

EVALUATION OF EU COHESION POLICY IMPACT ON REGIONAL CONVERGENCE: DO CULTURE DIFFERENCES MATTER?

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Abstract. Attention to the harmonised economic growth by promoting regional economic convergence was paid in the 1960s, at the commencement of European economic integration. It served as a basis for initiation of programs intended to reduce disparities among regions. For the current programming period (2014–2020) over 350 billion euro was allocated to promote cohesion (more than 340 billion for 2007–2013 and about 213 billion for 2000–2006) and a considerable part of that funding went specially to promote regional convergence; therefore, the analysis of regional convergence in the EU countries is essential due to both economic and financial reasons. Regional policy can be considered successful if regional disparities are found to be decreasing; however, research on convergence/divergence issue has not provided any unambiguous conclusions. We aim to enrich this field of analysis by incorporating cultural dimension while analysing the factors influencing regional convergence. In order to identify a causal link between culture and economic outcomes, we define culture as the customary beliefs and values that ethnic, religious and social groups transmit almost unchanged from generation to generation. Our research hypothesis is that regional policy impact on regional convergence differs between groups of countries characterised by historically diverse cultural experience. Using panel data approach like FD and covering the two last programming periods along with a set of variables to control country-specific economic environment, we investigate whether the success of Cohesion policy has depended on cultural differences in the north, south, west and central-east groups of European countries.

Keywords: regional convergence; Cohesion policy; cultural differences; regression analysis.

Type of the paper: Empirical study

JEL Classification: R11, O47, C23.

Introduction

Trade and industrial development have stimulated the creation of a modern state; nevertheless, such a state serves not only to facilitate the national economic development but also to ensure wealth to its citizens. Therefore, it is natural that countries deal with the issue how to ensure equal growth possibilities for all regions in the country. This issue cannot be solved without taking into account the extent of economic territorial disparities and development process thereof. The identification of reasons and character of the above phenomenon is relevant since even slight regional economic disparities, which have been accumulated over a long period of time, may cause different levels of living standards within the country. These disparities have negative impact on further economic growth and increase in economic, social, cultural and political imbalance among the regions.

On the basis of the EU cohesion policy, programmes under implementation during the last programming period were allocated over 291 billion euro from the EU funds directly to promote regional economic convergence and, therefore, the analysis of regional convergence in EU countries is essential due to both economic and financial reasons. Regional policy can be considered successful if regional disparities are found to be decreasing; however, research on convergence/divergence issue has not provided any unambiguous conclusions.

In answering the question of what makes a policy successful, most economists emphasise the conditions that are necessary for economic development. Considerable cultural differences exist and cultural diversity remains definitely significant among different countries and regions, so it is clear

that culture may affect the influence of policy on economic outcomes. Thus, in this paper we are going to evaluate how a cultural difference influences the implementation of the EU Cohesion policy.

The listed reasons determine the relevance of research area and require reassessment of regional economic disparity causes, considering not only different national economic growth rates, integration level of the world economy as well as different production structures and investment rates but also cohesion policy through cultural differences. The aim of the research – on the basis of analysed scientific studies and results of application of introduced econometric model – is to evaluate the impact of the EU cohesion policy on regional convergence as well as the differences between the groups of countries with common culture.

The rest of the paper proceeds as follows: the next sections briefly review the related literature on regional economic convergence factors in terms of cultural aspect and the EU cohesion policy. Section 1 introduces a brief overview of EU cohesion policy periods. Section 2 reviews the studies on cohesion policy impact on regional convergence. Cultural aspects of policy impact on economic outcome are analysed in Section 3. Regional economic convergence factors are presented in Section 4. Econometric model constructed to evaluate the EU cohesion policy impact on regional convergence through culture channel in the short- and long-run, while controlling other convergence factors, is presented in Section 5. Section 6 discusses the results of method application in EU Member States. Finally, Section 7 closes the paper with the main conclusions.

