The Regional Economic Resilience and Cohesion Policy

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Abstract

This article discusses the impact of regional status in the term of the EU's Cohesion Policy on the economic resilience of regions. Some regions can be described as more or less resilient to the economic recession from the position of resilient theory perspective. The aim of this paper is to clarify the relationship between economic resilience of regions and status of cohesion regions in the term of the EU's Cohesion Policy. The analytic part of this work is created upon the NUTS 2 regional data sets and reflects the impacts of the 2008 economic crises. The main methodological attitude is processed by the correlation analysis. As part of this objective is the evaluation of the differences between the determinants of economic resilience with regard to the EU's Cohesion Policy regional status.

Key words: Regional development, Regional resilience, Determinants of Regional resilience, Employment, Cohesion Policy.

JEL Classification: R00, R10, R11

1 Introduction

The economic resilience of regions, more precisely, more broadly defined concept of regional resilience has been defined by some authors (e.g. Hutter et al., 2013; Pelling, 2011) as one of the main ideas of our time. It offers a new perspective on the region in dealing with many uncertainties and changes in society.

The term appears in discussions of various research fields, such as ecology, sociology, as well as in research such as crisis planning in relation to the effects of critical infrastructure failure. It is described in literature dealing with effects of natural or anthropogenic extraordinary events. These include an issue of flood risk management or it is mentioned within the process of assessment the impact of climate change (for more details see Hutter et al., 2013; Pelling, 2011; Gunderson, 2002).

Pendall et al. state that (Pendall et al., 2010): "Investigation of regional resilience allows to find a potential risk of development of regions, including both natural and economic shocks, and slow-acting and long-lasting processes, which have the character of barriers to further development."

Long-lasting processes are for example long-term de-industrialization of the region, the depopulation, demographic changes (e.g. aging of population), climate change, etc.
It can be said that the concept of resilience consists the region's ability to effectively resist to various challenges (as sudden fluctuations, and slow-running processes). Regional resilience is thus seen as the essence of why some regions respond flexibly to economic, social, political or ecological changes, while other long record deterioration of the existing development.

Nowadays the concept is elaborated by the wide spectrum of scientists from the field of regional analysts, regional economists and economic geographers. Among the others, we could mention Martin (2012), Hill, Wial and Wolman (2008), Pendall (2010) and Foster (2007). There are significant outputs of Kraft et al. (2011) and a team concentrated around Koutský (2012) in the Czech environment. Their aim is to describe impacts of the several deviations and disruptions such as economic recession, unexpected rise of the main regional rivals, unexpected plant closures, new technological challenges etc. (Simmie, 2010)

There are three ways of looking at the economic resilience of regions in the literature. The first one is based on the technical concept of resistance. Under this approach, the economic resilience of the region is seen as an ability of the economic system to get at a level that would correspond with a situation without the existence of a negative deviation.

The second approach is a concept of "ecological resilience", which emphasizes the magnitude of shock or failure which the region is able to absorb before it will divert from its original state.
The two above-mentioned approaches are criticized because, according to some authors (e.g. Pike et al., 2010, Martin and Sunley, 2007), have not sufficient aspect of the economy in the long term (which is in conflict with the perceived dynamics of successful economies). This led to creation of the third approach called "adaptive", specifically "evolutionary" approach. This third approach emphasizes the ability of the system to take change either preventively or in response to a sudden change in their structure to minimize the impact of destabilizing changes. So the main emphasis is put on adaptive capacity of the system.

The three above-mentioned concepts of economic resilience of regions summarise that a region is able to achieve the desired response in different ways (either the ability to return to a level that would correspond to the situation without the existence of abrupt changes or absorption destabilizing deviation or undergoing a change in its form to minimize destabilizing effect).
This article assumes the regional resilience as a resilience of the regional economy to the economic shocks. Based on data of the NUTS 2 region level it describes approach of the regional resilience evaluation in the environment of the economic crisis of year 2008. The interpretation of differences in regional resilience in focus on the EU's Cohesion Policy regional status is based on the analysis of the possible determinants of the regional economic resilience (RER).

