

LABOUR PRODUCTIVITY AS A FACTOR OF SECTOR COMPETITIVENESS

Tomáš Volek – Martina Novotná

Abstract

Competitiveness can be defined from microeconomic and macroeconomic perspective. Competitiveness at the level of countries or sectors can be evaluated by using different indicators. Labour productivity is one of the most important factors (indicator) which affects competitiveness. Paper is focused on evaluation of labour productivity as a factor of sector competitiveness. The objective of this article is to examine the sector's competitiveness in the EU countries and assess which countries are in particular sectors more or less competitive. The analysis deal with development of competitiveness in the post-crisis period and with determining the productivity gaps in the sectors between countries. Sectors are grouped with the help OECD methodology according to the technological intensity which based on the statistical classification of economic activities in the European Community. The analysis found that the most of the original EU countries have higher level of labour productivity in all analysed groups (sectors) of economic activities. On the other hand, most of new member states EU reached a high growth rate of labour productivity, especially in the industrial sector (low and medium low technology).

Key words: competitiveness, labour productivity, EU, sector

JEL Code: D24, E01, E23

Introduction

Competitiveness is nowadays evaluated not only at the firm level, but also at the macroeconomic national or regional level. Competitiveness at the national level in countries or regions linked to the changes in the world economy - globalization. Competitiveness of the sectors in the country is influenced by many factory and we can give the productivity of human capital. The objective of this article is to examine the sector's competitiveness in the EU countries and assess which countries are in particular sectors more or less competitive. The main factor of competitiveness was analysed indicator of labour productivity sectors.

Competitiveness is defined by European Commission (1999) as the ability to produce goods and services which meet the test of international markets, while at the same time maintaining high and sustainable levels of income or, more generally, the ability of (regions) to generate, while being exposed to external competition, relatively high income and employment levels.

Microeconomic competitiveness is positioned in the centre of national and regional competitiveness. Usually, it is defined as the ability of a firm to compete successfully in a market, to grow and to be profit table in a long run. It should be noted that the stressing the long-run profitability illuminates the need for a responsible and moral behaviour of firms to community and for matching the firms' goals, measured in quantitative terms, to the community interest. Different competitiveness shows private firms and municipal enterprises (Petrách&Leitmanová, 2013). Regional competitiveness has been often considered as the aggregate of microcompetitiveness or a derivative of national competitiveness (Borozan, 2008).

Microeconomic determinants of competitiveness are very different. Moving beyond the broad institutional factors, microeconomic competitiveness is focused on specific attributes of the national business environment, the organization and structure of economic activity, and the use of sophisticated business management practices. Macroeconomic determinants of competitiveness could be sector, social infrastructure, political institution, fiscally and monetary policies (Delgado et al., 2012).

Productivity is defined as a ratio between the output and inputs. Productivity measures how efficiently production inputs (labour, capital) are being used in an economy to produce a given level of output. Productivity is considered a key indicator of competitiveness. We have many types of productivity – labour, capital and total factor productivity. Labour productivity is the most frequently measured indicator of productivity. The important factor of labour productivity is the flexibility of the labour market (Pavelka&Loester, 2013). Labour productivity we can write as GDP per employee (Belorgey et al., 2006) or value added per labour (Broersma&Oosterhaven, 2009). Labour productivity can be measured at the firm, sector and regional or national level. The size and dynamics of labour productivity in the regions is one of indicators of regional competitiveness (Ramik et al., 2010).

Together, productivity and the employment rate are measures of what might be termed 'revealed competitiveness', and both are central components of a region's economic performance and its prosperity (as measured say by GDP per head), though obviously of themselves tell us little about the underlying regional attributes ('sources of competitiveness')

on which they depend (Gardiner et al., 2004). The competitiveness of a region or sector depends on its ability to upgrade its economic base (Boschma, 2004).