Brief overview of the two last EU cohesion policy periods

Regional disparities have always been an important question throughout the existence of the EU. The main purpose of the European Cohesion policy is to decrease regional disparities within the European Union. The EU Regional Policy is designed on the basis of three main assumptions: (i) disparities exist between EU regions, (ii) structural policies are orientated to reduce disparities, and (iii) regional growth and convergence lead to cohesion. According to the regional policy adopted in 1999, the European Council agreed upon ‘Agenda 2000’, which reformed a number of EU policies and re-established four Structural Funds: i) The European Regional Development Fund (investment in infrastructure and employment), ii) The European Social Fund (supports programmes that aid the integration of the unemployed or otherwise disadvantaged groups in the labour market), iii) The Guidance Section of the European Agricultural Guidance and Guarantee Fund (supports farmers and finances programmes for the development of rural areas), iv) The Financial Instruments for Fisheries Guidance (supports restructure and modernises the fishing fleet).

The majority of Structural Funds are based on three Objectives (EC 2004a; Ederveen *et. al.* 2003; Boldrin, Canova 2001):

- Objective 1 is to help lagging regions catch up with the rest of Europe by providing basic infrastructure and encouraging business activity.
- Objective 2 is to help those regions facing the difficulties.
- Objective 3 is to modernise education and increase employment.

In the 2000–2006 programming period, the regional policy focused on the European regional disparity decreasing (Objective 1) and the regions that faced structural change (Objective 2) during that period (Nordregio 2009). For the programming period, 2007–2013, the reform of the regional policy was implemented by introducing the term territorial cohesion. The main target of the financial support was to reduce imbalances and disparities between the European regions under the convergence, competitiveness and cooperation (EC 2004, 2010a, 2010b). The priorities of 2007–2013 programming period: i) *convergence*: promote the conditions which ensure long-term economic growth leading to convergence of the least-developed Member States and regions; ii) *regional competitiveness and employment*: promote innovations, knowledge society, entrepreneurship and sustainable development; iii) *territorial cooperation*: cross-border and transnational cooperation, joint local and regional initiatives, interregional cooperation and exchange of experience (EC 2007; Nordregio 2009).

Review of studies on cohesion policy impact on regional convergence

Reduction in regional disparities is a major concern for regional policy in the EU. Often, regional economic disparities exacerbate existing ethnic, cultural, linguistic or religious differences.

The standard approach to evaluate the EU Cohesion policy impact on convergence is to apply a neo-classical theory. Structural Funds are then included in a linear regression, so EU funds support regions' economic development (Eggert *et al.* 2007). The majority of research that use the neo-classical economic growth find a positive impact of EU funds on growth of convergence (Gaspar, Leite 1994; Solanes, Dolores 2002; Cappelen *et al.* 2003; De La Fuente 2003; Farrel 2004; Beugelsdijk, Eijffinger 2005; Becker *et al.* 2009; Ramajo *et al.* 2008; Hagen, Mohl 2008). There is no consensus in the scientific literature on the policy impact. Other studies do not find that the EU support fosters higher rate of convergence in funded regions in comparison with non EU-funded regions (Canova, Boldrin 2001; Garcia-Mila, McGuire 2001; Barry 2003; Dall'erba, Gallo 2008). Multiple factors impact regional economic growth. Unobserved or omitted variables would lead to a biased estimate of the impact of Structural Funds. The most common result is that the impact of EU Cohesion Funds on the growth of convergence is determined by a variety of other factors starting from economic openness (Ederveen *et al.* 2003, 2006), structure of the national economy and R&D intensity (Fagerberg, Verspagen 1996; Bussoletti, Esposti 2004; Cappelen *et al.* 2003), decentralisation of fiscal policy (Ezcurra, Pascual 2008; Bähr 2008), institutional environment (De Freitag, Pereira, Torres 2003; Ederveen *et al.* 2006), lack of corruption (Beugelsdijk, Eijffinger 2005) and a stable macroeconomic environment. We aim to enrich studies in this field by modelling EU Cohesion policy impact on Members States region convergence through cultural channel.

Cultural aspects of policy impact on economic outcome

Economic theories provide different dimensions towards regional convergence stimulating and limiting factors. There is no common consent among regional convergence researchers as to what factors should be included in the impact assessment model, since this depends on: (i) subjective research purpose; (ii) theory concept application in the research and (iii) relevant data and data availability. While analysing factors important for regional convergence in EU Member States, Cohesion policy also should be considered.

A growing number of authors seem to agree that policy impact on economic outcomes will take more than dependable political and economic institutions.

