REFLECTION OF THE DEGREE OF INTERATIONALIZATION IN THE ABSORPTION CAPACITY OF THE CZECH REGIONAL BUSINESS ENVIRONMENT

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Abstract: The aim of the paper is to find out how the degree of internationalization is reflected in the intensity of the foreign presence in the Czech regional business environment. The absorption capability is illustrated for six selected regions, in a series of thirteen years. The extent to which the regions can benefit from their degree of internationalization demonstrates the built-in transfer intensity indicator. Indicator values reflect how the region can benefit from productivity gains from the presence of foreign firms. The calculations performed show that all regions achieved positive average growth coefficient values, i.e. that the whole group of regions was able to absorb the technological growth opportunities brought by the analyzed foreign companies. From the trend's point of view, the Hradec Králové region is most successful in finding the potential in localization from foreign firms, and conversely, the smallest values have been identified in the Carlsbad region.

Keywords: Absorb capacity, business environment, foreign direct investment, internationalization, host region, productivity

1 Introduction

Foreign Direct Investment (FDI) creates a range of effects for the host region. However, the professional public has been, repeatedly, divided in their opinions on this type of foreign capital. There is no single view regarding FDI. One reason is that the impacts and effects of FDI are difficult to measure in the host region. Another major problem is that the impact of FDI is difficult to quantify, not only on the host economy's business environment, but it is also difficult to simultaneously evaluate whether and how much the local business environment receives and draws on the advantage of locating a strong foreign investor.

Although the Czech Republic is considered to be a successful recipient of foreign direct investment and the Czech business environment is, to some extent, internationalized, the question offered is whether the Czech business environment can fully exploit this potential.

Can the Czech business environment fully absorb the spillover effects to take on technology, know-how and human capital management from successful foreign companies? The emergence and absorption of these benefits are conditioned by the flexibility of domestic firms, banks, governments and the overall situation in the local business environment, which are then shaped by a system of institutional conditions, including, but not limited to, investment incentives.

Utilizing the potential offered by FDI localization of multinational companies is subject to many factors, especially the size of the host market and the level of competition there, the absorption capability of domestic firms, the adaptability of workers, the institutional environment and other factors. (Szent-Ivanyi and Vigvári, 2012)

This paper deals with the determination of the absorption capacity of domestic companies. The six selected Czech regions illustrate to what extent the Czech local business environment can benefit from the presence of foreign companies. In addition, to what extent there is technology transfer and to what extent the presence of foreign firms can be seen in terms of productivity growth.

2 Mutual position of local firms and FDI

Evaluating the business environment at a lower regional level is very difficult, especially due to complicated data collection, as some types of information are only reported at the national level. The second problem in assessing the regional business environment is clear from the macroeconomic concept of the competitiveness of the states, which cannot be fully applied to the regional level. Camagni (2009) argues that some laws that apply in international trade, do not work at a lower than national level. Unlike the state level, exchange rate differences, and changes in price and wage ratios at regional level either do not exist or do not work. On the other hand, the shift of production factors (labor, capital) between regions can pose a real threat to the regions.

Individual authors assessing the business environment at a lower regional level explore different aspects of regional competitiveness. However, there is a uniform agreement on the perception of productivity as a key indicator of the competitiveness of the regions. Kitson et al. (2008) discusses looking at productivity from an economic and regional point of view. They realize the extent of this concept however perceive productivity as an important indicator of regional competitiveness. This is confirmed by Gardiner B. et al. (2004), who analyzed productivity in the European regions, in terms of the effectiveness of the workforce.

In the original neoclassical models, such as the Sollow Growth Model, foreign investment is considered to be one of the capital resources, but they do not pay more attention to the effects (Srholec, 2014). The theory of endogenous growth, unlike Sollow's Model, is embedded in the production function of external effects on knowledge and technological change. For example, Romer's (1986) Model explores "learning by doing," whereon, knowledge is a public good, when the author assumes that it cannot be kept secret. Creating knowledge in one business eventually spills over into the whole economy, creating the spillover effect.

According to Lucas (1988), the dynamics of economic development is linked to the supply of human capital. In this context, Lucas mentions the effect of the migration of skilled workers, because a sufficient number of qualified employees is an important localization factor for companies producing high added value goods.