2 The Economic Resilience and Cohesion Policy

There are authors (e.g. Kraft et al. (2011) and Koutský et al. (2012)) who mention that the economic globalization brings the higher sensitivity of the region to economic swings. The open economy causes strong mutual dependency of the regions. In the moment of the economic

problems this wave is able to generate strong susceptibility of the regions to economic and social shocks. Hand in hand with economic crisis of 2008-2009, this issue is more and more focused. One of the research questions of the issue (Dawley, 2010) are as follows: What kind of attitudes and method could be used for the regional resilience evaluation? How to explain diversity in regional resilience? Which regional characteristics could be marked as determinants influencing regional resilience?

2.1 Determinants of the Economic Resilience and approach of its measuring

Basing on previous researches – e.g. Martin (2012), Foster (2007), Koutský (2012) - and own research (Svoboda, 2013) there can be designed sets of factors of the regional resilience. The sets of factors could be divided into 4 sections:

- Regional Economic Performance,
- Innovation Activity and R&D,
- Human Capital,
- Economic Structure.

It could be mentioned also next factors (e.g. socio-demografic characteristics and characteristics of labour market), but four factors (mentioned above) are appear to have the strongest impact to regional resilience evaluated on the basis of employment level (see previous research - Svoboda, 2013).

Those set of factors can be represented by a variety of indicators (see Tab. 2). Analysis of the determinants of the RER may reveal the origin of inter-regional disparities (Kraftová, 2013). The basic question is to find the way of measuring the RER. The recommended way on how to assess the regional economic resilience is to measure the regional product or regional employment as well as some other characteristics (e.g. regional wages, regional labour productivity or regional investments (ESPON, 2014)). The most common basis for quantification of the regional resilience is considered either use of regional product or employment of regional level. Due to the problematic determination of regional product, the development of regional employment if often analysed (Martin, 2012). When compared, the regional product or regional employment has both its advantages and disadvantages. A common disadvantage of both indicators is the inability to shield the impact of commuting.

2.2 Cohesion Policy

The Regional Policy of the European Union (EU) is also referred as Cohesion Policy. Cohesion Policy aims at reducing disparities between the levels of development of regions. It supports job creation, competitiveness, economic growth, improved quality of life and sustainable development. These investments support the delivery of the Europe 2020 strategy.

This policy belongs to one of the most important policies in the EU. It focuses to emphasise of regions according to their economic performance. Main aim is to reach sustainable economic growth. Regional development is emphasised by supporting of regional innovations, R&D and improving of quality of human capital (these areas belong to factors of the regional economic resilience).

The EU's Regional Policy covers all European regions and these regions fall in different categories (so-called objectives), depending mostly on their economic situation. In the period

2007-2013 (which is relevant for the purposes of this paper) the definition of categories was carried out according to the following rules (European Commission, 2014):

- Under objective "Competitiveness and Employment" belong regions (that are deemed to be "more developed") whose GDP per capita in PPS was over than 75 % of the average of the EU-27. (Regions eligible under Competitiveness and Employment objective).

- Under objective "Convergence" belong regions (that are deemed to be "less developed") whose GDP per capita in PPS was less than 75 % of the average EU-27 (Regions eligible under Convergence objective).

- Third category is called "Phasing out and Phasing in regions". With the addition of the newest member countries in 2004 and 2007, the EU average GDP fell. As a result, some regions in the EU's "old" member states, which used to be eligible for funding under the Convergence objective, became above the 75 % threshold. These regions received transitional, "phasing out" support during the previous funding period of 2007-2013. Regions that used to be covered under the convergence criteria but got above the 75 % threshold even within the EU-15 received "phasing-in" support through the Competitiveness and Employment objective.

For completeness of information: The third objective of Cohesion Policy in the 2007-2013 programming period "European Territorial Cooperation" was not used.

3 Research Methodology

The first aim of the paper is to consider significance of region's status under the EU's Cohesion Policy. The second aim of the paper is to evaluate differences among factors impact to regional resilience in surveyed groups of regions (according to region's status under the EU's Cohesion Policy).

For the first classification of region we use classification according to region's status under the EU's Cohesion Policy (eligibility under the 2007-2013 programming period was used): Regions under Competitiveness and Employment status (CE), Regions under Convergence status (C) and Transitions regions (T) – it aggregates phasing-in and phasing-out regions.

