

# Industry 4.0 and FDI CZECHIA

Josef Bič, Jana Vlčková

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## 1. Introduction

The role of manufacturing in Central Europe and Czechia, in particular, belongs to the highest in terms of employment as well as its contribution to GDP. The major advantages of Czechia have been geographic location, cheap labor costs, industrial tradition and neoliberal policies (Drahokoupil, 2009). FDI inflows played important during the transformation period. Currently, the stock of FDI inflows accounts for 67 % relative to GDP.

Industry 4.0 is about to change the production process substantially. Higher automation can make cheap labor costs less important. It will affect manufacturing, but middle-skilled jobs in services (e.g. accounting) can also be at risk. Such changes can have significant impact on domestic and foreign-owned companies in Czechia and inflow of foreign direct investment.

The aim of the report is to explore whether technological changes (Industry 4.0) can affect FDI inflows to Czechia. This is largely dependent on the motivation for investments. Whereas in case of services, market-seeking motive dominated in Czechia, in case of manufacturing most of the investments were destined for export production taking advantage of low production

costs, geographic proximity of affluent markets as well as integration to the EU (Pavlínek, 2018). Therefore, this sort of investment can be at bigger risk. Automation and digitization could reduce new foreign investment and also lead to relocation of existing production of foreign subsidiaries to other countries (possibly also to home countries, so called backshoring). On the other hand, ongoing shortening and restructuring of supply chains, which will be speeded up by the Covid-19 pandemics could also mean relocation of some production from Asia to Europe and possibly Czechia. In previous years, we have also witnessed investment to research centers of MNEs providing evidence, that Czechia is no longer only suitable for low- or medium-skilled manufacturing production. Therefore, the situation is somewhat unpredictable.

Despite of that, we will try based on quantitative data (FDI, digitization level and other indicators), and qualitative surveys assess the possible impact of technological changes on FDI inflows to Czechia. The paper is divided three parts. In the first one we analyze the trends in FDI inflows to Czechia. The second one is focused on existing research on Industry 4.0 in Czechia. The third part describes the results from our interviews. In the concluding part, we sum up the findings from the whole paper.

## **2. FDI in Czechia**

The FDI has played major role in the global economy as well as in Central Europe in the last 30 years. Between the second half of the 1980s, until the financial crisis in 2008 FDI has grown faster than trade (Dicken, 2015). This has been accompanied by increasing interconnectedness of countries. Since the financial crisis, the FDI flows have weakened due to slowing pace of trade, introduction of protectionist measures as well as more widespread “asset-light” investment (UNCTAD, 2019). Foreign capital plays an important role in Czechia and other Visegrad economies and FDI was viewed as having a critical role in economic modernization in the region (Lankes et al., 1999).

Post-communist Central European countries have had a tradition in producing final products, nonetheless these products were mostly sold on "protected" markets of other communist countries and had low technological sophistication. Such products were uncompetitive on Western markets. Therefore, in the early stages of transformation, Visegrad countries exported especially commodities and natural resources. After the steep decline of the machinery exports

in the early 1990s, there was a steady increase since the mid-1990s. More manufactured goods were traded, with a growing share of human-capital and technology-intensive products (Hotopp et al., 2002). This has been associated with the entry of MNEs which focused mainly on the production of inter-mediate for export (Myant and Drahekoupil, 2013).

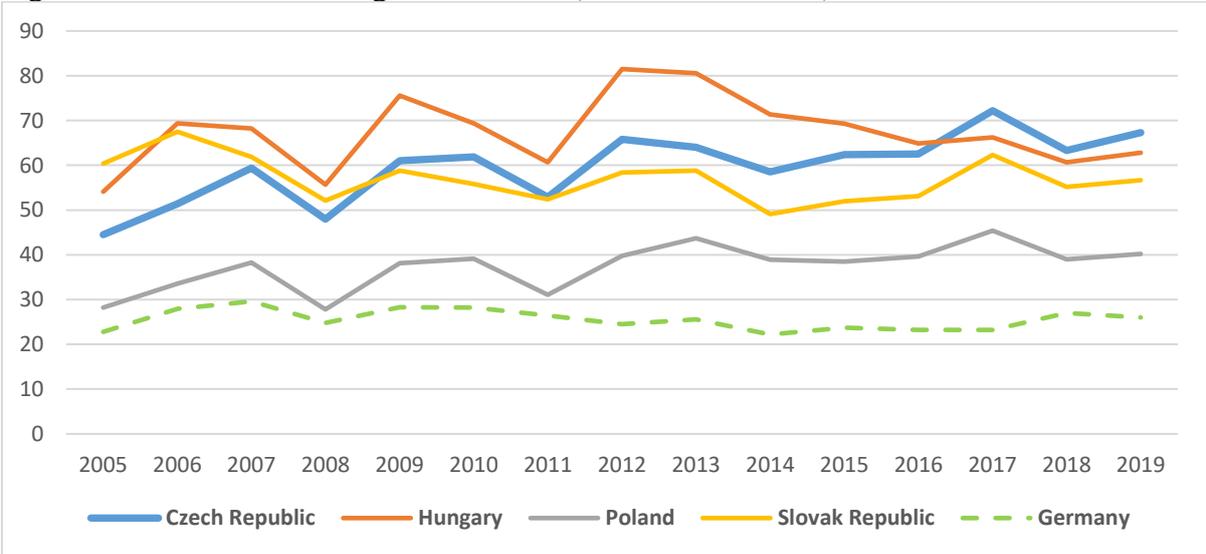
Czechia had an open policy towards FDI since the mid-1990s and started to offer investment incentives in 1998. The more positive view towards FDI compared to the early 1990s was to large extent related to failures of domestic mass privatization and later to the banking crises. Further, greenfield investment was welcomed in regions with high unemployment. At the same time post-communist Central European countries were viewed as attractive locations for investment with good ratings, they attracted FDI and some of the production from EU15 countries was relocated to V4 countries. This was also connected with the availability of capital in the global economy in the pre-crisis period, EU accession and liberal regulation in these countries. The overall positive attitude towards FDI in the Visegrad group in the 1990s and early 2000s led to competition among CEE countries over FDI inflows (Pavlínek, 2004). With upcoming EU accession, the majority of FDIs in manufacturing was directed towards export-oriented production taking advantage of relatively skilled and cheap labor forces (Pavlínek, Domański, and Guzik, 2009). Many factories in the electronics and automotive industries were relocated to Visegrad countries due to cost-cutting motives (Humphrey and Memedovic, 2003). For example, between 1990 and 2006, foreign automakers and component suppliers invested more than \$34b in CE (Pavlínek, Domański, and Guzik, 2009).

Czechia is a small open economy. Such economies produce, in general, less intermediate inputs domestically than large economies and are often heavily involved in international sourcing. Czechia is thus to large extent integrated to global production networks and its participation in these networks belongs among the highest in the world (Vlčková, 2017). The FDI now play a significant role in Czechia and other Visegrad economies. FDI stock reaches 67% of GDP and foreign firms accounted for 62% of value added in manufacturing in 2016 (OECD, 2019). Due to the large role of FDI and foreign ownership in Visegrad countries, decisions are often being taken externally – in other countries. The economies of Eastern Europe have been identified as a new variety of capitalism – dependent market economies (Nölke and Vliegenthart, 2009). In the early stages of transformation FDI was viewed as "the engine of growth" in transition countries (e.g. Lipton et al., 1990). However, the impacts of FDI on economic growth, employment and innovation in Czechia and Visegrad countries have not only been positive and

among others led to downgrading, poaching of workers from local companies and many others (e.g. Pavlínek, 2012; Pavlínek and Žížalová, 2014).

