

# PRODUCTION-CONSUMPTION PATTERNS OF BEHAVIOUR OF EUROPEAN REGIONS

Ivana Kraftová, Zdeněk Matěja

**Abstract:** Cohesion policy belongs among the most important fields of EU interests. Its objectives are achieved by many ways with respect to diversity among the European regions at the level of NUTS 2. The aim of this paper is to analyse relevant indicators, and via the evaluation of EU regional policy effectiveness to review difference in the production-consumption patterns of behaviour of European regions; focussing on convergence and variability of these regions. With defined goal in mind, the regions have been classified. To classify the regions, the relational indicator has been created. The relational indicator has been developed as the relationship between the index of relative performance and index of relative consumption sources. The changes of relational indicator, as well as the GDP per capita criterion, have been evaluated in two periods.

**Keywords:** Cohesion policy, Production-consumption patterns, Convergence, Variability, Classes of EU regions.

**JEL Classification:** R12, R58.

## Introduction

A major area of EU policy is the area of cohesion policy, which can undoubtedly be testified by the funds it has been allocated in the last two multiannual financial frameworks to support the objective “cohesion for growth and employment”: in the planning period 2007-2013 the amount of approximately 335 billion EUR, i.e. 33.70 % of the total commitment, and in the planning period 2014-2020 the amount of 325 billion EUR (i.e. 33.85 %). [4] The importance given to policies aimed at the cohesion of regions across the EU territory will remain preserved in the future; the objective remains to achieve the necessary degree of cohesion within the European integration grouping. The last three expansions meant the accession of states with a prevalence of less developed regions at various different levels, and so the emphasis on the convergence objectives of cohesion policy was further enhanced by a focus on promoting growth. It can be spoken about of the objective of “growth orientated convergence of EU regions”.

Any meaningful policy should have a defined purpose, and therefore the concept of cohesion policy can be viewed from a teleological point of view. [3] It is subject to the principle of finality perceived from the present to the future. When identifying policy objectives and their fulfilment it is necessary to address - in addition to the above relationship of hierarchical succession - the question of relations between different objectives (purposes), and means.

With connection to the EU policy and its member states, the terms of performance and competitiveness have been many times mentioned. But it should not be forgotten that such terms do not create the original purpose of policy, since satisfying the needs of inhabitants via consumption do. It is possible to assume that by filling the original purpose not only single production-consumption pattern for all regions exists. On the contrary, as a consequence of regional diversity we can suggest that more behaviour

patterns which reflect different initial conditions and chosen ways to reach the objectives exist.

A comparative study presents different views on the development of EU Member States in terms of the objectives of cohesion policy and shows the consequences of EU enlargement. [1, 12, 13] For example A. Krueger [10] concludes that while Member States converge in terms of gross domestic product per capita in PPS (measured variation range in 2000-2008), internal disparities between the regions within the states increase. It is not unusual to also point out that the causality between the high consumption of income in a given state and the tendency for low investment (and vice versa) is weakening as a result of the significant effects of global capital markets and international trade. [2]

The continuity of consumption with the production function is quite obvious. Only to a limited extent can man consume what has not been produced. If consumption is understood as the fulfilment of a desired standard of living, it is not possible to disagree with the idea of the winner of the 2008 Nobel Prize in Economics, P. Krugman, who said that: *“The ability of the state (or region) to improve the standard of living depends almost entirely on the ability to increase output per worker”*. [11]

With regard to aforementioned minds, it looks to be useful to analyse relevant indicators in this field, and focussing on evaluation of EU cohesion policy effectiveness to catch possible differences in production-consumption patterns of behaviour of European regions. Furthermore, we would like to provide some kind of classification of these regions.

The objective of the research is to evaluate European regions according to the relation between the growth of performance and growth in sources of individual consumption and to classify them.