1 Data and methodology

The aim of this paper was to assess the competitiveness of territorial units (states - NUTS 1) using indicators of sectors labour productivity. The first part focuses on assessing significance of the sectors in the economy of each country. Next analysis deal with the average level of labour productivity in the individual groups (sectors). The last part is focused on determining individual groups (sectors) in the EU countries which were affected by the global crisis in 2009. Competitiveness was evaluated for various groups of economic activities according to the OECD methodology, which is also used by Eurostat on the basis of two levels NACE (Eurostat, 2004). The data source was Eurostat (National accounts). The observed data were from the period (2008-2014). Based on this classification of economic activities are divided into 5 groups: A1 (Industrie: High and Medium High Technology), A2 (Industrie: Medium Low and Low Technology), B1 (Knowledge-intensive market services), B2 (Less knowledge-intensive market services), C (Agriculture, construction and utilities).

Labour productivity was determined as the ratio of gross value added (GVA) and total employment. Gross added value is determined at prices of previous year, indices are constructed on the basis of the indicators in this valuation represent practically the aggregate volume indices, which are not affected by changes in prices and they are appropriate to the time comparison. Some states had to be excluded from the analysis because they were not available data for divisions of NACE (Ireland, Croatia, Cyprus, Lithuania, Luxembourg, Malta). The positions of the examined sectors were classified according to the quotient of labour productivity of particular countries to the productivity of the starting year of observation, i.e. in the year 2008:

$$\frac{\frac{GVA_{i,2013}}{L_{i,2013}}}{\frac{GVA_{i,2008}}{L_{i,2008}}}, \quad (1)$$

Where

$GVA_{i,2008,2013}$ is gross value added of individual groups in year 2008,2013 ($i = 1...5$),

$L_{i,2008,2013}$ is number of employees (domestic concept) of individual groups in year 2008,2013 ($i = 1...5$).

The calculation of the average yearly indexes, i.e. the average growth of observed productivity, was performed using the geometric mean.

2. Results

2.1. Sectors

The first part of the analysis focuses on assessing the significance of the sectors in the economy of each country. Table 1 shows the distribution of states by percentage of gross value added (GVA) of individual groups of economic activities in the total volume of GVA.

It is obvious that Industrie: High and Medium High Technology (A1) is represented by more than 10% of GVA in the economy countries: Hungary, Czech Republic and Germany. Industrie: Low Medium and Low Technology (A2) make up the largest percentage of GVA in Romania. Services (B1 and B2) represent the largest portion of GVA in the economy of all countries.

Tab. 1: Distribution of countries into groups of economic activities according of GVA share (%)

A1	0 - 5%	Greece, Latvia, Portugal, Bulgaria, Estonia, France, United Kingdom, Spain, Netherlands
	5%-10%	Poland, Italy, Belgium, Denmark, Romania, Slovakia, Austria, Finland, Slovenia
	10% and more	Hungary, Czech Republic, Germany
A2	0 - 5%	
	5%-10%	Denmark, United Kingdom, Netherlands, France, Greece, Belgium, Spain, Germany, Finland
	10% -15%	Latvia, Portugal, Austria, Slovenia, Estonia, Bulgaria, Poland, Slovakia, Czech Republic
	15% a	Romania
B1	25%-30%	Romania, Slovakia
	31%-35%	Poland, Bulgaria, Czech Republic, Latvia, Estonia, Austria
	36%-40%	Spain, Italy, Hungary, Germany, Slovenia, Portugal, Finland, Greece
	40%-45%	Belgium, France
	45% a	United Kingdom, Denmark, Netherlands
B2	25%-30%	Netherlands, Denmark, Slovenia, Czech Republic, Finland, Romania
	31%-35%	Hungary, Slovakia, Belgium, Germany, United Kingdom, Poland, Bulgaria, Estonia, France
	36%-40%	Austria, Spain, Portugal, Italy
	40%-45%	Latvia, Greece
C	0 - 5%	
	5%-10%	Germany, Belgium, France, Italy, Greece, United Kingdom, Portugal, Austria
	10% -15%	Denmark, Netherlands, Hungary, Slovenia, Finland, Czech Republic, Spain, Latvia
	15% a	Estonia, Poland, Slovakia, Bulgaria, Romania

