Using regional HERMIN model at NUTS3 level for CSF ex-post assessment in Slovakia

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Abstract

Main scope of the paper is ex-post assessment of Structural Funds and Cohesion Fund (SF and CF) implementation impact on eight Slovak regions during programming period 2007-2013. Assessment will be based on the system of regional econometric structural models HERMIN. Model framework is based on eight (satellite) regional models that are mutually interlinked only on the level of aggregated statistical indicators. Proposed model framework is suitable for regional ex-post assessment due to its dependency mainly on generally available regional data. However, regional data are usually published with significant time delay (based on Eurostat guidelines) compared to national one, which need to be treated by ex-post analytical estimation of disaggregated data using available national data as constraints. On the other hand, due to limited links between regions only direct effect of SF and CF implementation could be assessed (in terms of regions). It is not possible to fully examine spill-over effects of growth of individual regions, resulting from SF and CF implementation, on other regions. From sectoral point of view, the HERMIN model covers the spill-over effects between individual sectors within the given region. Therefore each regional model can predict the development of the sector also in a situation, when the given sector is not affected by any direct influences (expenses of SF and CF). In case of creating new jobs, the model assumes that all jobs are filled with labour force from the given region, thus the aspect of interregional labour migration is not depicted. However, it is inevitable to realise that significant interregional labour migration occurs (especially in construction sector), and thus the increased income of households and their consumption in another regions is not captured. Additionally, using ex-ante prolongation of the model run, we were able to estimate sustainability of created jobs. Applied methodology on regional level is not yet broadly utilized and paper brings new perspective for further application for assessment of regional disparities within EU.

JEL classification: C54, E24, R58

Topic: Regional modeling / Impact and scenario analysis

Introduction

During the last two decades the Slovak economy went through following stages: the start of the transition in early 90’s, standardisation of economic environment after 1998, culmination of unemployment at 19 % in 2001, accession to the EU in 2004,. Followed by period of unprecedented economic growth until the beginning of the economic crisis in 2008 that is currently still influencing the economic development. Slovakia belongs to the EU countries with highest regional disparities, which is influenced by various numbers of factors, such as structure of regional economies, education level, as well as geographical factors and past development.

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One of the main objectives of governments and supranational entities is to lower the existing regional disparities\(^6\). Within the EU (European Union), this objective is defined in the Maastricht Treaty, as follows: “Community shall aim at reducing disparities between the levels of development of the various regions and the backwardness of the least-favoured regions, including rural areas”. EU cohesion policy aims at NUTS 2\(^7\) regions with GDP per capita in PPP (purchasing power parity) lower than 80 % of EU average. European cohesion funds should be utilized as additional regional source of capital, but in many countries is used as major source of national regional policy interventions.

Several European pre-accession CSF (community support framework) tools have been applied in Slovakia, but by far the allocation of Cohesion and Structural funds within EU programming period 2007-2013 was most significant. Paper assesses the possible effects of cohesion funds on Slovak regions during programming period 2007-2013. Guidelines for allocation of these funds require all projects to be finalized within time rule t+2, thus all drawings must be finalized until end of year 2015\(^5\).

During period 2007-2013 almost 11.5 billion EUR\(^8\) was allocated for the Slovak Republic as part of the cohesion policy. The aims and ways of using the financial resources from SF and CF have been defined in the National Strategic Framework of Reference (NSFR). It consists of 11 operational programmes implemented as part of the aim convergence, and regional competitiveness and employment (programmes of European Territorial Cooperation are not part of the NSFR). Until the end of the year 2013, 7.85 billion EUR were allocated to projects implementing SF and CF resources, this figure includes also co-financing from the state budget and own sources of beneficiaries. This amount also includes resources classified as ineligible, i.e. expenditures paid from EU sources and state budget that were not used in line with valid legislation and payment of which is claimed from the beneficiary. From analytical point of view, those discrepancies are implicitly contained in statistical data, since they represent an actual investment in economy regardless of the sources of financing. Majority of used resources was made up of contributions from EU funds, more than 6 billion EUR.

