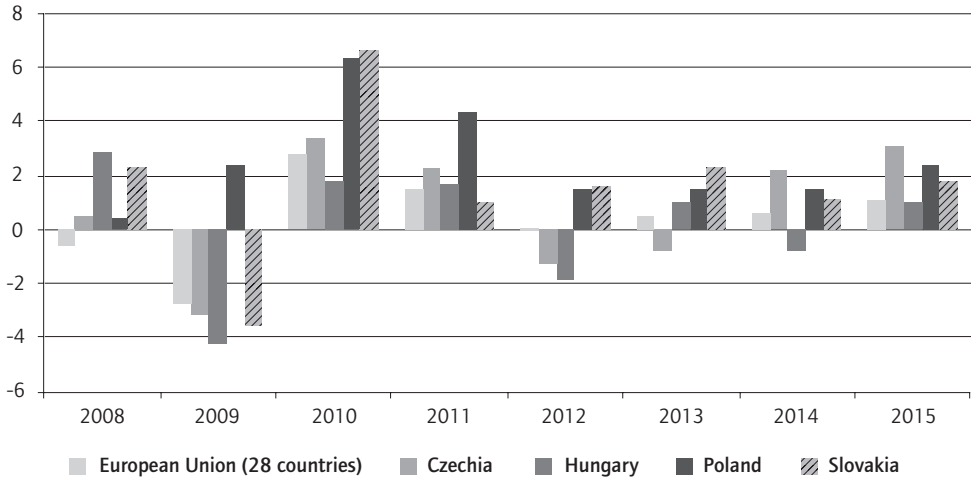
It can be concluded that, over the 2008-2015 period, Czechia was the most competitive V4 country measured by real GDP per capita, while Poland showed the greatest improvement (see Figures 2 and 3; Tables 2 and 3).

Productivity is another important dimension of competitiveness (Porter 2008). Its level determines the level of prosperity that can be achieved by an economy. Sustained economic growth and competitiveness improvements come from increases in productivity. Therefore, it is worth examining how productivity developed in the V4 countries over the 2008-2015 period.

Figure 4 compares real productivity growth in the V4 countries with the EU average over the 2008-2015 period. The data shows the percentage change of real labour productivity over the previous period calculated in national currencies. Poland was the only V4 country with real labour productivity growth throughout the 2008-2015 period. Slovakia also experienced increases but a decrease in 2009, while in Czechia and Hungary productivity fluctuated during the whole 2008-2015 period (Figure 4).

A different picture emerges when productivity levels in the V4 countries are compared to the EU average. In 2008-2015 Slovakia was the leading V4 country in terms of labour productivity, with its level in nominal terms growing from 74.9% to 83.3% of the EU average. In Czechia, labour productivity increased from 77.6% in 2008 to 79.9% of the EU28 level in 2015. Poland managed to catch up 12.2 p.p. in 2008-2015, achieving 74.3% of the EU28 average in 2015. Hungary's labour force was the least productive in the V4 region: despite fluctuations, labour productivity per person remained the same in 2015 as it was in 2008, constituting 70.3% of the EU average (Table 4).

Figure 4 **Changes in the real labour productivity per person in the V4 countries, 2008-2015 (percentage change on previous period)**



Source: own elaboration based on Eurostat data, http://ec.europa.eu/eurostat/data/database, accessed 7, February, 2017

Table 4 **Nominal labour productivity per person (percentage of EU28 total based on million PPS in current prices), 2008-2015**

GEO/TIME	2008	2009	2010	2011	2012	2013	2014	2015
European Union (28 countries)	100	100	100	100	100	100	100	100
Czechia	77.6	79.1	77.0	77.4	76.2	76.7	79.3	79.9
Hungary	70.3	72.2	72.7	73.8	72.5	72.9	71.0	70.3
Poland	62.1	65.4	70.2	72.7	74.1	74.0	73.9	74.3
Slovakia	79.4	79.3	83.6	81.6	82.5	83.8	84.1	83.3

Source: Eurostat data, http://ec.europa.eu/eurostat/data/database, accessed 12 February 2017

4.2 Social and environmental dimensions of V4 competitiveness

As indicated in the introductory part of this paper, the overall assessment of competitiveness should take into account not only economic aspects but also social and environmental factors. To measure the quality of life in the V4 countries, broader yardsticks of competitiveness should be used. These include for instance the school enrolment ratio, tertiary educational attainment, life expectancy, child mortality rate, access to piped water, quality of electricity supply, access to information and communications.

One composite measure of social development and living standard is the Human Development Index (HDI). It is the geometric mean of normalized indices reflecting gross national income per capita (in PPS), life expectancy at birth, and mean years of schooling combined with expected years of schooling. The index ranges from 0 to 1, with a higher value reflecting a higher development level (UNDP 2015: 3).

The HDI of the V4 countries has grown consistently, confirming their socioeconomic progress. All V4 countries belong to the very high human development category. However, the positions of the individual V4 countries in terms of the HDI have been changing from one year to another depending on changes in the indices constituting the HDI. The leading position in the V4 group was consistently occupied by Czechia, which has maintained its 28th position in the HDI ranking since 2009. Poland was next, ranked 36th in 2015, followed by Slovakia and Hungary. Compared with the HDI ranking list of 2009, Poland dropped three places in the 2015 ranking, though managing to outpace Slovakia (-7 places) and Hungary (-4 places). Furthermore, in the decade 2000-2010 and in the five-year period 2010-2015, all V4 countries experienced higher annual HDI growth than the OECD average. However, the HDI grew faster in 2010-2015 than in 2000-2010 only in Poland, while in the other three countries it was higher in the first decade of the 21st century than in the post-crisis 2010-2015 period (Table 5). These trends indicate that in Czechia, Slovakia and Hungary the pace of socio-economic development slightly slowed down in the post-crisis period, to some extent due to relatively slow growth (or even a plateauing) in the indicator reflecting expected years of schooling. Nevertheless, it should be stressed that the competitive position of all V4 countries assessed by the Human Development Index was much better than when expressed in gross national income per capita terms alone (Table 5).

Table 5 **Human Development Index (HDI) trends for the V4 countries, 2010-2015**

Country	Human Development Index (HDI)		HDI rank 2015	HDI rank change	Average annual HDI growth (%)		Gross national income per capita rank minus HDI rank
	2010	2010	2015	2009-2014	2000-2010	2010-2015	2014
Czechia	0.861	0.861	28	0	0.47	0.39	+11
Slovakia	0.829	0.829	40	-7	0.83	0.39	+1
Poland	0.829	0.829	36	-3	0.56	0.62	+11
Hungary	0.821	0.821	43	-4	0.67	0.36	+6
OECD	0.872	0.872	-	-	0.44	0.33	-
World	0.697	0.697	-	-	0.82	0.61	-

Source: UNDP (2016), p. 198 and p. 202-205

Social development can also be measured by the Social Progress Index (SPI), an index bringing a new perspective going beyond GDP and covering social and environmental aspects. It combines three dimensions: basic human needs, foundations of wellbeing, and opportunity for personal development (Porter *et al.* 2016: 32). As economic performance is not included as an SPI component, this indicator allows us to measure social progress directly, without taking economic aspects into account (Porter *et al.* 2016: 35). Nevertheless, economic development and social progress are interrelated, though the relationship is not linear. There has been a positive and strong relationship between the SPI and GDP per capita. The correlation coefficient for the 133 countries for which SPI is calculated was 0.78 in 2014 (Porter *et al.* 2015: 18) and 0.89 in 2015 (Porter *et al.* 2016: 72). This also holds true for the EU member states from the CEE region, including the V4 countries (Weresa 2016: 248).

SPI was first calculated in 2015, meaning that there is no long-time series allowing a longer-term country comparison. The available data indicates that, with regard to the social and environmental dimensions of competitiveness covered by the Social Progress Index, Czechia led the V4 countries, while Hungary had the weakest results in 2015-2016 (Table 6).

Table 6 **Social Progress Index for the V4 countries, 2015-2016**

	Social Progress Index 2015	Social Progress Index 2016
Czechia	80.59	82.80
Poland	77.98	79.76
Slovakia	78.45	78.96
Hungary	74.80	76.88

Source: Porter *et al.*, 2015 p. 17 and 2016 p. 51

4.3 Digital competitiveness of the V4 countries in the 2008-2015 period

Digital competitiveness is important for Europe, as ICT is playing a growing role in boosting innovation, employment and growth. The ICT sector generates new technologies which are then applied in other sectors. The development of high-speed Internet impacts the way we do business and shapes consumer behaviour, creating the need for new skills (European Commission 2015b; OECD 2016a).

Over the first decade of the 21st century, information and communication technologies (ICT) confirmed their role as one of the major drivers of Europe's economic and social modernization (European Commission 2009: 8). In 2005, the European Commission presented its i2010 strategy aimed at boosting Europe's lead in ICT and increasing the benefits of the information society for European growth and jobs. One of its objectives was to increase digitalization in the EU. In 2010, the European Digital Agenda was introduced as a part of the Europe 2020 strategy and ICT was acknowledged as one of the key drivers for smart and sustainable growth (European Commission 2017).

Digital competitiveness can be measured by many different indicators. The European Commission selected more than 100 measures to monitor and compare progress across European countries in the area of digitalization. They are divided into groups corresponding to European information society dimensions, such as development of the telecom sector, broadband infrastructure, Internet usage, mobile networks, ICT skills (European Commission 2015b). Based on 30 selected indicators, the Digital Economy and Society Index (DESI) has been calculated for all EU member states and for the EU as a whole. Calculated for the first time in 2014, it has since been used to monitor progress in digital competitiveness in the EU. It is a weighted average of five components or dimensions: (1) connectivity (weight: 25%), (2) human capital (weight: 25%), (3) use of Internet (weight: 15%), (4) integration of digital technology (weight: 20%) and (5) digital public services (weight: 15%) (European Commission, 2015a, p. 4). It allows the comparative analysis of digital competitiveness. The first DESI dimension is connectivity. It is composed of 7 indicators showing the availability of infrastructure

necessary for a digital economy and society. Human capital, and in particular the skills needed to produce and consume digital goods and services, represents the second DESI dimension. Four indicators cover these types of skills. Use of Internet, the third DESI dimension, is measured by 7 indicators, while integration of digital technology, the fourth dimension, is represented by 8 indicators. The development of digital public services is reflected in 4 indicators (for a detailed description of these indicators see: European Commission 2016a: 5-10, Mateus 2016).

The EU countries have been grouped into clusters according to their DESI index scores and growth. All V4 countries belong to 'the falling behind' cluster of countries (together with Bulgaria, Cyprus, Greece and France), as their DESI scores are not only below the EU average, but also have grown slower than the EU average (Mateus 2016). When comparing the DESI for the V4 countries with the EU average score and the cluster score, we see that only Czechia is close to the European average, even though its ranking dropped from 15th in 2015 to 17th in 2016. The other three countries progressed slowly, without significant changes in their position among the EU countries. Nevertheless, all V4 countries except Poland had a higher DESI that the average of the 'falling-behind' cluster (Table 7).

Table 7 **Digital Economy and Society Index (DESI) for the V4 countries, 2015-2016**

	DESI 2015	DESI 2016	Rank in the EU in 2015	Rank in the EU in 2016
Czechia	0.50	0.50	15	17
Hungary	0.45	0.45	21	20
Slovakia	0.45	0.45	22	22
Poland	0.42	0.42	20	21
EU	0.50	0.50	-	-
Cluster score	0.44	0.44	-	-

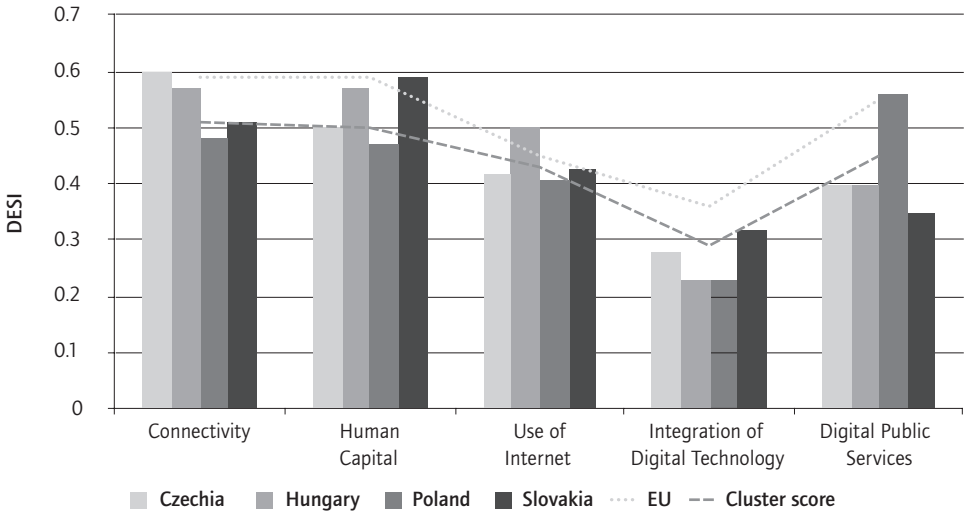
Source: own elaboration based on European Commission (2015c; 2016c,d,e,f)

Performance varied across the V4 countries for different DESI dimensions (Figures 5 and 6). In the connectivity dimension, only Czechia performed slightly above the European average. Hungary remained just below it, despite improvement in 2015 caused mainly by progress in rolling out fast broadband technologies (European Commission 2016d: 2). Connectivity is one of the DESI 2016 dimensions where Slovakia and Poland underperformed, attributable to the still relatively low fixed broadband coverage of households. Poland's ranking is, however, partly offset by the rapidly growing use of mobile broadband.

The second DESI dimension, the human capital necessary for digitalization, is relatively well developed in Slovakia and Hungary, where scores are close to the EU average. Digital skills and the availability of ICT specialists are among Slovakia's strengths relative to the EU average (European Commission 2016f: 3), as is the case with Hungary (European Commission 2016d: 3). In Czechia and Poland, this DESI dimension needs improving as their performance is much below the EU average, mainly due to the lower-than-average level of digital skills in both countries. Another weakness in this field is the declining share of ICT specialists in total employment observed in both

counties in 2016 compared to the preceding year (European Commission 2016e: 3 and 2016c: 3).

Figure 5 **Digital competitiveness of the V4 countries, 2015-2016 (measured by the DESI)**



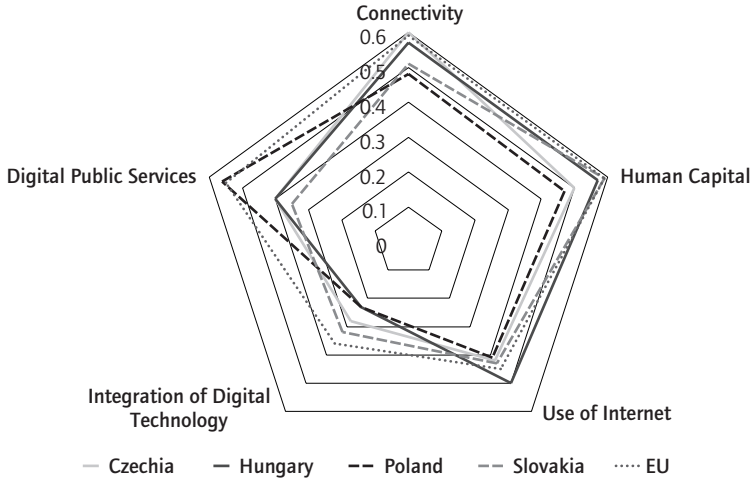
Source: own elaboration based on European Commission (2016c,d,e,f)

With regard to individuals' propensity to use Internet, Hungary scores highest, exceeding the EU average, followed by Slovakia. Both countries experienced some improvement in this respect in 2016 compared to the preceding year. In Czechia and Poland, no progress was made in this DESI dimension, although some of the component indicators were quite well developed, above the EU average: in Poland, the consumption of audio-visual content using broadband connections; in Czechia the usage of Internet banking and online shopping.

In a developed digital economy, businesses are able to use digital technologies to improve their efficiency and productivity, as well as to sell their products and services. None of the V4 countries performed well in this fourth DESI dimension, with all below the EU average (Figure 6).

In the fifth dimension, 'digital public services', Poland took the lead among the V4 countries with a score exceeding the EU average. In the other V4 countries, the distance to the average was quite big. Although the V4 countries have made progress in digitalising the public administration, progress remans insufficient and the uptake of digital public services remains low.

Figure 6 **Digital Society and Economy Index (DESI) in the V4 countries by dimension, 2016**



Source: own elaboration based on European Commission (2016c,d,e,f)

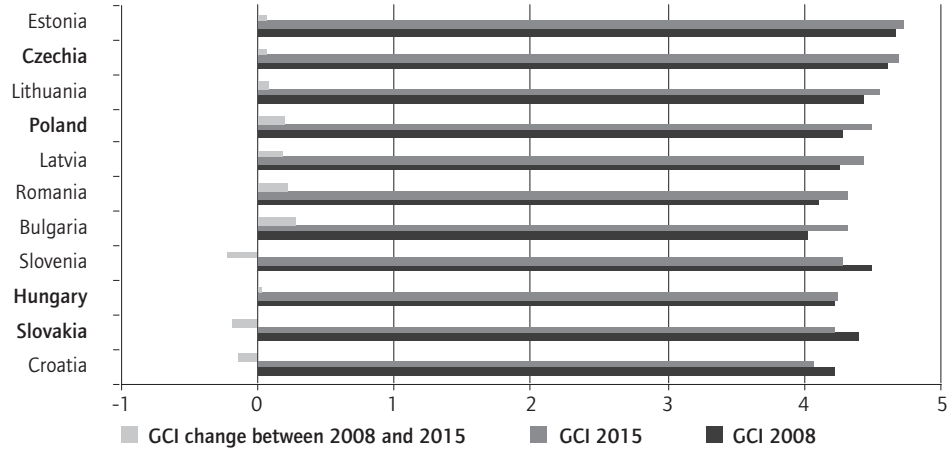
4.4 Competitiveness leaders and laggards within the V4 group

The results of the analyses conducted above can be summarized using the Global Competitiveness Index (GCI) calculated by the World Economic Forum in its World Competitiveness Reports. It is based on 12 competitiveness pillars: institutions, infrastructure, macroeconomic environment, health and primary education, higher education and training, goods market efficiency, labour market efficiency, financial market development, technological readiness, market size, business sophistication, and innovation. These pillars are used to calculate three sub-indexes representing basic requirements, efficiency enhancers, and innovation and sophistication factors. The three sub-indexes make up the overall Global Competitiveness Index (for the detailed description of methodology see: WEF 2016, Appendix A). Figure 7 shows changes in the composite Global Competitiveness Index over the 2008-2015 period, with the positions of the V4 countries compared to other CEE EU member states. Data presented in Figure 7 allows the conclusion that the overall competitive positions of three V4 countries improved from 2008 to 2014, despite the fact that all four countries suffered from the global crisis. Slovakia was the exception, with its overall competitive position deteriorating from 2008 to 2015. In 2015, Estonia was the most competitive economy in the whole CEE region, followed by Czechia, Lithuania and Poland. Hungary, Slovakia and Croatia were the lowest-ranked countries (Figure 7).

There is no doubt that Czechia is the V4 leader in the majority of competitiveness indicators analyzed above, i.e. living standard measured by real GDP per capita, productivity level, social and environmental dimensions measured by human development and social progress indices. This country is also the most advanced among the V4 with regard to digital competitiveness measured by the Digital Economy and Society Index. However, the competitiveness index does not correlate well with DESI

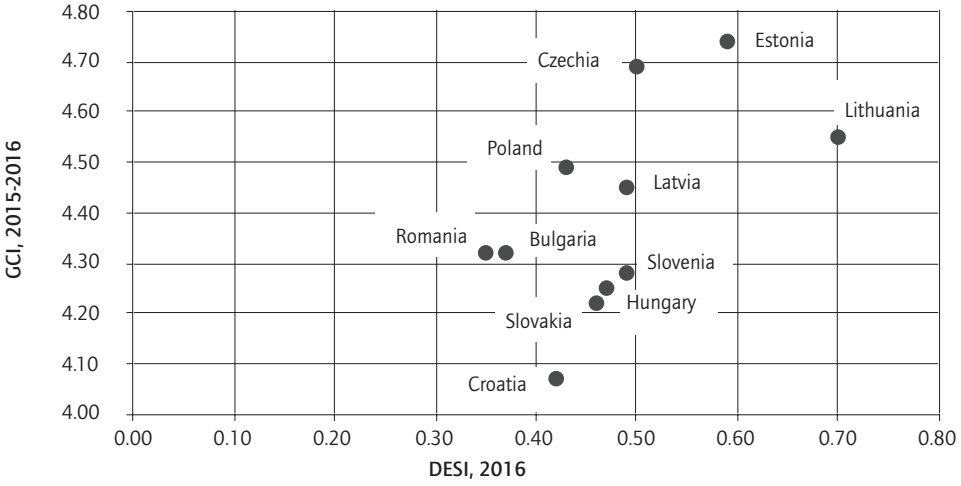
(Figure 8), possibly indicating that digital development alone is not enough to advance a country's competitive performance. Therefore, other competitiveness drivers, such as human capital and innovation, will be analyzed in depth in the next sections of this paper.

Figure 7 **Changes in competitiveness, 2008-2015: V4 compared to other CEE countries**



Source: own elaboration based on data from the World Economic Forum: WEF, 2008 and 2015

Figure 8 **Digital competitiveness (measured by DESI) and competitive performance (measured by GCI) of the CEE countries, 2016**



Source: own elaboration based on data from the World Economic Forum (WEF, 2015) and European Commission (2016)

5. National innovation capacity: Czechia, Hungary, Poland and Slovakia compared over the 2008-2015 period

As shown in the literature review presented in the second section of this paper, economies are searching for new sources of competitiveness allowing sustainable development. The theory confirms the growing importance of non-traditional competitiveness factors. In the past, the focus was on factors related to geographical location, including population, climate and the availability of natural resources. In the digital economy, innovation, human resources, education and training, technological sophistication and institutional factors become increasingly important as competitiveness drivers. All these factors taken together constitute a country's national innovation capacity (see: Figure 1). Countries capable of building up and using knowledge can improve their competitive position faster than other economies. Therefore, an assessment of V4 competitiveness should take innovation performance and human capital development into account.

5.1 Innovation performance of the V4 countries and developments over the 2008-2015 period

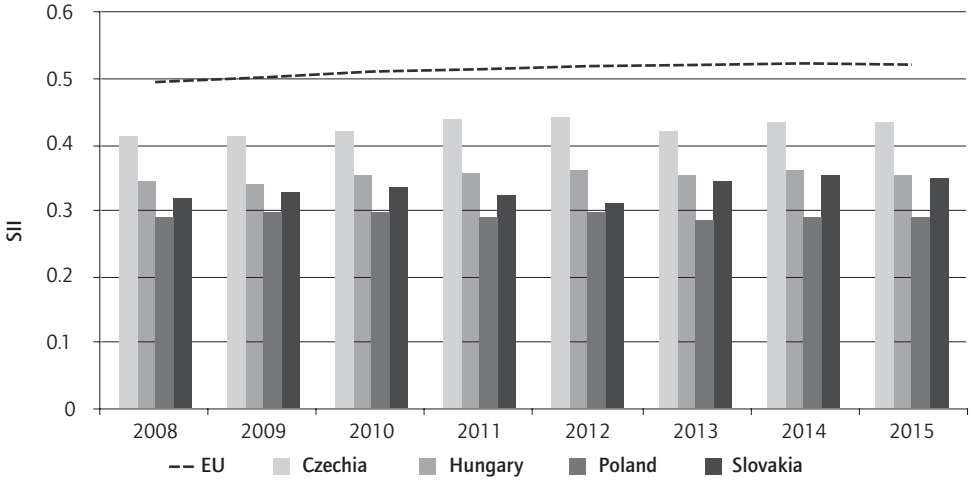
As innovativeness is a very complex phenomenon, it is worth looking at the innovation process from a broader perspective, taking the whole innovation system into account. It encompasses the human capital and knowledge resources accumulated in the system, as well as institutions related to the development of science, technology, education and entrepreneurship (Weresa 2014: 79).

To evaluate an economy's innovativeness in a summary form, the methodology used by the European Commission for assessing the level of innovativeness of individual European Union member states is adopted. The focal element of this methodology is the Summary Innovation Index (SII), a composite index capturing the complex nature of innovative processes by measuring various elements of innovativeness, starting with innovation enablers (measured by R&D expenditure, doctorate graduates, educational attainment, scientific publications, etc.), through company activities (reflected in business R&D, collaboration in innovation activity, patent applications, etc.), up to the output of innovative activities (e.g. sales of new-to-market and new-to-firm innovations, knowledge-intensive services exports, high-tech product exports in proportion to total exports).[2]

Based on the average innovation performance measured by the Summary Innovation Index, the EU member states have been divided into four different performance groups: innovation leaders, strong innovators, moderate innovators and modest innovators (European Commission 2016g: 6). All V4 countries fall into the group of 'moderate innovators'. Throughout the 2008-2015 period, the innovation performance of the V4 countries measured by the SII lagged behind the EU average (Figure 9).

2. For a detailed methodology and complete list of the 25 indicators constituting the Summary Innovation Index see: the Methodology Report of the European Innovation Scoreboard 2016, http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards/index_en.htm.

Figure 9 **Innovation in the V4 countries: Changes in the Summary Innovation Index (SII) in 2008-2015**



Source: own elaboration based on European Commission (2016g) - EIS database, http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards/index_en.htm, accessed 16 August 2016

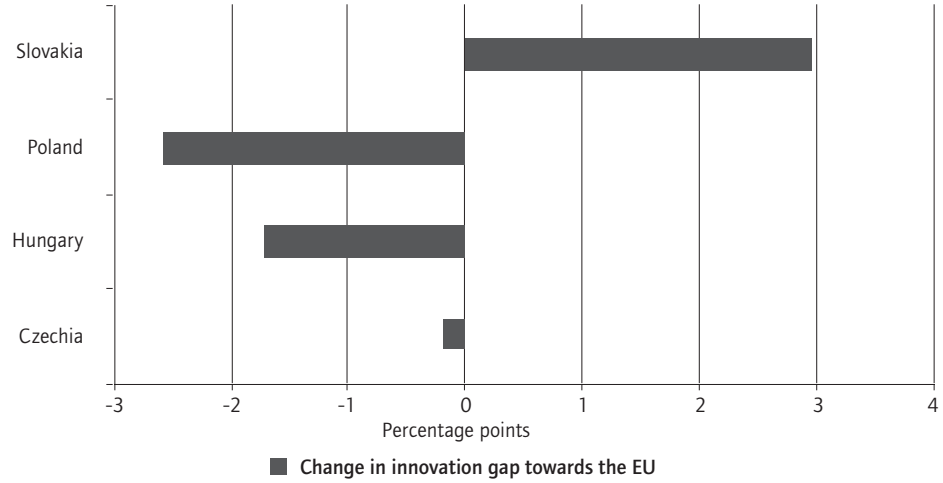
The performance of Czechia relative to the EU average was 83.1% in 2015, down from 83.3% in 2008. Hungary's performance in 2015 represented 68% of the EU average, down from 69.7% in 2008. A similar trend was observed in Poland, declining from 58.5% in 2008 to 55.9% in 2015. Slovakia improved over the 2008-2015 period, with its SII 64.2% of the EU average in 2008 and 67.1% in 2015. Therefore, it can be concluded that in three V4 countries the gap vis-à-vis the EU average grew, most of all in Poland (by 2.6 p.p.), followed by Hungary (1.7 p.p.) and Czechia (0.2 p.p.). Slovakia was the only V4 country able to reduce the innovation gap over the 2008-2015 period (by 3 p.p.). Though it remained behind the best V4 performer, Czechia, it caught up with Hungary. Poland was the laggard, not only with regard to innovation performance measured by the SII, but also to its negative development over the 2008-2015 period.

Nevertheless, all V4 countries have some relative strengths bringing them closer to the EU average when individual SII indicators are taken into account. In Czechia, the top five innovation indicators see the country outperforming the EU average: international scientific co-publications, R&D expenditure in the public sector, exports of medium- and high-tech products, collaboration of innovative SMEs, and upper secondary education. The weakest areas of Czech innovation are: venture capital investment, PCT patent applications and the number of non-EU doctorate students. The area in which the country is increasingly underperforming is innovation funding and support, in particular venture capital investment (European Commission 2016g: 49).

Hungary performs below the EU average in nearly all 25 SII indicators, with only two areas in which performance is much above European average: revenues from abroad for licences and patents, and exports of medium- and high-tech products.

The Hungarian innovation system is especially weak in the following areas: non-EU doctorate students, community designs and PCT patent applications (European Commission 2016g: 63).

Figure 10 **Change in the innovation gap of the V4 countries vis-à-vis the EU average in 2008-2015 (EU average SII=100)**



Note: The innovation gap is measured by the Summary Innovation Index in relation to the EU28 average in 2008 and 2015 respectively; the change in the innovation gap represents the difference between this ratio in 2015 and 2008.
Source: own elaboration based on European Commission (2016g) - EIS database, http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards/index_en.htm, accessed 16 August 2016

Poland's innovation performance is stronger than the EU average in four areas: non-R&D innovation expenditure, community designs and human resource development measured by the population with completed tertiary education as well as by upper secondary education. The indicators furthest below the EU average are: non-EU doctorate students, private-public scientific co-publications, PCT patents applications, and revenues from abroad for licences and patents. The strongest deterioration in Poland's innovation performance was noted in collaboration of innovative SMEs (European Commission 2016g: 67).

Slovakia's largest relative strengths in terms of indicators above the European average include: sales share of new innovations, new doctorate graduates, exports of medium- and high-tech products, non-R&D innovation expenditure, and upper secondary education. A huge performance decline is observed in revenues from abroad for licences and patents and non-R&D innovation expenditure. The former also belong to the weaknesses of Slovakia's national innovation system. Other indicators well below the EU average are: non-EU doctorate students, venture capital investments, and PCT patent applications (European Commission 2016g: 71).

Table 8 summarizes main strengths and weaknesses of national innovation capacity of V4 countries in 2015.

Table 8 **Major strengths and weaknesses of national innovation capacity of the V4 countries in 2015**

	Strengths	Weaknesses
Czechia	– international scientific co-publications – R&D expenditure in the public sector – exports of medium- and high-tech products – collaboration of innovative SMEs – non-R&D innovation expenditure – upper secondary education	– venture capital investment – PCT patent applications – number of non-EU doctorate students
Hungary	– revenues from abroad for licences and patents – exports of medium- and high-tech products – non-R&D innovation expenditure – upper secondary education	– non-EU doctorate students – community designs – PCT patent applications
Poland	– non-R&D innovation expenditure – community designs – population with completed tertiary education – upper secondary education	– non-EU doctorate students – private-public scientific co-publications – PCT patent applications – revenues from abroad for licences and patents
Slovakia	– sales share of new innovations – new doctorate graduates – exports of medium- and high-tech products – non-R&D innovation expenditures – upper secondary education	– revenues from abroad for licences and patents – non-EU doctorate students – venture capital investments – PCT patent applications

Source: own elaboration based on European Commission, 2016g

One common feature of innovation capacity in which the V4 group has a relatively good performance is upper secondary education. This result points to potential improvements in the countries' innovation performance in the future. Furthermore, it can be observed that all V4 countries base their innovation performance first of all on non-R&D expenditure, an indicator above the EU average, while both public and private R&D expenditure in relation to GDP is much below the EU average. The only exception to this trend is Czechia, where the public R&D to GDP ratio exceeds the EU average. This is one of the elements contributing to the country's leading innovation position in the V4 group.