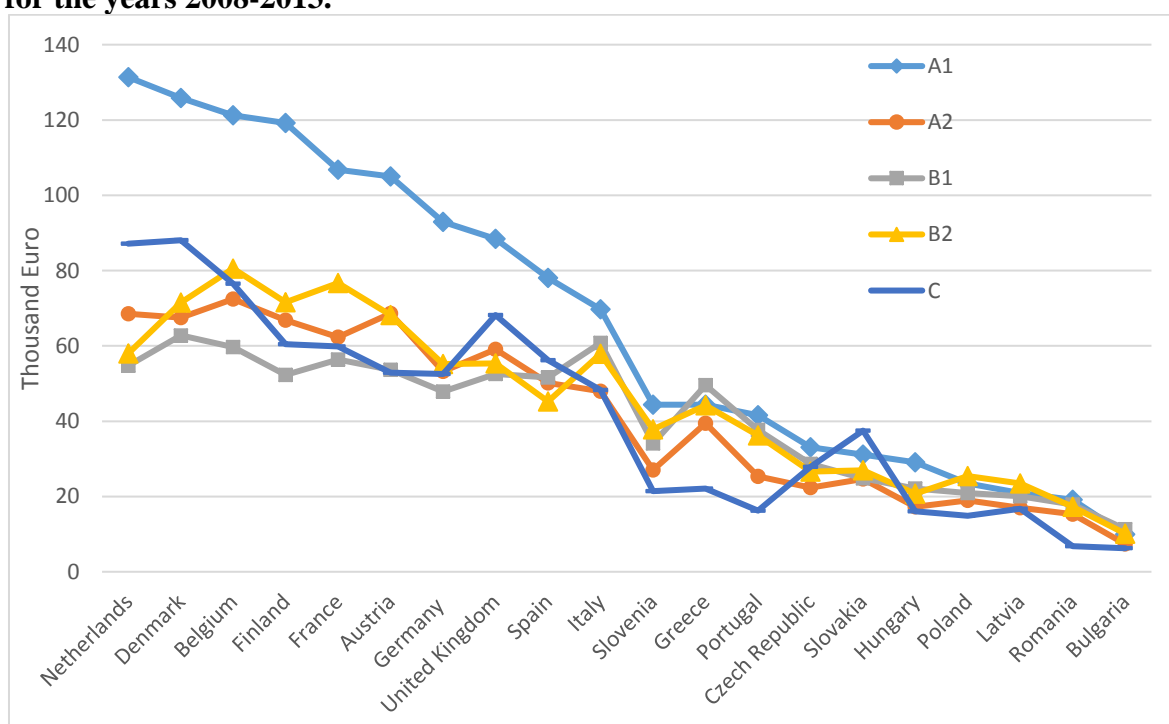
Source: Eurostat - National account

Knowledge-intensive market services (B1) are the most prominent in the United Kingdom, Denmark, Netherlands, constitute more than 45% share of GVA produced. Less knowledge-intensive market services (B2) have the largest share of GVA in Latvia and Greece (40-45% GVA). Grouping C is expected in most represented countries Estonia, Poland, Slovakia, Bulgaria, Romania.

2.2. Labour productivity

The second analysis dealt with the assessment of the average level of labour productivity in the individual groups (sectors). Figure 1 illustrates the average level of labour productivity in the 2008-2013 period for each group. States are ranked in descending order, the level of productivity A1. The highest level of labour productivity, ie. GVA per 1 worker is achieved in group A1 and in some states greatly exceeds (Netherlands, Denmark, Belgium, Finland, France, Austria, Germany, United Kingdom, Spain) labour productivity levels in other groups. The reason could be advanced technology and modern equipment used in those states. Countries that are not founding members of the EU still have levels of labour productivity in all sectors lower. At the very end of the scale, Romania and Bulgaria, which is about all groups of the same productivity and the lowest of the all compared countries.