Linkages between foreign subsidiaries and domestic firms are crucial for creating jobs and production and especially for knowledge transfer (Blömostrom and Kokko, 1998; Giroud & Scott-Kennel, 2009). In Visegrad countries MNEs became more integrated into local economies with rising local linkages, despite differences between countries and industries (Pavlínek, 2018; Plank and Staritz, 2013). Large dominance on foreign capital is also undesirable. It makes economies dependent on external decisions and might reduce the autonomy, because the goals of MNEs and states are often conflictual (Dicken, 2015). It limits the value capture and control and makes economies also dependent on foreign technologies (Smith et al., 2002). Last but not least, it increases the likelihood of cost-driven relocations. The quality and quantity of linkages of MNEs in host economies play thus crucial role not just for economic development of host locations but also in terms of location decisions of MNEs (Pavlínek, 2018). Reasons for location decisions are complex and include multiple factors, among others costs of production (labor costs, taxes, costs of inputs) and logistics. Relocations are associated with high sunk costs, and relocations to lower-cost locations are the least likely (Dicken, 2015). Therefore, companies employ several restructuring strategies including downsizing, automation, outsourcing and other forms of corporate reorganization (Clark and Wrigley, 1997). In Czechia and Slovakia wage gap to Western Europe, sunk costs, supplier relations and skilled labor were the main reasons why automotive MNEs were not planning relocations (Pavlínek, 2020).

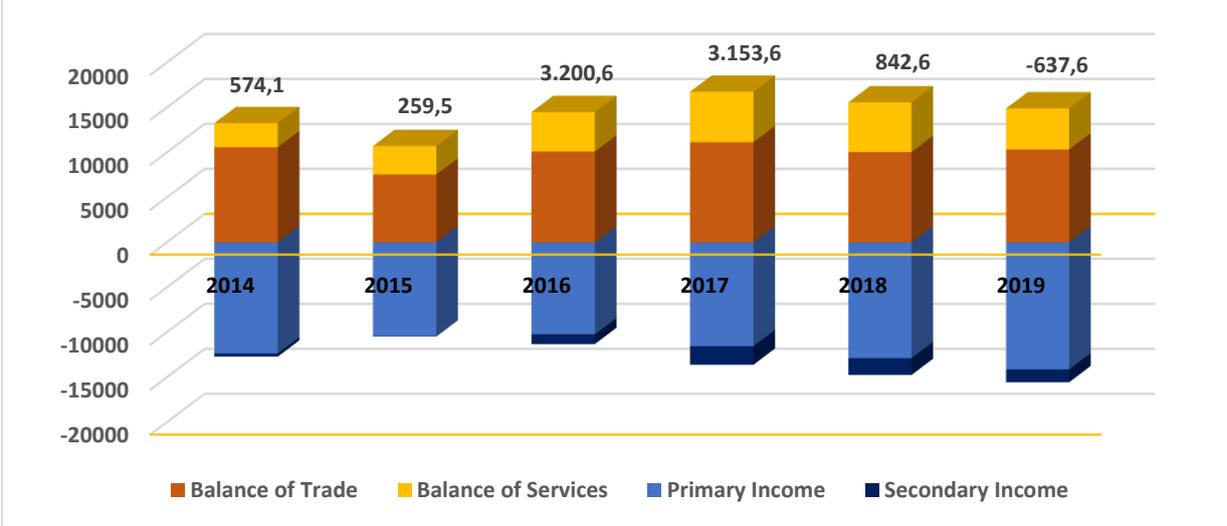
Figure 1: FDI Stocks in Visegrad Countries (Inward, % of GDP)



Source: own construction based on OECD (2020a)

The importance of foreign capital for each country can be seen from the above chart. FDI reaches over 50% of their GDP in three of the four V4 countries. Regarding Czechia, the volume of the inward FDI stock shows a growing trend within the countries surveyed. Moreover, the share of our inward FDI stock to GDP is the highest for the last three years in comparison to other Visegrad countries. This Czech dependence on foreign capital started at the end of the 1990s after the investment promotion system was introduced (see above). The intention was to change a structure of foreign capital inflow. It was expected to support the stabilization of the Czech economy in terms of the positive effects associated with FDI from the inflow of foreign capital, because portfolio investment (only motivated by short-term profits) had flowed primarily into the Czech economy before the above mentioned institutional change. The significant increase in FDI is thus apparent after 1998, which also contributed to the stabilization of the Czech balance of payments (current account deficit coverage).

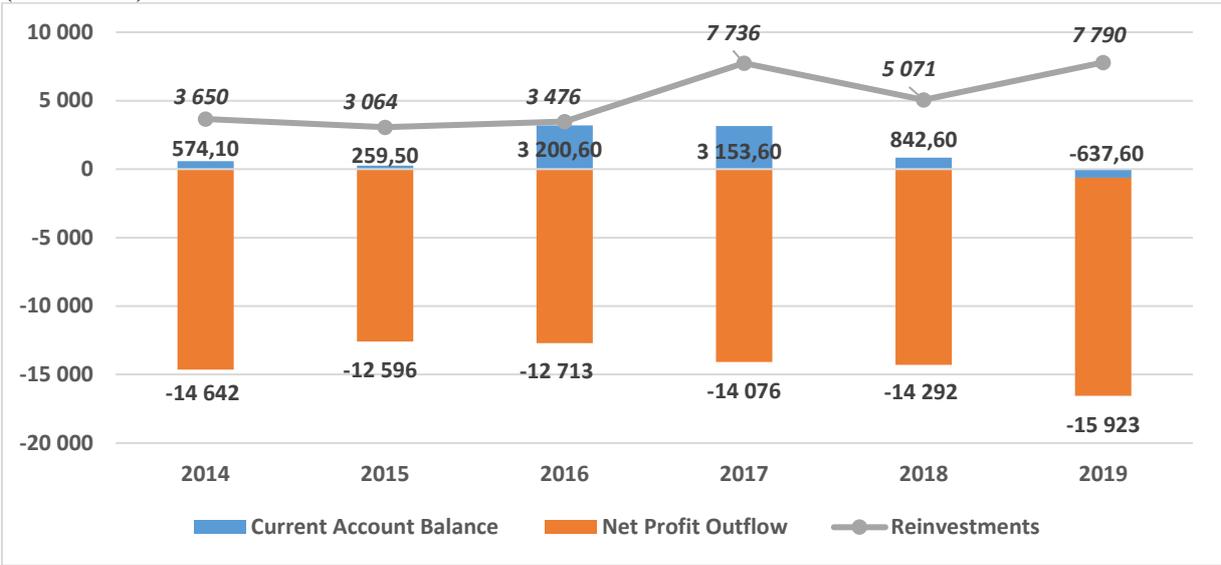
Figure 2: Structure of Current Account Balance of Czechia (mil. USD)



Source: own construction based on ČNB (2020)

Czechia also shows another specific feature characteristic for transition countries. This is a strong disparity between the inward and outward stock of foreign investment. Thus, Czechia differs significantly from the model of Western European economies, which has great consequences for the balance of payments, resp. Czech net investment position. While the trade (goods and services) balance has shown a growing surplus since our accession to the EU, the overall current account balance is limited by the outflow of profits abroad. Current Account Balance of Czechia ran a surplus after 2014. However, we have again reported a current account deficit since 2019 according to OECD (2020b), which may again re-open a critical debate about the high role of foreign capital in the domestic economy.