Fagerberg (1987) a Verspagen (1991) criticize theoretical approaches, which are based on production functions and their modifications. They consider them to be too formalized. These authors interpret economic growth a result of technological absorption capability and the size of the technological gap. Technological absorption capacity is considered a key factor in the reduction of the technological gap between the investor's country of origin – FDI provider and FDI recipient. For, with significant technological gaps, FDI can function as "cathedrals" in the desert. In this case, they are large production plants, using relatively advanced technologies (cathedral), with a low number of links to the host region (desert). Successful dissemination of knowledge (spillover effect) can be considered to be regions without the dominance of these individual actors (cathedral), respectively regions with a dense network of links between entities.

In case of a significant technological gap, there is no positive spillover effect. Due to the size of the technological gap, the isolation of FDI will cause workers to disseminate their knowledge and experiences, which can be caused by a fundamental separation of production and conceptual processes, when the branch is fully subordinated to the headquarters in the parent economy. Massey (2007) sees a solution in providing a varied structure of job functions at all skill levels. But there is another question on whether there is a correlation between the qualification structure and the employers' requirements in the host labor market.

The technology gap is closely related to domestic firms' absorption capacity. Szent-Ivanyi and Vigvári, (2012) talk about

the technological competence of companies in the host market; whether and to what extent the local business environment is able to absorb foreign technology. This technological competence can be measured, for example, by the emergence of subcontracting chains or the innovative activity of domestic firms.

Absorption capacity is defined as the ability to acquire knowledge created by someone else and to modify it for their own business needs (Narula and Marin 2005). It is also considered as another determinant of indirect FDI effects (Narula, 2017). Absorption capacity expresses the overall level of the region (Xu, 2000), as well as the technological level of a given territory, infrastructure, cultural and social capital, financial institutions and other institutional factors affecting the business environment on a given market (Griffiths and Sapsford, 2004). But the key attribute is the level of human capital, because, on the one hand, the FDI inflow creates the potential for technological transfer to the domestic business environment. On the other hand, the level of human capital in the local labor market determines, how much and what structure of foreign companies can be attracted to the region and logically, to what extent are capable domestic companies, respectively, home business environment to absorb (absorb) technology transfer (Fifeková, 2008).

3 Methodology

E_{FDI} is the number of FDI employees who have gained investment incentives in particular regions. E are employed people, according to Czech Statistical Office classification and statistics (Czech Statistical Office, 2018). As noted above, the size of the gap is one of the major determinants of spillover effects, along with FP.

In order for the FP region to grow its productivity and grow economically, it must, first of all, prove its high openness abroad, i.e. to be able to attract a sufficient number of foreign companies with high productivity that are willing to create as many new jobs in the region. Second, the region must be able to exploit the intensity as much as possible. It is, therefore, important to monitor the level, and the capacity of the region to use FP. It would be interesting to look at the extent to which, ceteris paribus, the region from the average FP unit can win productivity growth. The average FP unit is the average FDI productivity per FDI worker in the given year. Such an intensity indicator can be described "indicator of the intensity of use of the foreign presence in the region under survey," or otherwise known as the intensity transfer (IT).

To monitor the region's capacity to intensively exploit and effectively absorb the FDI technological possibilities, it is possible to examine the shift in productivity in the surveyed region only as a function of the technologically advanced country from which the FDI came (country productivity) and in what proportion they invested (the number of jobs). It can be said that if the region has achieved relatively high productivity growth, with the participation of a small number of foreign firms, with a small number of jobs created by them in the region, this region was, in other cases not considering factors, ceteris paribus, more successful in the intensity of transfer of the technological level of foreign companies to the region (in the absorption of this level). To monitor this ability to "absorb," a technological level can serve, for example, as the equation for an indicator in which the productivity of the region will be read in the given year. The weighted average productivity of foreign firms will be in the denominator, where the weights will be represented by the individual shares of employees of these companies, again for the year under review.

The constructed IT indicator can be calculated by the following relationship (2):

$$IT_n = \frac{AP_{LR}^{reg}}{\sum (AP_{L_i}^{FDI} FP_i^{reg}) / \sum FP_i^{reg}} * 100 \qquad (2)$$

Where $AP_{L_i}^{reg}$ is the productivity of the region in the given year n. $AP_{L_i}^{FDI}$ is the productivity of foreign companies of the given country (OECD, 2017) (expressed as the FDI producer's country of origin) in the year n. FP_i^{reg} is the share of employees of foreign companies in the given country, in the surveyed region of year n.

For a given IT indicator, the higher the value, the more the region is able to absorb the experience and possibilities of technological growth of companies from abroad.