Two partial hypotheses are set:

- A. European regions reflect the expression of beta convergence in the sense that the less developed regions have a higher growth performance index than the index of growth of creation of sources of individual consumption;
- B. European regions confirm the high variability of the regions of individual states, i.e. NUTS 2 of the respective states in terms of the surveyed relationship does not fall into the same class.

## **1 Data and methodology**

Eurostat data was used for the analysis. From the total number of 272 NUTS 2 of all of the 28 states, 85 NUTS 2 had to be excluded because of an absence of the relevant data. Therefore, the sample includes 187 NUTS 2 (69 %) of eighteen EU Member States (regardless of whether the country was an EU Member State in the year of the survey or not).

A ten-year period from 2000 to 2009 is assessed, which includes the impact of the global economic crisis that hit Europe in 2008. In order to eliminate the impact of the recession selected moments evaluated in this period were compared with the results for the shortened period from 2000 to 2007.

The analysis works with regional disposable income of private households as an indicator of sources of individual consumption and regional gross domestic product as an indicator of performance. A relational indicator was created for analyses of the

relation between the performance and consumption in EU regions showing the relationship between the index of growth of relative performance  $I_P$  and the index of growth of relative production of sources of individual consumption  $I_H$  in order to point whether in the relevant NUTS 2 region the growth of performance exceeded the growth of individual, or vice versa.

$$r(P, H) = \frac{I_P}{I_H} = \frac{P_{2009}/P_{2000}}{H_{2009}/H_{2000}}, \text{ resp. } r(P, H) = \frac{I_P}{I_H} = \frac{P_{2007}/P_{2000}}{H_{2007}/H_{2000}} \quad (1)$$

The relative performance  $P_t$  is given by the gross domestic product per economically active person (2). [9]

$$P_t = \frac{GDP_t}{EAP_t} \quad (2)$$

Where: GDP = gross domestic product at current market prices in PPS;  
EAP = economically active person from 15 to 64 years;  
t = time, year.

Furthermore, the indicator of relative creation of sources of individual consumption  $H_t$  was calculated as a share of regional disposable income of private households in PPCS and the mid-year population of the relevant region (3). [9]

$$H_t = \frac{DIH_t}{MYP_t} \quad (3)$$

Where: DIH = disposable income of private households in PPCS;  
MYP = mid-year population;  
t = time, year.

In order to avoid the anticipated effects of the global crisis, therefore the relational indicator  $r(P, H)$  is calculated for the two periods, as indicated by formula (1), both for the period 2000-2009 and for comparison with the pre-crisis situation for the period 2000-2007, including an assessment of the changes that determined the outcome. According to classification two criteria - degree of development of the region according to the median of gross domestic product per capita, and the ratio of the dynamics of the growth of consumption and performance using  $r(P, H)$ , the sample of surveyed regions was divided into four classes, namely:

Class I.  $r(P, H) < 1$  in the less developed regions;

Class II.  $r(P, H) < 1$  in more developed regions;

Class III.  $r(P, H) > 1$  in more developed regions;

Class IV.  $r(P, H) > 1$  in less developed regions.