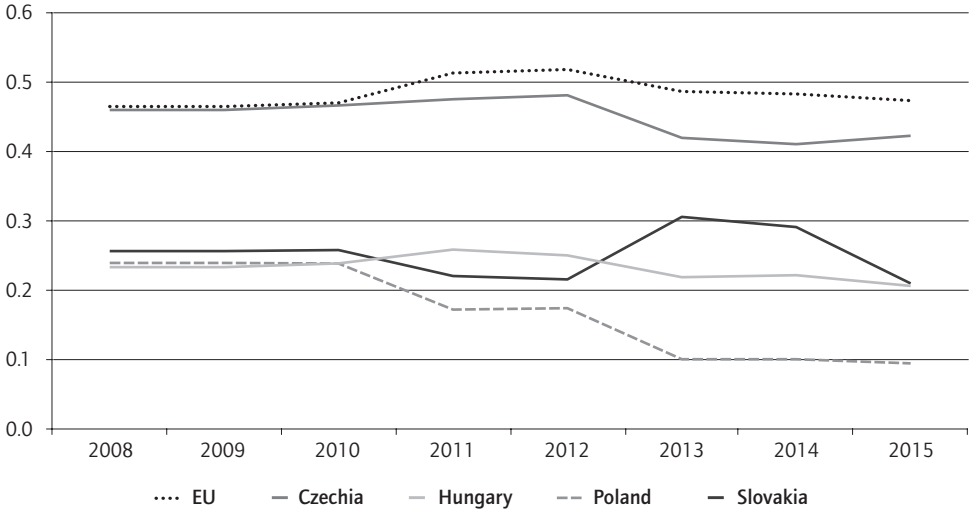
It should also be noted that Czechia, Hungary and Slovakia are relatively strong in manufacturing, with the shares of medium- and high-tech products in total exports of these countries higher than the EU average.

There are two very weak indicators common to the whole V4 group. These are PCT patent applications and the share of non-EU doctoral students. Furthermore, in Czechia and Slovakia there is also a need to improve the venture capital market, as in these countries venture capital investments are much below the EU average.

Looking at the weaknesses from a broader perspective, an insufficient development of linkages and entrepreneurship should be pointed out, as reflected in the SII 'Linkages & entrepreneurship' sub-index. Over the 2008-2015 period this sub-index was

significantly lower in the V4 (except in Czechia in 2008-2009) than the EU average, and, what is more, declined in all V4 countries (Figure 11).

Figure 11 **Linkages & entrepreneurship sub-index in V4, 2008-2015 (a composite indicator that constitutes SII)**



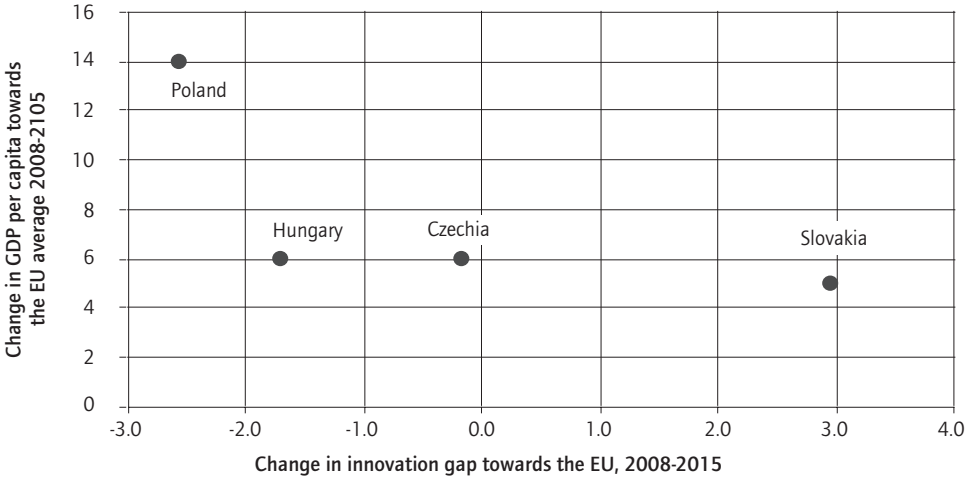
Source: own elaboration based on European Commision (2016g) - EIS database, http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards/index_en.htm, accessed 16 August 2016

The weaknesses of V4 innovation capacity are all in areas where policy intervention is needed. This aspect will be discussed in the concluding section of this paper.

Summing up, the analysis of the developments over the 2008-2015 period with regard to the national innovation capacities of the V4 countries shows that Slovakia is the only one where convergence with the EU28 average in terms of prosperity (measured in real GDP per capita) has been accompanied by a catching-up with the EU average in terms of innovativeness. Yet convergence in prosperity in Slovakia was the slowest among the V4 countries. While prosperity in the other V4 countries also converged, their innovation performance diverged. Poland is an extreme case among the V4 group, showing the fastest prosperity convergence, yet the largest innovation divergence in the 2008-2015 period (Figure 12).

These differences in convergence/divergence trends in prosperity and innovation performance allow us to draw a tentative conclusion that innovation was not the driver of V4 competitiveness in the post-crisis period. While the innovation performance of the V4 countries (except Slovakia) declined compared to the EU average, their competitiveness improved. Therefore, it seems that the availability of resources and their relatively lower prices still constitute the main competitiveness pillars in the V4 countries.

Figure 12 **Changes in the Summary Innovation Index (SII) and changes in real GDP per capita (in PPS) in relation to the EU average levels, 2008-2015 (percentage points)**



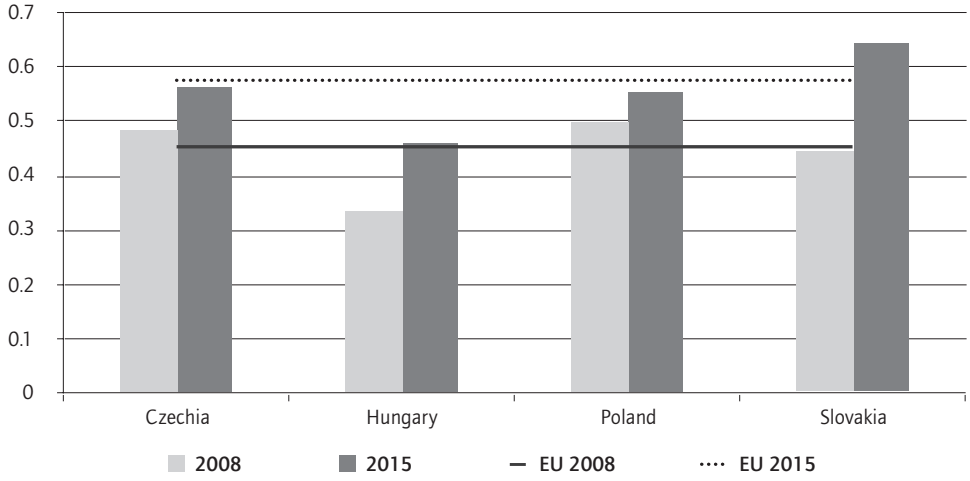
Source: own elaboration based on Eurostat and the database of European Commission (2016g)

5.2 Human capital for a digital economy in the V4 countries

Human resources are one of the most important elements of national innovation capacity (Figure 1). This is also one of sub-indices constituting the Summary Innovation Index. In terms of human resources, the V4 countries have relatively strong positions when compared to the EU average. Poland and Czechia were originally the V4 leaders in this respect, but were overtaken by Slovakia in 2015, followed by Czechia, Poland, and Hungary (Figure 13).

The human resource sub-index is composed of 3 indicators: (1) new doctorate graduates per 1000 population aged 25-34; (2) percentage of the population aged 30-34 having completed tertiary education, and (3) percentage of 20 – 24-year-olds having attained at least upper secondary level education. A more detailed look at these indicators and a comparison of V4 achievements in 2008 and 2015 reveals that Slovakia has made most progress with regard to the first 2 indicators, as well as leading the V4 group when it comes to new doctorate graduates and the percentage of young people aged 20-24 having attained at least upper secondary level education. The values of these 2 indicators were much higher for Slovakia than the EU average. Poland was the V4 leader in the percentage of the population aged 30-34 having completed tertiary education, and its performance here was 10 p.p. higher than the EU average (Table 9). It should however be pointed out that in recent years there has been growing emigration from Poland. Estimates published by the Polish Statistical Office at the end of 2015 put the number of Poles residing temporarily abroad at approximately 2.4 million, a number that has increased by nearly 200,000 since 2008 (GUS 2016). While to a certain extent mitigating the problem of unemployment, this emigration may cause some shortages in human resources.

Figure 13 **Changes in Human Resources Index in 2008-2015: V4 countries and EU average compared**



Source: own elaboration based on the database of European Commission (2016g)

Table 9 **Human capital development in the V4 countries, 2008-2015**

Indicators constituting Human Resources Sub-Index	EU		Czechia		Hungary		Poland		Slovakia	
	2008	2015	2008	2015	2008	2015	2008	2015	2008	2015
New doctorate graduates per 1000 population aged 25-34	1.6	**1.8**	1.3	**1.7**	0.8	**0.9**	1.0	**0.6**	1.5	**2.5**
Percentage population aged 30-34 having completed tertiary education	31.2	**38.5**	23.7	**29.5**	22.8	**34.9**	29.7	**43.2**	15.8	**27.9**
Percentage youth aged 20-24 having attained at least upper secondary level education	78.7	**82.6**	91.6	**90.7**	83.5	**84.3**	91.3	**90.9**	92.3	**91.2**

Source: own elaboration based on European Commission, 2016g

Furthermore, the availability of human resources and some progress in human capital creation might not be sufficient to take advantage of a digital economy. Increasing use of digital technologies creates demand for new specialist (ICT) skills in the fields of programming, developing applications and managing networks; enabling the use of ICT in businesses; information processing and problem solving with the use of ICT, communication, etc. Digital literacy as well as social and emotional skills are also crucial to enable the effective use of digital technologies (OECD 2016b: 6). In the context of human capital development, these skills have been concisely characterized and assessed for EU member states in the EU's Digital Progress Report. The Human Capital dimension of the DESI covers two elements:

— basic skills and usage, comprising indicators showing whether people have basic digital skills and to what extent they use the Internet;

— advanced skills and development, consisting of indicators describing ICT specialist employment and the number of graduates in science, technology and mathematics (European Commission 2016b).

Table 10 **Digital human capital indicators**

	% of citizens aged 16-74 having at least basic digital skills		Internet Users as % individuals (aged 16-74)		ICT specialists as % individuals (aged 16-74)		STEM graduates per 1000 individuals (aged 20-29)	
	DESI 2015*	DESI 2016*	DESI 2015*	DESI 2016*	DESI 2015*	DESI 2016*	DESI 2015*	DESI 2016*
EU average	59%	55%	75%	76%	2.8%	3.7%	17	18
Czechia	n.a.	57%	76%	77%	4.4%	4.1%	17	17
Hungary	n.a.	50%	74%	72%	4.7%	4.9%	9.5	10
Poland	n.a.	40%	63%	65%	3.1%	3.0%	18	19
Slovakia	n.a.	55%	76%	74%	3.9%	4.1%	18	18

Note: *data for DESI 2015 are mostly of 2014; data for DESI 2016 are mostly for 2015
Source: European Commission (2015c; 2016a; 2016b; 2016c; 2016d; 2016e; 2016f;)

As shown in Table 10, digital human capital is underdeveloped in the V4, with the majority of indicators of digital capital development below the EU average in Poland and Hungary and around this EU average in Slovakia and Czechia. Furthermore, all V4 countries show limited progress in the development of digital skills, with some indicators even declining in 2015 compared to the preceding year (for example: the percentage of internet users in Hungary and Slovakia, the percentage of ICT specialists in Czechia and Poland – see: Table 10). As a result, all V4 countries still belong to the so called 'falling behind cluster' with regard to Digital Economy and Society Index, with their overall scores below the EU average and growing slower than that of the EU as a whole.[3]

6. Policy recommendations for the V4 countries in the post-FDI period

The aim of this chapter was to assess the competitiveness of the V4 countries in the post-crisis period, identifying the role of innovation and human capital in shaping competitive advantages for these countries in the era of digitalization.

The analysis conducted above allows the conclusion that the role of innovation in shaping competitiveness in V4 countries remains limited. All V4 countries still use relatively low input costs as their main base for competitiveness. However, this is no longer sufficient to keep up with other emerging economies and to catch up with developed countries. The main barriers for the V4 countries in switching to a new competitiveness model based on skills and innovation are:

— a too low R&D level (including business R&D); with innovation mainly supported by non-R&D investments;

3. Detailed analysis of digital competitiveness was conducted in the section 4.3 of this paper.

— inefficient links between science and business;
— barriers to knowledge diffusion and learning processes;
— insufficient development of digital skills.

Therefore, a long-term economic policy challenge for the V4 countries is to create a framework for achieving competitiveness through innovation and digitalization. To make V4 economies more competitive, long-term policy aims should focus on accelerating the catching-up process with regard to innovation and human capital development. This should be accompanied by steps to reduce the digital divide vis-à-vis more advanced Western European EU member states. However, these goals can only be achieved when a broader institutional environment is addressed by appropriate policy measures. Further institutional changes are needed, including reforms in the education and science sectors, further deregulation of markets and support for entrepreneurship and establishing start-ups.

Furthermore, these steps should be coupled with policies aimed at fostering the development of assets embodying creativity potential, such as knowledge, technology, human capital. At the same time, innovation should be enhanced as a primary driver of V4 competitiveness. The expansion of innovative companies requires reforms in the R&D sector, the introduction of new policies aimed at boosting business R&D as well as the injection of additional funds, in particular, higher investment in knowledge diffusion. The latter can be eased by incentives for venture capital market development. The improvement of innovative capacity should be supported by cluster development, including the strengthening of local supplier networks around foreign investments.

Last but not least, multi-level governance of research and innovation needs to be reshaped. The main focus here should be on the territorial dimension, including the better use of EU funds and the implementation of smart specialization strategies.

To achieve these policy goals, significant improvements in the business environment in the V4 countries are indispensable, as are the reduction of bureaucracy and the introduction of more efficient public-sector management. Innovation as a base for competitiveness should be promoted not only in business, but also in the public sector in order to increase the quality of public services.

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Chapter 4
R&D internationalisation and local innovation in the Visegrad Group after the FDI peak

Mark Knell

1. Introduction

One policy objective of the Visegrad group of countries[1] (V4) is to encourage economic growth by enhancing technology transfer and technological learning. Foreign direct investment (FDI) can facilitate the cross-border transfer of a variety of resources, including process and product technology, managerial skills, marketing and distribution knowledge and human capital. It can also result in significant positive *spillovers* to the local economy through linkages with local suppliers, competition, imitation and training. Yet, the V4 has played only a marginal role in attracting foreign research and development (R&D) targeted towards creating new local competences. Still, the region has the advantage of having geographic and cultural proximity to Germany and Austria, as well as having a skilled scientific workforce and relatively lower R&D costs. One noticeable trend is that the internationalisation of R&D activity has increased significantly in all four countries over the past sixteen years.

Decisions on the extent and location of foreign R&D activities of global enterprises can be very complex, often involving the expansion or modification of already existing investment projects. Though multinational companies generally prefer to keep their R&D activities close to their headquarters, they sometimes locate R&D activities and other technical support in their subsidiaries with the intention of adapting existing technologies, resources and products to local market conditions. These asset- (Dunning and Narula 1995), competence-exploiting (Cantwell and Mudambi 2005) or home-base (Kuemmerle 1999) activities mainly reflect local demand conditions, including the size of the home market, the competence of the parent enterprise, as well as regulations, standards, and consumer tastes (Jindra 2012). Multinationals may also locate foreign R&D activities in specific locations with the target of creating new technology and products. These asset-augmenting or competence-creating activities mainly reflect local supply conditions, including whether the multinational company recognises the technological skills of the workforce, the relative cost of high-tech labour, proximity to universities and R&D laboratories and to potential partners.[2]

This chapter considers R&D internationalisation from the perspective of the technology accumulation approach developed by Cantwell (1989), Stephan (2006, 2013) and Jindra (2012). Their approach originates in the dynamic, evolutionary theory of Nelson

1. The V4 is made up of Czechia, Hungary, Poland and Slovakia.

2. Competitive enterprises often follow both strategies simultaneously, suggesting the motives cannot be easily separated. Narula and Zanfei (2005) and Sachwald (2008) suggest that asset-seeking strategies have become more frequent, but that asset-exploiting strategies continue to predominate.

and Winter (1982), considering the importance of technical change in the context of localised technological learning. The idea suggests a cumulative relation between existing location-specific advantages within the host country, decisive for the locational choices of multinational companies. Stephan (2013) distinguishes between the technological role of internal and external networks, stating that internal networks give rise to internal technology transfer between parent and affiliate, while external networks give the foreign investor access to local knowledge and technology. This provides a way to relate the spatially bounded technological capabilities to the internationalisation of R&D and innovative activities.

The second section considers the sourcing of foreign technical knowledge in the V4. Section three provides a review of recent trends in the internationalization of R&D by multinational companies in the V4. Section four then asks who are the major foreign R&D investors in the V4 and from what industries do they come. Here the automotive industry is discussed in more detail. Section five discusses innovative activities from the point of view of whether the company has a foreign head office or not. The rise of global innovation networks is then considered in section six. By way of conclusion, section seven addresses the issue of whether the R&D activities of foreign enterprises in the region are having a significant influence on technological upgrading and innovation-driven growth.

2. Foreign knowledge acquisition and local knowledge creation in the V4

Gross domestic spending on R&D not only leads to the creation of new technologies in the V4, but also improves companies' ability to absorb already existing knowledge and technology. Cohen and Levinthal (1989: 569) observed that companies have to enter a time-consuming and costly process of investing in their capacity to absorb knowledge, or their 'ability to identify, assimilate and exploit knowledge from the environment', if they are to successfully apply the knowledge learned from spillovers. This idea becomes a connecting device between the potential for catching up (technological opportunities) and its realisation (appropriation conditions). Technological opportunities can arise from changing patterns of demand, changes in the size of markets, the product cycle and new developments in science and technology. Realisation of these opportunities will depend on the ability of entrepreneurs to secure profits generated by innovation (Fagerberg *et al.* 2007).

The absorptive capacity (knowledge, skills and experience) of the local affiliate defines the pace of technological accumulation within the global enterprise. Multinational companies can transfer technology directly (internally) to local affiliates under their ownership and control or indirectly (externally) to companies not under their control. They can also encourage technical change and technological learning directly through technology upgrading and indirectly through technology transfers from within their networks to local companies. Spillovers can occur between companies that are vertically integrated with the global enterprise (inter-industry spillovers) or in direct competition with it (intra-industry spillovers). The innovation system, together with

the absorptive capacity of other enterprises, will determine the pace of technical change and technological learning in the region as a whole (Rojec and Knell 2017).

R&D is often seen as a linear sequence of functional activities, but evolutionary models emphasise that innovative activities are the outcome of a dynamic non-linear process. Schumpeter (1934) perceived innovation as part of the economic process itself, with the actions of cost-minimising capitalists generating a tendency toward equilibrium through the search for *global* investment opportunities, and the actions of *local* profit-seeking entrepreneurs engendering disequilibrium through the introduction of new products, markets, production methods and new organisational forms. Increasing market demand also encourages technical change and technological learning as it induces companies to invest and rationalise production. Innovation should not be considered the same as R&D activity, as it does not imply pushing back the frontiers of knowledge, but developing the capability for technological learning and technical change.

The challenge for the V4 is to build the appropriate or relevant technological and organisational capabilities needed to carry out specific tasks and assimilate new knowledge. Building technological capabilities is a cumulative, path-dependent activity that generates technical change, investment in new capacity and ultimately growth. It is also a complex and diverse activity that involves interaction between users and producers, and between companies and other organisations, engendering different patterns of technological accumulation and innovation depending on the learning structure. The incentive structures underlying the institutional arrangements support and sustain the rate and direction of technological learning, providing an important influence shaping public policy. Appropriate technology and innovation policy can improve the absorptive capacity of local companies by opening up access to foreign knowledge and through R&D incentives and various forms of public support intended to speed up local knowledge creation (Lee 2013).

Most competences acquired before 1990 became obsolete immediately after the economic collapse of Eastern Europe, meaning that new ones had to be acquired (Pavitt 1997). With only a tenuous connection between innovation, diffusion and productivity gains under central planning, institutional change was required to put the economies on a new path of economic growth. The transition from central planning to a market-oriented economy proved to be a formidable challenge for the V4 countries, especially when considering the twin issues of technical change and technological learning. Over the past 25 years, the V4 has played only a marginal role in attracting foreign R&D aimed at creating new local competences. The challenge for the V4 is to shape and create new technological opportunities and market landscapes.

Upgrading technology in the V4 to EU levels necessarily involves learning to use and improve technologies that already exist in the relatively more advanced industrial economies, and not by pushing the knowledge frontier further.[3] Learning-by-doing,

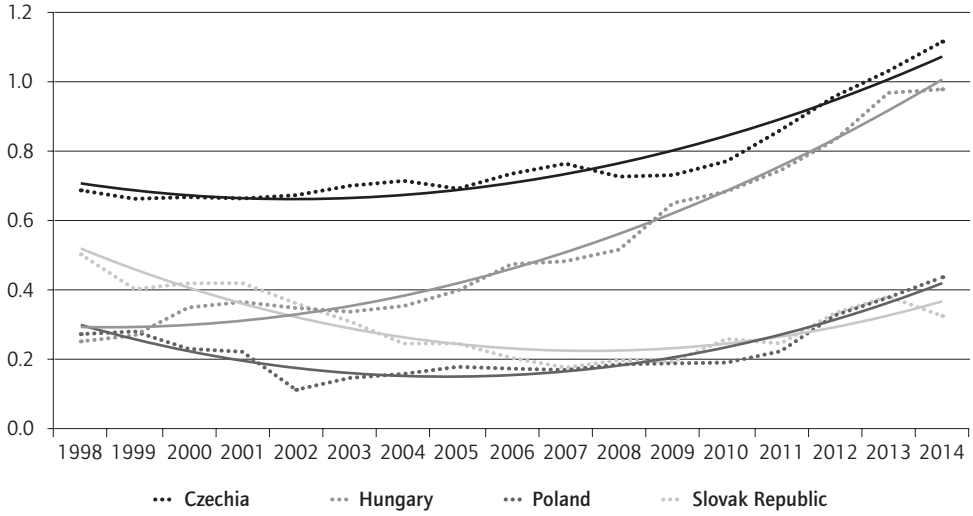
3. Catching-up can also be percieved as moving up the value chain ladder. The V4 is deeply integrated in global or European value chains.

learning-by-using and learning-by-failing involve building the capability to master, appropriate, and improve already existing knowledge (Lall 2000). Countries that have invested heavily in the formation of skills and R&D capabilities appear to be capable of catching up, while those that have not made such investment are falling further behind (Lee 2013). A mission-oriented approach to R&D and innovation policy could put the V4 countries onto a path of economic growth, but this involves bold, risk-taking actions by both private and public-sector entrepreneurs (Mazzucato 2015).

Total R&D spending in 2015 as a share of GDP (R&D intensity) was still comparably low in the countries within the group, although significantly up on 2005. Czechia and Hungary (1.9% and 1.4% respectively) had moved closer to the EU average (2%) by 2015, though still far away from the EU2020 target of 3%. Slovakia and Poland had lower values (1.2 and 1.0%) but still higher than other CEE new member states (Eurostat 2017).

Figure 1 illustrates the evolution of business enterprise R&D spending (total BERD) as a percentage of GDP (BERD intensity) in the V4. Compared with 2005, Czechia and Hungary had seen significant increases in BERD intensity (1.1% and 1% respectively) by 2015. Poland and Slovakia on the other hand did not show much progress and had a BERD intensity of just around 0.4% in 2015. All V4 countries received significant help from European structural and investment funds, which also appear in the statistics as inward BERD (see also the chapter by Ferry in this publication).

Figure 1 **BERD intensity in the V4, 1998-2014**



Source: OECD Main Science and Technology Indicators, 2017

3. R&D Internationalisation and the V4

R&D activities have become increasingly internationalised over the past 60 years. Though multinational companies have been carrying out R&D activities abroad for many years, the trend accelerated significantly in the mid-1990s (Israel 1998).[4] Within 10 years, R&D expenditure of foreign affiliates worldwide more than doubled, from US$29bn in 1993 to US$67bn in 2002 (UNCTAD, 2005). Similar statistics from the OECD (2008) show that R&D under the control of foreign companies more than doubled from US$37bn in 1995 to more than US$83bn in 2005 in the OECD countries. Moreover, the share of corporate R&D spent outside the home country by Western European multinationals almost doubled from 26 to 44%, while the share spent by North American multinationals increased from 23 to 32% over the same period. There is a clear global trend of multinational companies increasingly locating R&D activities outside their home country. Statistics on R&D internationalisation have also improved in recent years (OECD 2015).[5] Most European countries now collect information from domestically-owned enterprises and foreign-owned subsidiaries about their total business enterprise research and development (BERD) on a bi-annual basis. Inward BERD represents expenditures of foreign-owned affiliates in the reporting country, while domestic BERD refers to expenditures of domestically-owned affiliates in the reporting country[6]. Sectoral data are generally available at NACE (revision 2) two-digit level. The quality and availability of inward BERD data is reasonably good for the manufacturing sector, but not for service industries.

More than half of the total €4.4bn BERD activity in the V4 took place in the manufacturing sector. R&D activity by foreign enterprises is important for all four V4 countries. In 2013, foreign enterprises accounted for over 60% of total BERD in manufacturing, or about €1.35bn. Czechia and Hungry each accounted for more than €600m of inward BERD in manufacturing, Poland for about half of that, while Slovakia was estimated to have about €100m. By contrast, domestic enterprises carrying out R&D activities in the manufacturing sector spent less than €600m in the entire V4 in the same year. While there is no data for service industries in Poland and Slovakia, inward BERD in the Czech service sector makes up about one third of total inward BERD, and about 60% in the Hungarian service sector.

Figure 2 illustrates the intensity of R&D internationalisation over time. The trend line shows that R&D internationalisation (share of foreign BERD in total BERD) has increased quite significantly over the past 16 years in all four V4 countries; the largest increases were observed in Poland and Slovakia, but there were also noticeable increases in Hungary and Czechia. Considerable variation was observed in the statistics in all four countries, ranging from as low as 10% in Poland in 2001 to over 80% in Slovakia in

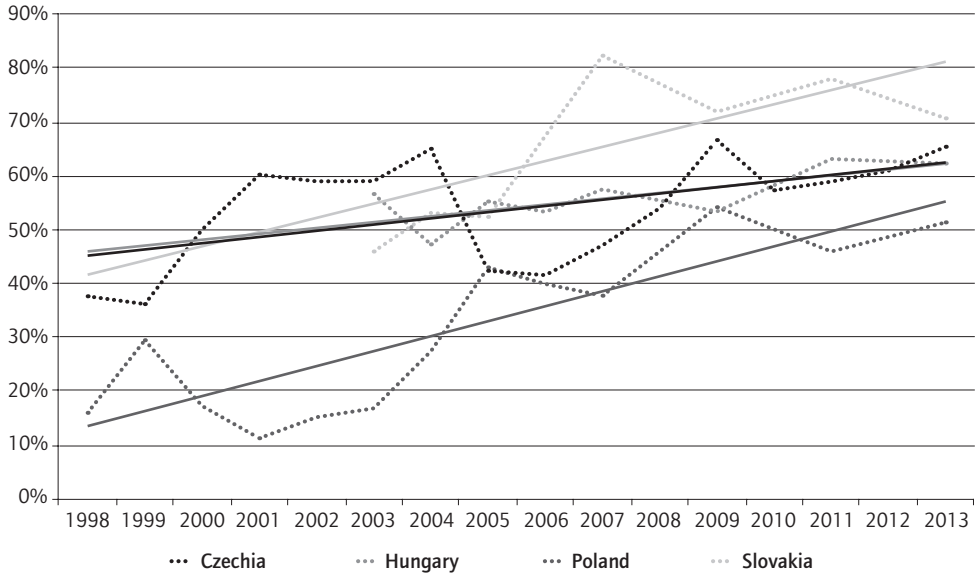
4. Thomas Edison is often credited with the creation of the first industrial research laboratory in Menlo Park, New Jersey, which included several scientists who had migrated from other countries, especially Germany. The laboratory became a model for other institutes and enterprises to duplicate in the late nineteenth century, but became most notably a leading source of new industries and technologies. Another example is IBM's research laboratory located in Switzerland since 1956.

5. The Frascati Manual (2015) provides 'the guidelines for collecting and reporting data on research and experimental development'.

6. In line with the terminology of the European Commission, this chapter will use the term 'inward BERD' for business R&D spending by foreign-owned affiliates (also referred to as 'foreign BERD')

2007. R&D internationalisation generally appears highest in small countries, as is the case with the V4 where Slovakia has the highest share and Poland the lowest. The other side of the coin is that there were very few domestic companies in the V4 engaging in any significant R&D activity. By contrast, the larger European countries, such as Germany and France, have a much lower share of R&D internationalisation, as business R&D is mainly driven by domestic companies.

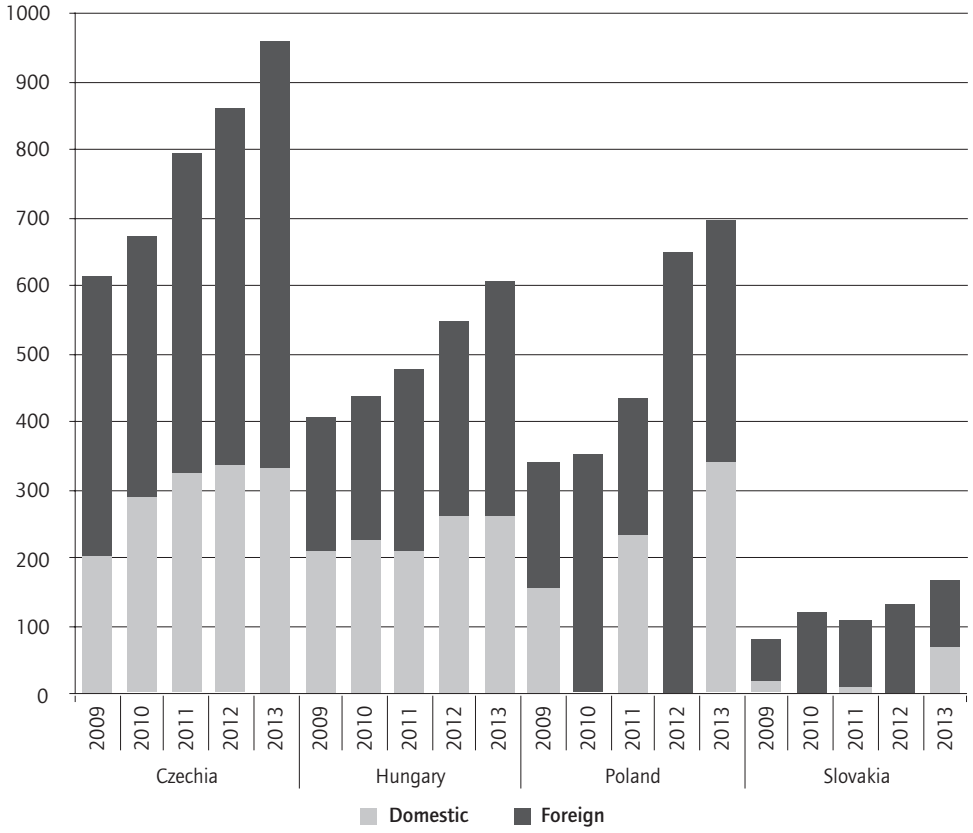
Figure 2 **Share of R&D by foreign affiliates (inward BERD) in total BERD in the V4 (%)**



Source: own calculation based on Iversen *et al.*, 2017

Growth of inward BERD has been very strong in the V4 since 2009. Figure 3 confirms how R&D internationalisation has evolved, showing business R&D activity in the manufacturing industries broken down into its domestic and foreign components between 2009 and 2013. There appears to have been little or no growth in domestic R&D activity from 2009 to 2013 in all four countries, except in Poland where it increased significantly. However, inward BERD increased significantly in all countries over the same period. Inward BERD can have both positive and negative effects. Inward R&D-related FDI can increase technology accumulation in the V4 but can also result in a downsizing of indigenous R&D capacity, a crowding-out of the labour market, and a loss of technical competences (Piscitello and Santangelo 2011).