For the second classification of region we use classification according to resilience on the basis of methodology of ECR2 ESPON project (ESPON, 2014). So we identify four categories of resilience:

- Resistant regions (RS) – those regions that have not experienced an absolute decline in regional employment level following the economic shock.
- Recovered regions (RC) – those regions that experienced a decline in regional employment level, but have since recovered to pre-shock levels.
- Not-recovered, but in upturn (NR1) – those regions that experienced a decline in regional employment level, have passed the trough of the recession, but have not yet recovered to pre-shock activity levels

- Not-recovered, still in decline (NR2) – those regions that experienced a decline in regional employment level, which was still ongoing at 3Q2013 (because we analyse period from 1Q2008 to 3Q2013).

The starting point was to quantify the regional economic resilience for 175 regions NUTS 2 of 9 states of EU (Austria (AT), Czech Republic (CZ), Germany (DE), Spain (ES), France (FR), Italy (IT), Poland (PL), Slovakia (SK), United Kingdom (UK)).
The choice of the above states is based on the current fulfillment of the following criteria:

- sample regions must come from the EU (in order to assess the impact of regional status of Cohesion Policy),
- selected regions are from the states of the latest EU enlargement in 2004 (in order to assess the impact of the economic crisis in 2008).

The main input data represents 11 indicators (grouped to sets of 4 factors). This regional data was collected from a database of EUROSTAT (EUROSTAT, 2014) from year 2007. This year was the last year when economic crisis had not impacted the real economy of regions (Kraft, 2011).
To identify factors of the regional economic resilience, it was necessary to quantify intensity of the regional economic resilience. To do that it is important to analyse the impact of economic crisis on the time series of employment. Quarterly data of regional employment was collected from a database of Labour Force Survey (Labour Force Survey, 2013).

Economic shocks indicate the decrease period (recession phase) and ensuing rise of the employment level (recovery phase). The employment data time series can be looked upon as a compound of only two parts, the recession and recovery phase. The recession phase begins in a point where the local maximum is reached and ends in a point of its local minimum (recovery phase is analogous). This determination is important for construction of characteristics reflecting the negative economic shock (e.g. tempo of employment decrease).

There are four important characteristics used for the regional resilience evaluation of negative economic shocks:

- Tempo of employment decrease (geometrical average expressing the percentage of decrease of the regional employment level at the first period of decline – symbolised as F_1 – where "F" expresses "Fall", number 1 expresses the first period of decline).
- Tempo of the employment rise (geometrical average expressing the percentage of rise of the regional employment level at the first period of recovery – symbolised as R_1 – where "R" expresses "recovery", number 1 expresses first period of recovery).
- Percentage change in employment levels measured between the moments of the first peak (maximum of employment level at beginning of crisis) and moment of the end of surveyed time series in 3Q2012. This characteristic is symbolised as CH – where "CH" expressed "Change". It represents the percentage change in the level of employment in period from the peak (which occurred in most of the regions in period between 1Q2008 and 3Q2008) to 3Q2012.
- Duration of recession phase (number of quarters corresponding to recession phase). This characteristic is symbolised as F_1d – where "F" expresses "Fall", number 1 expresses the first period of decline and "d" expresses "duration".

The dating of the economic cycle was carried out on a quarterly time series of the number of peoples employed in surveyed regions. Indicators of the regional economic resilience are dependent on the correct identification of breakpoints (or turning points) and correct dating of recession phases and recovery phases. Indicators F_1, R_1 and F_1d do not apply to regions of type RS due to the absence of a period of decline.

For the process of dating turning points we used seasonally adjusted series (we used X12 - ARIMA method). For each region was also created smoothed time series (obtained by the method of Hodrick - Prescott filter, the parameter lambda = 2), which served to identify false peaks and troughs. This technique, which is recommended in the literature dealing with the analysis of business cycles (e.g. Poměnková, 2011), has significantly contributed to the accuracy in distinguishing real and apparent turning points. Those arrangements were made with the Gretl software, ver. 1.9.9.