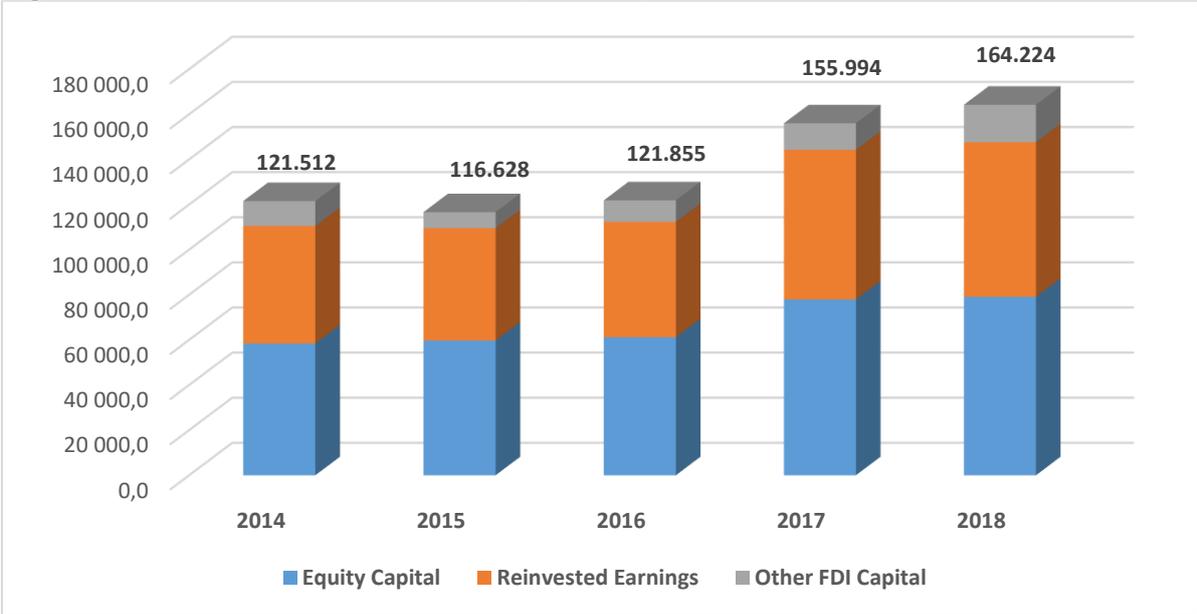
Figure 3: Profits outflow and the current account balance of Czechia in relation to reinvestments (mil. USD)



Source: own construction based on ČNB (2020)

However, one important fact must be considered. While until 2002 the inflow of new investments, so-called equity capital, had been dominant in the total FDI flows (mainly due to the privatization process), afterwards relative importance of reinvested profits has increased. At present, the shares of inflows of new investments and reinvestments are even (ČNB 2020). Furthermore, while the share of foreign ownership in the total production of Czechia was less than one tenth in the mid-1990s, it currently generates about a third of gross value added, less than half of total turnover and even two thirds of all Czech companies' profits.

Figure 4: Inward FDI Stock in Czechia (mil. USD)



Source: own construction based on ČNB (2020)

We also analyze the relevant territorial and sectoral structure of the stock of incoming FDI. These links may predetermine Czech vulnerability to the implementation of Industry 4.0 features due to territorial involvement in global production networks and differences between economic sectors. However, in today's globalized world, it is very difficult to identify the national domicile of foreign investors. Firstly, due to the complex ownership relations within the multinational enterprises (MNEs) and also due to the use of national domiciles of countries that are attractive, for example, for low-tax or low-regulatory reasons. Therefore, we use OECD (2020d) statistics that distinguish between immediate and ultimate counterparts.

Table 2: Czech Inward FDI positions by main partner country (BMD4, % of total FDI)

Ranking (2018)	Immediate counterpart					Ultimate counterpart						
	Country	2014	2015	2016	2017	2018	Country	2014	2015	2016	2017	2018
1	Netherlands	24	24	23	20	19	Germany	25	24	21	20	20
2	Luxembourg	12	12	12	15	17	Czechia	6	8	8	14	18
3	Germany	13	13	14	16	16	Austria	11	10	10	9	8
4	Austria	13	13	11	10	10	France	7	8	9	8	8
5	France	6	8	8	7	7	Netherlands	5	5	7	7	7
6	Switzerland	5	4	4	5	4	USA	8	8	7	7	6
7	Cyprus	4	3	4	4	3	Switzerland	3	3	4	4	4
8	Slovakia	4	3	3	3	3	Italy	4	5	5	4	4
9	Italy	1	1	3	3	3	UK	5	5	5	4	3
10	Poland	1	2	2	2	3	Belgium	4	4	4	3	3
11	UK	3	4	3	3	2	Cyprus	3	3	3	3	3
12	Belgium	3	2	1	0	2	Poland	1	1	2	2	2
13	Korea	2	2	2	2	2	Japan	2	2	2	2	2
14	Sweden	1	1	1	1	1	Korea	1	2	2	2	2
15	Japan	1	1	1	1	1	Slovakia	3	3	2	1	1

Source: own construction based on OECD (2020d)

If we don't consider the ultimate investing country attitude, in the long run, investments from the Netherlands are of the utmost importance, although their share fell from 29% to 19% between 2013 and 2018 (OECD 2020d). Luxembourg (17%), Germany (16%) and Austria (10%) are in the following places. France, Switzerland, Belgium, the USA, Slovakia, the UK and South Korea also account for between 2 and 7%. Nevertheless, if we consider the true origin of FDI, the position of individual countries will be different. Germany will come in the first place (from a quarter to a fifth share between 2013 and 2018), followed by Czechia itself (due to reinvestments this share is rising from 12% to 18%), France (8%), Austria (8%), Netherlands

(7%), the USA (6%), Italy (4%), the UK (3%), Belgium (3%), Switzerland (4%), Japan (2%), Poland (2%) and Korea (2%).

Over the last five years, which are statistically captured by the OECD (2020d), FDI has flown mainly to the services sector (about 60%) and the manufacturing industry (about 30%). If we look more accurately at individual service sectors, the highest shares are reported by the financial sector (incl. insurance), real estate, wholesale, retail trade and professional services. Within the manufacturing industry, the largest concentration of FDI is located in motor vehicles, trailers, semi-trailers and of other transport equipment production, further Manufacture of petroleum, chemical, pharmaceutical, rubber and plastic products, Manufacture of computer, electronic and optical products (resp. ICT in services as well). Foreign investments in Czech energy industry is also relevant.

Vast FDI inflows reflect the long-term high values in the assessment of the investment attractiveness of the Central and Eastern Europe region. Czechia has been at the forefront of such rankings since the mid-1990s, whether the UNCTAD assessment (Inward FDI Potential Index) or other analysis of consulting companies (such EY, AT Kearney). This attractiveness stemmed from the relatively developed physical infrastructure and good human capital facilities combined with low labor costs. In addition, with the advent of the new millennium, the prospect of entering the EU internal market has been added.

### **3. Industry 4.0 in Czechia**

Fourth industrial revolution is about to disrupt almost every industry in every country transforming entire systems of production, management, and governance (Schwab, 2016). It is not only about manufacturing, but also energetics, logistics, trade and services. Particularly, since around 40% of jobs in European manufacturing jobs are service related (Roland Berger, 2014). The impacts on society are unknown; however, the findings from existing studies confirm that innovation will become even more important, the demand for high-skill jobs will grow and low-skilled jobs will be the most affected (IAB, 2015; Roland Berger, 2014). Also, the demand for highly qualified services and the need for collaborative and cross-cultural competencies will increase. Major issues of Industry 4.0 include security and reliability of data and systems. Other major worries are related to the reduction of jobs, since low and middle-skilled jobs are likely to be mostly affected, and there will be a need for frequent retraining.

The consequences can be very serious for Czechia, not only due to the results of economic transformation, but also due to the fact that it is the country with the second highest share of industry relative to GDP after Ireland within the EU (UnctadStat, 2020).

Current globalized, highly competitive world economy is putting pressure on less competitive national sectors and businesses. This is logically reflected in the labor markets in some countries (or regions) by rising unemployment, as these countries are unable to undergo structural changes. The process of digitization, more advanced automation and robotics further strengthens this development. Due to the emergence of new better and more efficient technologies, companies that use them have a competitive advantage. This will also lead to increased market concentration in some sectors (OECD, 2018). Countries where the innovation associated with Industry 4.0 have been developed are able to meet the demands of their existing and new customers better and thus earn more. However, even in this case, the situation on the labor markets is exacerbated, in terms of the loss of some jobs and possibly emergence of new ones.

Although there is a widespread belief in the media and the public that "machines take jobs", especially in terms of awareness of 19th-century social relations, the overall impact on states may be different. According to many analysis, technological progress since the first industrial revolution has had a positive effect on the overall state of the labor market. For example, as the European Policy Information Center (2017) points out, technological progress has created more jobs than it has destroyed. Overall, its effect is also beneficial due to the fact that the transition to a more complex production system has led to high growth in labor productivity and thus more that workers can buy for their wages. Last but not least, the length of working hours has been reduced. The WTO study (2017) also states that during the last two centuries, the development of technological progress has not led to any disaster in the labor market. On the contrary, the employment rate has increased and there is no clear long-term effect of the increase in the unemployment rate due to technological change.