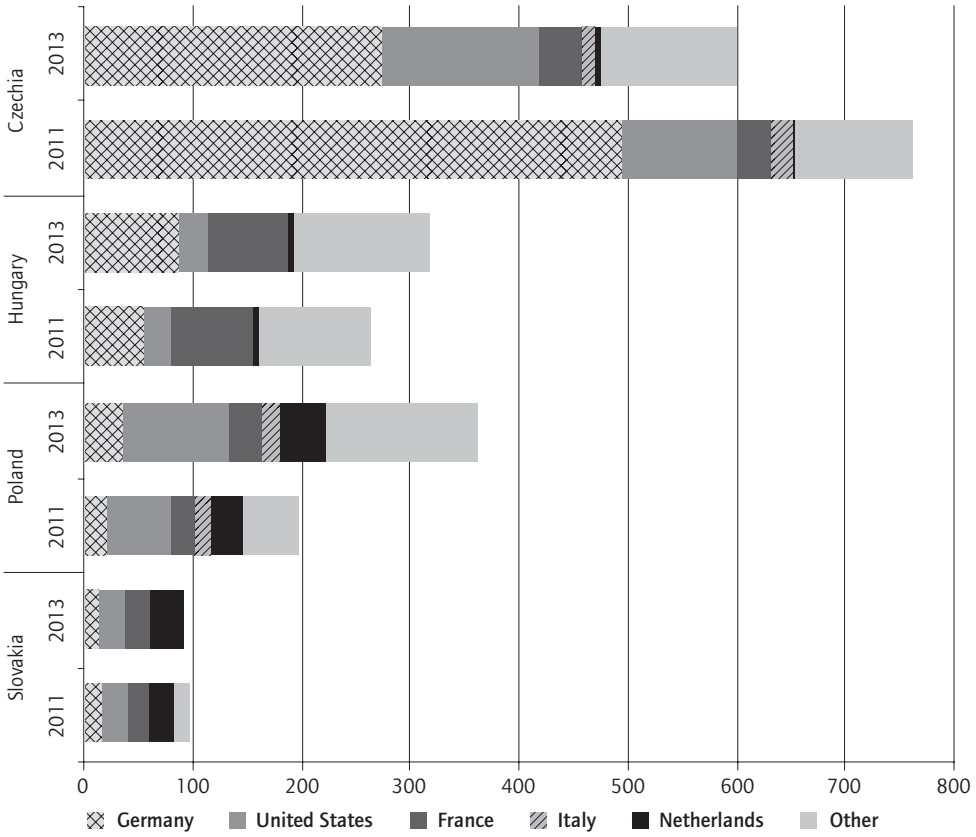
Figure 3 **Domestic and foreign BERD in manufacturing at constant 2010 prices in millions of Euros**



Note: for Poland and Slovakia values for 2010 and 2012 show total BERD.
Source: own calculation based on Iversen *et al.*, 2017

Figure 4 shows that Germany and the United States were the largest foreign investors in R&D activity in the V4 industrial and construction sectors. Germany was the main source of inward BERD flowing into Hungary and Czechia. In the early 2010s, German companies accounted for more than half of inward BERD in these sectors in Czechia and for about a third in Hungary. US-based companies also made significant investments in Czechia, while companies based in France and in Sweden made notable investments in Hungary. Poland experienced a very large jump in R&D funding from 2011 to 2013, mainly because of R&D activity carried out by US-based companies. R&D activity financed by foreign companies increased by 75% over the two-year period, while domestic investment increased at a much lower rate. And although the size of R&D investments in Slovakia was low when compared with the other countries in the group, R&D internationalisation was the highest. Companies based in the Netherlands, Germany, France and the United States invested in R&D in Slovakia during 2013.

Figure 4 **Inward BERD in industry and construction, by country of origin, millions of Euros**



Source: Eurostat and Iversen *et al.*, 2017

The connection between inward BERD and productivity highlights some of the important issues within the V4. Table 1 shows apparent labour productivity[7], BERD intensity (share of BERD in value added) and the share of R&D employment for 2009, 2011 and 2013. Apparent labour productivity of foreign enterprises appears to be twice as high as that of domestic ones in the V4, though at levels significantly lower than in Germany. A similar pattern is observed for BERD intensity and the share of R&D employment, though the differences are not so great. Compared to domestic BERD, inward BERD is significantly higher in Czechia and Slovakia (although Slovakia has low levels in both), while in Poland the shares are more balanced, with relatively low BERD spending. The data for Hungary indicates that R&D intensity is more domestic-oriented and that the share of R&D employment is higher in multinationals.

7. Apparent labour productivity is gross value added per person employed, expressed in thousands of Euros.

Table 1 **Apparent labour productivity (in thousand EUR) and BERD intensity (%) in manufacturing, 2009, 2011, and 2013**

		Apparent labour productivity			Share of BERD in value added			Share of R&D employment		
		2009	2011	2013	2009	2011	2013	2009	2011	2013
Germany	*Domestic*	*52.1*	*64.5*	*64.6*	*11.7*	*9.8*	*10.6*	*3.7*	*3.5*	*3.4*
	Inward	*82.8*	*89.2*	*82.5*	*9.4*	*10.4*	*12.5*	*6.0*	*7.4*	*7.8*
Czechia	Domestic	15.8	18.5	18.3	2.2	2.7	2.5	0.9	1.1	1.1
	Inward	30.0	36.0	37.2	3.5	4.1	3.3	1.5	1.6	1.9
Hungary	Domestic	16.1	18.0	17.3	2.9	2.4	3.2	1.1	1.4	1.7
	Inward	32.2	39.2	39.4	2.1	2.1	2.5	1.3	1.6	1.9
Poland	Domestic	15.7	19.2	20.7	0.7	0.9	1.1	0.5	0.6	0.7
	Inward	32.7	37.1	35.5	0.9	0.8	1.4	0.5	0.8	1.0
Slovakia	Domestic	13.1	15.7	15.6	1.1	0.7	:	0.4	0.3	:
	Inward	19.6	28.5	31.8	1.6	1.5	:	0.4	0.7	:

Source: Eurostat

An alternative way to measure the number of announced greenfield R&D FDI projects and related design activities is by source and destination. Announced greenfield FDI projects include information about R&D activities, including design, development and testing that originate in (are funded by) one country but are carried out in another. The fDi Markets database (Financial Times Ltd) provides an alternative, but complementary picture of the internationalisation of R&D activity, with its data covering a sample of 3,480 announced FDI projects in high to medium-high technology-based industries from 2010 to 2015. It differs from the BERD data in its source in that it includes reported projects focused on R&D and/or design. Table 2 contains a matrix of announced greenfield R&D FDI projects, by source (originating) country (or region) by row, and the destination (receiving) country (region) by column, from the beginning of 2010 to the end of 2015.[8] The table shows that the vast majority of R&D projects going to Central Eastern Europe were financed by Western Europe and the United States. To be more precise, 13 projects were financed by the V4, but located outside the region, whereas 137 projects were financed by foreign sources (mainly located in Europe and the United States), but located inside the V4 during this period.

8. The matrix resembles a transport-planning problem and is presented here as a square matrix. UNCTAD (2016) presents similar statistics in Annex table 7, but presents them in terms of the world as destination and the world as source (investor).

Table 2 **Number of announced greenfield R&D FDI projects, by source and destination, 2010-2015**

	W Europe	E Europe	USA+	E Asia	Other	*Total*
W Europe	344	140	235	209	418	***1346***
E Europe	6	6	2	2	3	***19***
USA+	412	109	72	255	545	***1393***
E Asia	114	18	105	100	127	***464***
Other	80	20	54	24	80	***258***
Total	**956**	**293**	**468**	**590**	**1173**	**3480**

Source: own calculation based on based on information from the Financial Times Ltd, fDi Markets (www.fDimarkets.com) and Iversen *et al.*, 2017

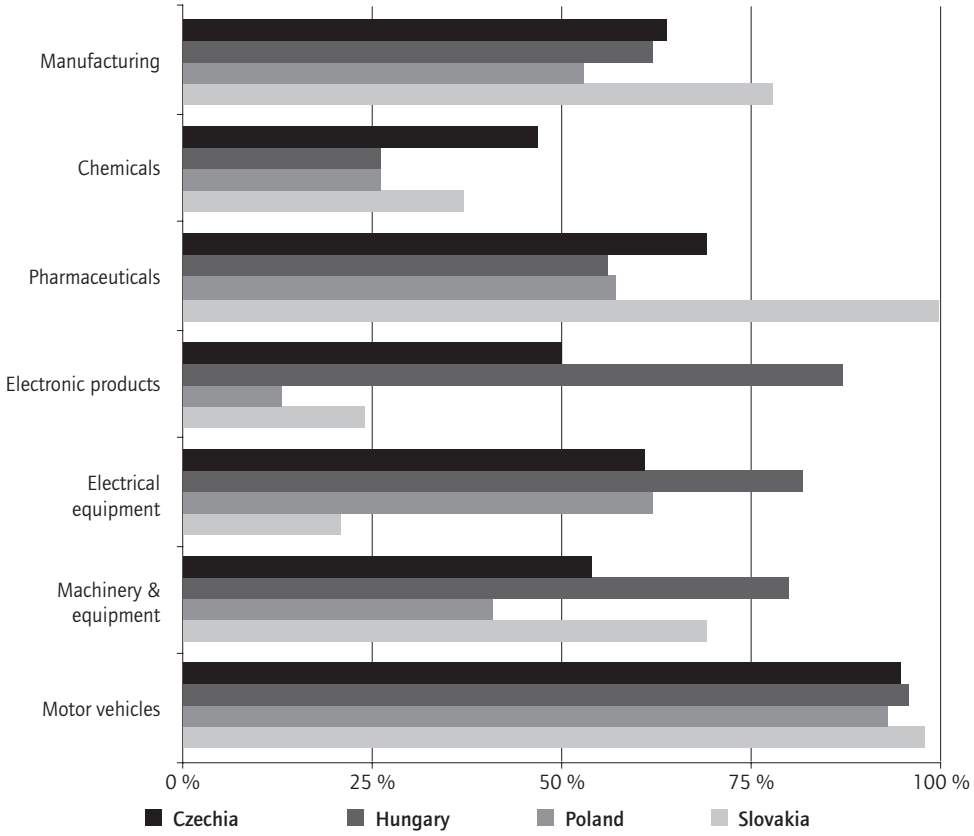
4. The share of foreign investors in business R&D in the main V4 industries, with a focus on the automotive industry

The internationalisation of business R&D is largely shaped by the industries or sectors in which it takes place.[9] Company heterogeneity and behaviour have an important influence on the industrial structure and on both domestic and foreign research and development. UNCTAD (2005) estimated more than 10 years ago that almost 60% of the R&D expenditures of the 700 largest R&D-performing multinationals took place in three industries (IT hardware, automotive, pharmaceuticals/biotech), with a further 20% invested in another three industries (electronics/electrical equipment, chemicals and IT software). Since then the main trends have remained stable, with the same industries tending still to be the most internationalised ones in terms of outward R&D. Pharmaceuticals take the lead (share of foreign R&D of almost 40%), followed by automotive, IT hardware and electronics (30%).

More than half of the R&D activity carried out by Visegrad enterprises is of foreign origin. Figure 5 shows inward BERD as a percentage of total BERD in six relatively more R&D-intensive industries in 2013. There is considerable variation across the industries and countries, as one would expect. More than 90% of R&D activity in motor vehicles is attributable to foreign enterprises in all four V4 countries, while the figure for pharmaceuticals is at least 50%. Figure 6 shows the distribution of total BERD in the V4, by type of ownership in main manufacturing branches. R&D investment in the motor vehicle sector makes up more than a quarter of total BERD, while another quarter is attributed to electrical and electronic products, and machinery and equipment.

9. Pavitt and Patel (1999) observed that a company's competitive advantage 'is often directly related to that of its home country and as such is strongly shaped by that country's industrial specialisations and national innovation systems, including its accumulated research and labour force skills.'

Figure 5 **Inward BERD as a percentage of total BERD, by selected industry, 2013**



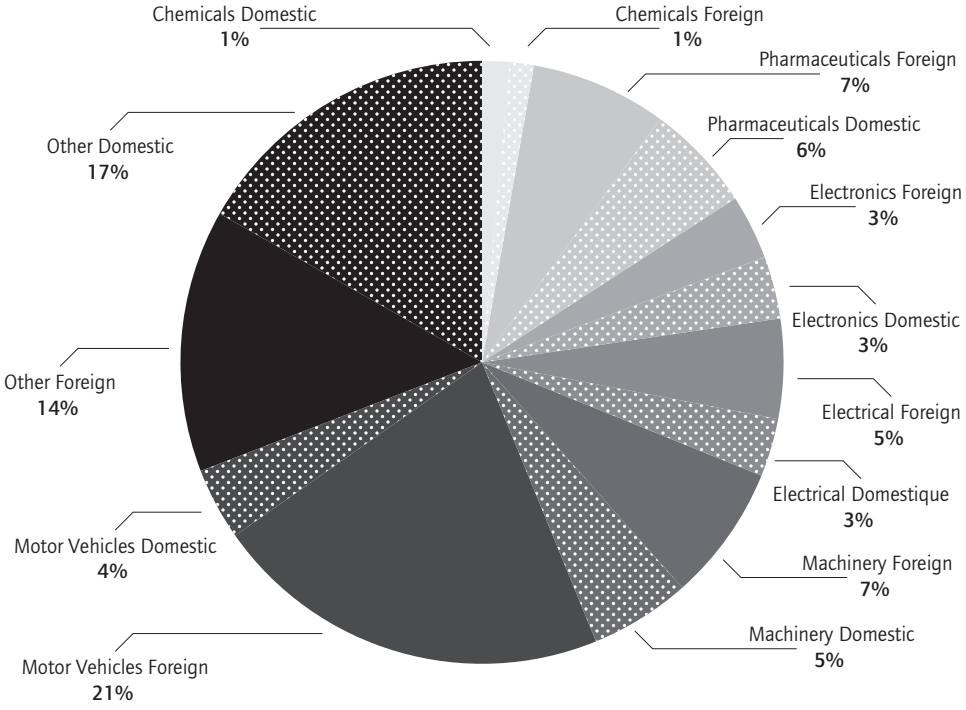
Source: Eurostat and Iversen *et al.*, 2017

This section focuses on the automotive industry. The industry, including the manufacture of parts and accessories for motor vehicles, is classified as a medium-high technology industry on the basis of its R&D intensity. It is a highly internationalised industry with a substantial flow of foreign direct investment from Western Europe (mainly Germany) to Central and Eastern Europe (mainly the V4 countries). R&D internationalisation follows a predominantly demand-driven strategy, as the industry tends to adapt products to satisfy customers' preferences, road and climatic conditions, and governmental regulations in foreign markets (UNCTAD 2005).

R&D activity in the European automotive industry has more than doubled in the past 16 years, accounting for about one-quarter of all European R&D activities in 2015. Activity is highly concentrated on Germany which accounts for almost two-thirds of total European automotive R&D. Germany relies on extensive cross-border R&D networks, in particular to Western Europe (France, the Netherlands, Switzerland and Austria) and also to the United States and Japan (see also Figure 9 on innovation networks), but not so much to the V4 countries, though its R&D activities there increased in the last decade. BERD activity within the industry is dominated by large multinational companies. The

Volkswagen group spent more than €13.6bn Euros on R&D activities in 2015, the most of any global multinational enterprise, and twice as much as it spent in 2010. A member of the Volkswagen group, Škoda Auto invested an estimated €400m in R&D facilities worth in 2014, the most significant such investment in the V4 in the last decade.

Figure 6 **Total BERD in the Visegrad Group, by ownership and industry, 2013**



Source: Eurostat and Iversen *et al.*, 2017

One of the conditions of Škoda's sale to VW was the continuation of Škoda's in-house R&D (Pavlínek 2012; 2017). The Czech government played an active role in providing investment incentives for the development of a new Škoda R&D centre, which was opened in 2008. Here, the Volkswagen group adapts existing technologies and design engineering of the upper bodies of its cars to local market conditions, taking into account regulations, standards and consumer tastes. There also appear to be some competence-creating activities, as the Volkswagen group was able to make use of certain technological skills within the workforce and the proximity to the parent firm. Ultimately, Volkswagen was able to significantly lower the cost of in-house R&D by hiring experienced engineers and designers at a wage rate lower than in Germany.

Table 3 shows apparent labour productivity, the share of BERD in value added and the share of R&D employment for Germany and the V4. Apparent labour productivity of automotive production is much higher in Germany than in the V4 countries, while the share of BERD in value added is on average nearly ten times higher than in the V4, as is the share of BERD in value added and the share of R&D employment. In Germany,

the productivity of domestic enterprises in the sector is higher than that of foreign ones, while we see the opposite in the V4 countries. These figures illustrate that R&D intensity remains very low in the V4 automotive industry, while the productivity gap with Germany remains persistently high. The data also suggests that there has been limited technological upgrading in the V4 automotive industry. While apparent labour productivity in the V4 automotive industry improved, the share of BERD in value added did not change in the period examined, and even decreased in Czechia (though the country still has the highest of the V4 countries).

Table 3 **Labour productivity and BERD intensity in the automotive industry**

		Apparent labour productivity			% of BERD in value added			% of R&D employment		
		2009	2011	2013	2009	2011	2013	2009	2011	2013
Germany	Domestic	:	103.2	105.4	:	23.5	27.6	9.2	10.5	10.1
	Inward	58.7	71.0	:	29.8	21.8	:	11.9	9.8	11.7
Czechia	Domestic	14.6	16.6	18.9	4.7	3.3	2.7	1.7	1.6	1.7
	Inward	32.0	42.6	43.1	7.8	8.7	4.6	2.5	2.3	2.6
Hungary	Domestic	12.5	16.6	17.6	1.6	1.9	1.8	1.3	2.2	2.6
	Inward	38.0	51.9	48.1	2.4	1.7	2.5	1.7	1.9	2.1
Poland	Domestic	16.6	19.2	19.9	0.4	1.1	1.3	0.6	1.3	1.6
	Inward	30.4	36.8	36.3	2.5	0.9	2.7	0.4	0.7	1.7
Slovakia	Domestic	11.8	15.0	24.7	0.3	0.2	0.7	0.1	0.1	0.4
	Inward	23.7	32.0	36.6	2.3	2.7	2.1	0.3	1.0	1.3

Note: apparent labour productivity in thousand EUR/worker/year.
Source: Eurostat and Iversen et al., 2017

5. Innovation in foreign-owned enterprises

Business enterprise R&D activities do not accurately describe the innovation process. Technological capabilities are also reflected by a company's ability to introduce higher quality products, cost-saving processes, and improved organisational and managerial processes. Such capabilities are often not captured in statistics measuring R&D activities, and indeed R&D surveys and innovation surveys are often carried out by very different people within an enterprise. Furthermore, foreign direct investment, joint ventures, strategic alliances, technology licensing, subcontracting and embodied technology transfer all play an important role in the innovation process.

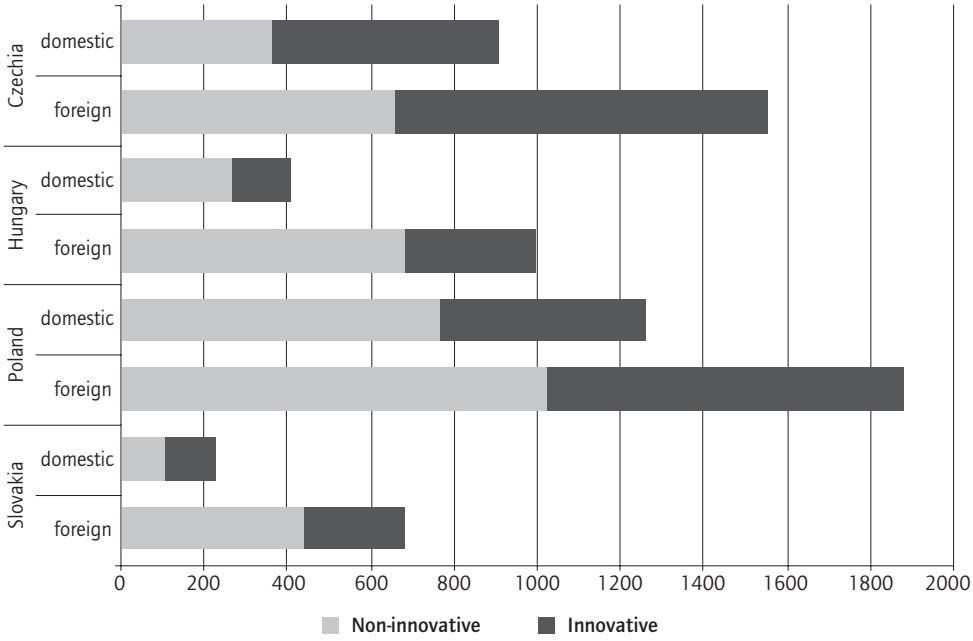
The Community Innovation Survey (CIS-2014) is one of the best ways to measure innovation.[10] It draws on Schumpeter's distinction between five kinds of innovation:

10. The Community Innovation Survey provides information on knowledge inputs going into the innovation process, including R&D expenditures within the company, collaboration with other companies and organizations, and R&D acquired outside the company, all of which are relevant for analyzing R&D internationalisation. The survey is based on the so-called Oslo Manual (2005) which provides guidelines for creating new input and output indicators that capture the innovation process and for composing survey questionnaires. Originally issued in 1992, the manual has been revised three times, with a fourth revision planned for next year.

new products, new production methods, new markets, new sources of supply and new forms of organisation. The survey identifies whether an enterprise is a member of an enterprise group and whether it is foreign. This means that each enterprise within the group can serve different markets, as with national or regional subsidiaries, or serve different product markets. An enterprise group is an association of enterprises under common ownership and controlled by the group head or parent. The CIS-2014 identifies all enterprises that are part of an enterprise group and enterprises groups that have a foreign head office. Here we only look at those with head offices located abroad.

Figure 7 shows the number of domestic and foreign enterprises in the V4 countries, classifying them as innovative or non-innovative. An innovative enterprise is considered one that introduced new or significantly improved goods or services or a new or significantly improved production process, distribution method, or supporting activity between 2012 and 2014. A non-innovative enterprise would include enterprises that either do not innovate or *only* introduce new organisational and marketing innovations. The data confirms that enterprises with a head office abroad tend to be more innovative than domestic ones. Czechia appears the most innovative of the V4 countries, followed in turn by Poland, Hungary and Slovakia if we consider the absolute number of innovative firms that are part of a global enterprise group. When considering the share of innovative firms within each category, foreign enterprises in Czechia and Poland perform rather well, as do Czech and Slovak ones in the domestic category.

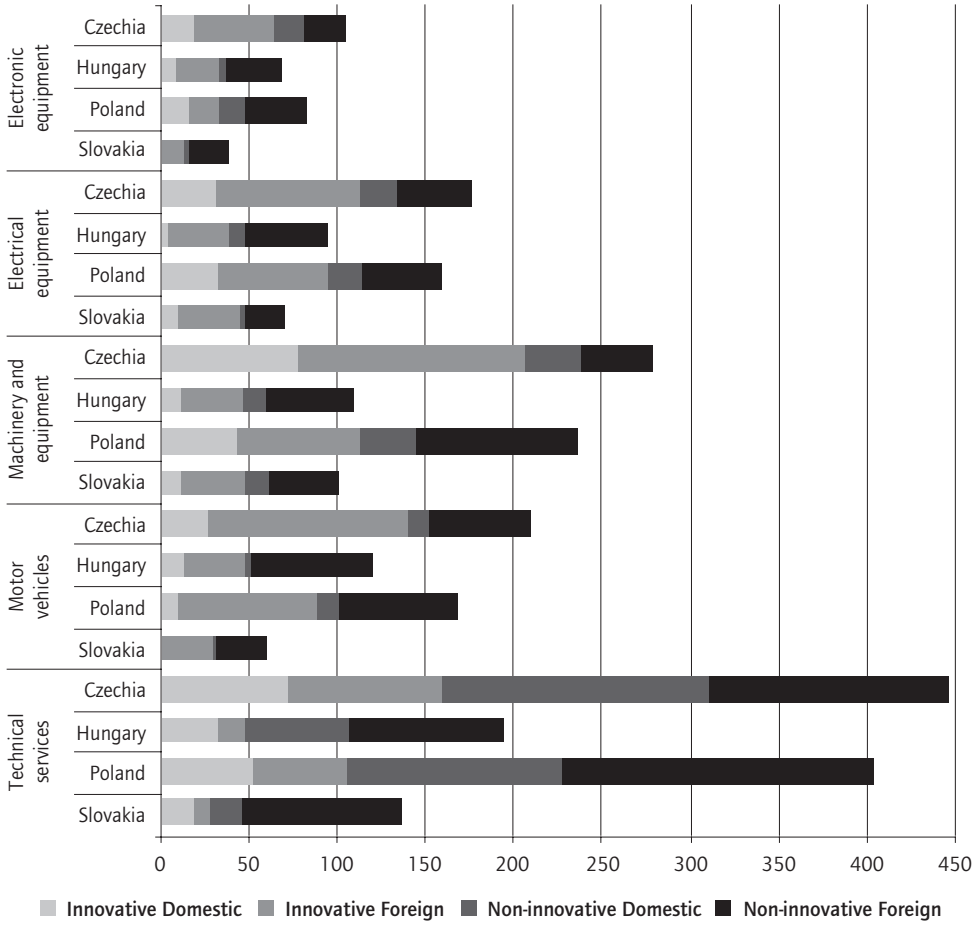
Figure 7 **The number of innovative and non-innovative enterprises that are part of a global enterprise group, 2014**



Source: own calculations based on The Community Innovation Survey (CIS), 2014

Figure 8 shows the number of innovative and non-innovative enterprises included in the CIS-2014 that are part of a global enterprise group by industry and illustrates the distribution according to form of ownership. The grey bars show innovative domestic and foreign enterprises, while the black ones show their non-innovative counterparts. As before, there is considerable variation across industries and countries. One visible pattern is that Czech enterprises appear more innovative than their regional counterparts, but this might be due to certain factors related to the questionnaire or its interpretation. In line with the BERD statistics, the automotive and machinery and equipment sectors appear most active in innovation, as does the electronic and electrical equipment sector, though it is a bit smaller.

Figure 8 **Share of innovative companies that are part of a global enterprise group, 2014**



Source: own calculations based on The Community Innovation Survey (CIS), 2014

The data also includes software and computer services, defined as computer programming, information services, software publishing and related activities. They are part of the Knowledge-Intensive Business Services (KIBS) and generally considered

to be high-tech based on their R&D intensity. However, in the V4, KIBS appear to be smaller enterprises that are less innovation-active. We have few statistics on inward BERD for the V4, except for Czechia. This data indicates that inward BERD accounted for just under half of total BERD from 2009 to 2013 in computer services.

6. The rise of global innovation networks in the Visegrad region

Innovation collaboration between companies and other organisations is essential for the creation, transfer and absorption of new knowledge and ultimately economic growth. Collaboration is important because it reduces the risk and complexity involved in the development of new products and processes by spreading it among several partners with agreed complementary aims. Collaboration is a strategic choice for local and global partners, and companies most often want to be in a *global innovation network*. When strongly embedded in the local social environment, they tend to cooperate with partners in their proximity, provided they have the necessary complementary resources. If these complementary resources do not exist locally, companies are more likely to collaborate with foreign partners. Foreign-owned subsidiaries are not free to choose a collaboration partner, as they tend to have more restrictions than domestically-owned companies. Foreign-owned subsidiaries also have the advantage of being able to tap foreign sources of technological knowledge through other subsidiaries in the group and parents abroad.

The Oslo Manual (2005) also provides the guidelines for measuring collaboration between companies located in different regions and countries. Table 4 provides data from the 2012 Community Innovation Survey showing the innovation collaboration activities of enterprises located in the V4 with domestic and foreign enterprises. Collaboration agreements typically have multiple partners, which means that regional totals do not add up to the number of total collaborations. The vast majority of collaborations occur between individual enterprises, or enterprise groups and organisations within the same country, which is generally the case when collaboration partners include upstream suppliers, downstream customers, competitors, the government and universities and other research institutes. About half of the collaborations involve other European partners, while about 10% of partners come from the United States and nearly 10% from China or India.

Table 4 **Innovation collaboration in the Visegrad region, 2014**

	Any type of collaboration	National	Europe	United States	China or India	Others
Czechia	2,534	2,140	1,277	288	205	207
Hungary	1,032	920	472	96	83	60
Poland	2,616	2,311	1,137	230	155	217
Slovakia	752	600	546	97	91	87

Source: The Community Innovation Survey (CIS), 2014

Freeman (1991), Powell and Grodal (2005) and others have shown that own R&D activity is positively correlated with the intensity of networking and that it positively affects a company's ability to exploit the opportunities arising from innovation cooperation. R&D and innovative activities are becoming globalised for several reasons. Companies tend to internationalise certain activities at earlier stages of their life cycle because of global competition and specialisation as well as the increasing costs of R&D and other innovative activities. The trend towards innovation globalisation is also part of a general tendency of companies to source technology externally and to collaborate with other companies, universities and public research organisations, in addition to investing internally in R&D and innovation activities (Powell & Ginnaella 2010). Data also suggests that companies that collaborate with international partners also collaborate with domestic and European partners (Knell and Shrolec 2008).

Social network analysis can be used to illustrate the spatial structure of international R&D networks. This describes networked structures in terms of nodes or actors within the network and the relationships or interactions that connect them. In our case, each node corresponds to the inward BERD of an individual country whereas each connection corresponds to the total flows between any two countries. Germany appears as the central node in Figure 9, with extensive interaction between it and its neighbours France, the Netherlands, Switzerland and Austria. This observation confirms the analysis of Scherngell (2014) that almost all European R&D activity is located in the centre of Europe, leaving very little in the periphery. Stehrer and Stöllinger (2015) suggest that European manufacturing is becoming increasingly concentrated around a Central European manufacturing core, centred in Germany, but including Austria and the V4. A more recent update by Dachs *et al.* (2014) that includes 2013 data, however, indicates that the V4 has become more integrated into the R&D network.