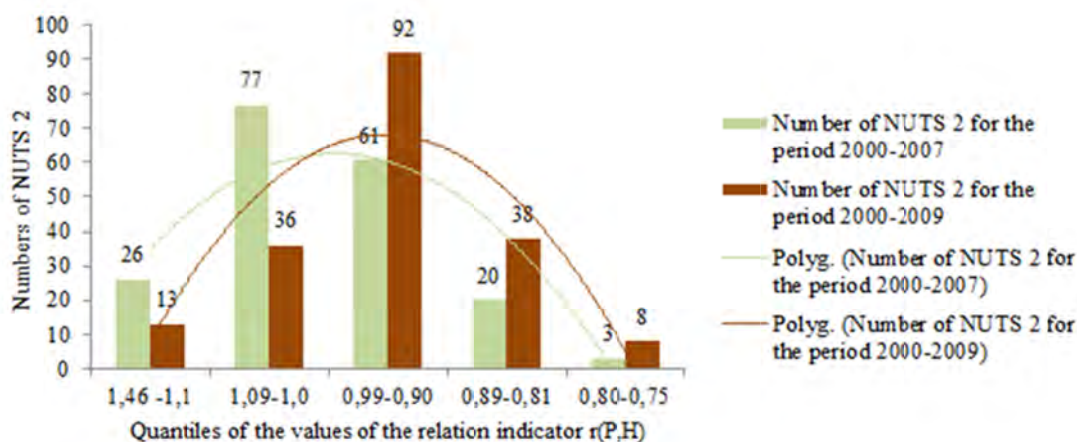
The regions were classified according to the ratio of the growth index  $P_t$  and the growth index  $H_t$  in the period 2000-2009 and at the same time by GDP per capita in PPS in the period 2000-2009. To assess the impact of the global crisis the ratio of the growth index  $P_t$  and growth index  $H_t$  was also incorporated into the analysis of the processed data.

## 2 Problem solving and discussion

Due to the devastating impact of the global economic crisis that hit Europe in 2008, a comparison was made of the NUTS 2 in five percentiles according to the relation between the growth of performance and the growth of indicators of final consumption  $r(P, H)$  both

for the period 2000/2007 (i.e. before the crisis) as well as for the entire study period 2000-2009 - see Fig. 1.

**Fig. 1: Comparison of the distribution of NUTS 2 in percentiles based on the relation between growth of performance and growth of sources of consumption**



Source: own work based on Eurostat data [5, 6, 7, 8]

Note: intervals of extreme quartiles incorporate the boundary values achieved.

The almost normal distribution of NUTS 2 in the period including the crisis is represented by a loss of skewness of the histogram in the pre-crisis period, which showed the predominance of the growth of performance over the growth of consumption in many of the regions. Fig. 1 illustrates that the condition  $I_p > I_H$  (growth of performance exceeds growth of consumption), which was recorded in the first two quintiles, is shown by 103 regions of the sample in the period 2000-2007, i.e. approximately 55 %, whereas in 2000-2009 this was only 49 regions, i.e. approximately 26 % of the sample.

When examining the causes of the results of the relation between the growth of performance and growth of individual consumption (i.e. one of the classification criteria) six theoretically possible cases were created; however, the results only include three versions of the practical expressions that determine the results:

A. the result of the calculation  $r(P,H) < 1$  according to the formula (3) is given by the conditions:  $I_p > 1$  et  $I_H > 1$  et  $I_p < I_H$ ;

B. the result of the calculation  $r(P,H) < 1$  according to the formula (3) is given by the conditions:  $I_p < 1$  et  $I_H > 1$ ;

C. the result of the calculation  $r(P,H) > 1$  according to the formula (3) is given by the conditions:  $I_p > 1$  et  $I_H > 1$  et  $I_p > I_H$ .

The remaining possible cases do not occur in the examined economic reality:

$r(P,H) < 1$  where  $I_p < I_H$  et  $I_H < 1$  et  $I_p < 1$ ;

$r(P,H) > 1$  where  $I_p > I_H$  et  $I_H < 1$  et  $I_p < 1$ ;

$r(P,H) > 1$  where  $I_p > 1$  et  $I_H < 1$ .

