

THE ECONOMIC PERFORMANCE OF REGIONS IN THE CZECH REPUBLIC

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Abstract

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Regional development in the Czech Republic contributed to the fact that at present none of the regions is significant backward compared to other. Individual regions have shown among themselves certain differences. This applies in particular to the economic performance of regions. This paper introduce results of our research. Main aim of the work was to identify economic performance affecting factors of regions NUTS 3 in Czech Republic. It was necessary to define quantity of economic performance to meet this goal. We used them to create method of valuating economic performance of regions. We weighed quantities (e.g. GDP, unemployment rate, net disposable income) according to their importance. This procedure was applied to individual regions. We determined the level of economic performance of Czech regions. We present overview of factors and using statistical methods we test their importance to the economic performance of Czech regions.

region, economic performance, factors, indicators, competitiveness

Even though EU area belongs to the richest parts of the world, among regions of European Union (further just EU) exist outstanding differences. Regions dispose of disparate economical, social and geographical condition. The aim of the European regional policy is to decline the social and economical disparity among the regions. The effort is to support the growth of competitiveness, prosperity and dynamic development of the regions. Acc. to Marshall (1920) competitiveness is not a regions' characteristic, but it is created by the competitiveness of companies operating in the regions. Prosperity, thus efficiency, is very often discussed term in relation to the regions. If we understand prosperity of the enterprise as economical efficiency, success, profitability or reinforcement of market position, it is also necessary for the assessment of economic prosperity or efficiency of regions to observe more indicators than just the size of GDP. The most common one is a combination of several economic indicators (Kahoun, 2007; Kupka, 2007; Jansky, 2009).

In the Czech Republic there are very prominent differences in some indicators between Prague and the rest of Czech regions (unemployment rate, average salary). It dramatically deforms the average

values of the Czech Republic. This variation has been increasing during the last few years, especially in GDP, average salary and unemployment rate.

A research was focused on the issue of economic efficiency of regions in order to identify the key factors affecting the economic efficiency of regions in the Czech Republic. The operational objective of this research was to create a aggregate index of economic efficiency of regions in the Czech Republic based on indicators of economic efficiency of regions. The research was focused on regions at NUTS III according to Regulation of European Parliament and European Senate (ES) No. 1059/2003 of 26 May 2003 on the establishment of common classification of territorial units for statistics. (Czech Statistical Office, 2012) It is therefore 14 regions. However, in the course of research was eliminated Capital region Prague, because of distorting considerably the results.

MATERIALS AND METHODS

Trade as a source of regionalisation

From the economical theory point of view, we can connect this topic with the economic geography

in the intentions of work of Paul Krugman. It belongs to the new theory of trade, which is in the comparison to the previous theories, related to the increasing returns to scale and imperfect competition (Krugman, 1979). Krugman (1979) used monopolistic model theory, created by Dixit and Stiglitz (1977).

We proceed from their results in our paper. The increasing returns to scale lead to accumulation of industrial branches in particular regions, Krugman (1991) was interested in the role of localization and geography in a common theory of international trade. He used so called a production line for this purpose in USA. He proved that history and structural policy has a considerable influence on the structure of the regions and companies localisation. Success of the region and / or business leads to start the process of accumulation. This process has a direct impact on economic efficiency and success of the region. Centripetal forces are associated both with the labor market and with the effect of the domestic market. Here follows a new theory of trade on Marshall's theory (1920). The difference lays in the fact that while Marshall works with perfect competition; Krugman's models are built on imperfect competition. This approach is reflected in terms of economies of scale. Marshall's concept leads to external economies of scale, Krugman's to internal ones. External economies of scale are realized outside of firms; important is a number of enterprises and size of the regional economy. Internal economies of scale, then take into account the size of individual firms. These theories justify the importance of understanding of the economic efficiency of regions. Despite the differences in approach, both authors arrive at similar conclusions.