The main rationale behind innovation globalisation is to gain access to local markets and to specialised knowledge located in different countries and regions. Since knowledge is not evenly distributed across countries and regions, companies create links 'between specialised knowledge development nodes located in places which are increasingly more geographically dispersed' (Herstad *et al.*, 2008). Innovation requires access to the global pool of knowledge where 'companies increasingly adopt ecosystems of innovation which link networks of people, institutions (universities, government agencies, etc.), and other companies in different countries to solve problems and find ideas' (OECD 2008: 31). Herstad *et al.* (2008) also suggest that international collaboration encourages innovation in enterprises, especially in small economies such as those found in the V4. Yet, the globalisation of R&D and other innovative activities requires substantial resources, and access to global innovation networks by small and medium-sized enterprises might be constrained by the high costs and complexity involved. Likewise, collaboration strategies hold most promise for sectors characterised by highly competitive markets with short product life cycles and where much explicit knowledge is required, external interfaces are important and positive externalities are created (OECD 2008b).

Figure 9 **European innovation networks**

Source: Iversen *et al.*, 2017

7. What policy actions are needed to promote business R&D and innovation in the V4?

Technical change and technological learning are essential for the V4 to get much closer to the knowledge frontier. Inward BERD is important for transferring new knowledge and technology to the V4, though it needs to be noted that most global BERD activities take place in multinational enterprises located in the most advanced economies. The presence of foreign subsidiaries with R&D activities should strengthen the absorptive capacity of local enterprises in the V4. As this capacity strengthens, policies should be aimed at facilitating the diffusion of new innovations throughout the economy. Potential spillovers can occur both directly through linkages in the local economy, as well as indirectly through the labour market and competitive pressure. Policy initiatives should promote R&D cooperation and a collaborative innovative environment that ties local enterprises together with other private and public players. Foreign direct investment coupled with an effective R&D and innovation policy can close the technology gap between V4 economies and the advanced EU economies by upgrading the region's technology. The main challenge is to build the appropriate or relevant technological and organisational capabilities needed to carry out specific tasks and assimilate new knowledge within the V4.

R&D activity continued to internationalise over the past 16 years in all four V4 countries, despite the financial crisis in 2008. This trend does not however imply the globalisation

of R&D activity, as it was mainly other European countries which provided most of the inward BERD in the manufacturing industries, strongly suggesting that geographical proximity is important to the region. However, total BERD intensity remained fairly low until after the crisis and the introduction of the Europe 2020 strategy. The goal here was to invest Structural Funds more efficiently by strengthening research, technological development and innovation (R&I target) as well as information and communication technologies (ICT target), a strategy later to become known as the smart specialisation strategy (Foray, 2015).

There is considerable heterogeneity across the different industries in the V4, in terms of both the intensity of R&D internationalisation over time and the relative importance of the respective industry. The automotive industry remains very important for the V4 and is highly integrated with Germany. While the industry accounts for about a quarter of all EU R&D activity, two-third of this is attributable to Germany. The V4 region has relatively little inward BERD in the sector, and much of this is attributable to Volkswagen's investment in Skoda, aimed at adapting existing technologies already available in the Volkswagen group and local design engineering. There are further examples of investments in automotive R&D activities by other enterprises, as the relatively high growth rate of foreign R&D activities indicates. On a positive note, foreign investment in ICT activities, including software development, has been strong in the last few years, with statistics from Czechia and Hungary suggesting that inward BERD in the KIBS has more than doubled since the financial crisis.

Funding of business R&D has been increasingly sourced from abroad since the financial crisis. Companies increasingly collaborate in R&D and innovation activities both within and across national borders, and multinational enterprises rely more and more on their subsidiaries for technical knowledge. Such collaboration networks often contain both large multinational enterprises that attempt to direct and control the global innovation network and smaller enterprises and research groups that evolve in a more self-organizing way, guided by the needs of network members. Policies should be directed toward local enterprises and their ability to collaborate with other domestic companies, universities and public research organizations.

Foreign enterprises located in the region tend to be a bit more innovative than domestic ones. A similar trend appears in the statistics of apparent labour productivity, but the results are mixed when it comes to the share of BERD in value added. Czechia appears to be the most innovative country in the region, though statistics are not strictly comparable. The V4 countries should strengthen investment in innovation and promote product and process upgrading by improving their absorptive capacity and policy governance (Fagerberg *et al.*, 2007). They must recognize internal and external sources of information and knowledge and then apply these in the innovation process. As companies develop their indigenous R&D capability, they will gradually follow an asset-seeking strategy rather than only following an asset-exploiting one.

The V4 should adopt a mission-oriented approach to innovation policy (Mazzucato 2013). Such policies emphasise problem-specific societal challenges involving many different players. Policy interventions are not to be seen as market failures, but as a

market-creating process that includes public-private partnerships and facilitates the development of larger and higher- risk projects. Many breakthrough technologies, such as the Internet, biotechnology, nanotechnology and green technology required risk-taking and bold entrepreneurial action by public organisations. The V4 countries should encourage industry clusters in knowledge-intensive industries and increase industry–university collaborations and support for start-ups. Moreover, they need to increase their private and public investment in R&D, regardless of whether the funding comes from domestic or international sources.

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Chapter 5
Industry 4.0 in 'factory economies'

Andrea Szalavetz

1. Introduction

Although the disruptive technologies jointly referred to as 'Industry 4.0' (Brettel *et al.* 2014; Hermann *et al.* 2015; Kagermann *et al.* 2013; Váncza *et al.* 2011) have been nearly universally hailed[1] as being set to improve the competitiveness of the manufacturing sector – also in high-wage countries –, scholars are far from unanimous in their assessment of their impact on selected economic subsystems such as the labour market, or on the geographical configuration of value-adding activities. Will these technologies lead to the reshoring of manufacturing and the related advanced support activities, erasing the results of FDI-driven modernisation in the host economies?

As for the former issue, some scholars have discussed the broad implications of the digital economy, looking for example at whether proliferating new forms of employment can be expected to *call the social model of paid employment into question* (Valenduc and Vendramin 2016), or whether, through causing massive job losses, new technologies will jeopardise overall welfare (Sachs *et al.* 2015). In a more definitive approach, several papers have quantified the number of jobs set to be eliminated by Industry 4.0 technologies (e.g. Arntz *et al.* 2016; Bonin *et al.* 2015; Frey and Osborne 2013; WEF 2015), discussing the implications of these developments on wages, the labour income share in national income and inequality (reviewed by Acemoglu and Restrepo 2016). The results of these calculations have been debated by other scholars, claiming that the new technologies will not eliminate jobs in the magnitude posited. By taking over the dullest and the most difficult routine activities, new technologies will in their view lead to a major adjustment in labour supply, eliminating certain activities while at the same time increasing demand for new, complex skills and thus enhancing the creation of 'good jobs' (Acemoglu and Restrepo 2016; Autor 2015; Chui *et al.* 2015; Porter and Heppelmann 2014).

The second issue, the geographical reconfiguration of production activities triggered by the disruptive impact of new manufacturing technologies on global value chains, has raised similar controversies. Whether or not the new manufacturing technologies will bring about major changes in global supply chains, for example prompting the massive reshoring of previously offshored production activities (surveyed by Oldenski 2015) remains to be substantiated by empirical evidence. The opposite is just as conceivable, with the co-location synergies that characterise modern production systems leading to further relocations (this time, the relocation of advanced activities such as R&D)

1. Notable exceptions include Benzell *et al.* 2015; Brynjolffson and McAfee 2014; Sachs *et al.* 2015.

to offshore, low-cost MNC manufacturing subsidiaries (Tassey 2014), or with certain Industry 4.0 technologies triggering a further decentralisation of manufacturing (Gress and Kalafsky 2015).

This paper is intended to contribute to these strands of the literature from the perspective of FDI-hosting, intermediate-level 'factory economies'.

Central and Eastern European (CEE) countries, and more specifically Hungary, are used as examples of this country group. Following the shift from command to market economies in the CEE countries, their economic actors have become successfully integrated in European and global value chains (GVC), mainly as subsidiaries of multinational companies. CEE economies can thus be classed as 'factory economies' under the Baldwin and Lopez-Gonzalez (2015) categorisation[2], even if local economic actors have achieved substantial product, process and functional upgrading.

Investigating the development perspectives of CEE manufacturing actors in an Industry 4.0 era is intriguing, since this country group represents an intermediate case. On the one hand, it is relatively more developed than peripheral low-cost locations, while on the other it hosts manufacturing subsidiaries that have undergone substantial upgrading in multiple respects.

Our point of departure is that the contradictions in the above-detailed assumptions can be reconciled through broadening the focus of investigation to include factory economies. Indeed, the impact of Industry 4.0 technologies will be a function of an economy's GVC specialisation[3] and how quickly it adjusts to new skill requirements. When examined from a GVC perspective, optimistic and pessimistic scenarios may occur in parallel, with benefits accruing to advanced economies (optimistic scenario), and costs (the adverse effects of the new technologies) accruing in peripheral 'factory' or dependent market economies (Farkas 2011; Nölke and Vliegenthart 2009) unable to adapt to today's high-speed business environment.

The issue at stake is whether the new technologies will annul local subsidiaries' past upgrading achievements, with the relatively advanced activities located in these countries, partly in recognition of demonstrated local competences, being reshored.

2. According to Baldwin and Lopez-Gonzalez (2015), in international production networks there are *headquarter economies* that 'arrange the production networks' and *factory economies* that 'provide the labour' (p. 1696). Scrutinising economies' trade patterns, the cited authors found that factory economies tend to be heavily reliant on the closest high-technology manufacturing economy – the US, Germany and Japan – whereas the sourcing and sales partners of headquarter economies are diversified.

3. For example, according to data published in the Economist (2016), half of the world's full-time call centre jobs are located in two countries: the Philippines (26%) and India (24%). As most of these activities will be subject to the automation of knowledge work – at least of routine cognitive activities (Manyika *et al.* 2013), the economic indicators (output, export, employment) of these countries will be hit above average by the new technologies. In a similar vein, countries specialising in low-skill repetitive manufacturing activities will also face dramatic job losses: for example, in May, 2016 Foxconn fired 60,000 workers in China following the automation of their activities (Millward 2016).

This issue will be discussed conceptually, drawing on the features of Industry 4.0 technologies (section 3). In a multidisciplinary approach, technological and engineering literature is combined with business and management literature. We summarise the specific attributes of selected Industry 4.0 technologies, predicting their impact on the location patterns of manufacturing activities – from the particular perspective of intermediate-level factory economies. Manufacturing activities are considered in a broad sense (Bernard *et al.* 2016) including all related business support activities, such as process development and production scheduling; capacity planning; engineering support for assembly line reconfigurations; testing; order processing; accounting, etc.

This conceptual analysis will be contrasted with interview findings about the adoption of and first experiences with Industry 4.0 technologies in MNC manufacturing subsidiaries in Hungary (section 4). These sections will be preceded by a short summary of the literature related to our investigations (section 2). The final section provides some concluding remarks and policy recommendations (section 5).

2. Definitions and related literature

In a broad sense, Industry 4.0 refers to a bundle of technologies[4] recently adopted in manufacturing and its related support activities (often referred to as advanced manufacturing – Tassey 2014). More narrowly, Industry 4.0 refers to the implementation of cyber-physical systems, resulting in the digitalisation of production (Kagermann *et al.* 2013; Monostori 2015). The flipside of the coin is the integration of new technologies in the products themselves: smart connected products, such as autonomous cars, smart apparel, smart consumer electronics products and smart buildings are themselves cyber-physical systems.

New technologies have dramatically improved adopting firms' operational parameters, such as efficiency, productivity, transparency, costs and flexibility. Moreover, they have altered industry boundaries, generating new business models (changing the way value is created and captured), and transforming corporate strategies (Porter and Heppelmann 2014; 2015).

Among the multiplicity of related strands in the literature (e.g. the expected benefits and challenges of the digital transformation; the speed and scope at which technology is diffused and the factors impacting its adoption; technical change and industry dynamics; the tertiarization of manufacturing and the interdependence of manufacturing and business services; skills and the labour market; global value chains and upgrading) closest to our investigation are papers concerned with the evolution of MNC subsidiaries and with the locational dynamics of value-adding activities along GVCs. These two strands are reviewed in brief below.

4. Examples of new technologies include cyber-physical production systems and the Internet of Things; big data; artificial intelligence and machine learning; cloud computing; 3D-printing (additive manufacturing); industrial robots, and optical 3D measurement (Manyika *et al.* 2013; Monostori 2015).

Birkinshaw (1996) and Birkinshaw and Hood (1998) are among the classical references on the evolution of subsidiaries. They posit that, over time, subsidiaries systematically accumulate resources and specialised capabilities, possibly resulting in their mandates being enhanced. This evolution is driven by increased headquarter (HQ) expectations and assignments and by the related transfer of additional resources (moderated by the capability of subsidiaries to absorb them), and/or by a subsidiary's proactive behaviour and initiative-taking. The development of unique, subsidiary-specific capabilities (Rugman and Verbeke 2001) allows a subsidiary to switch from being a peripheral implementer to a strategic contributor (Bartlett and Ghoshal 1986), or even to a centre of excellence within an MNC's network (Frost *et al.* 2002). Nevertheless, a subsidiary's evolution is no one-way street, as argued by Dörrenbächer and Gammelgaard (2010): its mandate can also be lost, driven by technological or host market changes, developments in the overall business environment, or by other strategic considerations of the parent company.

As for the geographical configuration and the dynamic reconfiguration of value-adding activities, there seems to be a consensus in the literature (e.g. Contractor *et al.* 2010; Koza *et al.* 2011; Linares-Navarro *et al.* 2014) that increasingly fine-sliced activities are *assembled* in GVCs. The term 'assembly' is used here in Koza *et al.*'s (2011) conceptualisation of *strategic assembly* (rather than product assembly), defined as a process consisting of (a) the identification of the necessary resources; (b) the design of the value chain structure and access to resources; and (c) the management and coordination of network relationships that include both equity and non-equity relations.[5]

A further common finding is that the attributes and composition of value chain activities keep changing, driven either by technological and business model innovations (Cano-Kollman *et al.* 2016) or by HQ efforts to adapt the organisational structure to changes in the external business environment (Chandler 1962; Szalavetz 2016a).

Locational choices are determined by matching the nature of the given activity with the tangible and intangible resource endowments of the selected locations. Both aspects need to be analysed in a detailed manner, taking account of phenomena where high-cost locations are selected or retained to host certain manufacturing activities (Jensen and Pedersen 2011). Moreover, location-based competitive advantages are not static, as companies and locations co-evolve (see the review of the related literature in Cano-Kollmann *et al.* 2016).

This paper attempts to bring these two reviewed strands of literature together, investigating the impact of Industry 4.0 technologies on FDI-driven factory economies that had already achieved substantial upgrading before the advent of these technologies. We argue that, in line with the evolutionary view of economic development (Nelson and

5. The business units where the individual value-adding activities take place are not necessarily in the ownership of the value chain orchestrator. As stated by Koza *et al.* (2011): ownership of resources - property rights, assets and operational capabilities - is not necessary for competitive advantage. Ownership may even limit firms' flexibility: their capability to adapt to changes in the business environment.

Winter 1982), technological change induces *selection*, *retention* and *reconfiguration* mechanisms – also within global value chains. In our case, the new manufacturing technologies prompt GVC orchestrators to make strategic locational decisions: whether they (a) keep their existing manufacturing facilities and upgrade them through installing Industry 4.0 technologies (retention); (b) consolidate and concentrate manufacturing activities in a (couple of) specific location(s) (selection); or (c) reshore part of the activities, and at the same time establish new facilities, and/or outsource certain tasks (reconfiguration).

Scenario building, from the perspective of CEE factory economies, is coupled with uncertainties for two reasons. First, there are non-negligible differences between individual CEE economies in terms of their progress towards implementing Industry 4.0 technologies. According to Roland Berger (2014), although no CEE economy can be regarded as a frontrunner in terms of preparedness for the 'Industry 4.0 era', (measured by indicators such as production process sophistication, degree of automation, workforce readiness, innovation intensity and Internet sophistication), some (the so-called 'traditionalist' cluster) are better prepared than others (the so-called 'hesitators').[6] New investment inflows and selection mechanisms may, however, change the Roland Berger ranking of these countries quite rapidly. According to empirical evidence (Roland Berger 2014; Szalavetz 2016b), new foreign-owned manufacturing facilities, established in the mid-2010s, are already highly automated,[7] characterised by state-of-the-art cyber-physical production systems. Accordingly, Industry 4.0 readiness in these countries will significantly depend on the outcome of foreign investors' future location decisions.[8]

Second, it must be borne in mind that Industry 4.0 technologies are heterogeneous. The impact of individual technologies differs across industries. Even within individual value chains, different Industry 4.0 technologies may trigger different geographical reconfiguration mechanisms. This paper is thus limited to discussing certain possible developments associated with selected Industry 4.0 technologies from the perspective of MNC manufacturing subsidiaries in Hungary in the automotive and electronics sectors.

6. Czechia, Hungary, Slovakia, Slovenia and Lithuania belong to the cluster of 'traditionalists', with Czechia featuring the relatively highest performance. Estonia, Poland, Croatia and Bulgaria are referred to as 'hesitators'. Another factor suggesting differences in preparedness is the fact that Czechia is the only CEE economy to have adopted a formal National Industry 4.0 Initiative (in 2016) (https://www.mpo.cz/assets/dokumenty/53723/64494/659339/priloha001.pdf). Hungary is preparing its own national Industry 4.0 strategy, to be completed in 2017. Slovakia is preparing industry-level action plans, envisaging 'smart industry'.

7. According to the International Federation of Robotics, Slovakia was among the top ten countries in terms of the number of multipurpose industrial robots per 10,000 employees in the automotive industry (920) in 2015. (Source: www.ifr.org)

8. Although process sophistication and the degree of automation are the two most spectacular constituents of Industry 4.0 readiness, other constituents less dependent on foreign investment in cyber-physical solutions are equally if not more important determinants of future shifts in CEE rankings. Estonia for example, boasts good results in terms of Internet sophistication due to its e-Estonia programme.

3. Industry 4.0 technologies and the geographical reconfiguration of value chains – Impact on MNC manufacturing subsidiaries

One of the salient technological novelties of the Industry 4.0 era is additive manufacturing, also referred to as 3D printing.[9] As the characteristics, benefits and disruptive implications of this technology on international business have already been extensively discussed (e.g. Berman 2012; Ford 2014; Garrett 2014; Petrick and Simpson 2013), we focus here only on a couple of thought-provoking specifics – from a factory economy perspective.

Although additive manufacturing is expected to fundamentally reorganise not only the way products are manufactured but also manufacturing location patterns, its diffusion is projected to be limited to particular product families. The main obstacles to intensive diffusion[10] are the higher costs and the lower production throughput of 3D printing compared to conventional manufacturing technologies. Hence, even in the medium term, it is projected to be used mostly for manufacturing customised products with a complex design in small quantities (Ford 2014), i.e. precisely the area where factory economies of an intermediate wage level, e.g. CEE countries, have comparative advantages (Artner 2005), as FDI inflows into CEE manufacturing have enhanced specialisation in relatively skill-intensive manufacturing (Damijan *et al.* 2015; Dulleck *et al.* 2005; Pavlínek *et al.* 2009).

It is fair to assume that the comparative advantages of the CEE region as a production location may vanish (at least in these specific products and industries) for the following reasons. 3D printing technology makes it much easier to switch a production location, making it much more dependent on the size and evolution of local market demand, rather than on local labour skills and costs (Berman 2012; Oettmeier and Hofmann 2016). Production will move closer to customers, meaning in general that manufacturing activities using 3D printing instead of conventional production methods (e.g. in certain machinery or automotive component industries) may easily be relocated closer to final or intermediate customers[11] – away from the current medium-wage level countries.

Another often-mentioned benefit of 3D printing is that it eliminates tooling, an expensive and time-consuming step of any new product launch: (e.g. Rosochowski and Matuszak 2000).[12] Moreover, in hybrid processes, 3D printing can be applied to prepare

9. Ford (2014: 2) clarifies the term 3D printing as follows. "Unlike traditional manufacturing processes involving subtraction (e.g., cutting and shearing) and forming (e.g., stamping, bending, and moulding), additive manufacturing joins materials together to build products" by depositing successive layers of polymers, ceramics or metals. The creation of physical products relies on digital models and is computer-controlled, hence it is also referred to as direct digital manufacturing.

10. Intensive diffusion refers here to the range of products manufactured using 3D printing (while extensive diffusion refers to the variety of geographical locations where 3D printing technology is applied). It is argued that, in contrast to rapid extensive diffusion, intensive diffusion will depend on the further development of the technology.

11. By intermediate customers we refer to the production locations where the components and subsystems are assembled into a final product.

12. Note that 3D printing was originally applied solely in rapid prototyping, accelerating product development through eliminating the procedure of designing and manufacturing prototype tools. This attribute of additive manufacturing is reflected by the third synonymous term used: direct digital manufacturing.

the tools themselves, which, once 'printed', can be used in conventional manufacturing processes (Holmström *et al.* 2016; Oettmeier and Hofmann 2016). Again, tooling is a GVC task where CEE actors have comparative advantages. Corporate interviews (e.g. Sass and Szalavetz 2013; 2014) indicate that functional upgrading in manufacturing subsidiaries was manifested, among others, in their taking responsibility for tooling – over and above their core production activities. It remains to be seen whether 3D technology triggers a reshoring of tool design to advanced economies.

A further IT-enabled industrial solution of the Industry 4.0 era is virtual reality-powered product and process development, and the virtual provision of engineering support to various manufacturing-related processes in distributed industrial locations.

Factory economies will be confronted with a thought-provoking implication of this evolution in ways of connecting, knowledge-sharing and collaborating.[13] Several scholars subscribe to the argument that the geographical separation of the tasks making up a value chain is not without limits. Keeping tasks together produces economies of scope (e.g. Lanz *et al.* 2011; Larsen *et al.* 2011). Ketokivi and Ali-Yrkkö (2009: 35) argue that 'as the knowledge intensity of an economic activity increases, the unbundling of several functional activities may no longer be possible: R&D, innovation, design, and branding may be activities that are intimately related with the manufacture of physical products.' Tassey (2014) maintains that certain manufacturing-related advanced support activities display non-negligible co-location synergies. For example, in the case of development activities related to launching a new product where technical knowledge is not yet standardised and requires continuous adjustment, person-to-person interactions are critical, since tacit knowledge is transferred. Tassey argues that in the Industry 4.0 era characterised by technological transition in multiple fields of the manufacturing process, co-location synergies will make it easier for manufacturing locations to take responsibility for and develop critical competences in advanced support activities, ultimately resulting in advanced economies losing their competitiveness.

However, the cited authors take no account of advanced virtual-reality and augmented-reality technologies that allow the geographical separation of tasks to be maintained and for process planning and process engineering support to be remotely provided to manufacturing facilities: bad news for manufacturing locations wishing to move up the value chain!

From the perspective of intermediate-development-level factory economies, the implications of some other Industry 4.0 technological solutions may represent a threat

13. Advanced visualisation solutions (e.g. the virtual representation of robots, machine tools, work pieces etc.) and advanced interaction (interactive real-time 3D simulation) tools allow production systems or parts thereof to be tested before any actual deployment or installation. They make it possible to remotely evaluate and resolve the problems that emerge in the context of industrial processes (Galambos *et al.* 2015). Concurrent (simultaneous) engineering (reliance on virtual reality) has been an established collaboration method since the 2000s, and the related enabling technologies (visualisation, object manipulation, interaction) have been incrementally developed ever since. Virtual reality technologies enable experts from various areas (designers, manufacturing planners, process engineers, marketing and procurement specialists, management, etc.) and in distributed physical locations to collaborate in joint product (or process) development projects. Conversely, augmented reality techniques enhance users' (e.g. assembly operators') perception and understanding of the surrounding world and are used in system maintenance and assembly operations (Ong and Nee 2013).

not only to future upgrading opportunities (in the field of manufacturing-related process development), but may also jeopardise prior upgrading achievements. Most of the smart computing solutions embedded in cyber-physical production systems digitalise activities – and thus, perform them themselves – that used to be classified as upgraded actors' knowledge-intensive assignments. Examples of knowledge-intensive, relatively high-value-adding activities, mentioned during the author's prior interviews (Sass and Szalavetz 2013; Szalavetz 2015) were production line design and factory planning, process configuration, production planning and scheduling, investigation of the machinability of new product designs, process development, e.g. reduced changeover time, reduced throughput time. Augmented reality-powered digital factory applications (Pentenrieder *et al.* 2007) are expected to redefine the tasks of local engineers engaged in line/work cell layout and factory planning. Advanced computing solutions, such as (a) big data–enabled predictive maintenance (Lee *et al.* 2013); (b) modelling and simulation-based smart algorithms for production planning and scheduling, and capacity control, etc. (e.g. Gyulai *et al.* 2015); (c) modelling and simulation-based smart algorithms for optimising process and improving capacity utilisation, throughput and overall effectiveness (e.g. Bard *et al.* 2015), can be expected to take over production planning, scheduling and process development tasks, currently performed by local engineers. At the very least, they will redefine task portfolios of local engineers and the associated skill requirements. In summary, advanced computing solutions may jeopardise local manufacturing subsidiaries' past functional upgrading results.

Furthermore, artificial intelligence and deep learning solutions will automate selected medium-knowledge-intensive support activities (routine cognitive tasks) such as accounting, order processing, payroll management, operational procurement (Lacity and Wilcocks 2015), jeopardising CEE actors' functional upgrading achievements, manifested in the location of shared services centres – near MNC manufacturing subsidiaries (cf. Sass and Fifekova 2011). With the automation of these tasks, a large number of jobs may disappear.[14]

Conversely, selected features of Industry 4.0 technologies represent upgrading opportunities for factory economies.

One is their compatibility with legacy systems. New technologies can be deployed stepwise: advanced robotic and/or 3D printing solutions, sensors and various devices can be added to existing production systems without jeopardising their functionality (Colombo *et al.* 2014). Since scalability, modularity and interoperability are important attributes of cyber-physical systems, this allows for a progressive reconfiguration of existing production facilities, successively transforming them into 'factories of the future'. Compatibility with legacy production systems is expected to prompt parent companies to upgrade their existing manufacturing assets in factory economies, instead of establishing brand new 'Industry 4.0' facilities in their home countries.

14. According to press releases of the Hungarian Outsourcing Association (www.hoa.hu), both the number of and employment in shared services centres have sharply increased in Hungary. In 2016 their number reached 90, with total employment above 35,000.

A further opportunity is that deployment, operation and maintenance of advanced manufacturing solutions require the development of substantial engineering capabilities at hosting units (at subsidiary level). Local capability accumulation may, in turn, have non-negligible multiplier effects, prompting parent companies to delegate further knowledge-intensive assignments, such as the programming of industrial robots or process development through the experimental analysis, measurement and testing, modelling and simulation of manufacturing processes.

4. Experience with Industry 4.0 at MNC manufacturing subsidiaries in Hungary – Sample and interview results

Applying a purposeful sampling method (Patton 1990) with the aim of selecting information-rich cases, i.e. companies whose cases promise insights into issues related to our research, we selected eight companies for in-depth interviews. Furthermore, two interviews were carried out with representatives of a Hungarian research institution specialised in software solutions related to Industry 4.0.

The eight large[15] foreign-owned companies operate in the automotive and electronics industries, and two of them can also be classified as technology producers, as they are specialised in the manufacture of intelligent sensors, data acquisition hardware and software, programmable automation controllers and automated test systems.

We selected MNC subsidiaries as they are spearheading the introduction of new technologies. According to the European Commission's Digital Economy and Society Index (European Commission 2016), Hungary ranks 20th of the 28 EU Member States, and is lagging behind, in particular in terms of businesses integrating digital technology.

An interview guide containing predominantly open-ended questions allowed interviewees to provide a detailed description of their experiences with the new technologies. We started by surveying management awareness of Industry 4.0 trends and technologies, wanting to find out whether a systematic digital strategy was behind the implementation of new technologies in the Hungarian plants, and whether further investments – aligned with a more or less predetermined roadmap – were expected. Next, we asked about the purpose of these investments (cost-cutting versus improving quality and efficiency).

The interviews, 45 to 60 minutes in length, were conducted between April and July 2016. Interviewed managers were the chief executive officers, division leaders or chief technology officers of the Hungarian subsidiaries. To preserve anonymity, neither company names nor main products will be specified.

15. Average turnover of the sampled companies (n = 8) amounted to €335 million in 2015, while their average headcount was 1,281.

4.1 Awareness and implementation of Industry 4.0 technologies

The first finding that crystallised during the interviews was the relatively high degree of preparedness of the surveyed organisations to adopt Industry 4.0 technologies. The managers interviewed were not only aware of the new technological trends represented by Industry 4.0, but had already invested heavily in the new technologies.

Over and above the two specialised technology producers, many of the surveyed companies also turned out to be technology producers, developing in-house measurement and testing equipment for their production processes. As cyber-physical production systems are not off-the-shelf solutions, they cannot be fully specified in the planning stage and usually need to be extended and adapted over the course of their deployment, and almost continuously modified during operation. Consequently, the IT staff of manufacturing companies are involved in the customisation, operational integration and subsequent adaptation of the purchased solutions (reprogramming).

The interviews indicated that the adoption of Industry 4.0 solutions is not a 'yes or no' issue, but rather an evolutionary journey encompassing a multitude of advanced techniques. Indeed, in several companies the implementation of production automation solutions, the use of sensors and the incorporation of traceability solutions in the manufacturing processes started more than a decade ago. Networked equipment controlled by computing algorithms has similarly featured in the production systems of the selected firms for at least a decade. The main innovations mentioned by the interviewed executives cover three aspects. First, the acquisition of a wide variety of production parameters for analysis by advanced data mining techniques. The second, related innovation is the unprecedented transparency of the whole production process, while the third involves man–machine collaboration (robots are no longer behind fences). Nevertheless, the current hype about Industry 4.0, as one of the managers interviewed explained, is not due to the alleged *revolutionary* character of the technologies, but to their better visibility. The costs of advanced solutions have declined below a threshold level, triggering a virtuous circle in terms of the diffusion, cost and improved quality of the individual solutions.

Nevertheless, there is a long way to go between adopting basic Industry 4.0 applications and becoming a fully integrated business unit, where communicating and collaborating devices are networked and integrated in MNC-wide systems, and where computational algorithms autonomously monitor, control and manage (intervene in) the manufacturing system – including the related support processes.

The production systems of several of the surveyed technology users[16] can be labelled as 'factory of the future' showcases (though a strong selection bias applies). They are

16. Note that there are some intra-sample disparities in this respect. The surveyed companies have all implemented industrial automation solutions, though there are differences in the degree thereof. While some have invested solely in standard robotic solutions, others are already experimenting with human–robot collaboration systems. The surveyed companies gather data generated during the production process, but in most cases business analytics are implemented by parent companies – though some subsidiaries recently invested in business analytics solutions.

not only characterised by a high level of automation – especially with respect to high-precision, physically difficult, high-volume, repetitive tasks, but also equipped with cyber-physical systems with embedded sensing, measurement and data extraction solutions. Some companies apply advanced decision-support systems, and rely on the 3D visualisation of manufacturing, assembly and related shop-floor logistics processes (virtual factory).

One explanation of the relatively high level of Industry 4.0 technology adoption – at least among the flagship companies surveyed[17] – is Hungary's status as an FDI-driven 'factory economy'. On the one hand, flagship MNCs obviously apply global corporate standards, including standardised systems architecture, standardised technology modules and standardised work practices, also at their manufacturing subsidiaries.[18] Moreover, industry standards prescribing increased product traceability also account for the rapid diffusion of the new manufacturing and testing technologies.