Regions in the sample group for the period 2000-2009 show a clear predominance of version A (135 regions, i.e. 72 %), whereas version B has a marginal representation (3 regions, i.e. 2 %), and version C had a significant representation (49 regions, i.e. 26 %). Group B, which showed a growth of individual consumption and decrease in performance,

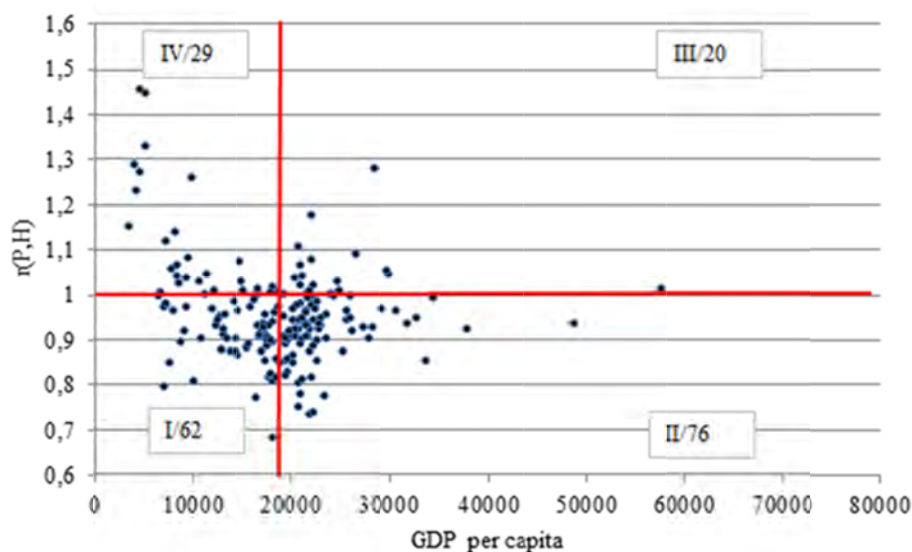
includes two French regions (Champagne-Ardenne and Basse-Normandie) and the Swedish region of Sydsverige. Group C, which is characterized by the growth of individual consumption and growth of performance, while consumption is growing more slowly than performance, includes regions of Belgium (3), the Czech Republic (5), Germany (8 - both the former East and West Germany, Great Britain (7), the Netherlands (6), Poland (10), Portugal (1), Romania (7), Slovenia (1), and Slovakia (1). It is also interesting that these Group C regions for the individual countries include the region that represents or includes the capital city of that country. All of the other regions show a growth in individual consumption and performance, while consumption is growing faster than performance (group A).

In order to classify the regions into defined classes the criterion of the degree of development of the regions was analysed using gross domestic product per capita. A general evaluation of the sample regions for the years 2000, 2007 and 2009 shows that between 2000 and 2007 there was an increase in the median and average of the evaluated indicators for all of the regions included in the sample. However, in 2000 the median exceeded the average, while in 2007, on the contrary, the average exceeded the median. Between 2007 and 2009 there was a reduction in the value of the median and average gross domestic product per capita and the median is smaller than average, which is similar to in 2007 but even more significant.

The changed in variability of the extent of development of the regions in terms of gross domestic product per capita is reflected by the relation of this indicator of the individual countries to the minimum determined value in 2000 and 2009. To illustrate: in 2000 the maximum gross domestic product per capita (British Inner London) is nearly 17 times the minimum (Romanian Nord-Est), the other 5 regions represented ten times the minimum indicator; whereas in 2009 it was “only” about 11 times (again, Inner London is the maximum and the minimum is Nord -Est). No other region had less than 10 times the minimum. The second highest (7.56 times) against the minimum of the Nord-Est region in 2009 is Rég. Bruxelles / Brussels Gewest. In this sense, the imaginary gap between the least and most developed regions is closing.

By using both parameters –  $r(P, H)$  and gross domestic product per capita – we can create, as described above, classes of regions whose changes in terms of affiliation in 2000, 2007 and 2009 are depicted in Figures 2, 3 and 4.