In the European Union and its Member States, another challenge related to the level and structure of employment will be the so called effect of dislocation (Acemoglu and Restropo, 2017). It explains the different impacts in terms of regions in different countries. Some will be more severely affected by job losses, and some may benefit from this process by relocating production. Acemoglu and Restropo recon that regions with routine manual work would be

most affected. However, the examples of some countries show that this process may not be so straightforward (Dauth et al, 2017). For example, in Germany, the "spillover" of workers from manufacturing (meaning material production) to non-manufacturing sectors (de facto public and social services) has reduced the negative effects of digitization, which has reduced employment in manufacturing but has been offset by job growth in non-manufacturing sectors, where the impact of digitization is minimal. However, the expectations that service sector can absorb these redundant workers in manufacturing can be wrong. Automation of intangible production is also growing rapidly (e.g. accounting and back-office activities).

The question is whether this paradigm will continue to apply. Doubts arise as the current and succeeding form of the automation process may have a worse effect on the labor market, because technological progress is much faster and the possibilities of artificial intelligence and robotics are higher than ever before. This is dependent on what type of jobs we analyze. Economic theory identifies this phenomenon as the effect of polarization, when the number of jobs in individual industries (according to the amount of wages, qualification requirements, the nature of work) changes the mutual share. Regarding the current development of the number of jobs in the EU monitored between the three groups according to the amount of salary, a decrease in the share of medium-earners was identified for the period from 1993 to 2010. Most of it in the case of Ireland, Belgium and Spain (between 12 and 15%) (David 2015). On the contrary, the shares of low- and especially high-income workers in the labor market have increased. Another study by Graetz and Michaels (2018) also draws attention to the risk that innovation will have a negative impact on the situation of the lowest-skilled employees.

As far as the Czech labor market is concerned, similar results are based on the model developed by the team around Chmelař (see Tables 3 and 4). Their analysis is based on a creation of the digitization threat index that shows which occupations are at highest risk of digitization. This model attempts to estimate how the labor market in general will be affected by the fourth industrial revolution in the next fifteen to twenty years. According to Chmelař et al. (2015) the impact on individual professions would differ in Czechia. As we can see in table 3, only some of them belong to blue-collar workers. Routine labor positions and those ones that can be easily replaced by robots are under the biggest risk. On the contrary positions in health care, ICT sectors and miscellaneous creative jobs would more in demand.

Table 3: Professions with the highest digital threat index in Czechia

ISCO-3 Code	Occupations	Digitization Threat Index
431	Numerical Clerks	0,98
411	General Office Clerks	0,98
832	Car, Van and Motorcycle Drivers	0,98
523	Cashiers and Ticket Clerks	0,97
621	Forestry and Related Workers	0,97
722	Blacksmiths, Toolmakers and Related Trades Workers	0,97
441	Other Clerical Support Workers	0,96
412	Secretaries (general)	0,96
834	Mobile Plant Operators	0,96
612	Animal Producers	0,95
921	Agricultural, Forestry and Fishery Labourers	0,95
811	Mining and Mineral Processing Plant Operators	0,94
814	Rubber, Plastic and Paper Products Machine Operators	0,94
432	Material recording and Transport Clerks	0,94
821	Assemblers	0,93
816	Food and Related Products Machine Operators	0,93
961	Refuse Workers	0,93
421	Tellers, Money Collectors and Related Clerks	0,93
831	Locomotive Engine Drivers and Related Workers	0,92
818	Other Stationary Plant and Machine Operators	0,92

Source: Chmelař, Volčík, Nechuta, Holub (2015)

Table 4: Professions with the lowest digital threat index in Czechia

ISCO-3 Code	Occupations	Digitization Threat Index
142	Retail and Wholesale Trade Managers	0,000
221	Medical Doctors	0,001
222	Nursing and Midwifery Professionals	0,002
134	Professional Services Managers	0,002
122	Sales, Marketing and Development Managers	0,005
231	University and Higher Education Teachers	0,008
133	Information and Communications Technology Services Managers	0,008
141	Hotel and Restaurant Managers	0,010
131	Production Managers in Agriculture, Forestry and Fisheries	0,011
226	Other Health Professionals	0,011
215	Electrotechnology Engineers	0,015
252	Database and Network Professionals	0,021
143	Other Services Managers	0,021
312	Mining, Manufacturing and Construction Supervisors	0,022
214	Engineering Professionals (excluding Electrotechnology)	0,044
111	Legislators and Senior Officials	0,048
213	Life Science Professionals	0,050
263	Social and Religious Professionals	0,054
132	Manufacturing, Mining, Construction and Distribution Managers	0,054
242	Administration Professionals	0,056
264	Authors, Journalists and Linguists	0,058

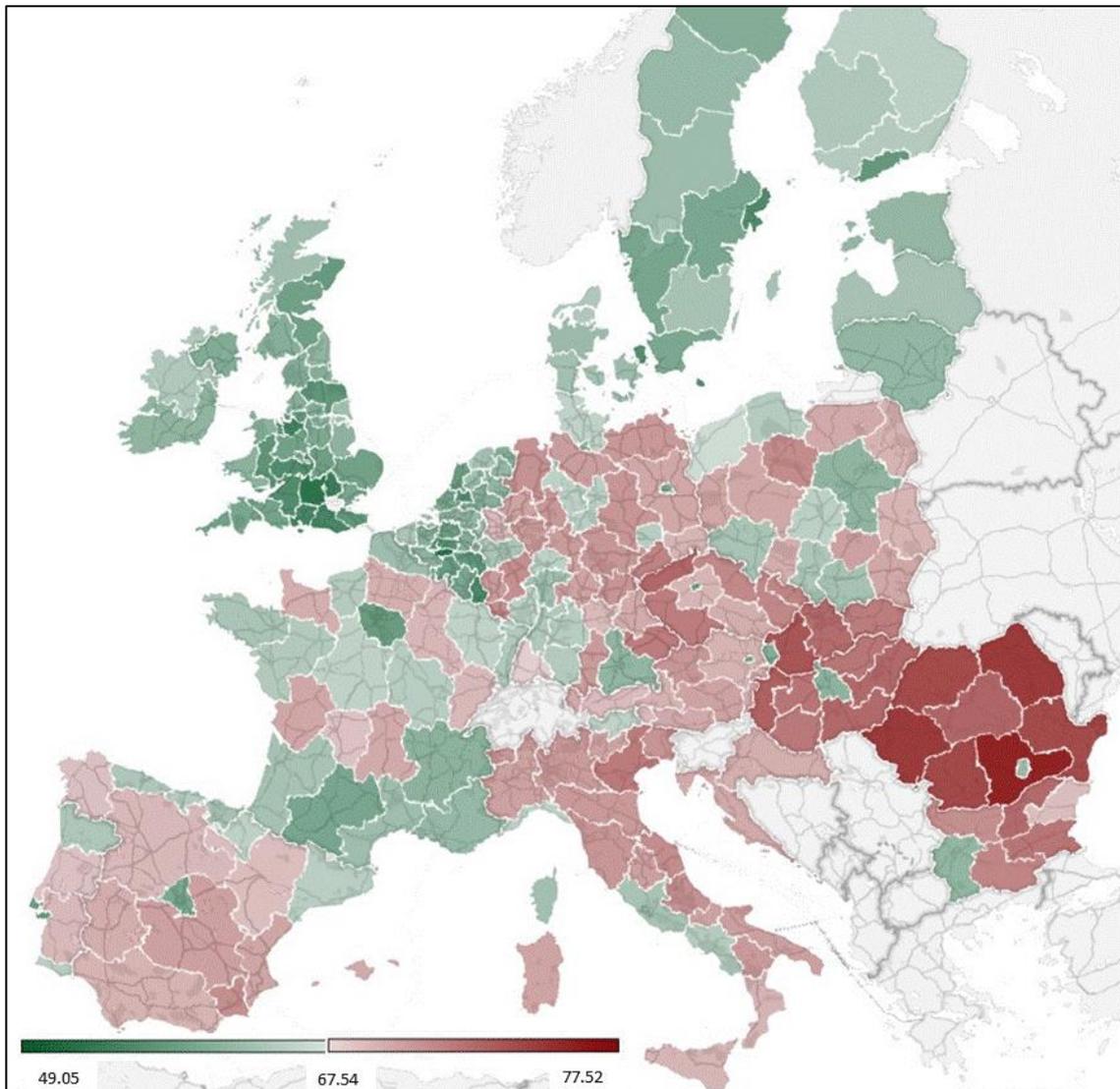
Source: Chmelař, Volčík, Nechuta, Holub (2015)