On the other hand, digitalising the shop-floor and making factories smart is easier and quicker by orders of magnitude than implementing 'headquarter economy'-type tasks related to digital transformation (DT). In factory economies, DT involves the application of digital tools and methods to automate, enhance and optimise the existing way of working. Conversely, in headquarter economies, DT refers to new ways of working, to a fundamental transformation of the rules of the game, e.g. a transition to platform competition[19]; entry into new sectors; business model innovation; innovative digital services provision and product differentiation based on a big-data/business analytics-based thorough knowledge of customers (cf. Porter and Heppelmann 2014). The main purpose of digitalisation in headquarter economies is to enhance flexibility and responsiveness through creating, managing and implementing *new processes*. Conversely, in factory economies, the main purpose of technology adoption is to achieve operational excellence in *existing processes* (see below). Consequently, DT in factory economies – at least in their FDI-driven segments – is much more rapid than in headquarter economies.

17. As emphasised by the technology producers interviewed, there are large size- and ownership-specific differences in the adoption of Industry 4.0 technologies.

18. Obviously, there are intra-MNC differences with respect to the deployment of specific solutions. For example, the pilot introduction of some new technological solutions usually takes place in manufacturing facilities at the HQ's location.

19. Industry platforms connect various actors belonging to an innovation ecosystem. Platform participants co-create new products and services around a core technology infrastructure (e.g. Apple's app developer eco-system), share information and/or implement a variety of transactions. Platform technologies are licensed to ecosystem partners (e.g. hardware or software vendors or service providers) that compete and collaborate to grow within the platform ecosystem. Network externalities are a key factor of success: the more users and ecosystem partners enter the platform, the higher the benefits. Examples of platforms include Amazon, Uber, Airbnb, Facebook (for more on different forms of platforms and platform competition, see Gawer and Cusumano 2014; Salazar 2015; and on a large industrial company shifting to platform competition, see Agarwal and Brem 2015).

4.2 Purpose of technology adoption

Another finding of the interviews was that (except for a few cases) even the advanced local users of Industry 4.0 applications lacked a systematic digital strategy. Primarily targeting specific outcomes/challenges, they have invested in selected advanced solutions, without aligning their investment decisions with a defined digital transformation roadmap. The challenges mentioned during the interviews fall into four categories:

1. Shop-floor technological problems. Examples of shop-floor technological problems included inefficient process scheduling, excessive downtime, long changeover times, quicker-than-expected tool wear, product defects, low overall equipment effectiveness, variations in cycle times due to low process stability, etc.

2. Shortages of skilled labour. Labour shortages (with respect to both operators and engineers) constituted one of the most commonly mentioned challenges. Together with the decreasing cost of industrial robots, this was an important driver for some of the surveyed companies to adopt industrial automation solutions.[20]

3. Increased production complexity. The solution to this problem was the implementation of advanced production planning and scheduling systems, integrated within the core enterprise resource planning (ERP) system.

4. Increased customer requirements in terms of time, variety, costs and flexibility.

Over and above addressing operational challenges, the surveyed companies' quest for a general improvement in both productivity and operational excellence was also uniformly stressed as a key motivation for investing in Industry 4.0 technologies.[21] Examples include the deployment of a visual recognition system combined with machine learning for quality inspection (to identify anomalies). Furthermore, seeking to prevent problems emerging during production and to minimise maintenance costs, Industry 4.0 solutions (e.g. computerised maintenance management systems relying on big data analytics or simulation-based smart algorithms) have been applied to predict and control any problems.

Although cost reduction was not among the explicitly stated purposes, this factor also figured among the expected benefits. It was expressed indirectly, in the form of the expected rapid return on investments in industrial robots, triggering a reduction in the number of operators needed.

20. This increasingly pressing problem is not limited to Hungary. According to Sondergaard *et al.*'s (2012) investigations, the shortage of skilled manual workers emerged as one of the most important constraints to company expansion throughout Central Europe.

21. One of the managers interviewed remarked: 'One of our objectives in deploying the automated optical inspection system and the production planning and scheduling software was to achieve a productivity level corresponding to 95% of the level of our parent company's production facility in Germany.'

Nevertheless, efficiency gains (reductions of machine downtime and interim storage; close-to-optimal assignment of work and the efficient use of resources such as material and energy) were apparently a more important objective of investing in smart systems than mere cost reduction.

4.3 Impact on jobs

The interviews made it clear that new relatively low-cost robots have indeed reduced demand for operators in the surveyed companies. Nevertheless, as emphasised by the executives interviewed, the impact of the new technological solutions on jobs is not straightforward, needing a nuanced assessment. On the one hand, these robots help overcome labour shortages. On the other hand, the reduction of demand for operators related to specific activities has not resulted in overall job losses. It was rather manifested in relative terms, in terms of the labour content per unit of output. Over the surveyed period, between 2012 and 2015, sample companies have considerably expanded their production, necessitating the expansion of their workforces.[22] Hence, the operators whose tasks had been automated have been reassigned to other production activities.

At the same time, some smart solutions are taking over white-collar tasks. For example, automated data extraction solutions have freed up engineers from preparing daily reports on selected production parameters. The introduction of big data analytics solutions has relieved engineers who used to spend a couple of hours each week studying production data and trying to discover patterns revealing the root causes of disruptions and other anomalies. Production planning and scheduling software has similarly redefined the jobs of engineers who used to be responsible for these tasks. Quality control has become increasingly automated.

Some interviewees mentioned that this redefinition of engineers' tasks and the expectation of them being able to work supported by smart systems have sometimes necessitated 'qualitative changes' in the white-collar workforce. On the other hand, engineers with adequate technical and non-technical skills are experiencing increasingly intensive *intra-firm competition* for their talents: they keep being tempted to move to (regional or central) HQ premises to take up more challenging, more knowledge-intensive (and obviously better-paid) activities there. Assessing this phenomenon from a 'factory economy' perspective, as some of the executives interviewed did, this may jeopardise the perspectives of a subsidiary upgrading its operations.

A common observation of the managers interviewed was that focusing on technology-driven relocation of tasks and job losses was not the right approach to our investigation. In an MNC's production system, characterised by end-to-end digital integration (along the entire value chain), the question where a specific processing task is performed is losing relevance, at least from an HQ perspective. Even internalisation (ownership-based control) has become less relevant than before, due to advanced communication and virtualisation technologies. From an HQ perspective, the sole factors of importance

22. Over this period, headcounts in the sample companies increased on average by 22.6%.

are *access* to capacities and competences and end-to-end *control* of the processes. Of course, from the perspective of local subsidiaries the pursuit of an 'entrepreneurial' subsidiary strategy (Birkinshaw and Hood 1998) is of crucial importance in order to withstand the intensified selection mechanisms triggered by technological change. Aiming to maintain or improve their position, Hungarian subsidiaries strive to spearhead the implementation of new technologies. Several interviewed executives remarked that pioneer adopters within the MNC organisation have the chance of becoming 'Industry 4.0 competence centres', with local experts responsible for transferring best practices to partner subsidiaries.

As for the impact of new technologies on jobs, the executives interviewed maintained that this research focus is irrelevant for companies faced with global competition. Implementing new technologies is simply a must, as otherwise competitiveness will soon be eroded and markets lost. The imperative of operational excellence requires the deployment of robotic solutions, for example to achieve high-precision machining and welding. As big data and simulation-based computing applications addressing multiple aspects of operational excellence are proliferating, technology-push factors are just as important determinants of the adoption of new solutions as demand-pull ones.

5. Conclusion and policy implications

Based on an overview of the literature on the features and expected impacts of Industry 4.0 technologies, this paper developed a rather pessimistic scenario, from the perspective of 'factory economies' in general and CEE countries in particular. In this scenario, economies at an intermediate development level were set to be hit hard by the new manufacturing technologies. These technologies would lead to massive job losses which may not be compensated by the creation of new skill-intensive jobs.

It was also predicted that some of the relatively advanced assignments gained by upgraded local manufacturing subsidiaries might be lost through reshoring, relocation or automation. Consequently, selected past upgrading achievements might be repealed.

Empirical evidence has however only partly supported these pessimistic predictions. Interview findings suggest that instead of relocating / reshoring production, MNC owners have (*so far*) tended to upgrade their existing production facilities by implementing Industry 4.0 solutions. This is made possible by the fact that these technologies are (or can be made) compatible with legacy production systems and legacy technologies. Moreover, when production was expanded through establishing greenfield facilities, these were characterised by advanced cyber-physical production systems.

Note that the implementation of advanced manufacturing technologies (upgrading technology in local subsidiaries) is only seemingly confined to improving the given subsidiaries' *production capability*. With the advent of Industry 4.0, technological capability and production capability have become more strongly interwoven than ever before (Tassey 2014), with the deployment of new technological solutions requiring subsidiaries to invest considerable effort in implementing them. As the experience

of some of the surveyed companies illustrates, demonstrated capabilities during the deployment of Industry 4.0 technologies have opened up additional opportunities for local engineers to participate in MNC-wide technology development activities. Instead of reshoring or centralising knowledge-intensive activities, MNC owners have delegated additional sophisticated engineering tasks to their local subsidiaries – *provided they have the required competences*.

Consequently, it is fair to claim that, *with the advent of Industry 4.0, the disjunction between technology use and technology generation that used to characterise the transformation and integration decades of the CEE region,*[23] *has been alleviated*.

Interviews indicated that the newly implemented solutions have indeed led to reduced demand for operators in the given activities, and it is anticipated that this trend will continue. At the same time, production expansion in the surveyed companies has increased overall demand both for skilled operators and for highly skilled engineers with a deep understanding of the production system (how its individual parts are related to each other and to the system as a whole) and of the tools and techniques needed to test and maintain the production system. This has made the labour shortages faced by local subsidiaries for some time even more pressing than before. Aggravating problems through labour shortages suggests that in the 'second machine age' (Brynjolfsson and McAfee 2014), the education system of Hungary has fallen behind in 'the race between education and technology' (Goldin and Katz 2008).

Overall, it can be concluded that in the short term, in our small sample of high-flying subsidiaries, (beneficial) *retention mechanisms* have prevailed over harmful-for-the-given-subsidiaries *selection* and *reconfiguration mechanisms*. It remains to be seen, however, whether medium- and longer-term reconfigurations of GVC architectures triggered by technological change will reinforce or rather mark down these initial developments.

The main policy implication of the results is that immediate action is needed to reform education systems in factory economies. Delays in boosting the supply of adequately skilled workers and aligning training with skill demands may eventually hinder the adoption of advanced manufacturing technologies, leading to activities being relocated. As one of the interviewees remarked, 'We badly need "vocational schools 4.0", where future workers are educated to use modern technologies, and will possess, at least, some basic programming skills.'

It can be concluded that it is not technological progress in the field of Industry 4.0 per se that could hit factory economies hard: they might lose out in the digital transformation of manufacturing if their labour markets remain too rigid and their education systems fail to adapt to the evolving demand for knowledge.

23. See Kravtsova and Radosevic (2012) who argued that productivity growth in the CEE region was based predominantly on improvements to economic actors' production capabilities and not on their enhanced technological or innovation capabilities.

In addition to education (e.g. improving IT literacy and promoting lifelong learning) and public awareness-raising programmes, government policy should promote overall Industry 4.0 readiness by several means. The first is strategic planning: the elaboration of country-specific, and also industry-specific Industry 4.0 development plans. Although direct emulation of best practices in other countries (e.g. Germany) is prone to failure (an emphasis should instead be put on context-based policy learning), there are some general 'recipes' that may prove to be useful constituents of Industry 4.0 strategies in all CEE economies.

Another general policy recommendation is to encourage companies to *use* the data generated by their state-of-the-art production systems, i.e. developing capabilities in data analytics. This would ensure that investment in Industry 4.0 technologies indeed results in improved productivity and resource efficiency.

Finally, policy should promote participation in European Industry 4.0 initiatives related to research, pilot programmes and demonstration projects.

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Chapter 6
The role of EU funds in enhancing the development potential of CEE economies

Martin Ferry

1. Introduction

The starting point for this chapter[1] is the disjuncture between fast productivity growth in Central and East European (CEE) economies and poor performance in developing innovative capacities for longer-term sustainable growth and development. The implicit 'development model' of the CEE economies in the past two decades has been based on institutional, trade/FDI and financial integration with Western Europe. Until the global financial crisis of 2008/2009 this model was considered a success. More recent assessments (see e.g. Becker and Jäger 2010) show that this model (particularly its strong reliance on external finance) is unsustainable. There is an argument that, as levels of FDI fall, the CEE Member States need to embark on a 'high road' of development based on 'competitive advantage', since the 'comparative advantage' stemming from low production costs cannot provide a foundation for long-term development. However, CEE economies are low performers in the development of indigenous technological capabilities, as demonstrated by stagnant or even falling research and development (R&D) expenditures, low propensity for innovation and limited patenting activities. According to the European Union (EU) Innovation Scoreboard, most CEE countries are 'moderate' innovators, performing below the EU average for different measurements, particularly for open, excellent and attractive research systems and linkages between research and entrepreneurship (European Commission 2016a).

Potentially, EU cohesion policy (CP) has a significant part to play in addressing this challenge in the CEE. CP is the EU's main investment policy tool. Composed of different funding streams,[2] for the 2007-2013 period the policy had a total budget of €454 billion, with around €175 billion going to CEE Member States.[3] Over the past decade, there has been a clear thrust in CP towards objectives that foster competitiveness and entrepreneurship and support innovation, in line with the priorities set out in the EU's Lisbon Agenda for Growth and Jobs (Bache 2008) and, subsequently, the Europe 2020 agenda. This chapter assesses the extent to which CP has addressed this development challenge in the CEE during the 2007-2013 period: what has it achieved in strengthening innovative capacities and development potentials in these countries and how can its performance be explained? The chapter is structured in four sections. The following section describes the different means by which CP can support innovation.

1. The content of this chapter is based on work carried out as part of the FP7 research project, GRINCOH: Growth – Innovation – Competitiveness: Fostering Cohesion in Central and Eastern Europe. See http://www.grincoh.eu
2. The European Regional Development Fund (ERDF), the European Social Fund (ESF) and the Cohesion Fund (CF).
3. For the purposes of this chapter these are: Bulgaria, Czechia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia.

An assessment of the achievements of EU innovation support in the CEE in 2007-2013 then follows, arguing that up to now CP has not efficiently supported transition to innovation-based growth in the CEE. The subsequent section details two of the key factors that can explain this weak performance: the focus of "innovation" spending and institutional weakness. The final section draws some key conclusions and highlights issues for CEE Member States as they seek to make optimum use of CP support in the coming years.

2. How cohesion policy can support innovation

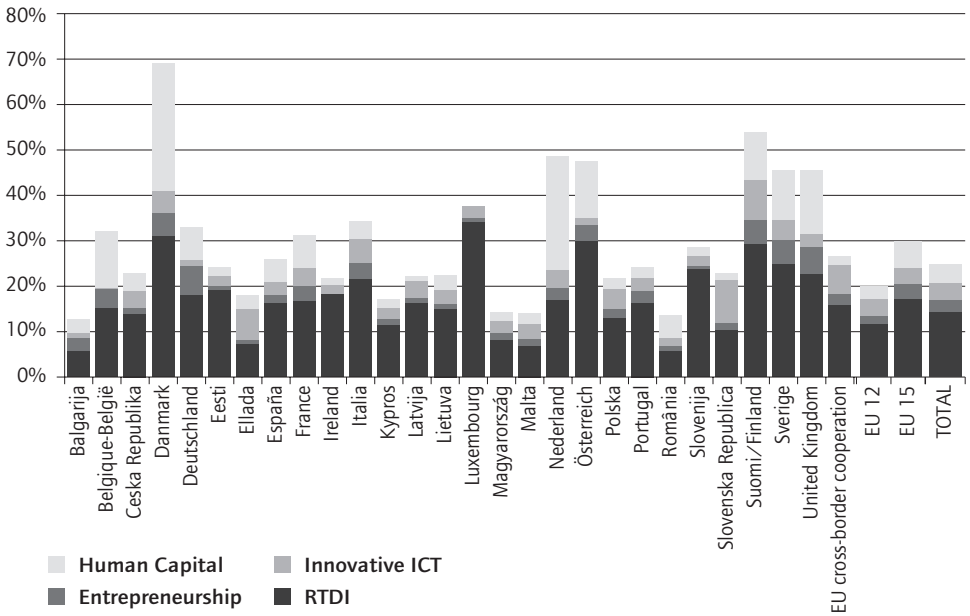
Cohesion policy supports innovation under different headings. The Community Strategic Guidelines on Cohesion Policy (2007-2013) adopted by the European Council stress that to promote sustainable development and strengthen competitiveness it is essential to concentrate resources on research and innovation (RTDI), entrepreneurship, information society and training and adaptability of workers. The policy offers different programmes, schemes, projects, grants and financial instruments that can be used to support innovation. These include sectoral Operational Programmes (OPs) that give priority to economy-oriented research projects and joint undertakings of science and business. In some countries, there are regional programmes that include a focus on these themes alongside other priorities. There are also macro-regional, transnational or cross-border programmes that can cover these headings. Within programmes, policy instruments have up to now been based mainly on non-repayable grants, although the use of financial instruments is growing (e.g. Innovation Loan Funds etc.) (Weresa 2015). Direct support schemes target enterprises, including investment grants for the development of new or improved products and services, for company modernisation, for conducting (or buying) R&D and implementing the results; for the purchase of the equipment necessary to carry out research and development; investment grants in fixed and intangible assets related to creating new companies, diversifying production in existing enterprises by introducing additional new products, or fundamentally changing the overall production process of an existing enterprise; grants for expansion to foreign markets etc.; grants to SMEs for technology transfer and for creating collaboration networks, etc. Indirect support schemes target R&D organisations. These include investment grants related to the construction and modernisation of scientific laboratories; grants provided to universities for establishing spinoff companies; grants for the development of entrepreneurship initiatives at universities. Indirect support schemes also target institutions in the business environment, providing grants for creating technology transfer platforms; grants related to the development of technology parks, business incubators, technology transfer offices and innovation centres; grants related to the development of consultancy agencies and their services for SMEs; co-financing the establishment and expansion of regional clusters; providing capital for loan funds and loan guarantees operating on local and regional markets.

At the outset of the CP programming period 2007-2013, the EU estimated that CP instruments would provide some €86.4 billion across all Member States (almost 25 percent of the total) to R&D and innovation, including the mainstreaming of innovative actions and experimentation (Charles *et al.* 2012). Out of this total, €50.5 billion would

go to R&D and innovation in the narrow sense, €8.3 billion to entrepreneurship, €13.2 billion to innovative information and communication technologies to foster the demand side of ICT, and; €14.5 billion to human capital. These investments represented more than a tripling of absolute financial resources dedicated to innovation and R&D compared to the previous period (2000-2006).

There are considerable disparities across countries in terms of CP funding amounts and targeted themes (see Figure 1). The EU12[4] earmarked an average of 20% of total CP allocations for innovation (i.e. around €34.7 billion), with Bulgaria earmarking the smallest share (12.8%) of total Structural Funds allocations for innovation, while Slovenia had the largest (28.5%). In the EU15, the average reached 30% of total allocations (i.e. around €48.7 billion), with Denmark's share at 69.2% (European Commission 2010). There were again marked differences in the funding allocated to the four innovation headings between different groups of Member States, with EU15 countries spending an average of 17.2% on RTDI, 3.3% on entrepreneurship, 3.6% on innovative ICT and 5.8% on human capital. The figures for the EU12 were lower (11.8% on RTDI, 1.6 on entrepreneurship and 2.8% on human capital) except for allocations to innovative ICT (3.7%).

Figure 1 **Structural Funds allocations to Research and Innovation (ERDF and ESF) in 2007-2013**



Source: European Commission (2010)

4. CEE Member States plus Cyprus and Malta.

3. What has EU innovation support achieved in the CEE?

Cohesion policy is one of the most evaluated EU policies. It is implemented according to regulations that require the Commission and Member States to regularly and systematically monitor its implementation. Nevertheless, after more than thirty years of policy intervention, empirical evidence remains mixed and contradictory: no consensus exists on the effectiveness of cohesion policy. Different methodologies have been applied in assessments of different types of CP achievements, each of which has yielded valuable insights without making a completely robust case. A first perspective considers the performance of the policy with respect to its key economic goal of growth in lagging Member States and regions and thus their convergence with EU averages. The reduction of regional disparities in the level of development has mainly been measured as the convergence of regional levels of GDP per capita relative to the EU average and labour market participation/employment/unemployment trends (Begg 2010). One insight emerging from this literature is that convergence has been limited among European regions over the past four decades (Monfort 2008). However, there are several caveats: the results obtained from these studies vary greatly, depending on the specification adopted (period and regions considered, dataset used). A more qualitative approach to assessing CP achievements relates to the concept of 'added value'. This broadly concerns the administrative learning and spillover effect on domestic systems and the related innovation and efficiency improvements. This can help gauge the impact of cohesion policy in the longer term. Different actors, working within or outside cohesion policy at different levels, have perceived different elements of this added value: financial (referring to the leverage of extra public and private resources for economic development through 'match funding' requirements); 'strategic' (concerning the diffusion of programme design and strategy development/management processes to domestic contexts); 'operational' (e.g. influence on domestic project generation, appraisal and selection processes; 'accountability' (through monitoring, reporting, financial management and evaluation requirements); and, 'democratic', derived from cohesion policy's partnership principle). However, research and policy debate have highlighted a range of aspects of 'detracted value', notably the perceived complexity and bureaucracy of Structural and Cohesion Funds administration, reflected in the ongoing pressure for 'simplification' from national and regional actors in all programming periods (Baumfeld *et al.* 2002).

Summing up, existing research makes a strong case for cohesion policy making a significant contribution to regional development; in regions which have experienced substantial CP investment in basic infrastructure and services, quality of life has improved. However, one common research finding is that this investment only represents steps in a longer development and change process. Generally, CP has struggled to resolve specific development challenges that can have differentiated territorial concentrations, such as those related to demography, poverty, low employment rates, low levels of entrepreneurship etc. Moreover, a major concern is that maintaining the capital investment and institutions established with CP support is a challenge for some regions, and that the economic crisis and fiscal constraints are undoing some gains (Bachtler *et al.* 2016).

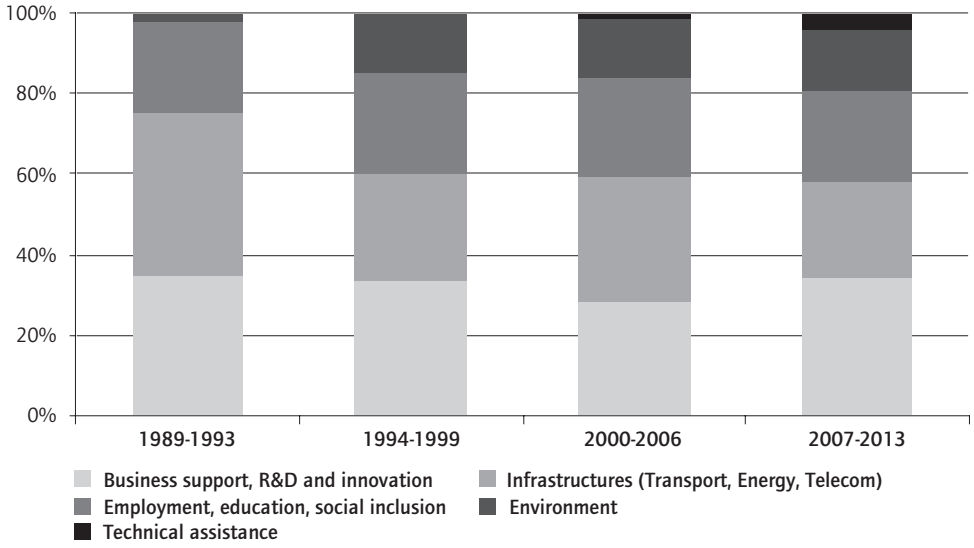
Weak innovation performance can be seen as one of these specific development challenges that CP has struggled to address in the CEE. The European Commission has recently completed an ex post evaluation of CP programmes funded by ERDF and CF in 2007-2013. This has produced some headline figures on innovation support, based on aggregated information contained in Annual Implementation Reports (AIRs) from Member States: an estimated 400,000 projects were implemented by SMEs receiving direct investment aid; 121,400 start-ups were supported, as well as 94,955 research projects and 33,556 co-operation projects; 41,600 new long-term research jobs were created; 8.3 million more EU citizens were covered by broadband connectivity.[5] Beyond this, there have been many evaluations of specific issues and policy fields, including EU-funded support of innovation. The Commission included a work package dedicated to assessing support provided for increasing research and innovation in SMEs and SME development in its ex post evaluation of 2007-2013, and a range of studies have been carried out across Member States and programme periods. Taken together, these offer important insights into the potential achievements of CP funded innovation support, particularly in less developed regions such as those found in the CEE.

First, the role of CP as an additional source of financial support for innovation activities is crucial where alternative resources are scarce or in those regions that have fewer capabilities to make use of domestic funding (Viljamaa and Halme 2006). There is also some evidence from previous enlargements of the EU that CP funding can be used as a lever to boost business investment in R&D in recently acceded Member States (Fitzpatrick Associates 2003: 61). From a CEE perspective, it is clear that innovation has become an increasingly important theme for CP investment. A 2011 study prepared for DG Research and Innovation compared RTDI expenditure/ allocations in the 2000-06 and 2007-13 programming periods at the level of individual regions, covering ERDF, ESF and EAGGF (European Commission 2011). According to this, EU12 regions increased the share of CP support for innovation headings by 12 percentage points on average between 2000-06 and 2007-13 (EU15 regions saw an increase by 8 percentage points). Figure 2 shows the share of CP devoted to different policy headings by less developed regions, the majority of which are in the CEE, between 1989 and 2013, indicating a shift of investment towards innovation between the periods 2000-2006 and 2007-2013.

Recent analyses have noted increases in Gross Domestic Expenditure on R&D (GERD)/ GDP ratios for CEE Member States from below 0.8% in 2006 to 1.2% in 2012 or by 0.4 percentage points of GDP. GERD/GDP did not increase during the period of economic growth before 2008 but did after 2008 when GDP fell in many CEE Member States as a result of the crisis. A potential explanation for this anti-cyclical trend is EU support for R&D and innovation through cohesion policy (Radosevic 2015). The Commission's ex post evaluation has gathered examples where CP support has had this vital impact on levels of innovation investment (European Commission 2016b). In Poland, an evaluation of the OP Innovative Economy found that more than half of recent growth in R&D expenditure as a share of GDP was driven by ERDF support (WYG PSDB 2014).

5. 'Key achievements of cohesion policy', Commission web page accessed October 2016: http://ec.europa.eu/regional_policy/en/policy/what/key-achievements/

Figure 2 **Composition of cohesion policy investment in less developed regions, 1989-2013**



Source: European Commission (2014), p. 15

The results of an econometric study indicated that, without the ERDF support, the share of R&D expenditure in GDP would have amounted to 0.7%, instead of the actual 0.89% in 2012. In addition, according to the same study, the recent increase in the share of high-tech (R&D-intensive) products in Polish exports was mainly driven by the ERDF funds. According to the 2013 Annual Implementation Report for the Polish OP Innovative Economy, a total of 7,000 new jobs would have been created in SMEs by the end of 2015 as a result of the OP support. Other analyses have found substantial impacts in CEE countries in terms of direct support for R&D projects. In Lithuania, it was estimated that policy additionality was achieved in about 30-40% of cases of direct CP support for projects. These involved 270 SMEs (ESTEP 2015). In Czechia, a study by the Ministry of Industry and Trade reported that 87% of the projects supported by an instrument promoting the innovative performance of firms would not have been implemented without EU grants. If they had not received grants, most enterprises would have postponed the implementation of their projects for a few years (European Commission 2016b). The ex post evaluation of the Śląskie Regional OP (ROP) for 2007-2013 in Poland included an analysis of the additionality and leverage effects produced by the OP. According to the study, each Polish zloty from the ERDF invested in an ROP project generated PLN 0.31 of additional investment effects. Such a high multiplier effect resulted from high percentage of projects which generated new investments. It found high levels of additionality, with local government units in the region allocating greater means for investment than before the launch of the programme, including under RTDI and entrepreneurship in which the amount of private investment due to ROP intervention was PLN 780 million (PSDB 2012).

However, it is important to look at the focus of this spending on innovation. Evaluation evidence indicates that across the CEE, EU innovation support in the period 2007-

2013 was largely related to "hard" capital investments (the purchase of technology, new machines, new infrastructure etc.) rather than investment in the development of indigenous innovation capacities. For instance, ex post evaluation of the EU-funded Economy Growth OP in Lithuania 2007-2013 found that objectives concerning business-science collaboration and related policy challenges were not transformed into more substantial policy instruments. Instead, large investments were made in public R&D infrastructure (EUR 364 million from the ERDF) (European Commission 2015a). In Czechia, the strongest demand for support from the Operational Programme Enterprise and Innovation 2007-2013 was for the purchase of new technology and equipment. Various support centres for start-ups and innovation-oriented entrepreneurs were created (business incubators, science and technology parks, innovation centres, hubs and clusters, etc.) (European Commission 2015b). In Poland, a World Bank study found that more than 40% of funds from the OP Innovative Economy 2007-2013 went to large companies for technology upgrading through fixed capital investments in plant machinery (Kapil *et al.* 2013). Other evaluations of OPs have indicated that spending under infrastructure-related categories outperformed those related to objectives supporting innovation and R&D activities, noting that the impact on innovation was limited to the purchase of machinery and the creation of supporting infrastructure: funds had not significantly impacted on cooperation between firms with research and development units, which still prioritised investments in fixed assets (PSDB 2012).

Of course, these types of investment have achieved important results. Investment in RTDI infrastructure has a crucial role to play in parts of the CEE where this base is missing or worn down. The World Bank's Enterprise Innovation Support Review acknowledges the role that EU funding has played in getting Poland's innovation system 'off the ground' (Kapil *et al.* 2013). An evaluation in Slovakia found examples of how the significantly improved Slovak research infrastructure, resulting from the investment of EU funds, managed to attract private funding (TECHsme.sk 2013). The focus on technology absorption through the purchase of technology or machinery is understandable, given the current level of economic development and enterprise needs in many parts of the CEE.

Nevertheless, many of these evaluations have been critical of the strong focus of EU-funded innovation investment on RTDI infrastructure and technology absorption. A number of problems with this approach are highlighted. First, the link between investment in infrastructure and technology absorption and increased productivity growth based on innovation and R&D activities is uncertain. In some cases, this approach has proven weak in leveraging private sector investments in R&I and fostering the commercialisation of state-funded research. Studies of innovation policies in the CEE confirm that one fundamental weakness is the lack of a corporate sector that actively uses links with science to innovate (Veuglers and Schweiger 2016). Infrastructure investments into science "valleys" have not automatically led to the establishment of innovative actions, such as business-academia collaboration (European Commission 2015a). Second, there are questions concerning the sustainability of these effects in the longer term, when funding will have to be found for replacing purchased technology and equipment and maintaining infrastructure (Kapil *et al.* 2013). Concomitantly, the comparatively limited level of direct investment in innovation activities by EU funds in

the CEE has been criticised. Evaluations from other parts of the EU have shown that more ambitious and systemic effects can be developed through CP innovation support, prompting changes in the institutional framework for innovation investment, fostering change dynamics within businesses and R&D centres, promoting openness to new ideas and agents, and encouraging the development of new strategic aims with longer-term time horizons to strengthen durability. According to some studies, the most effective measures to improve innovation performance are those enabling enterprises and R&D institutions to cooperate and combine resources, to create clusters and commercialise innovations. This stresses the role of "soft" support (brokers, consultants, mentors, and acceleration services) (European Commission 2015a).