**Fig. 2: Distribution of regions into classes according to the relation of growth of performance and individual consumption  $r(P,H)$  for the period 2000-2009 and the gross domestic product per capita in 2000**



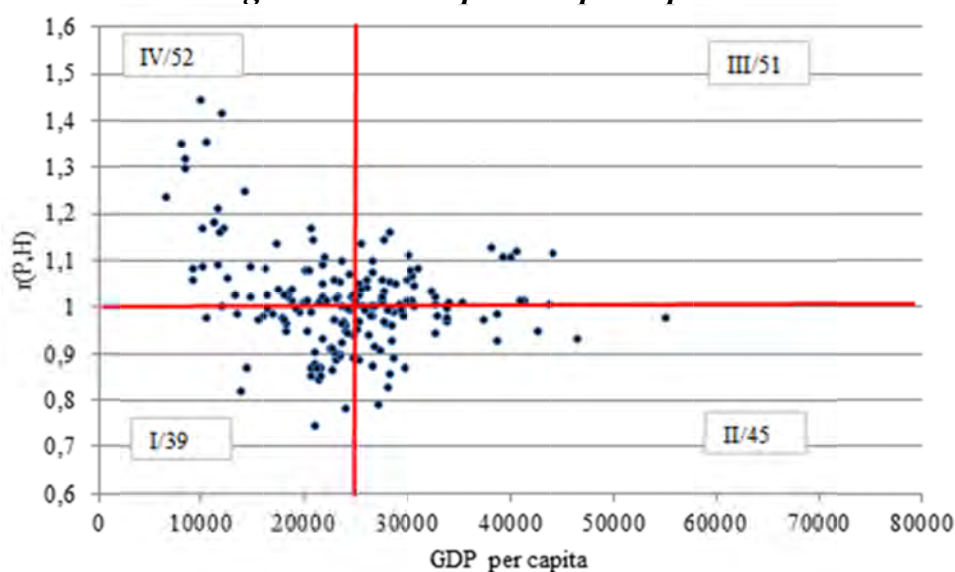
Source: own work based on Eurostat data [5, 6, 7, 8]

Note: The median gross domestic product per capita in 2000 was 19 085 PPS.

The regions of the following countries are located in the individual quadrants:

IV. quadrant BE(1), CZ(4), DE(4), PL(10), RO(7), SI(1), UK(2)	III. quadrant BE(2), CZ(1), DE(4), NL(6), PT(1), SK(1), UK(5)
I. quadrant BE(3), CZ(3), DE(2), EE(1), I.E.(1), ES(10), FR(10), CY(1), LV(1), LT(1), NL(1), PL(6), PT(6), RO(1), SI(1), SK(3), UK(11)	II. quadrant BE(5), DE(24), I.E.(1), ES(7), FR(12), NL(5), SE(8), UK(14)

**Fig. 3: Distribution of regions into classes according to the relation of growth of performance and individual consumption  $r(P,H)$  for the period 2000-2007 and the gross domestic product per capita in 2007**

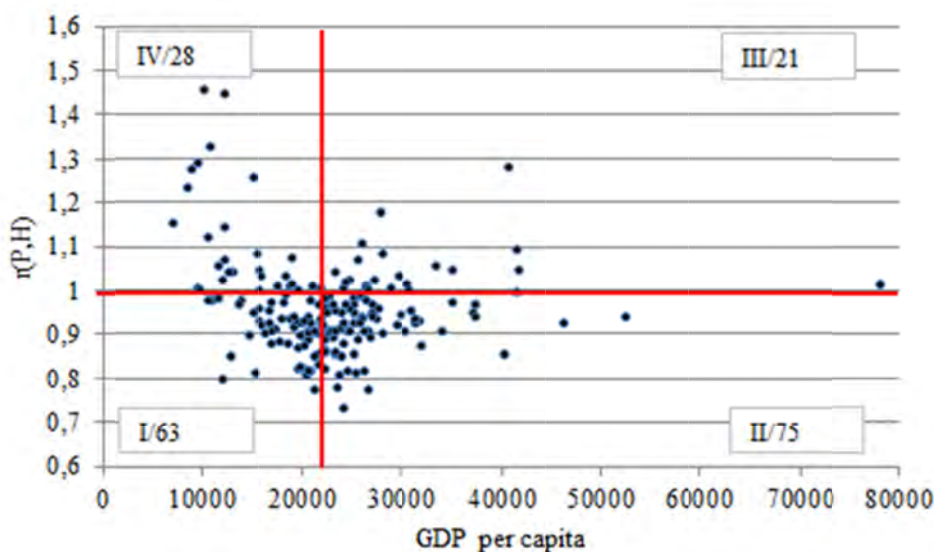


Source: own work based on Eurostat data [5, 6, 7, 8]