Furthermore, Czechia is already facing several other challenges. Aridi and Querejazu (2019) stress the risk of middle-income trap related to weak labor productivity and labor productivity growth in the Czech economy and the manufacturing sector in comparison to its regional counterparts. Czech labor market has shown overheated features until 2020, mainly in terms of labor shortages (esp. blue-collar workers) and wages growth. Long-term shortage of some labor categories might be settled by impacts of Industry 4.0. The question is if there is a match between professions with a shortage of employees and those that are under the highest digital threat. Considering asymmetric impacts of Industry 4.0 on constituent parts of labor market significance of education reform is rising. If contemporary system persists, future economic model will lead to a structural unemployment growth and deeper regional inequality in Czechia.

In this context, European Commission (2017) positively assesses the Czech attitude that is focused on skills, the adaptation of the education system and linkage between indicative measures and labor market. However, the gap between industry needs and qualifications remains one of the main threats related to the impacts of Industry 4.0 in Czechia. For example, Czechia (and Romania) belongs to the EU states with biggest shortage of ICT specialists. European Commission (2020) found out at least 80% of enterprises that recruited or tried to recruit these specialists reported such difficulties.

Czech labor market is at higher risk of digitization than some Western and Northern European states (Chmelař et al., 2015). As we can see in a map underneath, the regions from the north-west to the south-east of the European Union should be more at risk (from dark green as the least endangered regions to dark red, which are most at risk). This is dependent on the professional structure of workers, the economic level, the degree of urbanization and the readiness for digital change in individual countries.

Map 1: Risk of digitization threat in the European regions (at the level of NUTS 2)



Source: Chmelař, Volčák, Nechuta, Holub (2015)

To assess the readiness of the Czechia for new technologies, several multi-criteria indicators have been proposed. One of them is the Readiness for the Future of Production (WEF - RFP), which compares countries on a global scale according to their readiness in terms of reaping the benefits of emerging technologies and digital transformation. The European Union is also analyzing Member States' progress on digitization. To this end, the European Commission (EC) has compiled The Digital Economy and Society Index (EC - DESI). In the latter case, attention is paid only to countries that are members of the EU.

Table 5: Readiness for digitization according to the World Economic Forum and the European Commission

Ranking	Type of assessment		Ranking	Type of assessment	
	WEF – RFP (2018)	EC – DESI (2020)		WEF – RFP (2018)	EC – DESI (2020)
1.	Japan / USA	Finland	26.	Netherlands / Czechia	Romania
2.	Korea / Singapore	Sweden	27.	Denmark / Estonia	Greece
3.	Germany / Switzerland	Denmark	28.	Philippines / Portugal	Bulgaria
4.	Switzerland / UK	Netherlands	29.	Spain / Qatar	
5.	China / Netherlands	Malta	30.	India / Italy	
6.	Czechia / Germany	Ireland	31.	Lithuania / Poland	
7.	USA / Canada	Estonia	32.	Turkey / Slovenia	
8.	Sweden / Hong Kong	UK	33.	Canada / Cyprus	
9.	Austria / Sweden	Belgium	34.	Estonia / Chile	
10.	Ireland / Denmark	Luxembourg	35.	Russia / Thailand	
11.	Singapore / Finland	Spain	36.	Norway / Saudi Arabia	
12.	Thailand / Australia	Germany	37.	Croatia / Lithuania	
13.	UK / Norway	Austria	38.	Indonesia / Latvia	
14.	Finland / France	Lithuania	39.	Portugal / Mauritius	
15.	Italy / Ireland	France	40.	Bulgaria / Slovakia	
16.	Slovakia / Japan	Slovenia	41.	Brazil / Bahrain	
17.	Hungary / Belgium	Czechia	42.	Serbia / Hungary	
18.	France / Austria	Latvia	43.	Ukraine / Russia	
19.	Poland / UAE	Portugal	44.	Saudi Arabia / India	
20.	Malaysia / New Zealand	Croatia	45.	South Africa / Oman	
21.	Slovenia / Korea	Hungary	46.	Egypt / Mexico	
22.	Mexico / Malaysia	Slovakia	/ Bulgaria (48)		
23.	Romania / Israel	Poland	Latvia (49.) / Greece (50.)		
24.	Belgium / Spain	Cyprus	Greece (60.) / Croatia (51.)		
25.	Israel / China	Italy	Cyprus (64.) / Romania (52.)		

Source: own construction based on WEF (2018) and EC (2020)

Note 1: Country results of WEF-RFP by *Structure of Production* are in the first place, result by *Drivers of Production* in the second place.

Note 2: **Leading Countries** are orange, **Legacy Countries** are black, **High-Potential Countries** are blue and **Nascent Countries** are green.

It isn't too surprising that at the forefront, both globally and at the European level are the Nordic countries. These countries invest the most in R&D and are also leaders in terms of the quality of educational systems and quality of human resources. On the contrary, Czechia and other Central and Eastern European countries lag far behind (apart from Estonia). The new EU member states, except for the Baltics, are thus at the highest risk of digitization. Similarly, also southern Europe and some regions in Western Europe, which have long been unsuccessfully struggling with structural changes, can be negatively affected by digitization. Comparing last two DESI reports (European Commission, 2018 and 2020), the Czech position deteriorated.

Likewise, WEF ranks us as a country that has strong economy base (the sixth place), but is close to being at risk in the future (the 26<sup>th</sup> place). So, recommendation is clear, to improve the institutional framework, to invest in human capital and to boost technology platforms and innovation capacity. Comparing Czechia to our counterparts, mainly within V4, shows that our position is better, but still vulnerable. We should take better initial conditions as an opportunity.

Czechia is similarly well evaluated by a consulting company Cushman & Wakefield (2020). Based on their 2020 Global Manufacturing Risk Index, which evaluates the most suitable locations for global manufacturing among 48 countries in Europe, the Americas and Asia, Pacific, Czechia advanced to the 4<sup>th</sup> position (just behind China, the USA and India) thanks to strong FDI involvement in the Czech manufacturing sector, and strong links to Germany. Poland and Hungary are listed in the top quartile as well. Czechia performs well also in terms of risk assessment (unlike the other three V4 countries).

The Czech industrial base is strong in the automotive, electrical sectors and electronics. In these industries robots are most widely used. Although, almost three-fourth of new robot installations were realized only in five countries<sup>1</sup> globally, Czechia shows above average number of installed robots per 10 thousand employees in manufacturing industry (101 units, ranking 20<sup>th</sup> in the world in 2016), particularly in automotive industry. From the eastern European countries only two countries have been doing better, Slovenia (137 units, 16<sup>th</sup> ranking) and Slovakia (135 units, 17<sup>th</sup> ranking) (IFR, 2020).

According to above mentioned reports, Czech labor force and Czech economy in general have the capability to work with new modern technologies. However, according to UNIDO (2019: 6) the creation and diffusion of advanced digital production technologies associated with Industry 4.0 are concentrated in only several countries. 10 economies<sup>2</sup> account for 90% of all global patents and 70% of all exports. Czechia belongs together with another 40 economies, to so called followers, that actively engage in these technologies, though with more modest intensity. If we don't consider the patenting, but only export and import activity, Czechia performs better (above average) (UNIDO, 2019: 48).

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<sup>1</sup> There are China, Japan, the USA, Korea, and Germany.