These findings have implications for CP's impact on long-term sustainable development in the CEE. Research from previous EU enlargements distinguishes between 'demand-side" effects and impacts on the 'supply' side' in MS economies (Bradley *et al.* 2007). 'Demand side' growth driven by CP spending on infrastructure investment creates higher investment, higher consumption and higher levels of imports. However, its impact can be transitory, lasting only as long as there are significant amounts of CP funding available. There are longer-term costs for maintenance and there is a danger that a dependency culture develops, where in the name of generating 'structural change', less developed regions come to rely on transfers and experience convergence in consumption but persistent divergence in productive output and potential (Farole *et al.* 2011). 'Supply-side' impacts arise through the gradual accumulation of "stocks" of human capital, innovation and R&D, and the beneficial output and productivity spillovers that will be generated both during and after the CP programmes. This emphasises the need to support a new development model that focuses on innovative economic structures and entities at the expense of infrastructure, including in the RTDI sphere. According to this argument, in the CEE infrastructure should only be supported through CP where and when underdevelopment is a barrier to economic efficiency and social cohesion and the implication is that up to now this has not been the case (Gorzelak 2016). Cohesion policy investment in supporting infrastructure for innovation can pay dividends, and building up public infrastructure capacity to support innovation and entrepreneurship is an essential part of the development of an effective regional innovation system, but without parallel effort devoted to encouraging endogenous innovative activities in the public and, especially, the private sector, and building up innovation capacity, there is the risk that any impact will be limited and that higher levels of public investment can only be supported by continued CP subsidies. There is a strong argument that CEE Member States will need to divert EU-funded investment from absorption to innovation to maintain sustainable growth in the long term (Kapil *et al.* 2013).

4. What explains this performance?

Why has CP innovation support in CEE in the period 2007-2013 been used in this way? There are several possible explanatory factors for poor policy effectiveness, related to how instruments are defined, customized and combined into mixes that address the 'problems' related to the activities of the innovation system (Borrás and Edquist 2013). Two explanations will be detailed here: how the importance of CP funding relative to

domestic investment in the CEE influences the focus of that support, particularly in the context of the crisis; and, the influence of institutions and administrative capacities.

Cohesion policy is an important source of funding for regional development and also shapes the geographical and thematic allocation of domestic regional policy funding, particularly because it requires countries to co-finance CP programmes over a seven-year period. In poorer EU Member States, CP can account for a significant share of total public capital expenditure and funding for national economic development. Table 3 compares CP annual average allocations in 2007-13 and 2014-20, with all data in 2011 prices and as a percentage of 2011 GDP. The data show that there has been little change in the level of funding to wealthier countries in 2014-20 (as a percentage of GDP in constant prices). Funding allocations to a number of poorer countries are lower in 2014-20 than in 2007-13 (as a percentage of GDP), partly because of increases in these countries' GDP over the past decade, and also because a lower proportion of the total CP package is being allocated to the poorest countries and regions in 2014-20. Nevertheless, the percentage of GDP is substantially higher in CEE Member States than in others.

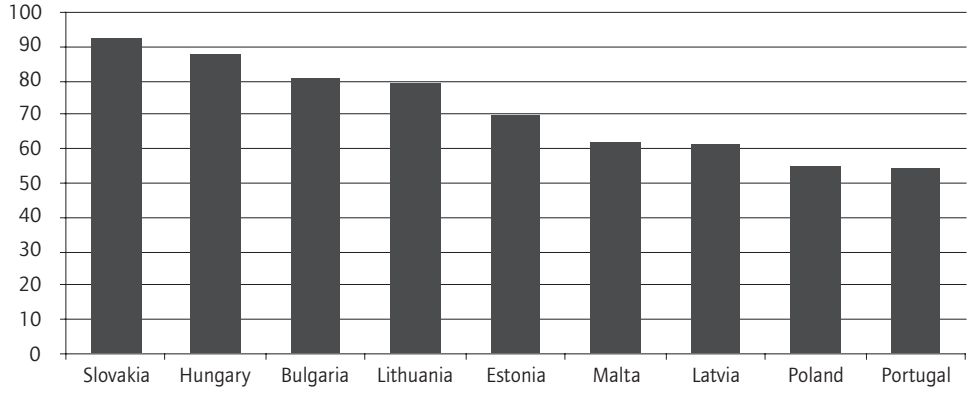
Table 1 **Cohesion policy allocations in 2007-13 and 2014-20 (% of GDP)**

	2007-13	2014-20
3.5-4.0%	Hungary	
3.0–3.5%	Estonia, Latvia, Lithuania	Latvia
2.5-3.0%	Bulgaria, Poland	Bulgaria, Croatia, Estonia, Hungary, Lithuania, Poland, Slovakia
2.0-2.5%	Czechia, Romania, Slovakia	Romania
1.5-2.0%	Malta, Portugal, Slovenia	Czechia, Portugal
1.0-1.5%	Greece	Greece, Malta, Slovenia
0.5-1.0%	Cyprus	
0.1-0.5%	Finland, France, Germany, Italy, Spain	Cyprus, Finland, France, Italy, Spain
<0.1%	Austria, Belgium, Denmark, Ireland, Luxembourg, Netherlands, Sweden, United Kingdom	Austria, Belgium, Denmark, Germany, Ireland, Luxembourg, Netherlands, Sweden, United Kingdom

Note: Annual average allocations in constant 2011 prices, as a percentage of 2011 GDP, with all data in euros.
Source: EPRC calculations based on European Commission data

Cohesion policy funding has also played a significant role in investment in these countries in the context of the global economic and financial crisis. The crisis has had a profound impact on national and regional budgets, limiting funding availability across all investment areas. In the EU as a whole, public investment declined by 20% in real terms between 2008 and 2013. In the Central and Eastern European countries, where CP funding is particularly significant, public investment (measured as gross fixed capital formation) fell by a third and CP funding came to play a fundamental role (see Figure 3).

Figure 3 **Cohesion policy funding and national co-financing as % of total public investment**



Source: European Commission (2014), p. 12

Ranked as moderate innovators and severely hit by the crisis, less developed regions in the CEE with longstanding structural difficulties received large volumes of CP funding that were often the only source of funding for industrial policies. In this context, CP was used to complement (or even substitute) national/regional support policies to help firms cope with the effects of the crisis, especially in those regions most severely affected. Cohesion policy performed an anti-cyclical role. Thus, although evaluations have identified some cases where CP innovation investment produced additionality and leverage effects, a basic feature is the inclination of CEE governments to substitute CP investment for national funding sources. This is cited as a key factor in explaining how a high share of CP investment in total public spending on RTDI can be associated with low policy efficiency (Veugelers 2014).

CP programmes were often revised to deal with the effects of the crisis, implementing generic policy instruments aimed at reaching the widest possible number of beneficiaries, enabling businesses to survive or preserve pre-crisis levels of investment and employment. The Commission's ex-post analysis noted a shift of resources away from research and innovation to more generic growth objectives in programmes in response to the crisis (e.g. in Czechia 'Enterprise and Innovation' OP). This reprogramming led to a reinforcement of measures focused on improving competitiveness and employment, seeking to give a more forceful response to the ongoing economic and financial crisis. The consensus in these programmes is that CP support was fundamental in responding to the crisis, but that more resources were allocated to strengthening private productive investment (new machinery, new construction) and stimulating employment (creation or, more often, safeguarding of jobs in the short term), detracting from funding for R&D and more ambitious innovation goals (European Commission 2016b). However, it is important not to exaggerate the role of the crisis in this approach to EU investment in innovation in the CEE. The approach was evident in Poland alongside other CEE countries, despite the fact that it largely avoided the most serious impacts of the crisis. It could be posited that in some parts of the CEE the crisis offered an ex-post justification for an approach that had already been adopted, driven by other factors including institutional conditions. Overall, innovation policies across the transition

region are surprisingly similar, characterised by an excessive focus on the creation of technology, particularly from public-funded research organisations, and by insufficient attention paid to the absorption of technology by the private sector. Innovation policies in transition countries would gain from better governance, more sophisticated public administrations and private-sector involvement. Innovation policies in transition countries: one size fits all?

5. The influence of institutional factors

In explaining this approach to innovation support, it is also important to look at the institutional context in the CEE. Specific institutional endowments, both 'hard' or 'formal' institutions (laws and regulations, rights etc.) and 'soft' or 'informal' institutions (norms, traditions, conventions, networks etc.), facilitate policy performance (Streeck 1991). Equally, institutions can have a negative influence on policy performance as a result of e.g. excessive bureaucracy, institutional lock-in etc. (Pike 2013). Research has identified how institutional weaknesses in the CEE determine CP performance (McMaster and Novotný 2005). The weaker a Member State's institutional capacity, the weaker the CP performance (Bachtler *et al.* 2013; Tosun 2014). A range of weaknesses has been highlighted in studies. Unstable organisational structures and staff turnover are cited as significant institutional factors undermining policy performance. Stability and continuity strengthens a policy's ability to deliver intended goals, encourages the pursuit of long-term development aims and strengthens administrative efficiency (Milio 2010). Recent research has explored staff turnover in public administration bodies implementing CP in 2007-2013. CEE MS were mainly assessed as moderate or high in terms of staff fluctuation, reflecting institutional factors: relatively low civil service wages (in comparison to the private sector); the politicisation of the civil service (political flux is often tied to changes in staff); and, lack of institutional continuity (Radzyner *et al.* 2014). For instance, in Hungary institutional instability in the innovation and public administration systems was exacerbated following the parliamentary elections in 2010. After the elections, key national and regional organizations involved in managing and implementing innovation support lost status and autonomy. Comprehensive personnel changes involved not only the top management of the previous political cycle but also desk-level officials. The implementation of innovation-related programs was frozen and the high level of institutional instability disrupted previously established linkages and reduced both innovation policy effectiveness and social capital (Szalavetz 2015). In Slovakia, frequent staff fluctuations were related to political change: in the course of the implementation of the Research and Development OP 2007-2013, the minister in charge changed three times and after every political change senior and desk staff positions changed.

The institutional infrastructure supporting innovation systems in CEE Member States suffers from fragmentation, and there are problems with inter-agency coordination. Responsibilities for strategy, financial planning and implementation are often unevenly distributed between different agencies and/or ministries. In countries with regional tiers of administration, the institutional framework is complicated further. For instance, each of Poland's sixteen regions, or *voivodships*, also has its own

innovation support initiatives. Mapping CP programming to domestic institutional systems had detrimental effects in this respect: rather than contributing to stronger strategic integration, institutional tensions stemming from the establishment of CP management and implementation arrangements in domestic systems undermined the strategic quality of CP programmes. Programme management was often disjointed and the 'silo' mentality of ministries made it difficult to prioritise strategic objectives. CP objectives were divided among ministries, departments or administrative tiers according to traditional portfolios or political bargaining rather than strategic logic. This fragmentation poses several obstacles to a comprehensive, integrated and affordable strategy for innovation and R&D. It duplicates objectives, discourages information sharing, disperses responsibility and accumulates administrative costs for the public sector as well as the grant applicants and beneficiaries. This fragmentation has undermined RTDI interventions where emphasis is placed on collaborative links between local authorities, businesses, research centres and academia (Kasza 2009).

Finally, it is important to note the emphasis placed by CP management and implementation bodies in the CEE on the efficient absorption of EU funds and compliance with EU regulations, emphasising timely spending, auditing and monitoring in order to ensure fast and appropriate use and legitimate expenditures. Given the amount of funding involved and the relative inexperience of programme authorities in these countries, there is particular pressure from the EU and national authorities on bodies involved in CP implementation in the CEE to maximize their absorption of structural funds (Cartwright and Batory 2012). In terms of financial management, the focus in all case studies was on 'policing' systems. The emphasis was on audit and control, constraining risk-taking and innovation in implementation. Although apparent across the EU, this behaviour has been most evident in CEE MS where institutional weaknesses prompted an excessive emphasis on "compliance" in administering the Funds. CP management and implementation systems in CEE Member States were designed to ensure procedural correctness rather than to facilitate access to EU funds by applicants; double and triple sets of checks were required for payment requests, slowing down the disbursement of grants (Oraze 2009). The cost of good absorption and compliance performance is often weak performance in strategic results and impacts (Balás and Kiss 2011).

In this context, it is useful to compare the varied application and impact of two EU conditionalities that were designed to influence CP implementation. The first conditionality was on spending: the decommitment rule which stipulated that any funding committed to a project needed to be paid out within two years (or three years in the case of CEE Member States) or else be lost to the programme. Drawing the evidence together, the decommitment rule was effective in achieving the goal of improving financial absorption. The rule was applied rigidly and consistently to all programmes in line with the regulations, including in the CEE. In comparison, Lisbon 'earmarking' can be seen as a conditionality targeting the allocation of spending. Member States were obliged to dedicate a set proportion of their programme allocations to supporting the EU's Lisbon Agenda objectives of increased competitiveness and job creation. Data on the allocation of funding by expenditure categories at the start of the 2007–2013 period has been used by the Commission to suggest a high level of compliance with the earmarking requirement. The caveat to this is that the Commission's definition of what constituted

'Lisbon-relevant expenditure' was widened considerably in the regulatory negotiations with the Member States. Although introduced with fixed percentages of expenditure in the regulations, it was varied by type of programme and was voluntary for the EU-12 where Member States were able to negotiate additional expenditure categories to be included in their targets. The potential influence of earmarking was also weakened during the negotiations, principally to give Member States more flexibility in what spending would count as 'earmarked expenditure'. This affected the credibility and criticality of the conditionality, although the targets and reporting mechanisms were retained. Thus, although earmarking has influenced the allocation of spending on strategic objectives in some Member States, including CEE Member States, this has not been to the same extent as the 'n + 2/3' spending conditionality (Bachtler and Ferry 2013).

These institutional issues have had an impact on CP strategic development and implementation. Ex post evaluations have criticised the strategic quality of EU-funded innovation support programmes, noting a reluctance to identify strong strategic priorities (European Commission 2016b). In Hungary, research has indicated that full procedural compliance with EU regulations and requirements for the implementation of CP innovation support has not automatically led to the strengthening of strategic capacities. The façade of procedural compliance masked a pragmatic approach to accessing the funds that were prioritised (Szalavetz 2015).

Across the CEE, administrative staff were trained in the mechanisms of spending CP funding efficiently (e.g. meeting eligibility requirements, regulations and 'decommitment' rules etc.) but often had no knowledge of specific fields or policy areas that would allow them to assess project ideas and monitor progress. This was particularly noticeable for complex, innovative interventions, including those supporting RTDI. At the launch of the programmes, there were very few evaluators able to judge the value and quality of innovation-related projects. This resulted in simplified selection criteria and indicators to assess innovation-related projects (Kozak 2013). Recent research by the European Parliament asked programme managers to assess capacities for different ERDF priorities. Respondents from the CEE described capacity under RTDI as 'less effective' (Metis and EPRC University 2014).

Preference was given to a demand-driven approach, providing beneficiaries with a broad range of support measures from which to draw. Moreover, the common pattern of intervention involved implementing generic policy instruments aimed at reaching the widest possible number of beneficiaries: although the budget allocation for CP instruments was often high, the size of individual projects was small, producing fragmentary results. Interventions designed to generate innovative and adaptive growth tended to be vague, providing a blanket authorisation for spending on a wide range of programmes and projects. Thus, institutional weaknesses conditioned the implementation of CP support for innovation: strategies allocated significant amounts for infrastructure rather than for innovative priorities because this is where the institutional interests of programme authorities and beneficiaries coincide: beneficiaries could pursue investments they had experience in managing and which brought immediate, visible effects; programme authorities, inexperienced in more innovative activities and wary of risking decommitment, received assurance of substantial, timely expenditure.

6. Conclusions

The 2014-2020 period could be the final phase of substantial CP transfers to the CEE, and this programming period has an increased focus on innovation support. A comparison of thematic shifts in funding from 2007-13 to 2014-20 shows a significant increase in CP allocations to R&D and innovation, ICT, SMEs and a low-carbon economy, which collectively will see an increase of 6 percentage points in less developed Member States to 35% of total funding in 2014-20. A second factor that has contributed to raising the profile of innovation within cohesion policy has been the introduction of ex ante conditionality linked to the requirement of approval of Smart Specialisation Strategies (S3) as a strategic basis for the programmes. It is crucial for CEE Member States that funding is used effectively for sustainable growth. The experience of EU15 countries is that the 'added value' of CP was highest in the third phase of funding – once stakeholders were experienced in the management and implementation of the policy, and at the same time well prepared to use the funds to promote innovation and change in economic development. For the CEE, the main requirement is to shift away from a focus on absorption (although this is important to meet decommitment rules) and concentrate funds in economically and socially viable projects based on sound strategic planning, matching the strategic objectives of the programme and the needs of the region (Gorzelak 2016). The chapter confirms recent studies that have focused on the role of institutional endowments in enhancing development investment. For instance, Casi and Resmeni (2014) conclude that the impact of FDI in regions is constrained by the variable endowment of regional human and social capital, behavioural modes, values and trust. Fratesi and Perucca (2014) arrive at similar conclusions in their conceptualisation of 'territorial capital' and their empirical analysis of its role in CP impact in the CEE: CP impact depends on the type and amount of territorial capital possessed. Entrepreneurship, innovation and ICT policies are only effective when the region is endowed with human capital, while their impact in regions not endowed is not positive. These findings have implications for CP support for innovation and in turn for long-term sustainable development in CEE Member States. Up to now, 'innovation' has often been defined broadly to allow spending on infrastructure. There is a similar focus on research infrastructure, technology parks, research centres and buildings or fixed assets. This can absorb investment and is beneficial in boosting 'demand side' growth and higher consumption. However, there are sustainability issues, as infrastructure will have to be maintained after CP investment ends. Moreover, this approach means that less emphasis is put on 'supply-side' impacts that arise through the gradual build-up of "stocks" of infrastructure, human capital and R&D. Following the closure of CP programmes and the end of EU investment, only these supply-side effects remain: the systemic, structural change effects induced by CP investments then come into play. Problems with strategic quality and lack of a strategic vision mean that funding has tended to be distributed widely across large numbers of projects, with a particularly detrimental impact on some strategic objectives where emphasis is placed on such effects.

That is not to say that the picture is completely negative and that the prospects for further CP achievements in the CEE in the future are bleak. The significance of cohesion policy for development in CEE Member States is evident and argues for a continued role

for investment in these countries. Given the time pressure and some of their inherited handicaps in administrative culture, these countries have performed remarkably well. Although varying across Member States and regions, progress has been made, especially during the 2007-2013 period: programme design has become more professional, with more analysis, strategic reflection and partner consultation; increased 'partnership-working' – greater involvement of regional/ local bodies, economic and social partners – although not usually in funding decisions; investment in project generation – working with applicants to get 'good projects'; more sophisticated project selection systems – competitive calls, scoring criteria; and greater attention paid to monitoring and development of an evaluation culture. The language of development policy has changed, reflecting the CP emphasis on innovation-related themes. There is awareness of new approaches beyond infrastructure support in strategic thinking. This suggests a potential impact of CP strategies on institutional settings in the longer term. Cohesion policy can simultaneously contribute to strengthening innovation in CEE regions and hence create growth in the short-medium term, but can also be used to strengthen institutional factors (including economic, political, entrepreneurial procedures and norms as well as public policy administration). This enriched endowment will eventually enhance the long-term growth of less developed regions.

However, thus far most progress has been made in strengthening capacity for procedural or operational compliance with Commission regulations and requirements, especially financial management and control. This has not been matched by progress in administrative processes related to strategic development and policy learning. CP funding is often spent according to short-term considerations, either responding to urgent problems or political considerations rather than to long-term strategic development. Thus, CP funding for innovation that in principle supports the development of strategies and instruments based on partnership, the mobilisation of local stakeholders (including private actors), decentralisation and bottom-up approaches, can be subsumed into a system that formally complies with EU regulations and procedures but in reality reflects traditional, hierarchical, redistribution and subsidy allocation. This undermines the development opportunities offered by CP (Szalavetz 2015). Administrative staff are trained in the mechanisms of spending CP funding efficiently (e.g. meeting eligibility requirements, regulations and 'decommitment' rules etc.) but often do not possess the knowledge in specific fields or policy areas that would allow them to assess the innovative worth of project ideas. Moreover, the focus has been on areas where authorities have implementation experience and where impacts are immediate and tangible, particularly in the area of infrastructure. Moves to more sophisticated interventions for innovation and entrepreneurship are apparent but authorities have struggled to implement actions in this field.

This highlights issues of strategic quality: the focus on stronger thematic concentration in the 2014-2020 period and the conditionality that Member States and regions should have a detailed Smart Specialisation Strategy to implement the funds should be used to develop clearer thinking under innovation headings. Strategic guidelines for CP programmes should be more concrete and clearly specify objectives, the structure of finances allocated, selection criteria, etc. Clear justification and logic are needed to ensure that a learning process is also taking place; more autonomy and flexibility in

implementation should be ensured within a focused and well defined strategic framework. In terms of implementation, regulations (particularly those governing financial control) need to be simplified and administrative processes for more complex, innovative projects need to become more flexible. Experts are involved in the project selection process but there is insufficient weight given to strategic, innovative aspects. There is very limited risk tolerance and stronger emphasis has to be put on risk assessment in innovative projects. This requires more training for staff in bodies involved in implementing OPs. Thus, a key challenge in optimising the benefits CP support for innovation offers to the CEE is ensuring sufficient investment in capacity. This applies to administrative capacity building for programme managers and stakeholders, particularly at sub-national levels. However, it also applies to the European Commission, which needs to make CP support more 'user-friendly' and context-specific and to provide incentives to mobilise stakeholders in a more meaningful and strategic way, overcoming the 'distance' between the Commission and those developing innovation strategies and instruments in Member States.

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Chapter 7
Investment promotion in the Visegrad four countries: post-FDI challenges

Balázs Szent-Iványi

1. Introduction

Following the end of Communism, attracting foreign direct investment (FDI) has been seen as one the key policies to promote development and technological upgrading in Central and Eastern Europe (CEE). In general, the CEE countries have been successful in putting themselves on the maps of multinational companies (MNCs): the share of Czechia, Hungary, Poland and Slovakia (the Visegrad countries, V4) in global FDI flows increased from 0.4% in 1990 to peak at 2.1% in 2007 (UNCTAD 2016). Although there were shifts in the specific policy tools, the promotion of foreign investment was the key element in the development and industrial policies of these countries for much of the two decades following the transition.

After the 2008 global economic crisis and its aftermath however, the strategy of relying on FDI as the main driver of growth has been increasingly questioned (see Galgóczi *et al.* 2015). The competitive advantages of the V4 countries, especially 'relatively cheap, yet relatively skilled labour' has increasingly eroded with the rise of even cheaper competitors. The positive developmental impacts of FDI have been questioned, and the crisis has shown just how vulnerable excessively open small economies, like Hungary or Slovakia, can be to the global business cycle. Industrialisation strategies based solely on large FDI inflows have led to a form of dependent development in the region (Pavlínek 2016).

These and other changes pose a clear question as to how investment promotion policies in the region need to adapt. The aim of this paper is to investigate the role of national investment promotion policies in this post-FDI age, focusing on the V4 countries, which have traditionally been the front runners in attracting FDI. Investment promotion is defined broadly to include policies aimed at attracting FDI, as well as policies aimed at increasing its benefits. If FDI is becoming less relevant for the region as a driver of development, does FDI promotion still have a role to play in these countries? Are investment promotion agencies (IPAs), and the policies they seek to implement now relics of the past? Should V4 governments abandon their FDI-focused development policies for different approaches? The paper investigates the impacts of three key features of the post-FDI age on investment promotion policies: (1) the changing competitive advantages of the V4; (2) the questionable nature of the long-term development impacts of FDI; and (3) the changing nature of multinational production, focusing on how discussions have shifted from multinational corporate networks organised through FDI to global value chains (GVCs) and global production networks (GPNs), where FDI is just one tool of governance.

The paper has two key findings. First, while investment promotion policies and IPAs can still be relevant in the post-FDI age, the policies regulating their operation are still (mostly) stuck in the 1990s. A number of fundamental changes are required in terms of their goals and operation for them to remain relevant in the post-FDI age. Most importantly, attracting new investments, as a primary goal for investment promotion policies, needs to give way to working with investors already present in the country, providing a wide range of aftercare services in order to foster reinvestment, upgrading, and productivity spillovers. Second, governments need to put a much larger emphasis on a number of different policies beyond investment promotion, which have been relatively neglected due to the excessive focus on promoting FDI. These include, but are not limited to, industrial policy, education and innovation support, which have been sidelined in the past 25 years at the expense of serving the interests of foreign investors, but are needed to support spillovers, integration into GVCs/GPNs and the eventual development of GVCs/GPNs run by V4 firms.

The paper is structured as follows. Section 2 focuses on discussing the impacts the changing competitive advantages of the V4 countries have had on investment promotion, and how IPAs have adapted. This is followed in Section 3 by an analysis of the role IPAs need to play in maximising the long-term development impacts of FDI. Section 4 deals with the impacts and possible reactions to the changing nature of multinational production, while the final section offers some brief concluding remarks.

2. Investment promotion and the changing competitive advantages of the V4

There has been much discussion in the literature on how the ability of the V4 countries to attract large-scale foreign investments based on the perceived competitive advantage of a relatively cheap yet skilled work force has become increasingly limited after the turn of the Millennium (see e.g. Kalotay 2017). The types of investments which dominated during the 1990s, i.e. mainly export-oriented assembly plants relying on abundant and cheap labour, have come under pressure in the region. The wage advantage of the V4 (and other CEE countries) has deteriorated, and they now face much more severe competition than during the 1990s due to the rise of even cheaper manufacturing locations further east. The fact that wages increased faster than productivity after the turn of the Millennium, especially in Czechia and Hungary (Meager and Speckesser 2011: 53), contributed to eroding the competitive advantage of these countries even further. Moreover, labour in the CEE countries is no longer particularly abundant. Poland and Hungary have experienced mass emigration, which, coupled with structural mismatches between the education system and the needs of the labour market, have led to severe shortages of skilled labour (BBJ 2016). While long-term unemployment and low levels of labour market participation are significant issues in all four countries, it is extremely difficult to bring back people who have fallen out of the labour market due to their lack of skills, relevant experience or state of health.

The fact that FDI based on abundant and cheap labour is no longer a viable strategy has been shown by a number of corporate relocations from the region (Hunya 2004),

exacerbated by the post-2008 global economic crisis. Sass and Hunya (2014) show for example that relocations from Hungary are most dominant in the electronics sector, where cheap labour was a key concern for investors, and many of these investments have been moved to China.

Faced with these challenges, governments have increasingly been emphasizing the need to 'upgrade' FDI activities from relatively low value-added ones relying on cheap labour to ones which produce higher value-added products and services, and as such require more skilled labour (Gereffi *et al.* 2005). Indeed, the 'upgrading narrative' is compelling. CEE governments have long argued that the relocation and divestment of activities using cheap labour and producing low added value should not be seen as problem, if these activities are replaced by ones producing higher added value. These activities create better jobs as they require workers with higher skills and thus pay better (see Szent-Iványi 2017). Indeed, there is evidence of such upgrading happening. One often-cited example is that of shared service centres: after the turn of the Millennium, many such investments began to arrive in the region, creating relatively well-paid office jobs (Capik and Drahokoupil 2011). A number of multinationals already present in the region, instead of divesting, began granting their subsidiaries new mandates beyond the tasks of mere assembly, including procurement, logistics, or research and development (Sass and Szalavetz 2014; Szalavetz 2016).

While there are theoretical reasons to expect such upgrading processes to be automatic (Szent-Iványi 2017), it is clear that governments can play a role in catalysing them, especially in cases where relocation is threatening employment. There are two main ways for this: (1) incentivising new FDI projects with a higher value added than what is already present in the country; and (2) promoting upgrading among the investors already present.

In terms of new FDI projects, governments can use sector-targeting policies, which, put simply, give some form of positive discrimination to FDI in the preferred (higher value-added) sectors or corporate activities. These types of targeting strategies have been seen as a best practice for IPAs by both scholars and practitioners (Loewendahl 2001). In the most comprehensive econometric study on the topic, Harding and Javorcik (2011) find that such policies can be effective in the case of less developed countries where there is much red tape and information on bureaucratic processes is not readily available.

The IPAs of all four Visegrad countries emphasise prioritising FDI projects in high value-added sectors or activities and make use of sector-targeting policies. Capik and Drahokoupil (2011) argue that FDI promotion policies in the V4 have shifted towards supporting investments in the service sector. As shown by Tőrös *et al.* (2017) in a comprehensive review of sector-targeting policies in the V4 countries, all of the countries have identified a number of 'priority sectors', in which investors are promised preferential treatment in the form of specialised support from sector experts and higher levels of financial and other incentives. There is a high degree of similarity between the sectors prioritised by the four countries, most likely reflecting the similar development challenges they face and including *inter alia* the automotive sector, business services

(with an emphasis on shared service centres), R&D, ICT, life sciences, nano sciences and renewable energy. Table 1 provides a full overview.

Table 1 **Priority sectors for investment promotion in the V4 countries**

Czechia	Hungary	Poland	Slovakia
Aerospace	Automotive	Aerospace	Aerospace
Automotive	Electronics	Automotive	Automotive
Business Support Services	Food industry	Biotechnology	Chemical industry
Data Centres	ICT	Business support services	Electrical engineering
Electronics & Electrical Engineering	Life sciences	Domestic appliances	ICT
Energy & Environment	Logistics	Electronics	Machinery industry
High-Tech Mechanical Engineering	Medical technology	ICT	Shared service centres
ICT	Renewable energy	Machinery and steel industry	Wood processing
Life Sciences	Shared service centres	Renewable energy	
Nanotechnology & Advanced Materials		Research & development	

Source: IPA websites

Little is known about how effective these targeting policies are in altering the composition of FDI and promoting upgrading. Tőrös *et al.* (2017) however identify a number of inconsistencies in the V4 targeting policies, showing that they are probably much less effective than they could be. First, they argue that it is unclear how the prioritised sectors are selected. Are these sectors the ones where the given country has a competitive advantage and is thus truly able to attract investments, or do they reflect wishful thinking on the part of governments? Indeed, as Loewendahl (2001: 11) argues, 'sector targeting should identify sectors in which the host country is best placed to attract investment and which meet inward investment objectives', clearly implying a trade-off between the two. As investment incentives are generally seen as secondary when multinationals make location decisions (Blomström *et al.* 2003), government targeting will not make much difference unless the country is really able to attract such investments. Second, the targeted sectors do not align perfectly with the incentive regimes: investors in priority sectors are not always eligible for more generous incentives. Investors in the Czech automotive sector for example can expect the same amount of government support as any other manufacturing industry, despite the fact that the automotive industry is named a priority sector. Naming a sector a priority, but then not providing meaningful additional incentives can send confusing signals to investors. Third, there is a lack of concentration. Based on the websites of their national IPAs, Hungary for example had nine 'priority' sectors in 2016, Poland ten. This leads to a fragmentation of the scarce IPA resources, and also makes it difficult to clearly communicate the competitive advantages of the country towards investors. As a fourth issue, it is possible to add that it is unclear to what degree these sector-targeting policies are actually driven by supporting upgrading, as opposed to other policy goals. Some countries, like Hungary, prioritise industries like electronics and the

food industry. Poland targets investments in domestic appliances, machinery and the steel industry. None of these are generally seen as high value-added sectors (although some niches are possible within them), and it is questionable whether the V4 countries can still realistically compete for investments in them. It is also difficult to classify many investments in the automotive sector, an industry prioritised by all four countries, as high value-added, especially in the case of lower-tier suppliers. It is therefore possible to question why these sectors have been selected for prioritisation. One potential explanation is that governments are driven not by upgrading considerations but by a desire to create jobs for semi-skilled workers, a category of workers hit especially hard by the post-2008 economic crisis.