European Union, as the most significant cohesion financial source, requires systematic assessment of SF and CF implementation effects and efficiency. From the macroeconomic point of view, several methods of assessment have been developed since the very first implementation of EU cohesion policies. Most used approaches for ex-ante and ex-post assessment are models HERMIN, QUEST (on national levels) and recently development RHOMOLO (on NUTS 2 regional level). More detail analysis is required to assess governance decentralization within EU and significant regional discrepancies within relatively small areas. Regional HERMIN model, utilized and described in this paper is first model used for assessment of cohesion and structural funds on NUTS 3 level. This requirement originates in Slovak regional structure, where NUTS 3 regions are functional self-government units and NUTS 2 regions are only statistical units.

The concept of the assessment is based on two scenarios. The basic one is the so-called benchmark scenario describing the development of economy based on real historical economic development. This assumption represents the main difference of the ex-post analysis in comparison to ex-ante one, in which the basic scenario is usually without implementation of SF and CF. The basic scenario, is thus built on a real historical conditions of the economic development of Slovak regions according to officially published statistical data. The alternative scenario describes the economic development of individual regions that would occur in case of not implementing SF and CF resources. Implementation of SF and CF during the years 2007 – 2013 on NUTS 3 region level was defined as the actual drawing based on indicative disaggregation of data from ITMS. Drawing of SF and CF during the years 2014-2015 is based on the assumption that 89%\(^8\) of allocated resources will be drawn with gradual growth of the intensity of drawing. This assumption was based on past development of drawing and expected speeding up of the implementation process in 2014 and 2015.

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\(^6\) Sometimes this objective is defined as equalisation of regional disparities. However, this objective cannot be achieved in an efficient way.

\(^7\) Nomenclature of Territorial Units for Statistics is a geocode standard for referencing the subdivisions of countries for statistical purposes. NUTS 1 level usually refers to country, NUTS 2 to states/provinces and NUTS 3 to districts. There are also two subdivisions named LAU (local area unit), and their usage differs by EU country. For reference please consult Eurostat.

\(^8\) Although years 2014 and 2015 are also part of EU programming period 2014 - 2020.

\(^9\) Amount of 11.5 bn. Eur represents over 18 % of 2007 Slovak GDP. Additionally, partial co-financing is required from national sources.

\(^10\) Remaining 11 % as unused allocation lowers expenditures of EU.
Applied Methodology

One of the tools which have been in use for at least 20 years to evaluate impact of European cohesion policy is the HERMIN macro-economic modelling framework, which has been broadly described in scientific journals and regularly used in official evaluations of the cohesion policy at the country level in at least four EU budget perspectives. One of the basic characteristics of the general HERMIN model is that it considers a small open economy. The theoretical concept of model also considers the cohesion policy structure.

The origins of the HERMIN model come from the complex, multi-sector HERMES model that was developed by EC at the beginning of the 1980s (d’Alcantara and Italianer, 1982). HERMIN was originally designed as more basic version of the HERMES model in order to be applicable in circumstances of decreased data availability; e.g. in poorer, less-developed member countries and EU regions of western and southern periphery (Ireland, Northern Ireland, Portugal, Spain, Italian Mezzogiorno, and Greece). Due to the limited data availability and sufficiently long time series without structural changes, the model used had to be based on a simple theoretical framework. This relative simplicity is one of the major advantages of the HERMIN model. The system of HERMIN models for all cohesion countries is described in (Bradley J., Gakova Z. et al., 2009).

In the rest of the paper, we will not focus on the national versions of the HERMIN model. Paper is addressing the context of the regionalization of HERMIN macro-economic framework for Slovak republic on NUTS 3 level as new tool for evaluation of cohesion policy at regional level. Although, applied modelling approach can be used for evaluation of many other policies at national and regional levels. The application of the model on the regional level was initially developed in Poland, in which the regions (in case of Poland NUTS II) represented separate satellite models with a connection to the national data. The Polish system of regional HERMIN models is the first case of building models for all regions of one EU country (Zaleski, J., 2009).