The idea that culture is a determinant of economic outcomes was developed by economic historians like North (1981) and Landes (1998) – other contributions to economic history were discussed by Jones (2006). In order to identify a causal link between culture and economic outcomes, we define culture as those customary beliefs and values that ethnic, religious, and social groups transmit almost unchanged from generation to generation. On the one hand, the upper definition of culture restricts the potential channels of influence to two standard ones; beliefs like priors and values like preferences. Causality is likely to go both ways, from culture to economics and from economics to culture (Guiso *et al.* 2006). Therefore, while not comprehensive, this approach focuses on those dimensions of culture that can affect policy economic outcomes and allows identifying a causal effect from culture to policy effectiveness. On the other hand, it conveys that culture is not located in the minds and actions of individual people and that individuals are living in particular social systems (Schwartz 2014). Thus, from this perspective, culture is seen as an 'inherited ethical habit' as well as 'what is transmitted from one generation to the next, via teaching and imitation of knowledge, values, and other factors that influence behaviour' (Shixue 2003). Bisin, Verdier (2002) and Benabou, Tirole (2006) suggest that culture can be influenced by two forces: current social interactions and the cultural features of earlier generations (transmitted over time through education or other channels).

With few exceptions (e.g. Turkey, Greek Cyprus, Israel Jews), the noticeable sets of cultural groups emerge together in regions of the space. Therefore, by drawing boundary lines around these sets of groups on the spatial map one can discern cultural regions (Schwartz 2014). A culture area is a region of the world in which people share similar cultural traits (Brown 2001). According to cultural

similarities, in our research we divide EU Member States into four cultural areas: central-eastern (including Bulgaria, Czech Republic, Latvia, Lithuania, Hungary, Poland, Romania, Slovenia, Slovakia), northern (Estonia, Finland, Sweden), southern (Greece, Spain, Croatia, Italy, Malta, Portugal) and western (Belgium, Germany, Ireland, France, Netherlands, Austria, United Kingdom).

Analysis of regional convergence factors

The analysis of theories and scientific studies showed that different schools identify different factors and channels by which regional convergence is influenced. Causes of regional economic convergence were based on neoclassic economic ideas until the last decade of the twentieth century. Regional economic disparities were treated as a short-term imbalance subject to the adjustment by free market. Cumulative causation theory (Kaldor 1981; Martin, Sunley 1998; Cherodian, Thirlwall 2015) representing the demand-based approach served to counterbalance the neoclassic theory in the regional convergence research. Cumulative causation theory established the feedback linkage of production and efficiency and economic growth, substantiating that regional convergence has been predetermined by the latter. Cumulative causation approach might be considered as a predecessor to endogenous growth theory (De Long, Summers 1991; Mullen, Williams 1990; Ke, Bergman 1995; Romer 1990; Grossman, Helpman 1991) that promoted a breakthrough in convergence research in the 10th decade. The above theory as well as the Marxism (Watkins, Perry 1977; Castells 1972; Smith 1984) approach proved that disparities in regions are caused by the factors stimulating economic growth (especially human and public capital through research and development) determining regional divergence. Having conjoined the ideas of cumulative causation and economies of scale, a branch of the endogenous theory – new economic geography theory (Krugman 1991; 1993a,b; 1995a,b; Krugman, Venables 1995) – emphasises that economic openness level via transportation costs as well as agglomeration advantage, does determine economic activity de-concentration/concentration and regional convergence/divergence in a country. Industrial restructuring (Massey, Meegan 1982; Noyelle, Stanback Jr. 1983) and flexible specialisation (Piore, Sabel 1984; Saxenian 1994) theories representing structural trends in industry and service sectors contradict the above viewpoint and state that openness does not ensure that all the regions are able to take advantage of it or the promotion of convergence in a country.

According to the main discussed theoretical frameworks in the area of regional convergence, we will include in our analysis a set of variables that control the main factors that influence regional convergence along with Cohesion policy variable and culture channel.

Model for assessment of cohesion policy impact on regional convergence

Our aim is to evaluate what impact on regional convergence the EU cohesion policy has and particularly whether this impact differs between groups of countries with common culture. We also want to test whether this impact differs in the short- and long-run.