The specific objective of the research is to test the following two hypotheses:
H1: Region's status under the EU's Cohesion Policy influences type of the regional economic resilience.
H2: Impact of factors of the RER differs between regions with different status in terms of the EU's Cohesion Policy.

4 Results of Analysis

This chapter presents the main results of the analyses. At first the results of analyses of significance of region's status under the EU's Cohesion Policy are presented. Next part of the paper deals with the results obtained on the basis of the correlation analysis (because there was not possible to prove the normal distribution of datasets, the Spearman's correlation coefficient was used).

Correlation analysis evaluated the influence of factors and set of indicators for the regional economic resilience (F_1, R_1, CH and F_1d). This analysis was made at the sample of regions under different status of the EU's Cohesion Policy (region symbolised as CE and C). In the case of transition regions (T) the results of the correlation analysis are not shown due to the lack of a statistically significant relationship, which is probably caused by a small number of these regions at surveyed sample.

As shown in Tab. 1 H1 hypothesis is confirmed (we use Chi-Square Test of Independence, alfa = 0.05). Regions that were eligible under the Competitiveness and Employment status proved to be disproportionately likely to have resisted (regions of type RS) or recovered (regions of type RC). In contrast, regions under the Convergence status have proven less able to resist or recover from the crisis (there was significantly lower proportion of regions type RS and RC, and higher proportion in category of NR2 type). Transition regions have also fared poorly in the crisis, with a particularly high proportion of regions still experiencing decline in 3Q2012. The same conclusion is also indicated by other studies (e.g. ESPON, 2014).

Tab. 1 Proportion of regions according to the EU's Cohesion Policy status and according to type of the RER

Type of regions	RS	RC	NR1	NR2	Total
CE	**14%**	**33%**	5%	**18%**	69%
C	1%	6%	5%	**11%**	23%
T	1%	2%	0%	5%	8%
Total	16%	41%	10%	34%	100%

Source: Own processing according to the LFS microdata (Labour Force Survey, 2013)

To explain the occurrence of interregional differences there were made correlation analyses. The results are displayed in the Tab. 2 and 3 Results show correlation coefficients of potential determinants with all characteristics of the RER.

Tab. 2 and 3 contain results of correlation analysis in the case of two groups of regions according region's status under the EU's Cohesion Policy. Significant values are bold. It can be assumed that the quality of human capital has a good impact to the RER in both groups. Other results of correlation analysis show significant differences in the influence of the examined factors.

First differences we could see (Tab. 2) in the case of factor "Regional Economic Performance". There is significant relationship between GDP p.c. and percentage change of employment level (CH) and also duration of recession phase (F_1d) in the case of regions with Competitiveness and Employment status - although relations are relatively weak. There is no significant relationship between the same indicators in the case of regions with Convergence status (as shown in Tab. 3).

Significant relationship (Tab. 2) is proven (at a significance level of 5 %) for the negative relationship between labour productivity and the rate of decrease of employment levels in recession phase (F_1r). It can be assumed that the productivity slows down the speed of employment level decline and so that have a good impact to the RER in the case of regions with Competitiveness and Employment status (in the case of regions with Convergence status the relationship is insignificant – see Tab. 3).

Second differences are in the case of factor "Innovation Activity and R&D". There is significant relationship between total intramural R&D expenditure and percentage change of employment level (CH) and also duration of recession phase (F_1d) in the case of regions with Competitiveness and Employment status. The significant relationship is also between Indicator Number of patent applications per million inhabitants and indicators CH and F_1d. There is no significant relationship between the same indicators in the case of regions with Convergence status (as shown in Tab. 3).