Creation of Single Market in EU led to the amplification of these forces, Disdier and Mayer (2004) described the local election of French companies considering the differences between the west and east Europe (New and old states of EU). Their paper can provide us a point of view on the original condition in Czech economy during the entrance to the EU. If the mentioned theory works, than the Czech regions are influenced by the entrance to the EU and the importance of understanding of Regional Economies increases.

Economic Efficiency of the Market

Economic efficiency of regions is one of three key parts of regional competitiveness, apart from innovative efficiency and life quality. Economic efficiency is understood as a general prerequisite and a result of regional competitiveness (Kahoun, 2007). This approach is basically consistent with the assumption of above mentioned theories. Meanwhile Marshall (1920) spoke about company's competitiveness, which creates the region's success, Krugman (1991b) arguments by the region's success as a main localisation factor. On a level of EU, economic efficiency is observed at individual regions NUTS III, from the mid-nineties thanks

to gross value added and GDP, indicators of labour market (employment, employees, compensation of employees, worked hours), gross fixed capital formation and net disposable income of households in the regions (Kahoun, 2010).

Kahoun (2007) performs the evaluation of regional economic efficiency thanks to GDP per capita, labour productivity, unemployment rate and gross fixed capital formation per capita. Janský (2009) on the other hand lefts apart the unemployment rate as an indicator of economic efficiency and compares economic efficiency of particular regions on the basis of gross domestic product, gross value added and fixed capital formation. Kupka (2007) considers as a fundamental indicator of efficiency of regions the gross domestic product per capita. Further he mentions unemployment rate, foreign investment and number of small and medium sized enterprises.

It results from the above mentioned that when evaluating economic efficiency of regions, the importance is based on GDP completed by others economic indicators.

Factors influencing economic efficiency of regions

When observing economic efficiency of regions, a combination of several factors has a big importance. Influence of these factors creates the distinctness among the regions. Individual authors (Kupka, 2007; Viturka, 2007; Wokoun, 2008; Chlad and Kahoun, 2001) divide these factors into particular groups according to the parameter. We can observe demographic, technologic, structural, economic, ecologic and other factors.

For instance Kupka (2007) states as factors influencing economic efficiency of regions in the Czech Republic a population aging (variance of age structure of the population in different regions), migration (permanent or long-term and short-term, i.e. for commuting to work), the educational structure (at the same time the structure of the quality of labor supply in the labor market), the position of the region and settlement structure (agglomeration or rural area, peripheral region), industrial infrastructure (such as industry structure of industrial buildings and equipment), transport infrastructure (density and quality), transportation services (use of public transport), technical infrastructure (water supply facilities, sewerage networks and waste water treatment plants), the environment and political science factors.

As factors that cause inter-regional differences in the attained level of GDP per capita, ranks Viturka (2007):

- economic structure expressed by the share of employment in agriculture, industry, construction, market and non-market services in total employment (this group of factors is closely linked with the trade theory. Trade leading to specialization directly affects the economic structure Krugman (1991c).),

- range of innovations that can be measured by the number of patent applications and inventions
- transport accessibility of the region, which is measured by marginality index covering not only the influence of geographic location, but also differences in the facilities of transport infrastructure,
- qualification of labor force, which is expressed in the share of population having completed university, secondary and primary education in the total population of the age group 25–59.

Other view on the division of factors is brought by Wokoun (2008), who divides the factors on natural resources and environment, tangible and intangible factors. Natural resources and natural environment understands as long-term determinants of regional development, tangible factors in a form of their production potential and infrastructure and intangible factors are considered especially innovation and ability of its creation and diffusion, accessibility and effective use of informative and communication technology (ICT), environmental sustainability of development, institutional environment and human resources with an appropriate level of abilities of technical education.

Chlad and Kahoun (2011) also investigate the factors influencing the rate of GDP per capita in the particular regions. They involve the sectoral structure, commuting to work, demographic influences, professional and educational structure of population, labour force and settlement of crucial firm.