One of the main aspects of the analysis in this area is to determine an indicator that would be suitable for evaluating not only the level of regional differences within a country but also a rate of its change, that is, convergence or divergence. There are few alternative approaches used to verify convergence. The two main ones are called β -convergence and σ -convergence. An application of these approaches depends on the methodological framework of researches. The β -convergence, which takes its origin from the Baumol (1986) study of real convergence between countries, is based on neoclassical theory assumption of diminishing return and postulates that, initially, poorer countries tend to grow faster because investments there generate higher returns. This means that poorer countries are converging to initially richer ones because the latter do not grow so fast (catch-up effect). Because this type of convergence is tested using a linear regression model (GDP growth per capita is negatively dependent on initial economic level) and coefficient on slope characterises direction and speed of convergence it came to be known as β -convergence. This type of convergence found application in a number of studies (for example, Thirlwall, 2013; Próchniak, Witkowski, 2013; Shabari, Debasis, 2015 and others) primary dedicated to evaluating convergence between regions.

The σ -convergence concept is also based on the neoclassical theory of economic growth. The idea is that all countries converge to the same level of development or in other words to the same level of output. The σ -convergence can be defined as lowering of variance of real GDP per capita among countries in time. This type of convergence is also widely applied in regional convergence analysis (for example, Smętkowski, Wójcik, 2012; Andersson, Edgerton, Opper, 2013; Huang, Chand, 2015 and others).

For measuring the direction and speed of convergence in EU Member States we will use the latter approach because the former is more suitable for evaluating convergence in the long-run. Another argument is that one of the indexes (dispersion of regional GDP per capita) for evaluating σ -convergence is provided by Eurostat. We should point here that this index does not show convergence. Convergence is approximated by changes of this index. We have chosen to measure regional convergence at NUTS 3 level because small countries in the EU, like Lithuania, Latvia Estonia, Slovakia and few others have regions just at this level, and the whole country is treated as NUTS 2 level region. Cyprus and Luxembourg are not divided into regions and so will not be included in our analysis as well as Demark, which has not received dedicated financing from cohesion funds to promote regional convergence for the previous two analysed programing periods. Our analysis covers 25 EU Member States for the period from 2000 to 2013, that is, panel data (structure NxT).

A few widely used regression analysis approaches for panel data can be applied here – first difference (FD), fixed effects (FE) and random effects (RE). All of them have their own advantages and disadvantages.

When T is large, and especially when N is not very large (as in our case, $N=25$ and $T=14$), we express caution in using the fixed effects estimators because they are very sensitive to violations of the classical fixed effects assumptions when N is small and T is large. In particular, we use data on dispersion of regional GDP per capita and other macroeconomic indicators, which exhibit unit root processes due to general development and this leads to spurious regression problems. In this case, using differences is favourable.

The ideal random effects assumptions include all the fixed effects assumptions plus the additional requirement that unobserved EU member state effects are independent of all explanatory variables in all time periods. However, such an assumption is very hard to ground in our case and we think that unobserved effects are correlated with explanatory variables.

One of the ways to use panel data is to view that unobserved factors (in our case unobserved EU Member States heterogeneity) affecting the dependent variable (in our case regional convergence) are constant over time (population attitude to government policy or income disparities, geographical differences within country and etc.). Many other factors may not be exactly constant, but they might be roughly constant over a 14-year period – education level of labour force, institutional structure, structure of population age and so on. In order to produce a consistent estimator that represents the impact of the EU cohesion policy on regional convergence, we would have to assume that the unobserved effects of EU Member States are uncorrelated with the EU Cohesion policy. But this is not the case, constant factors which influence regional convergence (for example, institutional structure of countries government) correlate with the EU Cohesion policy. The resulting bias can be eliminated differencing the data across time and as unobserved effects are constant over time they will be ‘differenced away.’ Equation (1), which we call the first-differenced equation and will use in our empirical analysis, is:

$$\begin{aligned} \Delta \ln(D_{i,t}) = & \alpha + \delta_4 \cdot dt2003_i + \dots + \delta_{14} \cdot dt2013_i + \beta_{1,0} \cdot \Delta \ln(\text{regpol}_{i,t}) + \beta_{1,1} \cdot \Delta \ln(\text{regpol}_{i,t-1}) \\ & + \beta_{2,0} \cdot \Delta \ln(\text{regpol}_{i,t}) \cdot \text{centeast} + \beta_{2,1} \cdot \Delta \ln(\text{regpol}_{i,t-1}) \cdot \text{centeast} + \beta_{3,0} \cdot \Delta \ln(\text{regpol}_{i,t}) \cdot \text{south} \\ & + \beta_{3,1} \cdot \Delta \ln(\text{regpol}_{i,t-1}) \cdot \text{south} + \beta_{4,0} \cdot \Delta \ln(\text{regpol}_{i,t}) \cdot \text{north} + \beta_{4,1} \cdot \Delta \ln(\text{regpol}_{i,t-1}) \cdot \text{north} \\ & + c_{1,0} \cdot \Delta \ln(\text{open}_{i,t}) + c_{1,1} \cdot \Delta \ln(\text{open}_{i,t-1}) + c_{2,0} \cdot \Delta \ln(\text{gdp}_{i,t}) + c_{2,1} \cdot \Delta \ln(\text{gdp}_{i,t-1}) + c_{3,0} \cdot \Delta \ln(\text{ind}_{i,t}) \\ & + c_{3,1} \cdot \Delta \ln(\text{ind}_{i,t-1}) + c_{4,0} \cdot \Delta \ln(\text{serv}_{i,t}) + c_{4,1} \cdot \Delta \ln(\text{serv}_{i,t-1}) + c_{5,0} \cdot \Delta \ln(\text{r\&d}_{i,t}) + c_{5,1} \cdot \Delta \ln(\text{r\&d}_{i,t-1}) + \Delta u_{i,t} \end{aligned} \quad (1)$$

Where:

$D_{i,t}$ - dispersion of regional GDP per capita by NUTS 3 regions (%) in a country i in year t . For a given country, the dispersion of regional GDP of the level 3 regions is defined as the sum of the absolute differences between regional and national GDP per capita, weighted with the regional share of population and expressed as a percent of the national GDP per capita. This variable for a period 2000–2011 was taken from Eurostat database and for years 2012 and 2013 was calculated by authors themselves using Eurostat provided regional GDP and population data. It is used to approximate regional disparities within a country at NUTS 3 level. $\Delta \ln(D_{i,t})$ will approximate the rate of convergence if $\Delta \ln(D_{i,t}) < 0$ or divergence if $\Delta \ln(D_{i,t}) > 0$.

$regpol_{i,t}$ - variable which will be used to measure the regional policy in a country i in year t . For approximating regional policy, we will use two alternative indicators: (I) – usage *intensity* of structural funds dedicated to stimulate convergence. Indicator is calculated as a ratio (%) between structural fund expenditures in a country compared to its GDP. (II) – expenditures in euros from structural funds dedicated to stimulate convergence in a country.

$open_{i,t}$ – approximates economic openness of a country i in year t . In the analysis we will use countries' export and import-to-GDP ratio (%).

$gdp_{i,t}$ – is the gross domestic product at market prices in a country i in year t (millions of euros). $\Delta \ln(gdp_{i,t})$ – approximates countries economic growth rates.

$ind_{i,t}$ – is the variable that shows the importance of industry sector (except construction) in a country i in year t . We approximate that variable in the model by value added in industry sector-to-GDP ratio (%).

$serv_{i,t}$ – is the variable that shows importance of service sector (except wholesale) in a country i in year t . We approximate that variable in the model by value added in service sector-to-GDP ratio (%).

$r\&d_{i,t}$ – expenditures on research and development-to-GDP ratio (%).

$centeast$ – is a dummy variable equal to 1 for countries Bulgaria, Czech Republic, Latvia, Lithuania, Hungary, Poland, Romania, Slovenia, Slovakia, and 0 for all other countries.

$south$ – is a dummy variable equal to 1 for Greece, Spain, Croatia, Italy, Malta, Portugal and 0 for all other countries.

$north$ – is a dummy variable equal to 1 for Estonia, Finland, Sweden and 0 for all other countries.

In our analysis, Belgium, Germany, Ireland, France, Netherlands, Austria, United Kingdom will be benchmark group *west*.

$dt2003, \dots, 2013_t$ – year dummy variables. Allowing the intercept (α) to change over time is important in our analysis. Secular trends in the EU will cause regional differences within a country in all Member States to change ($\delta_4, \dots, \delta_{14}$) perhaps markedly, over a year.