Tab. 2 Results of correlation analysis - Spearman's coefficient (significant values are bold) - Competitiveness and Employment

Factor	Potential determinants of the RER	F_1	R_1	CH	F_1d
Regional Economic Performance	GDP per capita (at current market prices) in PPS	-0,096	-0,216	**0,208**	**-0,216**
	Labour productivity (GDP at current market prices per employees)	**-0,379**	-0,029	**0,294**	-0,156
Innovation Activity and R&D	Total intramural R&D expenditure (in PPS)	-0,234	-0,197	**0,357**	**-0,238**
	Number of patent applications per million inhabitants	-0,180	-0,107	**0,487**	**-0,319**
Human Capital	People with lower secondary education (level 2)	0,011	-0,049	**-0,662**	**0,425**
	People with upper secondary or tertiary education (level from 3 to 6)	0,025	0,267	**0,673**	**-0,377**
	HRST – according to occupation	-0,186	**-0,275**	**0,538**	**-0,295**
Economic Structure	Primary and Secondary Sector	-0,121	-0,218	-0,162	-0,078
	Tertiary sector	0,117	0,211	0,157	0,083

Source: Own processing according to the LFS microdata (Labour Force Survey, 2013) and (EUROSTAT, 2014)

As shown in Tab. 3 there is two significant relationships between factor of "Regional Economic Performance" and indicator R_1. It can be assumed that the labour productivity (and also GDP p.c.) accelerates the speed of employment level development in recovery phase and so that both have a good impact to the RER. The strongest relationship was found in the case of indicator CH and the quality of human capital (e.g. indicator "People with upper secondary or tertiary education" correlate with percentage change of employment level (CH), correlation coefficient is 0,465). On the other hand negative correlation with indicator CH was found in the case of indicator "People with lower secondary education".

Tab. 3 Results of correlation analysis - Spearman's coefficient (significant values are bold) - Convergence

Factor	Potential determinants of RER	F_1	R_1	CH	F_1d
Regional Economic Performance	GDP per capita (at current market prices) in PPS	-0,199	**-0,398**	-0,184	0,140
	Labour productivity (GDP at current market prices per employees)	-0,136	**-0,385**	-0,024	0,100
Innovation Activity and R&D	Total intramural R&D expenditure (in PPS)	-0,259	-0,176	0,030	0,065
	Number of patent applications per million inhabitants	-0,180	-0,095	0,203	-0,046
Human Capital	People with lower secondary education (level 2)	-0,009	0,055	**-0,465**	0,297

	People with upper secondary or tertiary education (level from 3 to 6)	0,009	-0,055	**0,465**	-0,297
	HRST – according to occupation	-0,115	-0,128	**0,395**	-0,232
Economic Structure	Primary and Secondary Sector	-0,012	0,259	-0,243	-0,075
	Tertiary sector	0,012	-0,259	0,243	0,075

Source: Own processing according to the LFS microdata (Labour Force Survey, 2013) and (EUROSTAT, 2014)

Comparison of results (in Tab. 2 and 3) shows that H2 hypothesis is confirmed. The main differences are in the cases of factors "Regional Economic Performance" and "Innovation Activity and R&D".

5 Conclusions

The paper informs about the basic definitions of the Regional Resilience concept. It also specifies characteristics used for the regional resilience measurement. On the basis of the data sets of quarterly regional employment there are surveyed four groups of the regional resilience and three groups of regions under different status in terms of the EU's Cohesion Policy. The analytical part of the paper evaluates two hypotheses. Both are proved to be true. All the analyses confirm the differences between different statuses of the EU's Cohesion Policy. Findings could be useful for effective make-decisions in the field of Cohesion Policy within the regional management processes.

The results shows that Cohesion policy should support the RER by increasing the quality of human capital (especially in the case of regions of type CE and C) and also increasing innovation and scientific activities in regions (especially in the case of regions of type CE). It can be assumed that both lead to an increase in the economic performance of regions and also to increasing of the RER ability.

Limits of the presented results are obvious. The limited available datasets are completed with the reality that only one shock was researched. The further research would spread the indicator sets and also enrich the research attitude with the focus on typical characteristics of regions according to different types of resilience.

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References

DAWLEY, S. 2010. Towards the Resilient Region? In *SERC Discussion Paper* [online]. č. 53 [cit. 2012-10-20]. Available from: http://eprints.lse.ac.uk/33523/1/sercdp0053.pdf.

ESPON. 2014. *Economic Crisis: Resilience of Region (Final Report).* [online]. ESPON & Cardiff University, [cit. 2014-08-21]. Available from: http://www.espon.eu/main/Menu_Projects/Menu_AppliedResearch/ECR2.html.