Despite the various views on the given issue, and diverse perception and division of factors influencing the economic efficiency of regions in the Czech Republic, particular authors are in agreement with it.

On the basis of technical resources, there was created a methodology of economic efficiency evaluation in regions, based on aggregate indicator of economic efficiency in regions. It is created by GDP (of average price) per capita in CZK, by net disposable income of households per capita in CZK, the registered unemployment rate in % according to methodology effective from 1st July 2004 and gross fixed capital formation per capita in CZK.

In the next step was stipulated an appropriate importance to this indicators. Because of the fact, that mentioned indicators are determinant for the rate of GDP, a registered unemployment rate and gross fixed capital formation was given a higher importance at the evaluation of economic efficiency. It reflects the Solow's growth theory (Solow, 1956). To unemployment rate and gross fixed capital creation per capita was given importance of 0.3, GDP per capita obtained importance of 0.25 and net disposable income of households per capita has 0.15.

In order to evaluate aggregate indicators at individual regions, a point system was used. Regions were ranged according to values from the lower

to higher for each indicator; these values were further divided thanks to quartile. The first group of regions separated by lower quartile obtained 1 point, second group 2 points, third group 3 points and fourth group 4 points. In this way the points were multiplied by rate of given indicator for each region. The general evaluation of economic efficiency of regions was obtained as a sum of points. Furthermore at each region there were specified factors, which are, according to experts, influencing economic efficiency in the Czech Republic.

Multiple regressive model was applied on these data, where the explicative variables are factors and explained variable is aggregate indicator of economic efficiency, always for each region. In order to increase number of observation of explicative variables, there were used data from previous years, 2008–2010. Panel data were used.

Based on testing of the statistical significance of parameters, model was adjusted by removing statistically insignificant parameters until there was seen an improvement in the model. The statistical significant factors are the output of this model that affects the economic efficiency of regions in the Czech Republic. In order to stipulate individual factors and indicators, a regional statistics of the Czech Statistical Office were used. Amount of usable information was limited because of the changes in observed information in particular region during the various years.

RESULTS AND DISCUSSION

On the basis of performed analysis and thanks to evaluation of economic efficiency method in regions, an economic efficiency in individual regions in the Czech Republic was analysed during the period 2008–2010. The results are stated in the Tab. I.

As it is seen from a Tab. I, a highest economic efficiency was in the year 2008 at South Moravia Region, in 2009 and 2010 at Pilsen region. On the other hand the lowest economic efficiency was seen at Olomouc, Liberec and Karlovy Vary Region.

The operational objective of the survey was to identify the factors related to the economic efficiency of regions in the Czech Republic. These factors were for needs of further processing divided into three groups:

- the organizational structure of the economy (agriculture, industry, services, education),
- demographic and socio-economic factors,
- others.

Thus defined factors were tested econometrically, using the least squares method. We observed panel data, which included thirteen regions in the period 2008–2010. So we took advantage of 39 observations. Unfortunately there were not available comparable data in both time series and among regions for a longer period of time.

Especially in regional yearbooks in the individual years often changes monitored factors and

I: *Economical efficiency of regions in the Czech Republic in 2008–2010*

2008	Total Points	2009	Total Points	2010	Total Points
South Moravia	3,70	Pilsen	4,00	Pilsen	3,75
Central Bohemia	3,70	Central Bohemia	3,70	South Bohemia	3,60
Pilsen	3,70	South Moravia	3,55	South Moravia	3,40
South Bohemia	3,15	South Bohemia	3,45	Středočeský	3,40
Pardubice	3,00	Hradec Králové	2,70	Hradec Králové	2,65
Hradec Králové	2,45	Pardubice	2,45	Pardubice	2,30
Moravia-Silesia	2,40	Vysočina	2,45	Zlín	2,25
Vysočina	2,25	Zlín	2,25	Vysočina	2,15
Ústí nad Labem	2,15	Ústí nad Labem	2,15	Moravia-Silesia	2,15
Zlín	2,15	Moravia-Silesia	2,00	Liberec	1,90
Liberec	2,05	Karlovy Vary	1,60	Olomouc	1,60
Karlovy Vary	1,60	Olomouc	1,60	Ústí nad Labem	1,20
Olomouc	1,45	Liberec	1,45	Karlovy Vary	1,15