<sup>2</sup> The USA, Japan, Germany, China, Taiwan, France, Switzerland, the UK, the Korea, the Netherlands.

Significance of Industry 4.0 for Czech Republic was, of course, reflected by the Czech public authorities. The main kick-off strategy was elaborated by a team of experts led by Mařík and afterwards used by the Ministry of Industry and Trade. They point out that it will be important for the Czech manufacturing industry to prepare for the emergence of smart factories that will be able to exchange information autonomously, to trigger the necessary actions in response to current needs and mutually independent inspections. Czech companies will have to be able to operate in a way in which sensors, machines, components and IT systems are interconnected and communicate, not only within individual companies, but also within the entire production chain Mařík et al. (2016).

Table 6: Czech strategic documents and concepts related to Industry 4.0

<b>Year</b>	<b>Responsible institution</b>	<b>Documents</b>
2014	Ministry of Education, Youth and Sports (MSMT)	Strategy of Education Policy of Czechia until 2020
2015	Ministry of Transport (MD)	Action Plan for the Development of Intelligent Transport Systems in Czechia (ITS) by 2020 (with a view to 2050)
2016	MD	Implementation Plan for ITS
2016	Ministry of Industry and Trade (MPO)	Industry 4.0 (Initiative)
2017	Governmental Office	Action Plan for Society 4.0
2017	MD	Vision for Autonomous Mobility Development
2017	Governmental Office	Strategic framework Czech Republic 2030
2018	Ministry of Labour and Social Affairs	Action Plan for Job 4.0
2018	R&D&I Council (RVVI) / MPO	National Research and Innovation Strategy for Smart Specializations of Czechia 2014-2020 - update 2018
2019	RVVI	Innovation Strategy of Czechia 2019-2030 (Strategic Framework Plan)
2019	Governmental Office	Digital Czechia (strategy)
2019	RVVI	National strategies of artificial intelligence in Czechia

Source: Hnát et al. (2019: 50)

A series of other strategies have also been elaborated in the last six years (see table 6). The first Czech strategy directly related to the Industry 4.0 concept is the Initiative issued by the Ministry of Industry and Trade in 2016. It discusses possible directions for further development and requirements of Czechia in terms of security, labor market, education, regulation, etc. The initiative also pays attention to the possible risks of current economic, technical, and social

developments. Prior to this document, two sectoral ones were published. They can be indirectly linked to the solution for future challenges, namely in education and for the transport system. After Industry 4.0 Initiative, the Governmental office or ministries issued partial sectoral documents (such strategies, action plans, white papers etc.). Among them, the Digital Czechia has strategic importance because it is a set of concepts and implementation plans ensuring the preconditions for the long-term prosperity of Czechia in the environment of the ongoing digital revolution. This framework strategy covers three pillars, which form a logical unit with many internal links, but also reflect the structure targeted to different recipients, as well as differences in the current legislative definition (Office of the Government of Czech Republic, 2020):

- Czechia in digital Europe
- ICT Concept of Czechia (Digital Public Administration)
- The Concept of digital economy and society

Despite the existence of many documents and strategies related to Industry 4.0 across many resorts, overall strategic vision of Czechia (not only) related to Industry 4.0 is missing, there are too many goals and the coordination of these goals is insufficient.

#### **4. Qualitative research studies on Industry 4.0 in Czechia**

We draw on conclusions of existing qualitative surveys on Industry 4.0 conducted in Czechia and combine with findings from our interviews. These surveys include the research done by Confederation of the industry of Czechia transportation as well as our own other ongoing project named Targeting of investment support in Czechia with regard to the expected impacts of technological changes supported by the Technology Agency of Czechia (TAČR).

One survey on Industry 4.0 was done by **Confederation of industry and trade** between July and September 2019 among 105 Czech companies (SPCR, 2019). One of the first findings was that almost 80% of companies have projects belonging to Industry 4.0, however, another 10% of firms were not sure what belongs under Industry 4.0. 67% of firms already have defined a digital strategy or are working on it, though most of them do not have a special position for digital transformation. 65% of companies implemented I4.0 features, because they felt it is important for their future, another 8% companies were forced to do it by their parent company or customers. The major motivation for digital transformation is the improvement of market position in relation to the competition for over half of the companies. In a more detailed description the most common reason to do that was particularly: to increase productivity per

employee (56%), to lower unit costs (44%), to optimize the use of production capacities (e.g. predictive maintenance - 41%), due to insufficient workers (38%) or due to the provision of new services to existing products (35%). Features of I4.0 are most often implemented in production (58%), administrative tasks (42%) or logistics (37%). So far, over half of the companies think their expectations from the investment in I4.0 were fulfilled, 43% cannot tell yet and for 5% of firms' expectations were not fulfilled. Over half of the companies plan to increase the investment in I4.0, 36% want to keep it on the same level and only 2% plan to lower it. As qualification is crucial for digital technologies (see below), 22% of companies already invest in education of their employees and 20% prepare an education concept for them. An important finding from this survey is that corporate security systems are not ready for the rapid introduction of new digital technologies, only 23% of companies have such systems.

In our ongoing TAČR project Targeting investment aid in Czechia with regard to the expected impacts of technological changes we included semi-structured interviews with 41 managers (November 2019 – February 2020) and a questionnaire distributed to other 146 companies (first quarter of 2020). This survey was conducted across all Czech regions and across different industries. Here, we came to several interesting findings relevant to this project.

According to semi-structured interviews with 41 managers, Industry 4.0 is expected to increase efficiency in production, lower production costs and overall increase productivity. Further, technologies could replace lack of qualified workers. In terms of what is a major threat of Industry 4.0 it is the possibility that firms could start to lag behind and lose competitiveness. This is related to the fact that implementing Industry 4.0 is technologically and financially demanding and readiness of employees for such technologies is low. Further, evaluation of huge datasets as well as cybersecurity can be problematic. The most common implemented features of I4.0 included automation of production, digitization and optimization of firm processes, robotization and collaborative robots, big data analysis, machine learning and IoT sensors. In future, interviewed companies plan to invest mainly in 3D print, predictive maintenance, sensors and automation. Most companies use own resources, sometimes also credit and grants. The managers were also questioned about their expectations from the state in terms of readiness for I4.0. Most of them think that the State should build the infrastructure (roads, networks, data) and prepare qualified labor force in schools or possibly provide retraining. The State should lower bureaucracy, improve government procurement and lower taxes/provide tax deductions, or subsidies.

These semi-structured interviews were accompanied by a Computer Assisted Web Interviewing to verify and deepen the previous findings. According to results, 85% of companies already implemented or plan to implement I4.0 features, though this is more common among larger firms. The most widely implemented features include automatization of processes, automatization and robotization of production, using sensors or 3D printing. In terms of labor force, 67% of respondents believe that the biggest threat is the lack of qualified labor force able to use new technologies. Respondents had to choose the best form of state interventions, 77% of them agree that: „The state should set up a transparent business environment and not further intervene in it in the form of subsidies, tax relief or other interventions”. Other options included some form of state intervention either in the form of subsidies, tax relieves or support for strategic sectors. However, big companies were more inclined for state interventions than the smaller ones. Among strategic sectors to be supported by subsidies respondents mentioned especially education and R&D (which are already mostly state funded) and further also agriculture/sustainable agriculture, energy, health care and machinery. One of the most important questions was related to the measures that the Czech state should implement to be ready for Industry 4.0. 72% of respondents definitely agree with lower administration (particularly from the tax office). Other most important aspects were the reform of the school system, more intense cooperation of schools and firms, bigger subsidies for R&D and tax relief for R&D. The answers differed based on company size and sector. Overall, the automotive and aerospace industry implement more changes than other sector, whereas healthcare and pharma are lagging behind. In the automotive and electrical equipment sectors managers feel Industry 4.0 as threat for local companies more than in other sectors.