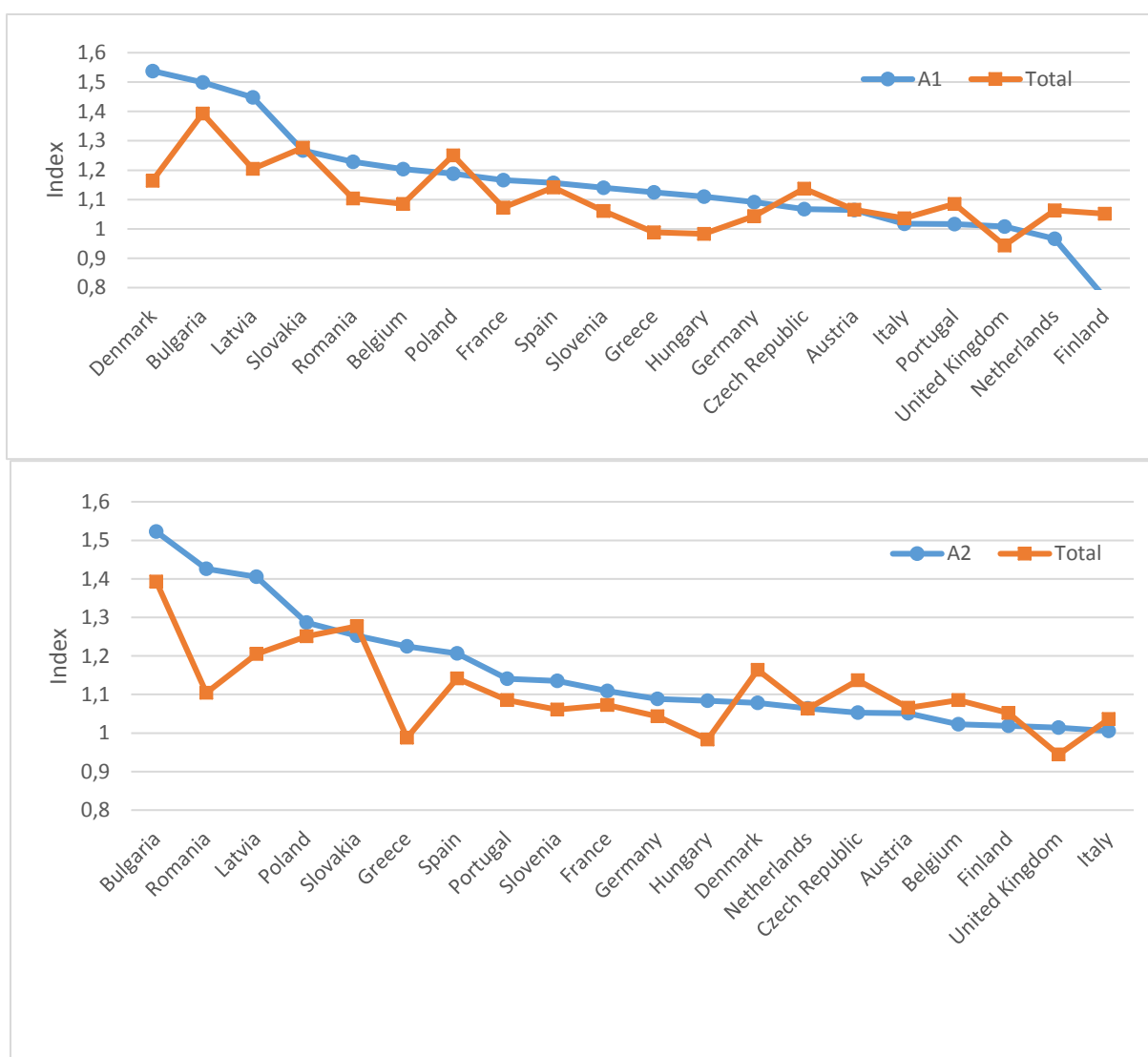
Fig. 1: The average level of labour productivity in individual sectors and EU countries for the years 2008-2013.