Source: data ČSÚ, own elaboration

indicators, or there is a change in methodology for their calculation. Differences are also among the regions, when the regions do not follow the same factors and indicators. When analyzing and processing data, therefore it was necessary to deal with many problems. By testing of the parameters' importance, we get the following estimation of parameters (Tab. II).

Regressive equation is in a form of:

$$\text{index} = 2574,73 - 2,3 \times x_1 + 4,7 \times x_2 + 0,000675 \times x_3 - 3925,65 \times x_4 + 0,028 \times x_5 - 0,007 \times x_6 + 0,0476 \times x_7 + -0,1 \times x_8.$$

The model did not show signs of heterocity (Whit's test) and residues were deviated normally. One of explaining variable was number of enterprises in our model. We have chosen this indicator in order to follow better influence of small and medium sized enterprises. In case we used turnover or number of employees, our investigation could have been biased due to big enterprises. Corelation between number of enterprises in industry and number of employees in industry is very strong (0.88). Therefor

we can use the number of enterprises without any data misleading because of the particular sector.

If we observe the individual parameters, the negative value in case of population density and population share in economic active age is in conflict with some opinions of experts (For example Chlad and Kahoun, 2011).

There does not exist clear correlation ($0.28 < \text{critical value } 0.376$) between the city population and density, it can be documented by fractionalism of regions, when the high density of population is balanced by its distribution within all region. This argument can be supported by another correlation, very strong negative correlation (-0.72) between city population share and number of towns. Deconcentration of population declines the region's efficiency. In case of higher density in cities, efficiency is increased. Empirical conclusion presented below is in agreement with above mentioned theories. In case of share of population in productive age on total, it is important for us the correlation of this indicator with economic activity in a given region. Uncorelation ($0.2 < \text{critical value } 0.316$) of these quantity can explain us, why

II: *Results of testing parameters*

Factor	coefficient	routing error	t-share	p-value
Constant	2574,73	848,853	3,0332	0,00496
Population density [capita/km2] (x1)	-2,33526	0,221364	-10,5494	< 0,00001
City population share [%] (x2)	4,71892	1,02738	4,5932	0,00007
Hitech export [mil. Kč](x3)	0,000675113	0,000170848	3,9515	0,00044
population share in the economic age of 15–64 [%](x4)	-3925,65	1246,39	-3,1496	0,00369
Number of industries* (x5)	0,0283151	0,00379675	7,4577	< 0,00001
Number of enterprises - construction(x6)	-0,00708633	0,00339376	-2,0880	0,04538
Number of enterprises - wholesale, retail (x7)	0,00476397	0,00150555	3,1643	0,00355
Number of enterprises - IT (x8)	-0,101686	0,0213347	-4,7662	0,00005

Source: data ČSÚ, own elaboration

* B-E CZ-NACE

III: *Descriptive statistics of the model*

Mean value of dependent variable	252,8205	Routing deviation of dependen variable	82,30076
Sum of squares of residue	29639,48	Routing error of regression	31,43219
Determination coefficient	0,884846	Adjusted coefficient of determination	0,854138
F(8, 30)	28,81506	P-value(F)	4,81e-12
Logarithm of reliability	-184,6880	Akaiko criterion	387,3759
Schwarz criterion	402,3480	Hannan-Quinnov criterion	392,7478
rho (autocorrelation criterion)	0,056370	Durbin-Watson statistics	1,223035

Source: Own elaboration

a population share has in economic active age negative sign.