$\Delta u_{i,t}$ - idiosyncratic error or time-varying error. We must assume that this error is uncorrelated over time for the usual standard errors and test statistics to be valid. This assumption will be tested in such a way – if $\Delta u_{i,t}$ follows a stable AR(1) model, then $\Delta u_{i,t}$ will be serially correlated. Only when $\Delta u_{i,t}$ follows a random walk, $\Delta u_{i,t}$ will be serially uncorrelated. If there is no serial correlation in the errors, the usual methods for dealing with heteroskedasticity are valid. We can use the White test for heteroskedasticity, and we can also compute robust standard errors. In case of heteroscedasticity we will use weighted least squares (WLS) estimates with weights based on per-unit error variances.

All coefficients except betas on interaction terms will be interpreted as coefficients of elasticities. Coefficients on interaction terms will show regional policy impact differences between benchmark group (*west*) and respective group (*centeast*, *south* or *north*) and will be interpreted in percentage points.

i - denotes cross-sectional observation number (25 EU Member States)

t - denotes time period (14 time periods from 2000 to 2013).

Impact in the short-run will be estimated using coefficients on current period independent variables. Impact in the long-run will be estimated summing up coefficients on current and lagged independent variables.

Empirical analysis results and discussion

We find some statistical evidence of minimal negative serial correlation in the first-differenced errors. Unlike with positive serial correlation, the usual OLS standard errors may not greatly understate the correct standard errors when the errors are negatively correlated. Thus, the significance of the variables will probably not be affected. There is strong evidence of heteroskedasticity in the OLS equations. This allowed us to choose another method for model estimation. WLS along with heteroskedasticity-robust standard errors increases probability to get BLUE estimates, which, in our case, will be used for interpretation. Estimation results of model (1) are provided in Table 1.

(I) – Regional policy is approximated by *intensity* of structural funds to stimulate convergence.

(II) – Regional policy is approximated by *expenditures* of structural funds to stimulate convergence.

OLS – Estimates using Ordinary Least Squares. Standard error presented in brackets.

WLS – Estimates using Weighted Least Squares. Weights based on per-unit error variances. Heteroskedasticity-robust standard errors presented in brackets.

Table 1. Model estimation results (Source: author's compilation)

	(I)		(II)	
	OLS	WLS	OLS	WLS
α	-0.0084 (0.011)	-0.0076** (0.004)	-0.0084 (0.011)	-0.0077** (0.004)
dt2003 _t	-0.0150 (0.015)	-0.0160*** (0.004)	-0.0146 (0.015)	-0.0155*** (0.004)
...				
dt2013 _t	0.0084 (0.014)	0.0065 (0.004)	0.0088 (0.014)	0.0066 (0.004)
$\Delta \ln(\text{regpol}_{i,t})$	0.0531** (0.023)	0.0496*** (0.011)	0.0506** (0.024)	0.0456*** (0.009)
$\Delta \ln(\text{regpol}_{i,t-1})$	-0.0500 (0.031)	-0.0425*** (0.013)	-0.0662* (0.035)	-0.0465** (0.021)
$\Delta \ln(\text{regpol}_{i,t}) \times \text{centeast}$	-0.0465 (0.031)	-0.0459*** (0.013)	-0.0463 (0.033)	-0.0426*** (0.011)
$\Delta \ln(\text{regpol}_{i,t-1}) \times \text{centeast}$	0.0468 (0.039)	0.0342* (0.018)	0.0723* (0.043)	0.0491** (0.025)
$\Delta \ln(\text{regpol}_{i,t}) \times \text{south}$	-0.0471* (0.028)	-0.0422*** (0.014)	-0.0451 (0.029)	-0.0387*** (0.013)
$\Delta \ln(\text{regpol}_{i,t-1}) \times \text{south}$	0.0791** (0.039)	0.0705*** (0.016)	0.0930** (0.044)	0.0743*** (0.025)
$\Delta \ln(\text{regpol}_{i,t}) \times \text{north}$	-0.0881 (0.062)	-0.1032*** (0.027)	-0.0702 (0.057)	-0.0771*** (0.022)
$\Delta \ln(\text{regpol}_{i,t-1}) \times \text{north}$	0.0016 (0.066)	-0.0214 (0.019)	0.0434 (0.063)	0.0096 (0.027)
$\Delta \ln(\text{open}_{i,t})$	-0.0998 (0.065)	-0.0955*** (0.026)	-0.0915 (0.064)	-0.0882*** (0.025)
$\Delta \ln(\text{open}_{i,t-1})$	0.0917 (0.061)	0.0966*** (0.027)	0.0929 (0.061)	0.0986*** (0.025)
$\Delta \ln(\text{gdp}_{i,t})$	0.0055 (0.133)	0.0298 (0.056)	0.0014 (0.133)	0.0324 (0.057)
$\Delta \ln(\text{gdp}_{i,t-1})$	-0.1279 (0.136)	-0.1452** (0.060)	-0.1309 (0.139)	-0.1601** (0.065)
$\Delta \ln(\text{ind}_{i,t})$	0.0640 (0.087)	0.0456 (0.040)	0.0605 (0.087)	0.0276 (0.040)
$\Delta \ln(\text{ind}_{i,t-1})$	-0.105615 (0.083)	-0.0870** (0.035)	-0.1091 (0.083)	-0.1019*** (0.034)
$\Delta \ln(\text{serv}_{i,t})$	0.5879*** (0.162)	0.6373*** (0.068)	0.5770*** (0.163)	0.6090*** (0.057)
$\Delta \ln(\text{serv}_{i,t-1})$	-0.1421 (0.150)	-0.1227* (0.073)	-0.1478 (0.151)	-0.1444** (0.072)
$\Delta \ln(\text{r\&d}_{i,t})$	0.0164	-0.0024	0.0155	-0.0043