To assess the overall capacity of the region to absorb the technological potential offered during the monitored period, i.e. the evaluation of the monitored trend, it is possible to use the indicator of the average IT growth factor or the modified IT indicator (IT_{k_n}). In this case, in the numerator of the formula, instead of the annual productivity of the region, the year-on-year change in the region's productivity (i.e. the absolute annual increase in productivity) - see the equation (3):

$$IT_{k_n} = \frac{\Delta AP_{L_i}^{reg}}{\sum (AP_{L_i}^{FDI} FP_i^{reg}) / \sum FP_i^{reg}} \qquad (3)$$

is the year-on-year change in productivity of the surveyed region.

The built-in IT indicator works with relative transmission capability (absorption) technological levels in the region. The indicator evaluates the degree of recovery – intensity – opportunities to take over the technological level of foreign firms by individual regions (regions). For the best region's economic development, leading to the region's productivity growth, the ideal state is the high level of both extensive and intensive growth.

It is necessary to point out again that the given indicator has several assumptions that are necessary for interpretation. The main two are mainly:

1) It does not take into account other factors of productivity growth (i.e. growth factors, which can be caused, for example, by the growth of the technological advancement of Czech companies without foreign influence or external factors of economic growth – growth or decline of macroeconomic indicators in the country, changes in institutional conditions,
2) Abstracts from interaction on productivity growth between regions. That is, one region is the technological "locomotive" of the other region or vice versa.

FDI effects are examined in a sample of six regions of the Czech Republic. Respectively, impacts of FDI effects are identified within the business environment of the Pilsen, Carlsbad, Ústí nad Labem, Liberec, Hradec Králové and Pardubice regions (at NUTS 3 level). The common characteristics of these regions their border positions and the neighboring of regions.

It is difficult to identify the effects of all FDI because of the lack of relevant data, but it is possible to rely on CzechInvest's resources, which files projects from foreign investors – applications for investment incentives. The main source of data was statistics issued by the CzechInvest on investment incentives provisions (CzechInvest, 2018). A secondary source are the financial statements and annual reports of foreign companies that have received a promise of investment incentives (Ministry of Justice, 2017). From the CzechInvest evidence (2018), a list of FDIs were obtained, including information on regional location, investor's country of origin, promises of the number of newly created jobs and other information. This information was subsequently extended by data on the number of employees obtained from the annual reports provided by the analyzed company for each year of the analyzed period. The calculations were made between 2002-2014; long enough to track the trend.

4 Calculation of the transfer intensity of a foreign presence

In this chapter, attention is focused on the calculations and evaluation of the RRTG development in the selected group of regions. In terms of countries of origin, FDI investors in the analyzed regions are dominated by Germany and the United Kingdom (UK). Investors from these countries were represented in all regions. The development of labor productivity during the monitored period is shown in Table 1.

Regions	2002	2003	2004	2005	2006	2007	2008
Pilsen	14.72	16.13	17.56	17.48	19.62	20.63	20.15
Carlsbad	13.28	13.57	14.5	14.59	15.5	17.17	16.76
Ústí nad Labem	14.39	15.71	16.73	17.75	19.04	20.54	20.47
Liberec	14.36	14.17	14.84	16.57	17.88	18.58	19.18
Hradec Králové	14.21	15	16.97	17.04	18.1	19.96	20.57
Pardubice	14.84	15.56	16.46	16.94	18.82	20.13	20.53

Regions	2009	2010	2011	2012	2013	2014	Mean
Pilsen	21.4	20.75	21.2	21	21.84	24.24	19.75
Carlsbad	17.72	17.42	17.55	17.88	18.38	18.25	16.35
Ústí nad Labem	21.99	20.99	21.1	21.88	22.09	21.81	19.58
Liberec	19.28	19.42	19.82	21.5	21.59	21.75	18.38
Hradec Králové	20.73	20.96	20.91	21.02	21.79	23.86	19.32
Pardubice	20.57	20.66	21.33	20.5	20.46	20.57	19.03

Tab. 1: Developments of labor productivity in the surveyed regions
Source: Own processing based on data from the Czech Statistical Office

The table shows that at the beginning of the monitored period, the Ústí nad Labem region was ranked third in the region's survey of productivity. But, during the increasing inflow of foreign investment with an investment incentive, it maintained a leading position, along with the Pilsen region. This fact clearly confirms how vital it is for a region with economic and social problems to be able to offer investors the right conditions for doing business, for example, in the form of investment incentives.