EUROPEAN COMMISION. 2014. Regional Policy. [online]. European Commission, [cit. 2012-08-19]. Available from: http://ec.europa.eu/regional_policy/index_en.cfm.

EUROSTAT. 2014. General and regional statistics. Eurostat [online]. [cit. 2014-08-15]. Available from: http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database.

FOSTER, K. A. 2007. *A Case Study Approach to Understanding Regional Resilience.* Working Paper 2007–08, Institute of Urban and Regional Development, University of California, Berkeley, [online]. s. 41 [cit. 2012-09-14]. Available from: http://www.iurd.berkeley.edu/publications/wp/2007-08.pdf.

GUNDERSON, L. H., HOLLING, C.S. 2002. *Panarchy: understanding transformations in human and natural systems*. Washington, DC: Island Press, xxiv, s. 507. ISBN 15-596-3857-5.

HILL, E.; WIAL, H.; WOLMAN, H. 2008. *Exploring regional economic resilience*, Working Paper, Institute of Urban and Regional Development, No. 2008, 04, [online]. s. 22 [cit. 2012-09-15]. Available from: http://hdl.handle.net/10419/59420.

HUTTER, G., KUHLICKE, C., GLADE, T., & FELGENTREFF, C. 2013. Natural hazards and resilience: Exploring institutional and organizational dimensions of social resilience. *Natural Hazards*, 67(1), 1-6. doi: http://dx.doi.org/10.1007/s11069-011-9901-x.

KOUTSKÝ, J., RUMPEL, P., SLACH, O. et al. 2012. *Profilace měkkých faktorů regionálního rozvoje jako nástroj posilování regionální odolnosti a adaptability*. Certifikovaná metodika Ministerstva pro místní rozvoj. [online]. s. 50. [cit. 2012-9-09] Available from. http://zam.uur.cz/Rohrerova/Certifikovane-metodiky/10-Koutsky-WD-61-07-1.pdf.

KRAFT, J. et al. 2011. *Východiska z krize. Cesty zmírnění negativních efektů hospodářské krize v ČR*. Technická univerzita v Liberci, Liberec. ISBN 978-80-7372-787-1.

KRAFTOVÁ, I., APPLOVÁ, P. 2013. Variabilita ve tvorbě bohatství: Ekonomický rozvoj a management regionů. In *Sborník recenzovaných příspěvků Mezinárodní vědecké konference Hradecké ekonomické dny 2013*. [online], s. 329-328 [cit. 2013-10-04], ISBN 978-80-7435-249-2. Available from: http://fim.uhk.cz/hed/images/Sbornik_2013_dil_1.pdf.

LABOUR FORCE SURVEY [online]. 2013. [cit. 2013-08-20]. Available from: http://epp.eurostat.ec.europa.eu/portal/page/portal/microdata/lfs.

MARTIN, R. 2012. Regional economic resilience, hysteresis and recessionary shocks, *Journal of Economic Geography*, 12 (1). pp. 1 – 32.

MARTIN, R., SUNLEY, P. 2007. Complexity Thinking and Evolutionary Economic Geography, *Journal of Economic Geography*. 7, pp. 573-602.

PELLING, M. 2011. *Adaptation to Climate Change: From Resilience to Transformation*. London: Routledge, ISBN 978-0-415-47750-5.

PENDALL, R., FOSTER, K. A., et al. 2010. Resilience and regions: building understanding of the metaphor, *Cambridge Journal of Regions, Economy and Society*, 3 (1). pp. 59 - 70.

PIKE, A., DAWLEY, S., et al. 2010. *Resilience, adaptation and adaptability*, Cambridge Journal of Regions, Economy and Society, vol. 3 (3), pp. 59 – 70.

POMĚNKOVÁ, J. 2011. *Vybrané aspekty modelování hospodářského cyklu*. 1. vyd. Brno: Konvoj, 151 s. monografie (Konvoj). ISBN 978-80-7302-161-0.

SIMMIE, J., MARTIN, R. L. 2010. The economic resilience of regions: towards an evolutionary approach, *Cambridge Journal of Regions, Economy and Society*, 3, 1, pp. 27 – 44.