The second way governments can promote upgrading relates to the activities of multinationals already present in the country. As mentioned, upgrading does not necessarily need to come from new investments, but multinationals already present in the country can also upgrade the mandates of their existing subsidiaries through reinvestment. The literature identifies several forms of subsidiary upgrading (Humphrey and Schmitz 2002; Szalavetz 2017), including product, process, functional and intersectoral upgrading. Subsidiary mandates, and the role of the subsidiary in the given multinational company network should be seen as dynamically changing, with possibilities for upgrading, but also downgrading for individual subsidiaries.

In the past decade, many multinational companies present in the V4 countries have progressively broadened or even shifted the tasks that their subsidiaries are charged with, and a significant stream of research has been dedicated to exploring these processes. Pavlínek and Zenka (2011) for example have found ample evidence of upgrading in the Czech automotive industry, with foreign-owned companies significantly increasing their value added per output ratio and engaging in both product and process upgrading. Sass and Szalavetz (2013) document rapid crisis-induced functional upgrading processes among Hungarian players in the automotive and electronics industries. By the end of the first decade of the 2000s, most of their case study companies had moved beyond being single-mandate manufacturing plants, and had taken on a number of other functions. These conclusions are echoed in Szalavetz (2017).

Governments can influence the decisions multinationals make regarding the mandates of their subsidiaries. When a multinational makes a decision to change a subsidiary's mandate, it weighs up several options, and more than one subsidiary can be a candidate, leading to a competition between them. The MNC in the end will award the new mandate to the subsidiary which it sees as the most capable of effectively executing it. This can be driven by several factors, including the traditional list of determinants of a country's competitiveness, but also less visible and tangible variables like the performance of the subsidiary's management, etc. Subsidiaries can have some bargaining power in these processes, but, acting alone, they are generally seen to have relatively little power to influence decisions made at the headquarters (Bouquet and Birkinshaw 2008; Sass and Szalavetz 2013). Support from the host country government can however bolster subsidiary bargaining power. The literature generally suggests that IPAs need to monitor subsidiaries for potential changes to their mandates, and, if the parent company is indeed considering such changes, to work together with the subsidiary to

ensure that a change leading to upgrading actually happens (UNCTAD 2003). This can involve supporting the subsidiary in convincing the parent company about the merits of upgrading in the country, and even providing financial incentives, such as grants for training workers or R&D support. Governments can even be more pro-active in initiating subsidiary upgrading – beyond creating the 'right environment' for upgrading, they can transparently communicate the incentives they have in place for these cases to all MNCs present in the country, as part of their broader country marketing efforts.

V4 governments have of course recognised the need for working with existing investors. Investment incentives offered by governments cover reinvestment by existing companies, or separate schemes exist for this. All IPAs offer 'aftercare services' to investors, including support for reinvestment, matchmaking with local suppliers, R&D support, advice on available grants, and liaising between the investor and the government on topics like amending legislation. The difficulty in providing pro-active and effective aftercare relates to the issue of information: the IPA will often have no *ex ante* information about upgrading decisions at multinationals. IPA staff therefore need to develop excellent personal relations with executives at subsidiaries, and also earn their trust (UNCTAD 2008), allowing them to gain first-hand information on internal process and to react accordingly.

IPAs across the globe devote much less attention to aftercare than is necessary (UNCTAD 2007), and the V4 countries probably devote even less and are generally unable to be proactive in this area. Aftercare services are rarely detailed, or indeed deserve more than a fleeting mention on V4 IPA websites. No IPA in the region has any publications or marketing brochures on aftercare, as opposed to the large number of publications covering various sectors and topics targeting new investors. One notable exception is CzechInvest, which provides details on what aftercare services actually entail, including support for 'expansion, re-investment and the development of research capacities', as well as a number of other services (CzechInvest 2016). CzechInvest also has a dedicated organisational unit for aftercare.

A key problem here relates to the capacities of V4 IPAs, which are generally geared towards generating new investments, with their 'ideal' investor a foreign company not present in the country and knowing little about it. This is again evidenced well by brochures and other marketing material published by V4 IPAs, which clearly target foreigners with relatively limited knowledge about the country – for example, much of this material includes details about life in the country and basic macroeconomic indicators. Some mission statements are also telling: 'The Polish Information and Foreign Investment Agency (PAIiIZ), helps investors to *enter* the Polish market and find the best ways to utilise the possibilities available to them' (PAIiIZ 2016; emphasis added). A significant IPA task relates to lead generation, i.e. sounding out which companies are likely to invest in the region, meaning that staff need to be outward-looking. Due to this, V4 IPAs are less well suited towards maintaining formal or informal relations with investors already present in the country, as the majority of their staff are preoccupied with generating new investments. Even CzechInvest, with its dedicated Aftercare Section, has only five people devoted to maintaining relations with the hundreds of foreign investors present in the country, while it has dozens of experts focusing on generating new investments.

This bias towards new investments is, in part, understandable, and due to the wider political economy of the issue, can be difficult to change for two reasons. First, there is clearly a degree of path dependency. Generating new investments was the *raison d'être* behind the establishment of the IPAs in the region in the early 1990s, and is deeply engrained in their organisational cultures. Second, due to their short-term preference for re-election, governments prefer new investments to upgrading. A new investment will always create new jobs and government officials can take some credit for it to enhance their chances of re-election. Upgrading however, while beneficial and indeed necessary for the economy as whole in the post-FDI age, has much more ambiguous effects on net employment in the short term: workers with lower skills might be laid off, with perhaps a smaller number of higher-skilled new hires.

Summing up this section, V4 governments have put some effort into promoting upgrading by introducing sector targeting and aftercare, but more is needed. They are on the right track with their targeting policies, but need to iron out inconsistencies to improve effectiveness. They also need to shift the scope of their IPAs from generating new investments more towards working together with existing investors by strengthening capacities for aftercare and promoting a shift in IPA cultures. The following section investigates the role played by IPAs and other government policies in maximising the benefits from FDI.

3. Investment promotion and maximising benefits from FDI

A constructive relationship between IPAs and subsidiaries is important not only in terms of incentivising upgrading, but also in terms of ensuring that the benefits from FDI are maximised. These benefits can come from a number of factors, but the literature on FDI and development has singled out productivity spillovers as the main qualitative channel through which FDI promotes development in the long term, beyond the quantitative contributions from the additional employment and tax revenues they create (Blomström and Kokko 1998; Dunning and Lundan 2008). The eclectic paradigm of multinational production (see e.g. Dunning 1988) argues that foreign firms have some kind of ownership-specific advantage which gives them a competitive advantage over companies located in the host country. These advantages, often relating to intellectual property, technology, knowledge, methods of operation, etc. are however difficult to monopolise, and economic players coming into contact with the multinational subsidiary will also be exposed to them, at least to certain degree. These contacts, which include buyer-supplier relations, the movement of employees, R&D collaborations and a number of other forms, allow the multinational's knowledge and technology to gradually spill over to other firms present in the economy. This leads to increasing economy-wide productivity, but also the erosion of the investor's initial competitive advantage, forcing it to engage in further innovation (Perri and Peruffo 2016).

Spillovers can happen through a number of different channels, including horizontal and vertical relations with other companies, as well relations with employees. The literature has emphasised that spillovers are by no means automatic, but depend on

certain context-specific characteristics which determine just how strong each channel is (Szent-Iványi and Vigvári 2012). These characteristics relate to the investor (what knowledge and technology does it transfer to its subsidiary, to what degree does the subsidiary integrate into the domestic economy, and the steps taken to deter spillovers); the domestic firms (their level of technology and abilities to absorb new technologies); the market (level of competition and the degree to which companies are forced to innovate; the dynamics of the labour market); and the national political economy (e.g. the strength of IPR protection). The extent to which spillovers actually happen will thus depend on the specific constellation of these variables, and will vary across countries (see Görg and Greenaway 2003; Blalock and Gertler 2008; Szent-Iványi and Vigvári 2012; Newman *et al.* 2015).

If the environment is right for spillovers to happen, MNC subsidiaries will be under constant pressure to innovate and develop new technologies, just to stay ahead of domestic competitors. As a result of this, the competitive nature of the economy will change. The type of investments the country can attract will also change over time, leading to increasingly sophisticated investments by MNCs, both to bolster the competitive standing of their existing subsidiaries, but also to take advantage of the developments at domestic firms, and thus the changing locational advantages of the country. In this rather optimistic reading, spillovers can lead to an automatic process of upgrading in the domestic economy. Thus, as FDI brings in technology not previously present in the economy, it makes sense to incentivise these investments and convince as many MNCs as possible to invest (see also Blomström *et al.* 2003).

The question thus becomes empirical: what is the extent of spillovers in the CEE context, and can governments truly rely on these automatic upgrading and development processes caused by FDI. The issue does not lend itself easily to empirical research, as the extent of spillovers is difficult to quantify and measure. Nonetheless, there have been a relatively large number of studies aimed at finding evidence of their existence in the CEE region. The emerging picture from this literature is, unsurprisingly, rather inconclusive, and much depends on the specific sector and the chosen methods. One of the most comprehensive studies on the topic by Damijan *et al.* (2003), covering ten transition countries, found that the most significant channel for technology transfer is that between parent companies and their local affiliates, but that spillovers to domestic companies were much more limited. Hunya (2002) also found little evidence of spillovers, while authors like Konings (2001) actually argue for the predominance of negative spillovers. In a comprehensive review of the literature, Hanousek *et al.* (2011) also struggled to show strong evidence of spillovers.

Pavlínek (2016: 576) argued that the development impacts of FDI have been limited by the types of investments arriving to region, focusing on manufacturing based on cheap labour. In a similar vein, Capik and Drahokoupil (2011) argued that the types of service sector activities arriving to the V4 countries, including customer services and common corporate functions, are not the most knowledge-intensive ones, and that thus, while they represent FDI upgrading, their potential for spillovers is again relatively low. The main point on which the literature agrees is that the reason why spillovers have remained limited relates to the low capacities of local firms to absorb knowledge.

Even the more positive papers have expressed reservations, emphasising that spillovers only happen in certain cases. Javorcik and Spatareanu (2008) argued that spillovers in Romania are only associated with FDI projects with shared domestic and foreign ownership, echoing the conclusions of Javorcik (2004) in the case of Lithuanian firms. Manole and Sparateanu (2014) argued that domestically-owned Czech firms benefited little from horizontal spillovers, unless they had access to external credit. Pavlínek and Žižalová (2016) found evidence of strong productivity spillovers in the Czech automotive industry, but little evidence of technology spillovers, which would allow domestic companies to become innovators in their own right. Radosevic (2006) argued that only vertical spillovers are present in the CEE region, while the horizontal and other channels seem extremely weak.

It is therefore difficult to argue that spillover effects from FDI have been strong in the CEE region. There is evidence that CEE governments have tended to neglect this reality, and have simply assumed that positive spillover effects from FDI will emerge over time (Pavlínek and Žižalová 2016). This has clearly not been the case, pointing to how governments in the region need to be engaged more actively in creating the conditions through which spillovers can happen. There are several ways through which they can support this, mainly related to the three main channels through which spillovers can happen. The main government actions are summarised in Table 2.

Table 2 **Policies to promote spillovers**

Spillover channel	Policy
Horizontal relations (i.e. spillovers to competitors)	– Increase absorptive capacity of domestic firms – Measures increasing market competition
Vertical relations (i.e. spillovers to suppliers and buyers)	– Increase absorptive capacity of domestic firms, universities and R&D organizations – Promote linkages between foreign subsidiaries and domestic suppliers
Employee relations (i.e. spillovers through employees)	– Improve the skills level of the workforce through education and training – Improve labour market dynamics (e.g. by making hiring and firing easier)
Wider institutional conditions	– Conducive environment for spending on R&D, including improving general regulatory framework (IPR regime, business environment, etc.).

Note: the table does not include performance requirement measures, such as compulsory minimum spending on R&D, domestic sourcing or limits on imports. Many of these measures go against WTO and EU regulations and are thus not realistic in the V4 context.
Source: compiled by the author

Some of the policy goals listed in Table 2 relate to investment promotion, but most go beyond it. Promoting linkages between foreign subsidiaries and domestic suppliers can be seen as part of the aftercare activities in IPAs. While V4 governments have indeed been engaged in activities like this, as well as other forms of support to domestic enterprises, these policies, as Pavlínek and Zenka (2011) point out, have never had a large emphasis in the region, and governments have mainly targeted multinationals

and not their domestically-owned suppliers, at least in the case of the automotive industry. The general consensus is that domestically-owned suppliers have a low share in supplying MNC subsidiaries, and the products they supply are generally low value-added. 80% of suppliers in the Slovak automotive industry are foreign companies (Pavlínek 2016), and only 13.5% of inputs are sourced from domestic sources in the Czech automotive industry (Pavlínek and Žižalová 2016: 344). The shift to services does not support spillovers either, as these investments generate lower levels of linkages, and are thus less likely to promote spillovers (Morrissey 2012).

Matchmaking services and support for domestic SMEs offered by IPAs to become suppliers to multinationals can only marginally help, supporting already relatively competitive companies in making the final steps, but unable to significantly alter the landscape. The same can be said for micro-level policies like support to SMEs for technological modernisation and R&D: there is significant literature showing that funds are usually awarded to companies which are competitive anyway, and do not contribute to closing the gaps between the able and less able.

Perri and Peruffo (2016) argue that policies which address the macro level and aim to create a more conducive environment for spillovers are more effective than micro-level support. This implies that investment promotion agencies have a lesser role to play in ensuring that spillovers happen, and that governments need to concentrate on a number of broader, institutional goals like the majority of the ones in Table 2. Increasing competition, enhancing workforce skills, spending more on education and creating a business environment conducive to R&D are more fruitful in the long term than micro management. These are goals which countries need to continuously focus on – for reasons broader than maximising spillovers and long-term FDI benefits –, as these support national competitiveness and development in general. Others, such as increasing labour market flexibility, are seen as more controversial, although a number of experts agree that overregulated labour markets are one of the main competitive disadvantages of Europe (Barbieri and Scherer 2009).

Summing up this section, evidence of spillovers in the V4 countries is inconclusive. Governments have put little emphasis on explicitly promoting these, and where they have, they have mainly used micro-level interventions, seen in the literature as less effective. Support to domestic companies has been neglected, while MNCs have received significant amounts of state money. V4 governments need to shift their emphasis to creating the wider macroeconomic and institutional conditions for spillovers to happen. While IPAs can be marginally helpful in linking up better-performing domestic suppliers with MNCs, they generally have a secondary role to play in this area.

The final section turns to examining how the changing nature of multinational production impacts the role of IPAs and government development policies.

4. Investment promotion and the changing nature of multinational production

As discussed above, V4 countries still place a large emphasis on attracting new FDI projects in their investment promotion policies, and IPAs in the region are almost exclusively geared towards this. One question arises however: is FDI still as important as it used to be back in the 1990s? And, more importantly, can it still be relied upon as an engine of development?

Looking at the data on annual FDI inflows published by UNCTAD (2016), the absolute size of these flows has increased substantially since the early 1990s to almost every region of the global economy, CEE countries included. This is mainly due to accelerated globalisation, driven by technological and policy changes, allowing companies to increase the global scope of their operations. But a very different picture emerges if one looks at how the relative importance of FDI has changed. Indeed, a pronounced shift is observable in the literature on international production since the turn of Millennium. Since the 1970s and the classic works of Stephen Hymer (1976) and Richard Caves (1971), the literature has conceptualised MNCs as networks of companies in at least two different countries, where a parent firm is able to control the activities of all the others. The primary instrument for this control was seen to be ownership through FDI (see e.g. Cohen 2007: 39). Since the turn of the Millennium however, international production has been increasingly conceptualised in the frameworks of GVCs and GPNs, as opposed to MNCs (Gereffi *et al.* 2005; Neilson *et al.* 2014; Coe and Yeung 2015). FDI however has ceased to be the dominant tool used by lead firms in GVCs/GPNs to organise global production, with a wide range of non-equity and contractual arrangements becoming more popular (UNCTAD 2011), without actual ownership. These provide lead firms with much greater degrees of flexibility to react to changes in the market as opposed to FDI. Firms can become part of GVCs/GPNs without ownership linkages or even traditional non-equity methods like franchising or management contracts. Subcontracting and outsourcing have become increasingly common, and thus company boundaries have become much more blurred. A GVC/GPN is a much broader concept than an MNC, as it also includes the suppliers, strategic partnerships and other partners a firm comes into contact with to create a product or service with added value.

FDI thus only covers one of the tools used by lead firms in GVCs/GPNs to govern their networks, and there is evidence that its relative importance is decreasing (UNCTAD 2011), although exact quantification is difficult. The amount of FDI coming into a country, as compiled by UNCTAD based on data from national balance of payments statistics, has clearly become an unreliable measure of a country's global integration, as this integration can happen in a variety of other ways not captured by these (or other) statistics.

Investment promotion policies need to react to these shifts, not least in the V4 countries, where, as discussed, they still focus on generating new FDI flows. There are two key policies that V4 countries need to consider, adjusting their paths accordingly. First, instead of focusing solely on FDI, investment promotion policies need to broaden their activities to support the integration of the national economies into GVCs/GPNs.

Second, greater attention needs to be placed on creating an environment supporting the development of GVCs/GPNs run by V4 firms.

In terms of supporting national integration into GVCs/GPNs, Pavlínek (2016: 579) argues that the state has a key role to play in creating and maintaining the regional and national assets which determine how a country can integrate into GVCs/GPNs. These include particular labour skills, knowledge and policies. Indeed, the state needs to ensure a close alignment between national capacities and GVC dynamics (Capik and Drahokoupil 2011), an aspect echoing the conclusions of research on how the development dimension of investment promotion policies needs to be strengthened by grounding them in development policy frameworks (UNCTAD 2012). Most of the specific policy measures relate to what has been previously mentioned in terms of promoting spillovers and linkages with suppliers. Supporting the integration of domestic companies into GVCs, while a somewhat broader issue than supporting them in becoming suppliers, nonetheless leads to the same recommendations as covered in Section 3, and so will not be repeated here. Promoting FDI 'as usual' should also remain part of the mix, complemented however by a new policy element related to investment incentives. If financial investment is no longer the dominant way through which foreign companies can enter an economy and create jobs there, then it might make sense to come up with incentive schemes for the other methods as well. Most of these other methods, such as building up long-term supplier relationships and franchising, do not involve any financial investment from the foreign company, and as such are under the radar of IPAs. A broader focus on all possible ways through which companies located within the economy, be they foreign or domestically owned, can become part of GVCs/GPNs is warranted. V4 governments can consider broadening their incentive schemes by dropping requirements on foreign investment levels, instead developing schemes which incentivise other forms of cooperation for foreign companies.

Relying solely on integration into GVC/GPNs run by foreign lead firms has been shown to limit the development possibilities of national economies, as most of the value created in GVCs/GPNs tends to be captured by the lead firms (Coe and Yeung 2015). Low value capture in more peripheral GVC/GPN participants, like those in the V4 countries, means fewer resources remaining in the country for development. Upgrading the positions of local participants can help, although it has been shown that upgrading does not automatically lead to higher value capture in the V4 countries (see Szalavetz 2017 for the case of Hungary). Also, as argued by Pavlínek and Žižalová (2016) for the case of the Czech automotive industry, no domestic firm has upgraded enough to improve its position in the GVC hierarchy.

Therefore, V4 governments also need to focus on supporting the development of GVCs/GPNs with lead firms located in the region, especially in industries characterised by the high importance of intellectual property. This can be seen as the only way of increasing the developmental benefits of GVC/GPN participation in the long run, and thus avoiding dependency. A detailed discussion on the policy options for this has been given in Szent-Iványi (2017), and only some of the key insights are repeated here. The existing multinationals headquartered in the region form a good basis for this, but consideration must also be given to smaller, highly innovative born global companies,

a number of which have already made a reputation for themselves, including Prezi and iGO Navigation from Hungary, CDProjekt Red from Poland, Aeromobil and Staffino from Slovakia, or Avast from Czechia. Supporting these companies in further growth, as well as fostering the emergence of similar small, innovative firms which can evolve into lead GVC firms, is possibly the soundest approach for increasing the benefits of GVC integration for the region.

How exactly this is done is crucial. Governments need to take a long-term view and focus on creating the right conditions for these companies to thrive, and not on picking winners. Conducive education, science and technology, and entrepreneurship policies need to be at the heart of these efforts. Easing market entry and access to funding are also key elements. All of these are again similar to the policies recommended in Section 3 for increasing spillovers: supporting companies in absorbing foreign technology and knowledge may also allow them to become competitive developers of technology in their own right.

One word of caution is however due. Policies aimed to promote 'national capitalism', most strongly embraced by Hungary after 2010 and involving government-backed loans, privatisation and favouring certain companies in public procurement, is unlikely to bring the desired results in terms of the emergence of nationally-led GVCs/GPNs, and will lead instead to ineffective 'crony capitalism' (Ágh 2015; Kornai 2015).

5. Conclusions

The aim of this paper was to review the challenges faced by investment promotion policies in the Visegrad 4 countries in the 'post-FDI' age, as well as to offer possible ways for responding to these. The paper grouped the challenges into three categories, relating to a) the changing competitive advantages of the V4, b) the questionable nature of the long-term development impacts of FDI, and c) the changing nature of multinational production, arguing that the investment promotion policies in the region have only partially adapted to these. Despite some changes, like targeting higher value-added investments, these policies are still very much 'stuck in the past' and influenced by the legacies of the 1990s, remaining focused on generating new, large investments, primarily in the manufacturing sector.

There are several actions that the V4 governments can take to better align their policies with the changing environment. Some of these, like improving the effectiveness of targeting policies or investing more in aftercare services, are within the realm of traditional investment promotion, and show how this policy area still has relevance in the post-FDI age. Many policies however are outside this realm, and this paper has argued that they have been neglected due to an excessive focus on promoting FDI. Industrial policy, education, and innovation support, are all policies which need a new lease of life in the region. The policy goals recommended in the paper for governments to pursue are summed up in Table 3.

Table 3 **Investment and other policy reforms for the post-FDI age**

Challenge	Policy goal
1. The changing competitive advantages of the V4	– Incentivise higher value-added investments through targeting – Promote upgrading among investors already present through aftercare and incentives
2. Increasing the long-term development impacts of FDI	– Promote linkages between foreign subsidiaries and domestic suppliers through aftercare and 'supplier programmes' – Support to SMEs for technological modernisation and R&D – Macro-level policies: increase market competition, enhance employee skills, education, and create an environment in which companies are incentivised to engage in R&D
3. The changing nature of multinational production	– Support national integration into GVCs/GPNs and similar policies promoting spillovers, but also focus on promoting foreign market entry with modalities not involving FDI – Support the development of nationally-led GVCs/GPNs

Source: compiled by the author

The paper has aimed to offer a broad view on potential V4 government responses to changes defining the post-FDI age. Due to this broad scope, it was unable to go into the details of how exactly the recommended policies could be developed and implemented. Each policy recommendation would need considerable amount of further research to ensure that they are truly feasible in the region, and will indeed lead to the desired outcomes. The paper should thus be seen as setting the agenda for this research, and its recommendations should by no means be seen as definitive solutions to ensuring that the V4 continue to be attractive locations for international business, or benefit from these investments.

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Chapter 8
The EU industrial policy and SME development in Central and Eastern Europe

Zhelyu Vladimirov

1. Introduction

The aim of the paper is to examine the effects of European Union (EU) industrial policy on small and medium-sized enterprise (SME) development in the new Member States (NMS) from Eastern Europe. It includes a short review of how EU industrial policy has evolved since the beginning of 1990s from a vertical to horizontal approach, and how these changes reflect on SME policy as part of overall industrial policy. The main thrust of the paper is that the effects of this policy on SME development in the new and the old Member States are unequal due to significant differences in their respective SME landscapes. The majority of SMEs in the NMS are younger, have less experience, and often work far from the technological frontier. For that reason, applying equal requirements to enterprises operating under unequal conditions leads to the reproduction, or even deepening, of the existing inequality. To be more precise, the EU initiatives for SME clustering and participation in global value chains (GVC) did not sufficiently contribute to improving SME competitiveness in Eastern European countries. The participation of SMEs from these countries in GVCs is concentrated predominantly in labour-intensive, low value-added manufacturing and services activities, while in many cases clusters are only important for project support.

These effects are explained by a neglect of the broader institutional and capability conditions required before an efficient horizontal policy can be implemented. Although the horizontal industrial approach prevails in the EU, it has also a sectoral dimension reflecting specific sector characteristics. At the same time, this policy neglects the specific institutional environment and capability shortages under which Eastern European SMEs operate. Building local capabilities requires huge investment in people and equipment, which many SMEs in NMS countries cannot shoulder alone. Weak technological capacity and the lack of sufficient state support explain why Eastern European SMEs are less prepared to follow the EU's innovation-driven industrial renaissance.

The paper thus concludes that industrial and SME policy in the NMS needs to be modified to reflect the specific situation in these countries. It means that SMEs should be supported by policies oriented towards both improving the institutional setting and developing innovation capabilities. Accelerating the catching-up process in Eastern European countries requires work to be done mainly on industrial upgrading, the adoption of new technologies, and skills development, rather than on immediate innovations. Therefore, SMEs in the NMS need dual support simultaneously – for innovation itself and for building innovation capabilities.

2. EU industrial and SME policies

2.1 Two types of industrial policy

The 'industrial sector' is made up of manufacturing enterprises, i.e. companies producing goods. It is also referred to as the secondary or the manufacturing sector, in contrast to the primary sector (raw materials) and the tertiary sector (services). The narrower meaning of 'industrial policy' (IP) reflects government efforts to encourage the development of part or all of the manufacturing sector. Some researchers, however, use the term in an extended meaning to encompass 'non-traditional activities in agriculture or services', as 'there is no evidence that the types of market failures that call for industrial policy are located predominantly in industry' (Rodrik 2004: 2). Bianchi and Labory (2006: 3) define IP as a set of government measures aimed at guiding the structural transformation of an economy to improve a country's industrial performance. Formally, this policy differs from 'competition policy'. However, as all government measures and policies affect industry in one way or another, 'boundaries between competition/industrial policy and other policies, such as technology policy, regional policy, structural policy, competitiveness policy, and even macroeconomic policy, are not always clear' (Pitelis 2006: 435).

After the end of the WW II, most governments adopted *active industrial polices* to stimulate post-war economic recovery. These policies included direct state support for industries, known as a '*vertical approach*' and combined with *state protectionism*. For example, France applied formal planning to support selected industrial sectors and build 'national champions' (Cohen 2007). A similar policy was used in Japan and other East Asian 'tigers'. The *vertical approach* implies the application of different measures to promote successful firms able to compete on international markets.

The neoliberal revolution of the 1980s put an end to this type of industrial policy. Based on the argument that the market is the only driver of production optimization, it accepted that 'the best industrial policy is none at all' (Schrank and Whitford 2009: 523). Since the beginning of 1990s, *new industrial (horizontal approach) policy* was designed to respond to globalisation challenges, a shift supported by the 'theory of clusters' (Porter 1998) and the global value chain (GVC) approach (Gereffi *et al.* 2005).

All developed countries have applied and continue to apply industrial policies *under different forms* (Chang 2003). For example, US industrial policy goes beyond upholding market competition and macroeconomic stability. It is rooted in a number of agencies addressing company-specific needs (Schrank and Whitford 2009: 537). In Europe, the term 'industrial policy' was replaced in the mid-1990s by 'competitiveness policies', and in 1999 the term 'enterprise policy' was coined as part of a competitiveness policy dealing with SME issues and later used as a label for that part of competitiveness strategy dealing with industry. The notion of 'enterprise policy' was subsequently dropped due to increasing EU concerns about '*deindustrialization*' (Pelkmans 2006: 54).

2.2 Changing European industrial policy

At the beginning of the 1990s, industrial policy in the European Community shifted from a vertical approach to facilitating *industrial clusters* and *innovation networks*. Instead of direct financial transfers to enterprises, the emphasis switched to R&D, innovation, and (clusters of) small firms (De Bandt 2006: 106). The new approach was defined in article 130 of the Maastricht Treaty, the Lisbon strategy, and subsequently developed in a number of the European Commission (EC) Communications: '*Industrial Policy in an Enlarged Europe*' (2002); '*Some Key Issues in Europe's Competitiveness - Toward an Integrated Approach*' (2003); '*Fostering Structural Change: an Industrial Policy for an Enlarged Europe*' (2004). The main goal of the new European industrial policy was to create an environment favourable to industrial development, and to overcome the negative effects of 'deindustrialization' (Pitelis 2006: 443-444).

Over the last two decades, Europe has experienced significant dismantling of its manufacturing sector, in terms of both its contribution to GDP (dropping from 18.5% in 2000 to 15% in 2012) and employment (with a total loss of 3.8 million jobs over the 2008-2012 period). The recent economic *crisis*, however, revealed the importance of the real economy, including industry. The EU manufacturing sector contributes disproportionately to exports (80%), productivity growth (60%) and innovation, accounting for 77% of business investment in R&D. In 2012, EU manufacturing companies employed 32 million people directly and approximately twice that number indirectly, mainly in SMEs (HLG-KET 2015: 6).

The new European industrial policy consists of three building blocks: *framework conditions*, the *horizontal* and the *sectoral dimension* (Pelkmans 2006). It 'combines a horizontal approach, aimed at ensuring cohesion and synergy among the various strategic sectors, with a *sectoral approach*, allowing the specific characteristics of the various sectors to be taken into account' (European Commission 2006). With its sectoral dimension, this policy thus contains some elements of the *vertical industrial approach*.

The EC recently recognised the importance of the manufacturing sector in its Communications on '*Integrated Industrial Policy for the Globalisation Era Putting Competitiveness and Sustainability at Centre Stage*' (2010) and '*A Stronger European Industry for Growth and Economic Recovery*' (European Commission 2012), asserting that 'Europe needs to reverse the declining role of industry in Europe for the 21st century. This is the only way to deliver sustainable growth, create high-value jobs and solve the societal challenges that we face' (European Commission 2012: 3). The EC confirmed its commitment to *reindustrialisation* as part of its efforts to increase industry's contribution to GDP to 20% by 2020 (European Commission 2014a). The main pillars of the new industrial policy include: 1) an integrated and unified European market; 2) industry modernisation; 3) SMEs and entrepreneurship; and 4) internationalisation.

2.3 SME policy as part of EU industrial policy

Until the 1980s, the SME sector was regarded as not being able to compete at international level. This policy began to change due to the decline of the Fordist production system, and the success of a few innovative SMEs. European SME policy was launched in 1983 with the first *Community programme for SMEs*. Since then, various programmes have been adopted such as '*Growth, Competitiveness and Employment*' (1993), the *Integrated Programme in favour of SMEs and the Craft Sector* (1994), and the *Integrated Programme for Small and Medium-sized Enterprises (SMEs) and the Craft Sector* (1996). European 'enterprise' policy now stresses the necessity to encourage an environment favourable to SMEs (Article 173, ex Article 157 TEC). This policy is *horizontal* in the sense that other policies need to take SME needs into account (Bianchi *et al.* 2006: 388).