Note: The median gross domestic product per capita in 2000 was 24 091 PPS.  
The regions of the following countries are located in the individual quadrants:

IV. quadrant BE(3), CZ(4), DE(3), EE(1), ES(5), LT(1), PL(14), PT(1), RO(7), SK(2), UK(11)	III. quadrant BE(4), CZ(1), DE(15), I.E.(1), ES(2), FR(1), NL(6), PT(2), SI(1), SK(1), UK(17)
I. quadrant BE(1), CZ(3), DE(3), ES(2), FR(17), CY(1), LV(1), PL (2), PT(4), RO(1), SI(1), SK(1), UK(2)	II. quadrant BE(3), DE(13), I.E.(1), ES(8), FR(4), NL(6), SE(8), UK(2)

**Fig. 4: Distribution of regions into classes according to the relation of growth of performance and individual consumption  $r(P,H)$  for the period 2000-2009 and the gross domestic product per capita in 2009**



Source: own work based on Eurostat data [5, 6, 7, 8]

Note: The median gross domestic product per capita in 2009 was 22 258 PPS.  
The regions of the following countries are located in the individual quadrants:

IV. quadrant BE(1), CZ(4), DE(3), PL(10), RO(7), UK(3)	III. quadrant BE(2), CZ(1), DE(5), NL(6), PT(1), SI(1), SK(1), UK(4)
I. quadrant BE(3), CZ(3), DE(1), EE(1), I.E.(1), ES(7), FR(15), LV(1), LT(1), NL(1), PL(5), PT(5), SI(1), SK(3), UK(15)	II. quadrant BE(5), DE(25), I.E.(1), ES(10), FR(7), CY(1), NL(5), PL(1), PT(1), RO(1), SE(8), UK(10)

Fig. 2 and 4 use the relation  $r(P,H)$  for years 2000-2009 and GDP per capita for the years 2000 and 2009. Fig. 3 includes the relation  $r(P,H)$  for the period 2000-2007 and GDP per capita for the year 2007. In all three years (i.e. 2000, 2007 and 2009) developed regions (i.e., projecting above the median GDP per capita) were represented by 96 regions. The remaining 91 regions (nearly half) are below the median. The figures clearly show an increase in the variation between regions in terms of this indicator, in other words: “the quadrants are increasing in breadth”.

Analysis of the change in the vertical axis  $r(P,H)$  shows a significant difference between the period 2000 to 2007 (before the crisis) and the period 2000 to 2009. Whereas in 2007 there were 103 regions for which growth in consumption was greater than growth in performance (with an almost equal representation of developed and less developed regions), in 2009 there were only 49 regions and the less developed regions (28) prevailed over the developed ones (21). Conversely, a higher growth in the sources of individual consumption than growth of performance was recorded in 138 regions in 2009. It is clear that the crisis significantly affected the European regions in this respect.

The main differentiating moment of the regions in terms of classification is therefore the relation  $r(P,H)$  not the median gross domestic product per capita.