Source: Own calculations based on the data National account

Figure 2 shows a comparison labour productivity in group A1 and A2 in 2013 (the latest year comparison) to 2008 (base year comparison). In industrie: High and Medium High Technology (A1), the largest increase was Denmark, which also has the highest labour productivity level and compared the change in labour productivity for all activities, it can be argued that the group A1 has achieved the most dynamic growth. Higher growth of labour productivity in this group compared with the overall change can be observed in Bulgaria, Latvia (increase of more than 45%).

Fig. 2: Comparison of labour productivity in industry (A1, A2) in the EU (2008/2013)



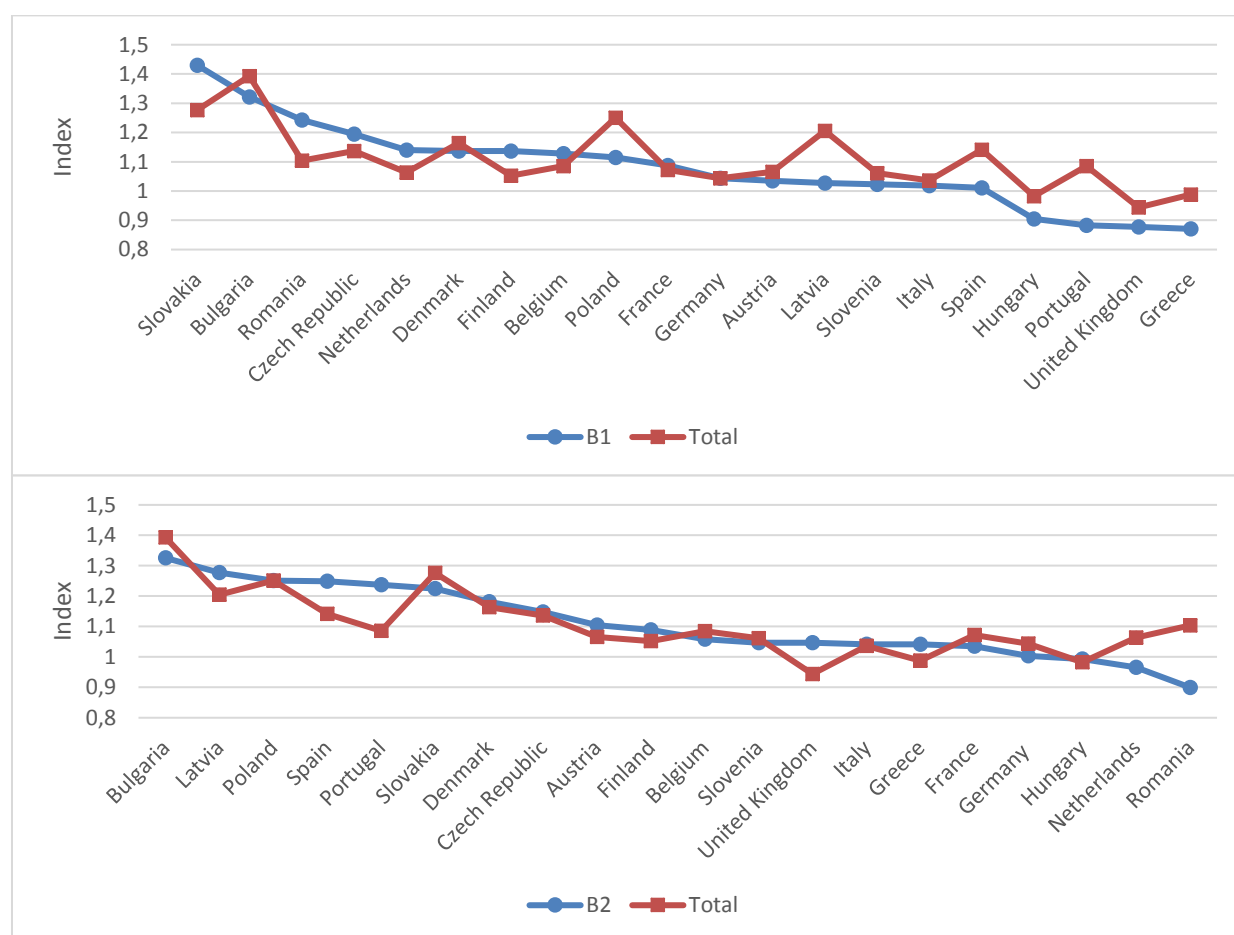
Source: Own calculations based on the data National account