### [Semi-structured interviews](#)

None of the above-mentioned projects focused directly on impacts of new technologies on FDI. Therefore, we conducted semi-structured interviews with relevant respondents. We had a pre-prepared set of questions (similar for all countries) with possible answers. We conducted interviews in January and February 2020. The interviews took from 30 to 60 minutes. An array of open-ended and closed questions formed the basis of the semi-conducted interviews, where the underlying motives for respondents' answers were also usually tapped into (Newcomer et al. 2015). In-person interviews were conducted with five people. One respondent was abroad and therefore the communication was held via email. Our respondents included two CEOs of multinational technological companies operating in Czechia, one of Czech origin, the other of European origin. One respondent was an entrepreneur and at the same time a head of an

association representing companies. Two respondents were from a governmental organization closely related to our research topic. The last respondent is a researcher in a big international organization. For an easier interpretation of results, we split the respondents in two groups: business sector and institutional sector. We planned to conduct more interviews with representatives of the business sector, unfortunately the pandemics/lockdown did not allow it. We would also like to stress that because the interviews were held before the covid-19 spread outside China, the possible impacts of pandemics were not covered in the interviews.

The semi-structured interview included 14 questions. In most cases, the respondents had to choose the most appropriate answer according to their view and, if possible, add some further comment or explanation. However, in many cases the respondents were not able to choose one answer, because they did not feel they knew the answer or because they felt more options were true. Or they chose the option, they felt was stronger, though they agreed with more of them. A typical example would be question number 14: In general, I4.0 is in your opinion more? A) a threat or B) a chance for V4 as location of FDI. They might have felt that I4.0 is to 45% a threat and to 55% it is a chance for V4 as location of FDI. In the results, their answer is that Industry 4.0 is a chance for V4 as location of FDI. Summing up the results was not an easy task, since the answers were very variegated. Despite the fact, that we were often not able to identify a prevailing trend, we were able to gather relevant comments useful for assessing possible scenarios.

#### Understanding of I4.0 /definition, approach

In terms of understanding **the term Industry 4.0**, three respondents from institutions view Industry 4.0 as a *set of technologies* (the most important being AI, VR, 3D, H2M), whereas three representatives of the business sector view it as *new business models* – platforms. For them Industry 4.0 includes “implementation of new technologies to its business and a transformation” or “a new attitude, where automatization is just one part of it” meaning that a company can be smart without being automatized. This can serve as a good example of divergent views of the business sector and the researchers/officials.

Question number 2: **Which effects of I4.0 are the most important for the company, national economy, region/location** where rather difficult to answer and the answers were rather diverse. Two respondents from the business sector find almost all or all the answers as true (possible answers included these options: *less defects /downtime; new smart products, new services, new*

*business models and new efficient processes; customization with mass production; alleviated resource scarcity; better energy efficiency; urban production possible; alleviated consequences of demographic change; other...*). One institutional respondent considered as crucial especially the *improved innovativeness and customization with mass production*. Two respondents think there is another answer. According to an institutional respondent it is social effect: “the cheap labor costs buffer has been depleted in Czechia, Industry 4.0 is in the hands of foreign owners and we can thus expect a fast replacement of labor”. On the other hand, a business sector respondent believes that the other missing answer is a strengthening of the competitiveness of the local environment.

#### I4.0 impact on MNEs and FDI

When we focus on the **dominant strategy of headquarters of MNEs**, most respondents think, that *appropriation* (i.e. keeping know – how to themselves which is detrimental for host country) dominates. According to one institutional respondent the MNEs only release the necessary know-how. He mentions an example of GE Aviation, where the Czech branch gathers a lot data, but they never get access to them. A respondent from the business sector also thinks, that in Czechia appropriation dominates and many MNEs (especially smaller ones) have a conquest position, however, he stresses the differences between firms which are dependent on the firm strategy, its size as well as country of origin. He mentions there are several large MNEs (including Siemens, Bosch or Škoda) that know the local potential and are more willing to share their know-how. He also stresses that this depends a lot on the Czech managers’ capabilities - whether they manage to improve the position of the Czech subsidiary in the MNE. The only respondent that believes that in Czechia subsidiaries *share know-how and technologies* possessed by MNEs is a CEO of Czech branch of a large foreign MNE. However, he also stresses that this is dependent on the location. He believes that in the EU sharing dominates, whereas appropriation is common in China which is viewed more as a threat. He also stresses that basic research is still concentrated in home country whereas applied research is more dispersed to other countries. Further, he mentioned the role of political pressures and says that even some Czech branches serve as a benchmark for Germany.

Considering the **consequence of I4.0 impact on business activities and manufacturing location** four respondents believe that it will give *more power to MNEs* (concentration, market dominance of few). That means that large companies might absorb the small ones. This is also related to the fact that new technologies are connected with high costs, which the smaller ones

cannot afford, although it can be still a chance to SMEs. One respondent from the business sector believes that I4.0 can mean *more power to SMEs* and stresses “the decentralization of production activities enabled by the existence of platforms which will secure orders”. One respondent from the business sector thinks that both SMEs and MNEs can get access to power, though this is dependent on the readiness of SMEs and the time horizon. If there will be decentralized production centers, the crucial will be who will own the final product. In Czechia it will depend more on the ability of local suppliers to integrate into digital platforms than on labor costs.

In terms of **dominant direction of FDI flows in consequence of I4.0** two institutional respondents believe that dominant flow will be *backshoring of FDI from V4 countries* (e.g. back to Germany or USA). They expect that a new smart factory will be built in Germany, not in Czechia. One respondent from the business sphere believes that *nearshoring* (e.g. German firm reshuffles investment from China to V4) and *backshoring by V4 companies* (e.g. from Asia back to V4 countries), will dominate. He stresses that “there is a need to return production back to Europe, otherwise we will lose know-how to produce something”. Other respondents also mention backshoring by V4 companies (e.g. from Asia back to V4 countries), although this will depend on where the final markets will be (Asia is rising). Some stress that it is already happening. Two respondents from the business sector believe that all three flows (backshoring of FDI from V4 countries, nearshoring and backshoring by V4 companies) will occur simultaneously. One of them expects Czechia will over time become more similar to Germany, the other one stresses overall decrease of employment in manufacturing.

The most pervasive **direct effects of I4.0 on global FDI flows** is according to two institutional respondents *creating less job*. Two respondents believe that FDI is becoming *less tangible* (less capital invested). One CEO thinks that FDI flows will be more *footloose* (can quicker withdraw and relocate). Another business representative believes that all three trends will occur - FDI becoming less tangible more footloose and less jobs will be created. Respondents also point out that in terms of jobs the intensity level of production, legislation, infrastructure as well as politics will play a role.

The answers to the question on **the type of FDI that will be most affected by I4.0** differed a lot. One institutional respondent believes it will be *Downstream/sales/marketing*. One respondent from the business sector believes that most affected will be *Upstream/ design/R&D* – because companies such as Bosch, Valeo or ABB are starting R&D centers with new

technologies here and digitization enables to work on projects from various locations. Two respondents think it will be *Production, assembly*. One of them stresses that although R&D is crucial and new international research teams are being created, investment in building a new factory are still much higher than in a building a research team.

In terms of **sectors that are the most affected by I.4.0 and in consequence by possible backshoring** two institutional respondents mentioned *services*. One of them stressed especially financial services, such as data processing. One of the respondents from the business sector mentioned *textile industry*, though this should not have big impact on Czechia. One respondent from the business sector mentioned *automotive industry and its supplying industries* not just because automation and digitization, but also due to electromobility. Owing to lower complexity of electromotor, there will be significantly lower demand for CNC machining or even breaking pads, since electromagnetic power breaks in electric cars. Another representative of the business sector mentioned that to lower extent *manufacture of machinery and electrical equipment* might be affected. Nonetheless, he also stressed that it is not just labor costs in manufacturing, but also accompanying service (transportation, warehousing), which is still cheaper in Czechia. He also mentioned that in case of services the shared service centers will not be backshored but people will be replaced by chatbots. This is a useful comment, because in case of services there might have been a slight misunderstanding of impact of I.4.0 on sectors in terms of automation/decline in labor force and backshoring.