The result of the use of multidimensional regression model is the fulfillment of the research's objectives; it means identification of statistically significant factors that affect the economic efficiency of regions in the Czech Republic. City population share in regions, furthermore amount of hitech export, number of industries, and number of enterprises-wholesale and retail belongs among these factors. Due to the fact, that investigation was based on trade theories and importance of trade as well as SME coverage in regions, it means that two last factors indicate that empirical results are in accordance with theoretical presumption.

Although Kupka (2007) considers as one of the indicators of region efficiency the number of SME, in our approach was number of SME considered as factor of regions' efficiency. This understanding comes from theoretic presumption of internal and external economies of scale.

Evaluation of economic efficiency of regions and degree of regional disparities expresses relatively difficult issue. In first case it was a choice of indicators. In case of big amount of indicators, there can be a very strong correlation among some of them, which leads to misleading of results. Outputs are than less understandable and difficult to interpret. It was important to choose just the significant indicators, which are related to the given issue. The same approach was necessary to apply in case of testing and choosing of individual factors. Although authors state number of enterprises and number of employees as factors influencing economic efficiency, it is not possible to work with both factors. These two factors express very strong correlation between them.

CONCLUSIONS

Regional competitiveness is especially in intention of European Single Market very frequently discussed topic. Attention of economy policy creators and theorist is focused on determinants and factors of regional economic efficiency. The aim of our article was to stipulate and test key factors in the environment of Czech regional economy. The topic is directly related to trade economic theory, which is considered as a necessary presumption of specialisation and diversification of regions. Theoretical bases predicate, that more successful regions are more interesting for new companies localisation is. Regional efficiency is also a cause and result of local competitiveness. Unbalanced development can lead either to diversification or to divergence of regions, which is in direct conflict with cohesion objectives of EU. From these reasons it is relevant to be interested in the objectives. Evaluation of economic efficiency is complex issue; therefor the indeces that are engaged with their analysis are complex indicators. To calculate our index, according to literary sources was used a macroeconomical aggregate. These factors influenced statisticly the presented index: share of city population in regions, amount of hitech export, number of industries, number of Enterprises in wholesale and retail.

The results indicate eligibility of commercially oriented approach. While the number of subjects interested in trade reflects the region involvement in national market, high-tech export proves the success of local products with high value added and thus related operation of local companies on the world market. Since the tendency of agglomeration is a connection point between economic geography and new theory of international trade, we can consider also in case of this factor, a statistical importance as argument for trade oriented approach.

SUMMARY

The article presents the results of investigation called Identification of factors influencing economic efficiency of regions in the Czech Republic. The aim of this investigation, as the name itself prompts, is to identify the key factors which influence the economic efficiency of regions in the Czech Republic. Based on the study of professional resources, a methodology of evaluation of economic efficiency of regions was created, based on aggregate indicators of economic efficiency of regions. It is composed of GDP per capita in CZK, net disposable income of households per capita in CZK, the registered unemployment rate in% and gross fixed capital formation per capita in CZK. These indicators

were given significance according to the importance assigned to the general indicators. Registered unemployment rate and gross fixed capital formation / capita were assigned a significance of 0.3. GDP / capita gained 0.25 and net disposable income of households / capita obtained 0.15. To evaluate the general characteristics for each region was used scoring method. Regions were scored according to the different indicators. Summary evaluation of the economic efficiency of the region was obtained as the sum of points. Subsequently, for each region there were quantified factors that influence according to experts the economic efficiency of regions in the Czech Republic. These factors were divided into three groups due to the need of further processing, namely the group of organizational structure of the economy (agriculture, industry, services, education), demographic groups and socio-economic factors and other groups. On this data was applied multiple regression model where the explicative variables are factors and explained variable is aggregate index of economic efficiency, for each region. Significant factors that affect the economic efficiency of regions in the Czech Republic are the output of this model. Among these key factors belong the proportion of the city population in region, size of high-tech export, the number of industrial enterprises and the number of enterprises engaged in wholesale and retail.

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