In Industrie: Low Medium and Low Technology is possible to say that countries that achieved the lowest level of labour productivity, have the highest increase (Bulgaria,

Romania, Latvia). In these countries, increased TFP work by more than 40% in a comparison of 2013 with 2008.

Figure 3 is focused on services and their development for the groups B1 and B2. It is a comparison of changes in labour productivity in 2013 compared to 2008. In the service are obvious differences between the development group and for the whole economy. In the group Knowledge-intensive market services (B1) in the same period there was a decline in Hungary, Portugal, United Kingdom and Greece. Conversely, the largest increase occurred in Slovakia (over 40%) and in Bulgaria (more than 30%).

Fig. 3: Comparison of labour productivity in services (B1, B2) in the EU (2008/2013)



Source: Own calculations based on the data National account

In the group Less knowledge-intensive market services (B2), labour productivity increased most in countries with the lowest level of this indicator, ie. In Bulgaria (over 30%), Latvia, Poland (almost 30%). In the reporting period decreased labour productivity in this group in the Netherlands and Romania.

The last part of the analysis is focused on determine if the individual groups (sectors) in the EU countries were affected by the global crisis and therefore they noticed of declines in labour productivity in 2009. The first part of Table 2 illustrates which countries and how big decline in labour productivity during this period there was a second part illustrates how the country dealt with a decrease. In some countries even in 2013 did not get the level of labour productivity to the value achieved before the global crisis ie. in 2008.

This situation has been in group A1 in Finland in Group B1 in Greece and Portugal, in Group B2 in Romania and Portugal. The last column of Table 2 is the country by individual groups, which in the period of global crisis, while a decrease was recorded, but in the last reporting 2013 achieves the level of labour productivity in 2009. In these countries labour productivity for the array of economic activity stagnates, respectively declining slightly. The Czech Republic is a group A2, where labour productivity in 2009, although did not record a decline, but compared with 2008, we can talk about a slight decline stagnation of this indicator.

Tab. 2: Reaction of labour productivity in groups in EU countries to the crisis year 2009

	An annual decline in labour productivity in the year of global crisis (2009)			The level of labour productivity in 2013 is lower	
	>20%	10-20%	< 10%	before crisis	after crisis
A1	GE	FI, IT, CZ, NL, BG, AT	UK, SI, HU, LV, PT,FR	FI	RO
A2		AT, UK, BE, GE	FI, IT, HU, SI, NL, SK		CZ
B1		UK	GE, EL, PT	EL, PT	IT, SI, ES, HU, LV
B2			UK, RO, FI, SI, GE, NL, IT, BE	RO, NL	HU
C		UK	HU, SI, RO, PT, AT	EL, PT	

Source: Own calculations based on the data Eurostat

Abbreviations: BE Belgium, BG Bulgaria, CZ Czech Republic, DK Denmark, GE Germany, UK United Kingdom, EE Estonia, IE Ireland, EL Greece, ES Spain, FR France, HR Croatia, IT Italy, CY Cyprus, LV Latvia, LT Lithuania, LU Luxembourg, HU Hungary, MT Malta, NL Netherlands, AT Austria, PL Poland, PT Portugal, RO Romania, SI Slovenia, SK Slovakia, FI Finland, SE Sweden.