4.1 Transfer intensity for the Pilsen region

The values of the transfer intensity for the Pilsen region are given in tab. 2. The dynamics of this indicator's development is then graphically illustrated in figure 1:
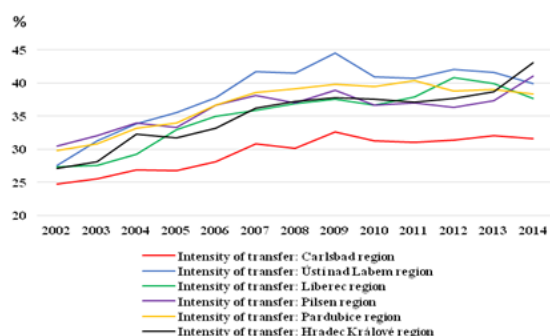

Figure 1: Comparison of the intensity of the transfer in the surveyed regions
Source: own processing based on own calculations and data from OECD, CZSO and annual FDI analysis

The Pilsen region is expected (given its strategic position, it enjoys spillovers from well-developed Bavaria, due to its short distance, above-average level of infrastructure with Bavaria and long-term cooperation between entrepreneurial environments)

the intensity of the transfer, relative to the other regions over the whole monitored period, is relatively high. It reaches thirty or more percentages over the entire period. However, the dynamics of IT growth is average or below average. This result is given by the relatively higher economic base of the Pilsen region, relative to other regions compared.

Year	IT annual productivity change (%) for Pilsen region	Growth coefficient of Pilsen region	IT annual productivity change (%) for Carlsbad region	Growth coefficient Carlsbad region
2002	0	-	0	-
2003	3	1.052	1	1.034
2004	3	1.059	2	1.052
2005	0	0.98	0	0.997
2006	4	1.102	2	1.049
2007	2	1.039	3	1.094
2008	-1	0.969	-1	0.977
2009	2	1.054	2	1.084
2010	-1	0.942	-1	0.96
2011	1	1.008	0	0.991
2012	0	0.981	1	1.012
2013	1	1.028	1	1.021
2014	4	1.101	0	0.986
Geographical mean		**1.025**		**1.021**

Table 2: Transfer intensity indicator for the Pilsen and Carlsbad regions
Source: own processing based on own calculations and data from OECD, CZSO and annual FDI analysis

In order to exclude the influence of the overall starting level of the region's economic maturity, it is appropriate to evaluate the development trend of the surveyed indicator on the basis of its year-on-year changes, to work with a year-on-year change in productivity in the region, measured by an appropriate trend indicator. Such indicators can also be considered, in this case, to be annual growth factors for IT. From these, the average growth factor can be determined (IT_{k_n}).[1] The average growth rate of IT in the Pilsen region was positive in the period under review of 1,025. It can be said that the Pilsen region managed to maintain an increasing rate in the ability to absorb the technological level of the foreign companies during the mentioned period, at ceteris paribus. However, this growth rate was below average over the other regions surveyed.

4.2 Transfer intensity for the Carlsbad region

The transfer rate values for the Carlsbad region are listed in Table 2. The dynamics of the development of this indicator is then graphically illustrated in Figure 1.

During the whole period, the region reached relatively low levels of foreign presence utilization, the worst of the monitored regions. The unfavorable position of the region is caused by low foreign presence and also from the low ability of the region to use the opportunity. The region is not capable of extensive or intense growth, using of foreign presence in the region. This conclusion further underlines the weaknesses of the labor market, and emphasizes the non-use of its potential and the comparative advantage of the region (economic diversity, convenient geographic position, low cost of work nearby Germany).

A very similar, not entirely positive, conclusion can also be reached about the indicator of the transfer intensity, in the year-

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[1] geometric mean annual growth coefficients of IT

on-year changes in productivity growth, see Table 2. Relative comparisons for the region are no longer negative, as in the case of absolute values of productivity. It is confirmed that the low productivity level region can absorb the technological gap, although smaller than the region, with a higher economic level (due to insufficient use of the region's comparative advantage, less economic experience and the ability of business entities to work with opportunities from abroad), however, the effect on productivity (i.e. its growth) is relatively higher due to a lower productivity starting base.

4.3. Transfer intensity for the Usti nad Labem region

In spite of its negative media image and socio-economic problems, the Ústí region managed to attract a relatively broad spectrum of foreign companies in the period under review, which created a relatively high share of jobs in the region. In addition, the region is able to use the FP quite intensively, according to the results of the IT indicator. It is very positive that the indicator has managed to grow, in the crisis period, to one of the highest values among the surveyed regions (44%) and has since kept its value above the 40% - see Figure 1.