The two largest countries based on the number of NUTS 2 regions - Germany and the United Kingdom – have regions in all four categories (I. - IV.), In addition, Belgium is third in terms of the number of regions. If we remove the exceptions (one of the regions of the country), then the regions of five countries fall into two classes classification (I., II.), Namely: all of the Spanish and French regions have lower performance, whether they are more or less developed, Dutch regions are all in the developed category, although some are characterized by higher growth performance (III.), or the second highest growth if consumption (II.), the Portuguese regions represent both the class of less developed performance regions (I.) as well as the class of advanced performance regions (II.), and finally the Polish regions are in terms of the relationship between the growth of performance and growth of consumption analogous to the Dutch regions , but unlike them they fall into the category of less developed regions (I., IV.). The regions of Sweden have an exceptional position as they remain in the class of developed regions with higher growth of individual consumption than growth of performance (II). In contrast, the Romanian regions (with one exception) are in the less developed regions with higher growth of performance than consumption (IV.). Regions of the Czech Republic and Slovakia representing or comprising of the capital city are specific as they belong to the developed regions with higher performance than consumption (III.), other regions have less performance but fall into both categories according to the indicators  $r(P, H)$  (I., IV.). It should be emphasized that the individual regions do not remain in the same class, and that their position changes over time. (In terms of the country's regions belonging to individual classes, countries representing a single NUTS 2 are not represented, i.e. Estonia, Cyprus, Latvia, Lithuania, and Slovenia, as well as Ireland with its two NUTS 2).

## **Conclusion**

The validity of beta convergence in the sense that the less developed regions have a higher index than the growth performance index of growth of individual consumption of resources was not proven. From the sample of regions, 91 are less developed, of which 62 regions have a lower growth of performance than growth of consumption in 2000; however in 2007 there were only 39 but in 2009 their number increased to 63. The hypothesis A has not been verified.

Classification analysis confirms that regions of a single country (if it is not a country which is also a single NUTS 2) do not fall into a single class. The hypothesis B has been verified. Moreover, the classification of the individual regions into classes changes over time. The positive development of the economy in 2000-2007 contributed to a more even distribution of the Regions in the classification of classes. On the contrary, the economic



crisis pushed many regions back into becoming regions with lower growth of performance, i.e. Classes I. and II.

The development of the relation between performance growth ( $P_t$ ) and consumption growth ( $H_t$ ) was significantly affected by the economic crisis. Up until 2007, there was a predominance of regions with performance growth higher than consumption growth, whereas between 2007 and 2009 there was a general decline in performance and in most regional economies the dynamics of performance were below the growth values of sources of consumption, the development of which manifested a certain inertia.

When classifying the regions into classes according to the selected criteria we determined that the differences in the indicator of gross domestic product per capita reduced during the studied period, despite the extremely high value of this indicator in the region of Inner London in 2009. The classification analysis revealed a highly significant finding i.e. the main classification criterion of the regions is the relationship between performance and consumption expressed by the relation indicator  $r(P,H)$ . Although the average and extreme values of the indicators performance and consumption tended to confirm the validity of the beta convergence, in the case of its assessment based on the relation performance and consumption this was no longer valid. Less developed regions were included not only in Class IV. where  $r(P,H)>1$ , where they should be in the case of the validity of the beta convergence, but also to Class I., where  $r(P,H)<1$ , and where regions with growth of performance and growth of sources of consumption dominated, although growth of performance ( $P_t$ ) is lower than growth of consumption ( $H_t$ ).

It is clear that growth of sources of consumption without growth of performance is not sustainable in the long term; on the other hand, supporting growth of performance cannot be an end in itself. In terms of the application of instruments of EU economic policy, particularly in the area of cohesion policy, it is not beneficial to focus only on gross domestic product per capita, it is necessary to use other additional indicators so that the applied instruments and allocated resources can ensure fulfilment of the main purpose, i.e. “long and quality of life of the inhabitants of the individual regions of Europe and the EU as a whole”.

## Acknowledgement

The paper was supported by Internal Grant Agency of the University of Pardubice, Project SGSFES\_2015001 „Economic and social development in private and public sector“.