	(0.034)	(0.016)	(0.034)	(0.017)
$\Delta \ln(r\&d_{i,t-1})$	-0.0492	-0.0529***	-0.050	-0.0522***
	(0.036)	(0.012)	(0.036)	(0.011)
			206	
Adj. R ²	0.102	0.470	0.094	0.552
Error AR(1)(p-value)		-0.1564(0.0587)		-0.1624(0.0510)
White's test LM statistics(p-value)		83.383(0.0006)		84.905(0.0006)
p-value on testing H0: $c_{1,0}+c_{1,1}=0$		0.97532		0.74477
p-value on testing H0: $\beta_{1,0}+\beta_{1,1}=0$		0.42129		0.9581
p-value on testing H0: $\beta_{1,0}+\beta_{2,0}=0$		0.57608		0.6177
p-value on testing H0: $\beta_{1,0}+\beta_{2,0}+\beta_{1,1}+\beta_{2,1}=0$		0.71248		0.61302
p-value on testing H0: $\beta_{1,0}+\beta_{3,0}=0$		0.37522		0.42071
p-value on testing H0: $\beta_{1,0}+\beta_{3,0}+\beta_{1,1}+\beta_{3,1}=0$		0.0065		0.0128
p-value on testing H0: $\beta_{1,0}+\beta_{4,0}=0$		0.0335		0.1223
p-value on testing H0: $\beta_{1,0}+\beta_{4,0}+\beta_{1,1}+\beta_{4,1}=0$		<0.0001		0.0045

*-significant at 90%, **-significant at 95%, *** - significant at 99%

We will begin the discussion about analysis results from insights about impact of independent variables included in the model to control the fact that regional disparities can be affected not only by regional policy but also by other factors that have variation in time and cannot be differenced away like time constant variables.

We find strong evidence that increasing economic openness has a positive impact on countries' regional convergence in the short-run, but no effect in the long-run. It seems that the short-run positive effect of a broader market is later outweighed by increasing competition that can be handled mostly by developed regions in country.

Economic growth has positive effect on regional GDP dispersion reduction only in the long-run and no effect in the short-run. One per cent of economic growth leads to 0,145–0,160% of regional convergence in the long-run. Here we have no evidence of cumulative causation pattern of growth and can give an empirical ground to EU policy of regional convergence through economic growth.

We also find long-run effect of the industry sector on regional convergence in EU Member States. Increasing share of industry sector in economy is inducing faster economic growth in lagging regions possibly due to territorial re-allocation of this sector, which is not in favour of metro regions characterised by higher cost of labour and other resources. We do not include the construction sector here, which tends more to concentrate in metro regions. Because the industry sector in most of the EU Member States has become decreasingly important for more than 20 years, we cannot depend on it as the main factor, which in future may induce the decrease of regional disparities.

On the contrary, the increasing share of the service sector in the economy has instant and negative impact on regional convergence. In fact, the magnitude of the impact is the largest when compared with all other factors we analyzed. We have just modest statistical evidence that in the long-run this effect will be smaller. This is not surprising, because sectors that are becoming more and more important in the economy, like information and communication, financial and insurance activities, professional, scientific and technical activities, arts, entertainment and recreation are much clustered in nature.