If the values at the end of the reference period were not in a downturn, compared to other regions (loss of growth dynamics between 2010 and 2014), the region would be a clear leader among the surveyed regions. This final statement also confirms and better describes the development of the transfer intensity calculated using year-on-year productivity changes, see Figure 2. The high level of the IT indicator, given the low level of the educational structure in the region, is provided, above all, by the quality regional policy and the mutual consistency between domestic and foreign firms.
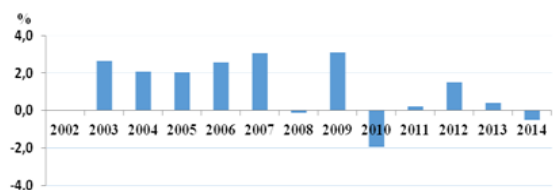

Figure 2: IT indicator - annual productivity changes for the Ústí nad Labem region
Source: own processing based on own calculations from OECD, CZSO and CzechInvest data

The IT figures (year-on-year productivity changes in the region) clearly show that at the end of the reporting period, the region was unable to take advantage of the opportunities for growth. There may be several reasons for this: external factors, change of IP priorities, reduction of regional activity and others.

4.4 Transfer intensity for the Liberec region

The values of the transfer intensity for the Liberec region are again shown in Table 3 and Figure 1.

Looking at this data, it can be concluded that in comparison with the other regions in the monitored set of regions, the Liberec region's transfer intensity was at a low level during the whole monitored period.

Year	IT year-on-year productivity change (%) for Usti nad Labem region	Growth coefficient Ústí nad Labem region	IT year-on-year productivity change (%) for the Liberec region	Growth coeficient Liberec region
2002	0	-	0	-
2003	3	1.131	-0.4	1.012
2004	2	1.08	1.32	1.058
2005	2	1.052	3.44	1.129
2006	3	1.064	2.56	1.061
2007	3	1.104	1.35	1.026
2008	0	0.995	1.15	1.026
2009	3	1.071	0.19	1.018
2010	-2	0.92	0.26	0.978
2011	0	0.994	0.77	1.034
2012	1	1.031	3.19	1.076
2013	0	0.99	0.17	0.977
2014	-1	0.959	0.28	0.944
Geometric mean		1.031		1.027

Table 3: Transfer intensity indicator for Ústí nad Labem and Liberec region
Source: own processing based on own calculations and data from OECD, CZSO and annual FDI analyzes

The region, however, cannot use a relative high level of internationalization (measured by high level of FP),   interest from foreign companies. This fact is reflected in the business environment, with low cooperation between domestic firms in the region and incoming foreign companies. Foreign firms are not fully involved in the business life of the region, or they mainly orient their supply-chain chains outwardly and domestic businesses are only subcontracted to a lesser extent. The ability of domestic enterprises to engage in the production networks of foreign firms is related to their absorption capacity - the ability to absorb technology transfer. The constructed IT indicator quantifies, given the simplified assumptions set out above, how far the regional business environment is capable of absorbing technology transfer, respectively. It is a simplified relative indicator of absorption capacity.

Very similar conclusions and evidence on the productivity growth's fluctuating rate, due to the low intensity of the use of the foreign firms' presence is documented in Figure 3, which refers to the intensity of FP use, related to the year-on-year change in productivity.
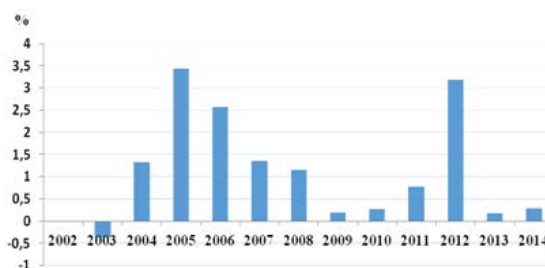

Figure 3: IT indicator - Year-on-year productivity changes for the Liberec region
Source: own processing based on own calculations from OECD, CZSO and CzechInvest data

As the region recorded a modest but steady productivity growth throughout the period, the values of the indicator for the whole period after 2003 are positive, but they are relatively low compared to the other regions. The value of this indicator never exceeded 35% over the whole surveyed period. Growth in regional productivity must be pulled higher than the other regions by domestic economic operators.