Conclusion

This article was focused to assess the level and development of competitiveness of individual sectors in the EU member states by labour productivity. The European Union is a heterogeneous group where there are states more oriented to industry or more oriented to services. It was found that most of the original EU countries (Netherlands, Denmark, Belgium, Finland, France, Austria, Germany) have higher level of labour productivity in all

analysed groups (sectors) of economic activities. On the other hand, most of new member states EU reached a high growth rate of labour productivity, especially in the industrial sector (Low and Medium Low Technology - A2). The economic crisis in 2009 had a significant impact on the decline of labour productivity in industry (group A1 and A2) however the most of member states EU have managed to return at least to the original level except Czech Republic and Romania. The reaction of labour productivity to the economic crisis is not identical in all countries (Auzina-Emsina, 2014), when an important factor here is the sectoral orientation of states.

Acknowledgment

This paper was supported by the Grant Agency of the University of South Bohemia GAJU č. GA JU 053/2016/S

References

1. Auzina-Emsina, Astra. (2014). Labour productivity, economic growth and global competitiveness in post-crisis period. In: *19th International Scientific Conference Economics and Management 2014*. Riga, Elsevier science BV, 2014, pp.317-321. ISSN: 1877-0428
2. Belorgey, N., Lecat, R., & Maury, T. (2006). Determinants of productivity per employee: An empirical estimation using panel data. *Economics Letters*, 91(2), 153-157. doi:10.1016/j.econlet.2005.09.003
3. Borozan, D. (2008). Regional Competitiveness: Some Conceptual Issues and Policy Implications. In: *Interdisciplinary Management Research*. Porec, Ekonomski fakultet osijeku-fac economics Osijek,2008, pp. 50-63. ISBN:978-953-253-044-5
4. Boschma, R. A. (2004). Competitiveness of regions from an evolutionary perspective. *Regional Studies*, 38(9), 1001-1014. doi: 10.1080/0034340042000292601
5. Broersma, L., & Oosterhaven, J. (2009). Regional Labor Productivity In The Netherlands: Evidence Of Agglomeration And Congestion Effects. *Journal of Regional Science*, 49(3), 483-511. doi:10.1111/j.1467-9787.2008.00601.x
6. Delgado, M., Ketels, C., Porter, M., & Stern, S. (2012). The Determinants of National Competitiveness. doi:10.3386/w18249

7. Gardiner, B., Martin, K., & Tyler, P. (2004). Competitiveness, productivity and economic growth across the European regions. *Regional Studies*, 38(9), 1045-1067. doi: 10.1080/0034340042000292638
8. Pavelka, T., & Loester, T. (2013). Flexibility of the czech labour market from a perspective of the employment protection index. In: *7th International Days of Statistics and Economics*. Praha, Slaný: Melandrium, 2014, pp. 1090–1099. ISBN 978-80-87990-02-5.
9. Petrach, F., & Leitmanova, I. F. (2013). Economic Municipal Undertakings. In: *Aktualne Problemy Podnikovej Sfery 2013*. Bratislava, Vydavateľstvo ekonom, 2013, pp. 440-444. ISBN:978-80-225-3636-3
10. OECD *Factbook 2014*. (2014). OECD Publications Centre.
11. Ramik, J., Nevima, J., & Hanclova, J. (2010). Multicriteria approaches to regional competitiveness and disparities. In: *International Conference on Regional Disparities in Central and Eastern Europe*. Bratislava, Slovak acad sciences, 2010, pp 259-265. ISBN:978-80-7144-180-9
12. *Sixth periodic report on the social and economic situation and development of the regions of the European Union*. (1999). Luxembourg: Office for Official Publications of the European Communities.

Contact

Tomáš Volek

Faculty of Economics, University of South Bohemia

Studentská 13, 370 05 České Budějovice, Czech Republic

volek@ef.jcu.cz

Martina Novotná

Faculty of Economics, University of South Bohemia

Studentská 13, 370 05 České Budějovice, Czech Republic

novnotna@ef.jcu.cz