Expenditures on research and development have a positive but very small effect on regional convergence in the long-run. Increase in these expenditures by 10% would reduce regional disparities in the long-run by just about 0.52–0.53%.

The findings about EU Cohesion policy impact on Member States regional convergence differences in terms of culture are provided in Table 2. (I) – Regional policy is approximated by *intensity* of structural funds to stimulate convergence. (II) – Regional policy is approximated by *expenditures* of structural funds to stimulate convergence. *Coefficients are calculated multiplying them by (-1) for easier understanding and interpretation, because decrease of dependent variable (dispersion of regional GDP) is a signal for at least sigma-convergence.

Table 2. Regional policy effect on regional convergence in countries with different cultural identity
(Source: author's compilation)

The group of countries	Convergence elasticity* on regional policy			
	Short-run		Long-run	
	(I)	(II)	(I)	(II)
West	-0.050	-0.046	0	0
Central-East	0	0	0	0
South	0	0	-0.035	-0.035
North	0.054	0	0.118	0.068

We found positive impact of the EU Cohesion policy on convergence only in Sweden, Finland and Estonia (group of northern countries). Identified effect in the long-run is higher in magnitude compared with short-run periods. In the latter period we find statistically significant influence of the EU Cohesion policy only if it is approximated by intensity of structural funds usage. We find no statistically significant evidence of policy impact on the group of central-eastern countries. This group consists of latest Member States. We can hypothesise that these countries do not have enough experience for effective usage of funds and the cultural environment is not suitable enough for that. In groups of western and southern countries, the EU Cohesion policy has significant impact but it is negative. This impact is estimated in western countries only in the short-run and in southern countries only in the long-run. We could explain these findings by saying that: (i) possibly funds in these countries were allocated to more developed regions and lagging regions did not receive enough of funds or (ii) positive effect of government interventions did not overcome negative effects of inefficiency created by these interventions.

These findings prompt some insights about the EU Cohesion policy: The EU becomes too diverse and Member States are too different with diverse culture backgrounds and a homogenous regional policy does not have positive effect on all of them. This policy is created and implemented taking into account that countries will seek to reduce regional differences by using structural funds in the most efficient way, but it is not the case. The cultural background of central and eastern countries created an environment in which government funds are treated as a possibility to implement personal aims, but not social ones. Therefore, it is not surprising that through corruption and ineffective allocation of funds, the EU Cohesion policy was not successful in these countries. On the contrary, the northern countries, which have strong cultural background of social responsibility, did not waste the opportunity to induce growth in lagging regions by using support from structural funds provided by the EU.

These findings imply that there is a necessity to overview methods for allocation and monitoring of EU Structural funds usage and to adapt these methods for country-specific cultural background in order to increase probability for a more successful Cohesion policy during the current programming period.

Conclusions

Regional disparities issue is one of the most important during all the existence of the EU because these disparities have a negative impact on further economic growth and increase economic, social, cultural and political imbalances among regions. The EU regional policy focuses on decreasing these disparities. Therefore, it is very important to evaluate whether the policy is successful and what determines its success. It was discussed that one of the determinants of successful implementation of the EU Cohesion policy could be the cultural differences between countries.

We develop a research model, which includes not only national economic growth rates, economic openness, expenditures on research and development and structure of economy but also the impact of Cohesion policy on dispersion of regional GDP per capita in NUTS 3 regions of a country through a cultural channel.

Summarizing our empirical findings obtained using a panel of 25 Member States covering two previous programming periods, we can conclude that openness of the economy has a positive average effect on regional convergence but only in the short-run. Economic growth, increasing share of industry sector in the economy and investment in R&D induces regional convergence in the long-run. Increasing share on service sector in the economy induces regional divergence in the short- and long-run.

Regarding the impact of the EU Cohesion policy on convergence through the cultural channel we found that the EU has become too much diverse and Member States are too different with diverse culture backgrounds and a homogenous regional policy does not have positive effect on all of them. Only in the group of northern countries, the effect of Cohesion policy on regional convergence is positive in the long-run and short-run. We found no statistically significant evidence of policy impact on the group of central-eastern countries. In the groups of western and southern countries, the EU Cohesion policy has significant impact but it is negative. This impact is estimated in western countries only in the short-run and in southern countries in the long-run.

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