## References

- [1] APPLOVÁ, P. Vliv rozšiřování Evropské unie na stupeň dosahované konvergence. In Klímová, V., Žitek, V. (eds.) *XVII. Mezinárodní kolokvium o regionálních vědách. Conference Proceedings*. Brno: Masarykova univerzita, 2014, pp. 62-68. ISBN 978-80-210-6840-7.
- [2] DUBSKÁ, D. *Investice a ekonomický růst v České republice: kam se ztrácí vysoká míra investic?* Praha: ČSÚ, 2006. [cit. 2015-01-20]. Available at WWW: <czso.cz/csu/2006edicniplan.nsf/p/1135-06>.
- [3] ENGLIŠ, K. *Teleologie jako forma vědeckého poznání*. Praha: Nakladatelství F. Topič, 1930.

- [4] EU. *Multiannual Financial Framework 2014-2020*. [cit. 2015-01-16]. Available at WWW: <[http://ec.europ.eu/budget/mff/index\\_en.cfm](http://ec.europ.eu/budget/mff/index_en.cfm)>.
- [5] EUROSTAT. *Regional gross domestic product (million PPS) by NUTS 2 regions*. [cit. 2014-10-27]. Available at WWW: <<http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=sgs00004&plugin=1>>.
- [6] EUROSTAT. *Disposable income of private households by NUTS 2 regions - PPS (based on final consumption) per inhabitant*. [cit. 2014-10-27]. Available at WWW: <<http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=sgs00026&plugin=1>>.
- [7] EUROSTAT. *Economically active population by sex, age and NUTS 2 regions (From 15 to 64 years)*. [cit. 2014-10-27]. Available at WWW: <<http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=sgs00001>>.
- [8] EUROSTAT. *Total population resident in a region. Average of population at the beginning of the year and population at the end of the year*. [cit. 2014-10-27]. Available at WWW: <<http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=sgs00001>>.
- [9] KRAFTOVÁ, I., MATĚJA, Z. Relation of Economic Performance and Creation of Sources of Consumption in Regions of the European Union. In *5th Central European Conference in Regional Science, International Conference Proceedings*. Košice: Technical University of Košice, 2015, pp. 461-470. ISBN 978-80-553-2015-1.
- [10] KRUEGER, A. Convergence and disparities in regional Gross Domestic Product. Eurostat. In *Statistic in focus*. Vol. 11, Iss. 46/2011, pp. 2-6. ISSN 1977-0316.
- [11] KRUGMAN, P. *Competitiveness: an international economics reader*. New York, Council on Foreign Relations, 1994. ISBN 978-087-6091-777.
- [12] TVRDOŇ, M. Makroekonomická konvergence: případ zemí visegradské čtyřky. In *Scientific Papers of the University of Pardubice, Series D, Faculty of Economics and Administration*. Vol. 16, Iss. 1/2010 pp. 316-328. ISSN 1211-555X.
- [13] ZDRAŽIL, P. Using the EU funds between 2007 and 2013 from a development of disadvantaged regions perspective: the case of Polish regions. In *5th Central European Conference in Regional Science, International Conference Proceedings*. Košice: Technical University of Košice, 2015, pp. 1170-1179. ISBN 978-80-553-2015-1.

## Contact Address

**doc. Ing. Ivana Kraftová, CSc.**

University of Pardubice

Faculty of Economics and Administration

Institute of Regional and Security Sciences

Studentská 95, 532 10 Pardubice, Czech Republic

Email: [Ivana.Kraftova@upce.cz](mailto:Ivana.Kraftova@upce.cz)

Phone number: +420 466 036 711

**Ing. Zdeněk Matěja**

University of Pardubice

Faculty of Economics and Administration

Institute of Regional and Security Sciences

Studentská 95, 532 10 Pardubice, Czech Republic

Email: Zdenek.Mateja@upce.cz

Phone number: +420 466 036 665

Received: 22. 04. 2015

Reviewed: 28. 05. 2015, 17. 06. 2015

Approved for publication: 02. 09. 2015