The *European Charter for Small Enterprises* adopted in 2000 outlined 10 key priorities for developing the SME sector: education and training for entrepreneurship; cheaper and faster start-up; better legislation and regulation; availability of skills; improving online access to public authorities; getting more out of the Single Market; taxation and financial matters; strengthening the technological capacity of SMEs; successful e-business models and top-class small business support; and more effective representation of SME interests at EU and national level. In 2002, the MAP project – a project targeting enterprise clusters and networks – was launched, followed by the *European cluster initiatives (ECI)* in 2006. There has been a general tendency in promoting SMEs of favouring their clustering and their relationships with local institutions (European Commission 2014b: 14-17). The Zombori report (2013), however, found that only a minority of clusters had an internationalisation strategy, and only a minority of SMEs benefitted from internationalisation support.

The SME focus was strengthened under the *Competitiveness of Enterprises and Small and Medium-sized Enterprises* (COSME) programme and *Horizon 2020*. The COSME programme (2014-2020) marks a shift from cluster support towards the *internationalisation, competitiveness and innovation* performance of SMEs (European Commission 2014c: 42). These programmes also aim to increase SME access to financing through the *EU Finance for innovators (InnovFin)*. Promoting SME *internationalisation* is one of the main tasks of 'Enterprise Europe'. Essential for SME competitiveness is also their enhanced use of *ICT*, as set out in the Europe 2020 *Digital Agenda* (2010).

In general, EU industrial policy devotes considerable attention to SME development. SMEs are supported financially by the Innovation and Competitiveness Programme, the European Structural Funds and other initiatives. Framework conditions for SME development have been improved by the 'Small Business Act' (SBA) (2008) and the Entrepreneurship 2020 Action Plan *Reigniting the entrepreneurial spirit in Europe* (2013). The EU has thus adopted an integrated approach to SME development, though unfortunately it takes no account of the differences between SMEs in the new and old member states.

3. SME development in the new and old EU member states

3.1 Characteristics of the SME sector

The group of micro, small and medium-sized enterprises (SMEs) is made up of enterprises employing fewer than 250 persons and with an annual turnover not exceeding EUR 50 million, and/or an annual balance sheet total not exceeding EUR 43 million. Within the SME category, a small enterprise is defined as employing fewer than 50 persons and with an annual turnover and/or annual balance sheet total not exceeding EUR 10 million. A microenterprise is an enterprise with fewer than 10 employees and with an annual turnover and/or annual balance sheet total not exceeding EUR 2 million (Official Journal of the EU, L 124/36, 20.5.2003)

Compared to large enterprises, SMEs have certain *advantages*, including a higher degree of flexibility, a simple organizational structure, closer perception of consumers' needs, etc. This allows SME managers to respond quickly to market signals. Because of their smaller size, however, SMEs also have *disadvantages* in terms of fewer resources, lack of access to information, insufficient management capacity, difficulty in attracting high-skilled employees (due to lower wages and fewer career prospects), restricted access to financial capital, etc. (Cowling and Storey 2002).

The term 'SME' does not denote a homogeneous category, but instead is a convenient notion allowing a simplification of a more complex reality. The vast majority of SMEs serve local markets, important for providing the majority of jobs. A much smaller number operate on the international market and play an important role as innovation catalysts. In practice 'SMEs are very heterogeneous, ranging from the rural family activity based on subsistence production to a firm with several hundred employees that sells on all world markets and frequently innovates' (Bianchi *et al.* 2006: 381).

The important demarcation line in the SME sector is between enterprises whose main purpose is to provide income for the owner ('life-style' oriented) and those who aspire to growth (Poutziouris 2003). Storey (1994) reveals that the majority of small entrepreneurs are not growth-oriented, although fast-growing enterprises contribute more to creating jobs, especially during a recession (Henrekson and Johansson 2010). 'The SMEs that do grow strongly are also responsible for a disproportionate amount of innovation and new economic activity. These firms are more likely to invest, to export, to undertake R&D, and to drive change in the economy' (Tewari *et al.* 2013).

SME support policies often make no distinction between a growing or entrepreneurial SME and others. These policies are based on the criterion of size and not on whether the activity in question has the potential to spawn new areas of specialization (Rodrik 2004: 22). 'Ostensibly, many existing interventions and structures have not been able to offer tailor-made supporting measures to 'growth-inclined' and 'growth-ambivalent' SMEs to enhance their internationalisation performance' (European Parliament 2016: 19-20). Therefore, SME policies should aim at creating more innovative firms, the ones that grow fastest.

In 2014 the SME sector accounted for 99.8% of all enterprises in the non-financial business sector in the EU-28, employed almost 90 million people (67% of total employment), and generated 58% of non-financial business sector value added (VA). The vast majority of SMEs (93%) are micro-enterprises. Statistics rarely provide information on which micro-enterprises are 'one-man shops' (the self-employed), and which are companies with less than 10 employees. According to Róna-Tas (2005), the self-employed differ radically from entrepreneurs and should be regarded rather as workers without a boss. Their businesses contribute to their survival, but not much to the innovative development of the economy. According to the latest data (from 2012), businesses without any employees within the micro SMEs accounted for 59% of all businesses (European Commission 2016a: 8).

About ¾ of European SMEs are active in five key sectors: 'wholesale and retail trade', 'manufacturing', 'construction', 'business services' and 'accommodation and food services'. In the *manufacturing sector,* 99.2% of EU-27 companies are SMEs, accounting for 59% of employees, 45% of VA and 39% of sales. 'Manufacturing' is the most important sector for medium-sized SMEs, while 'wholesale and retail trade' is the most important one for micro and small SMEs in terms of VA, employment and the number of enterprises. Large enterprises create a higher share of VA in the 'high and medium/low tech manufacturing' sector, while SMEs create a higher share of VA in the services sector. The analysis found that 'particularly young firms active in knowledge-intensive service sectors and based in favourable macro-economic conditions were the main net job creators' (European Commission 2016a: 5).

These differences between the SME shares of total employment and valued added in the non-financial business sector reflect the fact that their activities are typically more *labour intensive*, while those of large enterprises are more *capital intensive*. Only two sectors (business services and information and communication) account for a larger share of SME value added compared to their share of total SME employment (respectively 13% and 11%, and 5% and 4%), while the manufacturing sector accounts for 20% of SME added value and 20% of total SME employment. Therefore, revitalising manufacturing requires a specific focus on increasing SME productivity and VA.

The European Competitiveness Report (European Commission 2014b) showed that SMEs' level of internationalisation remains low, a fact particularly true for one-man shops and young SMEs in traditional industries. Among the roughly two million manufacturing SMEs in the EU-28, 14.3% export goods to other EU countries and 9.7% to countries outside the EU. Export participation strongly reflects company size: 7.9% of micro enterprises, 37.5% of small firms, and 67.0% of medium-sized enterprises export to internal markets, compared to 85.4% of large manufacturing firms (EC 2014b: 81). SME size is thus crucial for export performance. Not only in Europe, but in most countries throughout the world, SMEs are responsible for less than half the value of gross exports (OECD and World Bank Group 2015: 21).

The number of exporting SMEs is highest in *manufacturing* (51.7%), followed by information and communication services (40.9%) and transportation (36.2%). The gap in export participation between SMEs and large firms is much less pronounced

in specific service industries, i.e. in information and communication services and in finance. Exporting is the preferred internationalisation mode for SMEs, and only very few European SMEs have foreign affiliates outside the EU/EFTA region – 1.2% compared to 11.4% of large firms (European Commission 2014b: 82, 85).

3.2 Differences between SMEs in new and old EU member states

SMEs are also important for the New Member States (NMS), although they differ significantly from their counterparts in the old member states. The majority of NMS SMEs are younger, have less experience, and often work far from the technological frontier. Most have emerged in traditional sectors with low entry barriers, and have followed survival strategies instead of growth paths. Not surprisingly, the economic contribution of SMEs varies significantly across member states. For example, in 2014 the number of SMEs per € million of VA generated in the non-financial business sector ranged from 2 in Luxembourg to 27 in Bulgaria. Overall, most Eastern European (CEE) countries are characterised by a high number of SMEs per € million of VA generated compared to Western European countries (European Commission 2016a: 9). Borbás (2014: 100-101) also shows decisive differences between SMEs in Austria and SMEs in Poland, Czechia, Slovakia, Hungary and Romania, with Austria clearly in the leading position.

For example, only 0.8% of Bulgarian SMEs operate in high-tech and medium-tech manufacturing industries (compared to the EU average of 2) and only 16% in the knowledge-intensive services sector (28% average in the EU). 95% of Bulgarian SMEs also show a *low level of internationalisation*. The greatest share of the country's exports stem from medium-low (36%) and low technological (21.4%) activities, compared to high (6%) and medium-high (19.4%) activities (Ministry of Economy and Energy, 2012). The share of new-to-the-market products in the industrial firms' total turnover is only 2.9%, while the share of new-to-the-company but not new-to-the-market products is 3.7% (NSI 2016).

No CEE country features among the EU innovation leaders, and only Slovenia is classified as a 'strong innovator'. Czechia, Hungary, Slovakia and Poland are classified as 'moderate innovators', while Bulgaria and Romania are 'modest innovators'. The Summary Innovation Index 2015 (relative to Germany) was equal to 38% for Bulgaria, 69% for Czechia, 56% for Hungary, 46% for Poland, 28% for Romania and 55% for Slovakia (the CEE average was 49%) (European Commission 2016b). Consequently, SMEs in leading EU countries have more capabilities, as they combine in-house innovation activities with joint innovation activities with other companies or public-sector organisations (European Commission 2016b: 23).

The data shows that, of all EU countries, only Finland, Sweden and Denmark exceed the 'Europe 2020' target of 3% R&D, while Germany and Austria both fall just short of it. The current average R&D intensity in the EU is around just 2%, while in nine EU countries it is less than 1%. Among the CEE countries, Slovenia has caught up with the EU average GERD ratio of around 2%, while R&D expenditure in other CEE economies is

systematically below the EU average (Eurostat 2015). The situation is similar in respect to the *Industrial Performance Scoreboard*, where none of the CEE counties feature in the well-performing clusters. Slovenia alone belongs to the moderate cluster, while all other CEE countries are in the catching-up cluster (European Commission 2013b: 5).

With respect to changing industrial structures, the EC has outlined *four groups* of countries. The *first group* is dominated by technologically advanced sectors, and consists of Austria, Belgium, Denmark, Finland, France, Germany, Ireland, the Netherlands, Sweden and the United Kingdom. The *second group* consists of countries where industry is specialised in less technologically advanced sectors: Cyprus, Greece, Italy, Luxembourg, Portugal and Spain. The *third group* comprises countries catching up in terms of GDP per capita, although they are specialised in sectors with a high innovation intensity and in technology-driven industries (Czechia, Hungary, Malta, Poland, Slovakia and Slovenia). The *fourth group* also contains catching-up countries, but ones specialised in technologically less advanced sectors (Bulgaria, Estonia, Latvia, Lithuania and Romania) (European Commission 2011: 4-5). As can be seen, the first two groups comprise 16 old EU member states, while the last two groups consist of ten CEE countries and Malta.

This means that the industrial structures of the old and new member states differ in terms of technological progress and innovation capacity, with more industrial enterprises, including SMEs, from the advanced groups better prepared to absorb EU financial and technical support, compared to those from the less advanced groups. For this reason, applying equal innovation criteria to enterprises operating under unequal conditions will, at least, reproduce the existing inequality, if not deepen it. Borbás (2014: 101) considers that if no new policies are initiated or specific measures taken soon, the *gap* between Western and Eastern European SMEs will widen further. The European Commission (2013a: 5) has already noted that '*differences in innovation performance* in the EU have started to increase, signalling a possible halt to convergence in Member States' innovation performance'. This suggests that the current innovation policy may not properly reflect countries' level of innovation capacity.

In summary, industrial and SME policies in the NMS have followed a pattern similar to that of EU policies (switching from a vertical to a horizontal approach), but under *unequal conditions*. While the horizontal approach has replaced key industries' previous reliance on state support, it has not led to any significant industry upgrading. The question arises as to what extent CEE enterprises are able to participate in the new world of super-advanced industrial development. Given their technological and skill deficits, to what extent can they contribute to the development of space technology, clean motor vehicles, nanotechnologies and bioengineering innovation? (Bartlett 2014: 36). As EC general guidelines are not issued specifically to serve the interests of SMEs from this peripheral EU region, there is a need for specific solutions to upgrade these SMEs.

4. Effects of EU industrial policy on Eastern European SMEs

It is difficult to examine the effects of EU industrial (and SME) policies on SME performance, because so many factors are at play (Bianchi *et al.* 2006: 385). Evidence shows that SMEs can improve their performance via two strategies: go it alone or become part of a local *cluster* and/or a *global value* chain. The cluster approach assumes that upgrading is driven by local firms and institutions, while the GVC approach views this upgrading as a result of participating in GVCs (Humphrey and Schmitz 2002: 1020).

4.1 Effects of SME clustering initiatives

Although some clusters have performed relatively well over last decades, they are experiencing significant difficulties with globalization. For the archetypical *industrial districts* in Northern Italy for instance, globalization has created intense pressure from competitors in Asia and Eastern Europe. Certain activities have been outsourced, and there are serious concerns that this will undermine the basis of this traditional industrial region (Porter and Ketels 2009: 172).

While successful clusters emerge from grassroots, many efforts to create clusters from above have failed. The main factor distinguishing successful clusters is the level of *social capital*, a factor including existing norms, networks and social confidence (Putnam 1993). The *confidence* embedded in social relations is the most important factor for clusters to succeed. But this is exactly what is *lacking* in many CEE countries, a deficit characterised by the lower quality of their institutions rather than any lower trustworthiness of members of society (Lissowska 2013). Without trust, SMEs *restrain from collaborating* with other businesses, associations and local authorities.

Researchers highlight the significance of clusters for SME growth (Hagen *et al.* 2012), but there is not much empirical proof of transitioning countries showing any positive signs of cluster effects (Karaev *et al.* 2007). For example, clusters in the Eastern part of Romania have been identified as being local and dependent on natural resources rather than made up of trading industries (e.g. wood, textiles, tourism, etc.), as being based on horizontal relations (e.g. clothing, wood, metallurgy, etc.) rather than vertical ones, and as being latent or potential rather than working clusters (Constantin *et al.* 2011). Similarly, Akbar and Ferencikova (2007: 248-249) found that, in Slovak automotive sector clusters, many of the companies surveyed were not really functional. There is little intentional technology transfer from MNEs to their suppliers, as well as little evidence of cooperation in such areas as marketing, export promotion or investment. With the exception of a local market for skilled workers, the supplier sample displayed few of the cluster attributes identified in the extant literature. According to Gîrneaţă and Maşcu (2014), the striking aspect of the textile clusters in the six CEE countries is that they belong to the 'Moderate and Modest Innovators' category.

The Mawell Stamp PLS (2012: 40) research on the *EU Best Practice in Cluster Development Policy* commissioned by the Government of Croatia revealed that the key lesson is the need to put a strong emphasis on innovation within clusters. 'The cases have

all shown that, although networking amongst SMEs is important, the primary thrust of clustering should be to strengthen *technology transfer and innovation*'. Therefore, to cope with the new challenges clusters have to move towards higher quality, based on knowledge and innovation. Today's successful clusters are those which base their production on technological frontiers and actively participate in GVCs (Humphrey and Schmitz 2004). According to Nadvi and Halder (2005), linkages external to the local cluster but internal to the value chain in areas of complementary and new knowledge are of key importance to succeed in GVCs.

4.2 Effects of SME participation in GVCs

In the early stages of transition, economic growth depended on the speed and effectiveness of privatisation, while in subsequent phases FDI played an important role. During the transition process, Czechia, Hungary and Poland were the most attractive FDI destinations. 'In 2000, these three countries received 76.36% of the total FDI that went to the region, while in 2011 this was 70.21%' (Török *et al.* 2013: 20). In the period between 1995 and 2008, FDI to Romania and Bulgaria continually increased as well. However, after 2009, it dropped considerably in all these countries. Generally speaking, FDI can have both a positive and negative impact on local SMEs (Drahokoupil and Galgóczi 2015: 24). The negative impact refers to increased product market competition, which threatens the survival of local SMEs, while the positive effects are related to SME inclusion in GVCs and knowledge spillover.

According to Gereffi *et al.* (2005: 78) there are five types of GVC governance – hierarchy, captive, relational, modular and market – relating to the level of coordination and power asymmetry. In all types of GVCs, local producers can learn from global lead companies about how to improve their processes, and there is also scope for functional upgrading. Kaplinsky and Readman (2001) argue that, through accumulating international experience, most SMEs can move from low value-added to high value-added, knowledge-intensive production and high return rate of ODM (original design manufacturer) or OBM (original brand manufacturers). Moving up the GVC hierarchy relies on the assumption that local firms can upgrade their knowledge and increase their productivity through 'learning from global buyers'. The ability of small firms to move to 'high-end' GVC activities depends on their *absorptive capacity* and government support (Palit 2006). For example, the more advanced CEE countries have been successful in boosting exports in higher-end technology industries, while less advanced ones have continued to grow exports in lower-end technology industries (Damijan *et al.* 2013).

In *captive* value chains, however, small suppliers are much more dependent on larger buyers. Bearing in mind that many CEE manufacturing SMEs work as subcontractors to large EU and other world buyers, factors hampering their technological upgrading like *power asymmetries* are not much discussed. 'Captive inter-firm linkages control opportunism through the dominance of lead firms, while at the same time providing enough resources and market access to the subordinate firms to make exit an unattractive option' (Gereffi *et al.* 2005: 87). Consequently, many of the upgrading activities supported by buyers may be related to their appropriability strategies, rather

than to providing innovation opportunities to local producers (Morrison *et al.* 2008). Bazan and Navas-Aleman (2004: 115) found that 'buyers have resisted sharing their knowledge on higher valued added activities such as design, branding, marketing and chain coordination'. It is this power asymmetry which often prevents local suppliers from benefiting from global buyers in terms of innovation upgrading.

Staritz and Plank (2013: 4) have shown the limits of the conventional view of economic upgrading as a process where local firms 'learn from global buyers' and subsequently move up the VA hierarchy. This ideal trajectory is but one of many possible outcomes resulting from participation in GVCs which in a worst case may even lead to economic 'downgrading'. Their analysis revealed that the potential positive effects from MNE investments in Hungary and Romania, as reflected in the relevance of local linkages and knowledge spillovers, have remained *low and below expectations*. Besides the often cited 'lack of capacity' of local firms, the common industry practice of negotiating supply contracts at global level between headquarters leaves little room for local suppliers (Staritz and Plank 2013: 15). This business model, which relies heavily on imported inputs manufactured by established foreign-owned suppliers that relocate with the MNEs, might be one of the key reasons for the *limited integration* of local firms in electronics GPNs. Additionally, the strategic interest of MNEs may not allow any greater involvement of local suppliers beyond the provision of non-core products and services. For example, Akbar and Ferencikova (2007: 246, 248) found a mixed bag of 'spillover' prospects for local producers in the Slovak automotive cluster. MNEs appear to maintain *tight control* over relations with their suppliers, offering little technology transfer, restraining options regarding to whom suppliers can sell and restricting the use of multiple company tendering.

Baldwin (2012: 6-7) considers that current GVCs include 'headquarter' economies (whose exports contain relatively few imported intermediates) and 'factory economies' (whose exports contain a large share of imported intermediates). There is a hub-and-spoke asymmetry in the dependence of factory economies on the headquarter economy's intermediate exports. If Germany is the hub in Europe, CEE countries belong to the factory economies due to the relocation of lower technology intensive stages of production to them. The offshoring of lower value-added stages of production (assembly, fabrication stages) has led to a deepening of the so-called smile curve, while preserving high value-added stages (product specification, design, R&D, sales, marketing and after-sales services) at home. The GVC participation of CEE SMEs is concentrated in labour-intensive, low value-added manufacturing and services activities, where entry costs are lower. Therefore, the inclusion of CEE countries in GVCs through FDI has resulted in a spatial assignment of skill-intensive stages to high-wage nations and labour-intensive stages to low-wage nations, i.e. 'headquarter economies' offshoring to 'factory economies' (Baldwin 2012: 13-14).

Today, CEE countries operate mainly as *manufacturers of intermediate goods* within GVCs, contributing to the increase in the share of manufactured products in their exports from 80% in 1999 to 85% in 2013 (Bierut and Kuziemska-Pawlak 2016: 12). At the same time, over the 1995-2011 period, the manufacturing share of domestic VA in gross exports declined in most CEE countries, meaning that they are not moving up

the GVC ladder. The other problem in these economies is the lack of linkage between the manufacturing sector and services, i.e. manufacturing does not serve as a 'carrier function' for services to contribute to a country's export performance (Olczyk and Kordalska 2016: 20). Not surprisingly, the share of high-tech exports in total exports from the region remains more than 10 p.p. below that of more advanced EU countries, with the exception of Hungary (Bierut and Kuziemska-Pawlak 2016: 16). Generally speaking, CEE exporters are located more in *downstream production segments* than in upstream markets (Cieślik 2014: 25).

5. EU industrial policy and challenges for Eastern European SMEs

Now that the crisis and FDI period are over, the issues of innovation and the knowledge economy have moved up the agenda in CEE countries. Adopting a sectoral industrial approach, the EC has identified specific high-tech sectors to be supported through implementing advanced technologies, employing highly qualified workers and promoting innovation. *Innovation is thus at the heart* of both the horizontal and sector-specific approaches found in the new EU industrial policy. 'The pace of innovation is a key factor determining the potential of industries that are intensive in both technology and human capital and which play a significant role in Europe' (Heymann and Vetter 2013: 12). Innovation is stimulated by various external and internal conditions. While the former refer to the institutional and business environment, the latter reflect a company's capabilities in terms of knowledge, human capital and absorptive capacity (Bianchi and Labory 2006: 20-21).

5.1 Institutional challenges

Researchers have found that the *effectiveness of decentralizing industrial policy* presupposes the existence of *well-functioning markets*, an *entrepreneurial class* and the *institutional framework* needed for its implementation (Pitelis 2006: 446). Also important is the promotion of *attitudes, values and culture conducive to innovativeness*. This is evidently not the case in some CEE countries. Based on their analysis of a number of contextual restrictions, Sepulveda and Amin (2006, p. 333) concluded that 'building the baseline conditions for a decentralized policy framework is demanding and not open to easy or quick policy fixes'. This is because a culture of cooperation matures over decades. In a context of institutional uncertainty, small firms in particular see innovation as a high-risk activity vis-à-vis cutting labour costs and avoiding regulation and tax compliance (Sepulveda and Amin 2006: 330).

For this reason, any emphasis on innovation-driven growth is confronted with significant differences in SME capacities between countries with different institutional, business and physical environments. For example, the *national innovation systems* in old EU member states are geared towards meeting demand from companies (European Commission 2016b: 23), while those in the NMS are still in the process of creating ticker relationships with businesses. SME performance is also affected by the quality of physical infrastructure, such as roads, ports and airports, as well as the efficiency of their

operations (OECD and World Bank Group 2015: 60). Merely improving the transport infrastructure in the NMS is a challenge requiring significant investments (European Commission 2011: 9).

Significantly weaker in the NMS is the capacity of *public administrations* to deliver high-quality public services. E-government initiatives have been undertaken, but businesses in many of these countries still suffer from a lack of one-stop-shops. The literature also highlights the role that *local governments* play in providing 'a framework in which clusters of SMEs can flourish' (Humphrey and Schmitz 1996: 1861). Competent bureaucracies, however, are a *scarce resource* in many CEE countries.

Therefore, one of the limits to the 'horizontal' approach is the *lack of broader institutional conditions* required before any decentralized policy can be implemented. Analysing the EU's industrial renaissance strategy, the Confederation of Independent Trade Unions (CITUB) in Bulgaria arrived at the conclusion that the EC *Industrial Renaissance* report did not take into consideration institutional differences between old and new EU member states. For example, the measure to improve SME access to financing through issuing securities would hardly help CEE enterprises, given the relatively underdeveloped capital markets in certain CEE countries (CITUB 2014).

In summary, NMS enterprises – and particularly SMEs – operate in a less friendly environment (business, institutional, and physical) than their counterparts in the old member states. These institutional differences call for a careful evaluation of the thresholds of critical mass necessary for decentralization such as the number and types of firms, technological capacities, social and human capital, institutional quality and physical infrastructure. Improving SME innovation capacity in CEE countries thus requires a *mix of policies* specifically addressing these local challenges rather than a single policy instrument.

5.2 Capability challenges

There are cases where highly innovative SMEs can internationalize directly ('born global'). The majority of SMEs, however, i.e. those relying primarily on cost or specialised in certain types of services, are more likely to participate in GVCs as domestic suppliers (OECD and World Bank Group 2015: 22). Local companies' lack of technological and organizational *capabilities* is highlighted as a key obstacle to supplier integration. Indeed, many CEE SMEs do not meet the size and quality requirements necessary to qualify as MNE suppliers. In particular, *the missing layer of medium-sized firms* with appropriate technological capabilities and financial strength is generally pointed out as a major obstacle (Staritz and Plank 2013: 14).

These limits to SME upgrading may however be temporary, as chain governance is a dynamic process. If local producers can develop new capabilities, this can change power relationships within a chain. One basic requirement for upgrading is 'the strategic intent of the firms involved. Without intra-firm investment in equipment, organisational arrangements and people, no substantial upgrading of any kind is possible' (Humphrey

and Schmitz 2002: 1024). Gereffi (1999: 55) demonstrates that East Asian countries, after entering GVCc as first-tier suppliers of large buyers, evolved into full-package suppliers and 'thereby forged an innovative entrepreneurial capability that involved the coordination of complex production, trade and financial networks'. This success was made possible by extensive organizational learning at company level. Therefore, although external sources of knowledge are essential, the most important factor is the creation of internal technological capabilities. Lall (2006: 95) similarly concludes that the success of East Asian countries would not have occurred without developing *local capabilities*. Building local capabilities requires huge investment in people and equipment, which many SMEs in CEE countries cannot afford alone. The only way to increase SME innovation capabilities is through major government support. However, with the withdrawal of the state from the economy, the majority of local CEE enterprises are falling into a state of dependency, becoming increasingly peripheral parts of large multinational alliances (Chlumský 2002: 4).

Except for the East Asian examples, there are few other success stories on how local companies bound to GVCs succeed in upgrading from a captive situation to a higher-value-added form of exporting. All these examples stress the fact that *increasing supplier competences* has been the main driver behind this shift (Gereffi *et al.* 2005: 99).

The weak technological capabilities and the lack of state support explain why CEE SMEs are less prepared to follow innovation-based EU industrial renaissance policy. The NMS 'face significant challenges, as they move towards more knowledge- and skills-oriented industries, even if it is hampered by weaknesses in innovation capacity and knowledge transfer' (Török *et al.* 2013: 19). Additionally, changes in the MNE approach to local suppliers (selecting and sticking to a few 'half-tier' suppliers) is limiting the impact on the host economy and on host country suppliers.

6. Conclusions: modifying industrial policy in CEE countries

Although current EU industrial policies do not allow a return to old-style policies (involving direct state support to industries), it appears that certain elements of old-style industrial policies are particularly *useful at earlier stages* of development (Bianchi and Labory 2006: 24). Rodrik (2004: 15) argues that 'industrial restructuring rarely takes place without significant government assistance'. In the same vein, Shafaeddin (2008: 16) considers that both selective and functional government interventions are required to address obstacles to 'capability building'.

There is a growing consensus that state interventions are often necessary when market failures prevail. Economists recognise that public measures can boost certain development factors, which market forces alone cannot generate. Government programs need to subsidize SME capability development in terms of quality, innovation, training, R&D, networking, infrastructure investment, adaptation of foreign technology to local conditions, risk and venture capital, and so on. The advantage of such cross-cutting programs is that they span several sectors at once and directly target market failures (Rodrik 2004: 23).

A stronger argument for modifying industrial policies in the CEE countries is provided by the (neo) Schumpeterian growth theory (Aghion and Howitt 1998), under which successful innovation policies should take the *technological level* of individual countries into account. The CEE countries are operating as peripheral economies in terms of technology generation. Consequently, a single policy may not be effective in countries at very different distances from the world technology frontier. In less advanced countries, technology transfer and non-R&D innovation activities are more important drivers of innovation. Therefore, increasing the level of technology transfer and absorptive capacity through R&D and training should be a priority in these countries (Kaderabkova and Radosevic 2011: 2-3).

This raises the question whether unconditional government support for FDI is justified or whether government resources could not be better used on more proactive policies aimed at building up *local industrial structures* (Staritz and Plank 2013: 19). The identified low level of technology transfer from MNEs to local suppliers undermines one of the main policy arguments in favour of host governments encouraging FDI in Slovakia (Akbar and Ferencikova 2007: 259). Olczyk and Kordalska (2016: 20) argue that CEE industrial policies will have to be *modified* to improve CEE positions in GVCs. This involves introducing measures to facilitate the inclusion of SMEs in the early (research, conception and product design) and final (sales, marketing and distribution services) stages of GVCs. The OECD and World Bank Group (2015: 34) conclude that improved upstream integration in Mexico and Hungary could be achievable through *upgrading the SME* population to meet the quality standards and specifications of exporting firms.

The *policy implications* of these conclusions point to the necessity of: (1) increasing skill levels and R&D, thereby indirectly boosting SME export activities; (2) helping SMEs improve the quality of their products and services; and (3) stimulating SMEs to collaborate more with large foreign firms (European Commission 2014c: 95). Increasing SME productivity in current tasks can be achieved through capacity upgrading, and not necessarily through market innovations. Veugelers (2015: 23) also considers that 'more emphasis in innovation policy on supporting the *absorption and adaption* of existing frontier technologies by industry would make more sense for the EU countries in catching-up mode. Particularly for countries in less advanced innovation development phases, more attention to stimulating the quality of *human capital* formation and supporting firms' incentives to adopt *new technologies* would be more effective rather than supporting creative capacity building to improve the country's innovation potential.'

CEE countries have specific innovation strengths and weaknesses, which call for the development of customized policies and not the blinkered application of a 'Europeanized' policy approach (Reid 2011). This means that SMEs should be supported by *policies* oriented towards both improving the institutional environment and developing innovation capabilities. It is not enough to transpose EU directives into national legislation, as many CEE countries need additional measures to enforce this legislation. Moreover, support for SME innovativeness should be concentrated more on *innovation capacity development* rather than on immediate innovations. SMEs need simultaneous dual support – *for innovation itself and for their capacity to undertake innovation*. Therefore, accelerating the catch-up process in CEE countries presupposes

the implementation of policies devoted primarily to *industrial upgrading, the adoption of new technologies and skills development*. Such policies were applied as state aid, regional cohesion and trade policies in advanced EU countries 10 or 20 years ago (European Commission 2006).

Aghion and Akcigit (2017: 65) consider that the EC has been remarkably effective in limiting the scope of state aid. They recommend that the Commission move from a legalistic '*ex ante*' approach to sectoral state aid to a pragmatic '*ex post*' approach where state aid is only sanctioned when it can be proved that it reduces market competition. Otherwise, the application of the *same measures* to boost competitiveness through innovation will boost the competitive edge of companies from more advanced EU countries, without any significant impact on less competitive firms from less advanced countries. To be successful, EU industrial and SME policies should take greater account of the identified differences (1) between SMEs in more technologically advanced and catching-up member states; and (2) inside the group between life-style and growth-oriented SMEs.

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