#### I4.0 impact on attractiveness / host location

In case of question on **what can I4.0 induced changes in location preferences lead to** four respondents answered *more concentration* – e.g. capital cities “winner takes it all” and further polarisation/inequalities. The reason for that was particularly the fact that qualified labor force and accompanying services are concentrated. On the other hand, two respondents from the business sector feel it will create a *chance for peripheries*. According to one of them this is related to remote work thanks to virtualisation: „the centers will grow further for some time and then agglomeration diseconomies will prevail.“

The **most pressing host attractiveness’ challenges** are according to two respondents *legal standards and law safeguarding the rights and obligations under I4.0*, also related to constant changes in legislation. Two respondents consider all three of them to be pressing (*technical issues, legal standards and labor market solutions*) with major stress on education. One

respondent from an institution considers to be *technical issues* (infrastructure) due to „concentration to hubs and limited infrastructure in peripheries“. One respondent considers to *labor market solutions* to be the most pressing challenge. According to him, the state should promote practical fields of study – such as technical or business and less humanities and should also promote more open immigration policy (particularly for qualified workers).

In terms of **shaping the FDI policy** (“how to attract FDI?”) the most critical aspect is according to two respondent the *Macro / general ecosystem*, mainly strengthen business environment. One respondent thinks it is the *existence of clusters at meso-level*. One respondent thinks its rather *concrete politics*, particularly educational. One respondent agrees with three of the four options (*Macro / general ecosystem*, *IPAs – concrete tailor-made incentives* and *Concrete politics*). One respondent chose option *other*. According to him „the state should have a vision“, Czechia should be a bridge between the West and the East. There should be a concentration of intelligence and the system should be stable. According to him we have really smart hubs in Mladá Boleslav (Škoda), Brno (CEITEC) or Prague (CIIRC).

In the question on **the readiness in your country to host FDI in I4.0** we focused on several aspects. *Digital maturity* of domestic firms is according to two institutional respondents good. Business representative are more critical. A CEO of a foreign MNE thinks its rather poor. Other business respondent thinks it could be better. The last one stresses that there is a huge variation. For most firms, the digital maturity is rather low, but it is improving. Generational exchange which is now happening in many Czech firms as founding fathers are retiring and their descendants are taking over the business, can be an opportunity as well as threat. *Infrastructure* is considered to be rather poor. Backbone data lines are missing and digital communication with public sector is insufficient. Only one business representative thinks it is relatively good also in telecommunications. *Skills and education* are so far considered to be so far quite OK, but a challenge for the future. Many respondents think that there should be a selective support particularly for technical universities, because of shortages in technical graduates and also higher costs of technical education. Nonetheless, some respondents understand that such selective support is politically impossible and therefore recommend more information for parents about education and future perspectives. Respondents also name “low quality of elementary and high schools, which will catch on us” and “growing disparities between regions, especially in Sudetenland” and stress bigger need to specify skills for specific positions and a need for interdisciplinarity. *Capabilities of foreign subsidiaries* are considered to good by all

respondents. They mention that there is often a pressure from the parent company and the automatization has been ongoing for over 15 years (often since the first investment). The situation among foreign subsidiaries is thus considerably better than in domestic firms.

**In general, I4.0 is in your opinion more a threat or a chance for your country as location of FDI?** The answer to this question differed. Three respondents think it is a chance. Two institutional respondents think it is a threat in terms of FDI, but a chance for domestic companies. One respondent stresses that it is both a chance and a threat “if we do not wake up in time”. We believe that all other respondents would agree with this statement.

Considering **the most prepared country for Industry 4.0** all respondents agree that Czechia is the most prepared of all V4 countries, nonetheless, views on the preparedness of other countries differ a lot. Some respondents view Poland as having a big potential, others rather Slovakia. The **existence of investment incentives** has also been discussed. Two respondents believe that investment incentives should be cancelled. This is because they „deform the market technologically and economically“, and there is a big lobby for setting the criteria. One respondent mentions that subsidies distort the market, but are important for MNEs and the preferred form depends on MNEs strategies (some MNEs apply globally tax optimization and prefer subsidies on newly created jobs or infrastructure, others favor tax subsidies etc.).

It is not an easy task to sum up the findings of the interviews because often the views of the respondents were contradictory. However, here a few points we found out during the interviews:

- Big role of foreign companies, that own the new technologies
- Big variations even between MNEs
- Domestic companies are lagging behind in terms of digitization
- For the assessment of possible impacts of I4.0 time horizon needs to be taken into consideration
- Impacts of I4.0 depend on how Czechia (public and private sector) will respond to changes
- It is not just about labor costs, also supplying services are important
- There are differences between sectors
- In many cases institutional respondent were more skeptical than business respondents

## 5. Conclusion

Ongoing technological changes, the so-called Industry 4.0 or fourth industrial revolution, will not only change the way things are produced but probably also to some extent where they are produced and in consequence, foreign direct investment flows. In our paper, we focus on how Industry 4.0 could affect FDI inflows to Czechia.

We gathered data on FDI, digitization and quantitative studies and qualitative surveys on I4.0 in Czechia and combined them with our semi-structured interviews to present possible scenarios for future FDI inflows. We came to several interesting findings that will likely affect investment attractiveness of Czechia.

We found that the definition of Industry 4.0 is problematic, because people often view it as narrowly connected to manufacturing. Therefore, lately the term digitization has been used more often and might better reflect the connection of cyber and physical systems. In Czechia, insufficient labor skills and qualifications can be viewed as the major problem in terms of readiness for new technologies. The educational system thus needs to be reformed. Robotization and automation is ongoing in many companies. Foreign subsidiaries have already been to large extent automatized, this automatization has been ongoing for the past twenty years. Domestic companies, particularly SMEs are in general lagging behind, though there are many companies that implemented features of I4.0. One of the major reasons, is that new technologies are a costly investment for which small companies do not have sufficient resources. An important finding is also that companies are not prepared for cyber-threats which dramatically increase with digitalization. Here, we see the crucial role of the state, which should provide necessary infrastructure, reforms, and policies.

Czechia, like other Visegrad countries, is largely dependent on foreign capital. Therefore, these countries were named dependent market economies (Nölke and Vliegenthart, 2009). FDI stock reaches 67% of GDP and foreign firms accounted for over 60% of value added in manufacturing (OECD, 2019). The FDI inflows helped to transform the economy, at the same time there are also negative aspects associated with it such as dependence on foreign capital and technology, profit repatriations or limited value added created, controlled and captured in Czechia. There are three possible scenarios of impact of I4.0 in terms of FDI inflows to Czechia:

- 1.) Relocation of production to other countries (to lower cost countries or backshoring to core countries) - significant disinvestment
- 2.) Keeping production here with higher automation – slowly declining FDI inflows, probable downsizing of labor force
- 3.) Bigger investment in services and/or R&D (asset light investment) – long-term decrease in FDI

When assessing these three scenarios, we also need to consider the time horizon. According to our analysis, we expect the second scenario will prevail in the short run. Labor costs are not the only locational factors. Geographic location, logistics and other costs of production (including taxes, subsidies) are also important and sunk costs play a role as well. As Germany leads as the ultimate investor (contrary to largest immediate investor - the Netherlands) geographic location still matters.

In the long term the third scenario and to some extent also the first will become more important. However, there are big differences between industries and between MNEs' strategies even within the same industry, therefore it is really difficult to predict it. Further, electromobility together with automatization and digitization will have a big impact on Czech firms as Czechia is largely dependent on automotive sector and combustion engine cars include significantly more components (produced in Czechia) than electric cars. In Czechia, FDI to the service sector prevail over manufacturing. With ongoing digitization, this investment can become much more asset-light meaning that these inflows will weaken. A good example can be the reduction of branches in the banking sector as more and more of the activities at branches are performed online. We also need to differentiate between FDI to access the domestic market and production for exports (both in manufacturing and services). Whereas so far, major attention has been given to manufacturing, future research should focus more attention to services and how digitization will impact this sector.

We would like to stress that lower FDI inflows are not necessarily a bad thing. They could also be an opportunity for Czech companies and the Czech economy in general to lower dependence of foreign capital. However, this will depend on how the Czech economy and mainly the Czech government (through its investment, policies, regulation) will respond to these technological challenges.

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