4.5 Transfer intensity for Hradec Králové region

Figure 1 shows a very positive finding for the Hradec Králové region, whose transfer intensity indicator value remained constant or increasing throughout the monitored period. This suggests that there is an increasing absorption capacity of the business environment in the Hradec Králové region, that is, the growing ability of the participating economic entities to take advantage of opportunities to absorb the benefits from abroad.

Due to the fact that a large number of foreign companies did not operate in the region (it is indicated from the low level of FP), it can be said that the region managed to attract, mainly to the region, companies with a high degree of consistency of trade relations and a high degree of subcontracting between foreign companies and domestic enterprises. The high dynamics of the increase in the rate of foreign participation utilization in the region also confirms the values of the modified IT indicator, which are presented in Table 4.

Year	IT year-on-year productivity change (%) for the Hradec Králové region	Growth coefficient Hradec Králové region	IT year-on-year productivity change (%) for the Pardubice region	Coefficient of growth of the Pardubice region
2002	0	-	0	-
2003	1	1.036	1.4	1.035
2004	4	1.15	1.8	1.076
2005	0	0.983	1	1.024
2006	2	1.048	3.7	1.079
2007	3	1.088	2.5	1.054
2008	1	1.029	0.8	1.012
2009	0	1.017	0.1	1.019
2010	0	0.99	0.2	0.992
2011	0	0.99	1.3	1.019
2012	0	1.015	-1.6	0.963
2013	1	1.027	-0.1	1.007
2014	4	1.112	0.2	0.98
Geometrical mean		**1.039**		**1.021**

Table 4: Transfer intensity indicator for Hradec Králové region and Pardubice region
Source: own processing based on own calculations and data from OECD. CZSO and annual FDI analyzes

4.6 Transfer intensity for the Pardubice region

The Pardubice region recorded the most stable level in the surveyed indicator. The region managed to improve or maintain its ability to absorb benefits from abroad (by 2011) at a steady pace in the period under review. The negative thing is that this trend has fallen since 2012 and the region has never reached an IT level of more than 40%. The regional business environment can absorb 40% of each foreign capital unit. The development is again clearly shown in Figure 1.

Due to the location of the region, the indicator's small value can also be attributed to a lesser degree of experience with domestic subjects cooperating with foreign companies, particularly regarding border regions. This experience can be expected, at least, to a lesser extent.

Stability in the indicator's development and low growth dynamics will further enhance and confirm the view of IT values computed over the YoY changes in productivity - see table 4.

The comparison between that Pardubice Region and Hradec Králové region is also interesting. While the Hradec Králové region had the best IT indicator, compared to all regions, the Pardubice Region was at the back of the comparison.

5 Conclusion

The built-in IT indicator illustrates the degree of internationalization of the business environment examined (thanks to the incorporation of the degree of foreign presence) and reflects the degree of absorption capacity of the business environment, to receive and exploit this degree of internationalization, and to what extent the impact of foreign companies is reflected in productivity growth.

The calculations performed showed that all regions achieved positive average IT growth factor values, i.e. that the whole group of regions was able to absorb, to a greater or lesser extent, the technological growth opportunities brought to them by the

analyzed foreign companies in the region. The highest values of the indicator, in the relative conception of the studied regions, reached the Ústí nad Labem region, where significant fluctuations in values were recorded. An outstanding development trend has been identified in the Hradec Králové region, which has been able to maintain a constant or rising value throughout the period. This indicates the increasing absorption capacity of the business environment in the Hradec Králové region.

In the Hradec Králové region, the productivity growth is mainly caused by the intensity of the use of a relatively small number of companies from abroad in the region. These companies employ a relatively small proportion of employees. The highest value of the indicator, in the relative concept among the studied regions, was reached by the Hradec Králové region. The Carlsbad region has the lowest value. In the Carlsbad region, both the absolute IT indicator value and the relativized (modified) value of the indicator were low. The Ústí nad Labem region also achieved a relatively high IT value (the average IT growth factor was 1.031). The Pardubice region achieved a surprisingly low value (average growth coefficient - 1.021), which illustrates relatively constant development without significant growth tendencies in the absorption capacity of the business environment. All regions then achieved positive average IT growth factor values. It can be said that all regions are able to use the technological growth opportunities more intensively, which could bring to foreign companies in the region. This result is probably due to the region's growing experience, in terms of cooperating abroad and the penetrating foreign companies. This claim also corresponds to rising FP values.

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Primary Paper Section: A

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