The system of regional HERMIN models for Slovak republic originated from the Polish version of regional models. The 5-sector HERMIN models of regional economies were built for the following eight Slovak regions: Bratislava (BA), Trnava (TT), Trenčín (TN), Nitra (NR), Žilina (ZA), Banská Bystrica (BB), Prešov (PO) and Košice (KE). These models represent an extension from the original 4-sector versions of national model. Each of the regional HERMIN model contains 71 linear and 145 nonlinear equations. The main database comprises of annual data from 2000 to 2013 (at the time of writing), prior data were not taken into account as they are incomplete and not very reliable. Database was created using different sources, e.g. Slovak statistical office, Eurostat, AMECO and others.

The HERMIN methodology combines elements of Keynesian models with elements that are characteristic for the neoclassical school. That mean, the models are oriented towards the demand side of the economy and include competitiveness as a determinant of manufacturing output. Two main parameters are influenced by supply of goods and services produced with the implementation of EU funding in given region. The first group directly influences output. The second group impacts labour factor productivity. Either of these groups consists of three parameters that are approximating the effects of cohesion policy on an economy. The three main channels are physical infrastructure, human capital, and R&D. Each of these channels needs to be identified from data about the EU funds implementation. The HERMIN methodology uses separate calibrated parameters for the manufacturing and market services sectors in order to increase the precision of simulation results. It is important to note that the HERMIN model is not able to consider the spill-over effects between regions, as opposed to others macro models. That mean each regional model is satellite model and national results consist from the aggregate of all regional satellite models. However, that is the price for the models’ simpler structure and applicability in Slovak conditions.

In Figure 1 the regional accounting framework as the base for each regional HERMIN model is described. The model is based on utilization of measuring regional GDP by three different approaches/elements. **First** element is output approach, which measure the production in given region. Output in HERMIN model is divided into five main sectors: manufacturing, which mostly consists of sectors engaged in international trade, market services, which mostly consist of sectors not engaged in international trade, construction, agriculture and non-market (or government) services. **Second** element is defined by expenditure approach, which measures total expenses in given region. Expenditures in region are disaggregated into private consumption, public consumption, investments and regional trade balance. And **third** element is measured by income earned in given region. Balances and dependencies between these approaches as well as their additivity to indicators at national level are used to estimate regional dependencies.
Tricky part of finalizing the models is the estimation of regional trade. Regional trade balance does not represent export and import in traditional way, because also trade between other regions must be taken into consideration. While interregional trade is not captured by statistics, this trade between Slovak regions was calibrated by using available sources of information. Finally, we analytically derive the regional income as subtraction of regional wage income from regional GDP on an output basis and regional profit was defined as their difference.

Availability of many regional indicators is rather limited in almost all countries. The data about GDP by expenditure and income approach are not available in sufficient detail or are missing in required structure. The structure of GDP by output approach is on the other hand well statistically described also on regional level. Generally, it is necessary to complete the regional database using partial information about the data required; disaggregation of national data or other indicators was utilized. More detail information about the calibration of regional database is contained in (Zaleski et al., 2005.)

Significant issue is also the dealing with problem of two-year delay between current period and publishing official statistical data for individual regions (Figure 2). Considering this limitation, missing regional data were added as partial estimation, using the econometric-optimisation methods. This method consist of determining the value of given parameter in the conditions of uncertainty in 2012 and 2013 based on partial information.

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11 Please consult Radvansky, 2014

12 Time t has been expressed in years and illustrates the relationship to the last published data. The current time (year 2014) is labelled as t+dt, the indicator t is the last period of published data on the national level, thus year 2013. The delay in publishing of data on the regional level occurs between the period of t-2 and t. The period of t-2 is a period of the last reporting of regional accounts, thus the year 2011. From the aspect of analysis, this is the ex-post period, but data on the regional level must be partially estimated. The period of t+n (analysis) is identical with n+2 (2015).
consisting of actually observed values of the indicator on the national level and regional development of several factors. Those factors are influencing the given parameter, and information about their development is already available on this level (e.g. statistics of the labour market published at the same time as the data on national level).

From the perspective of data availability the HERMIN methodology modelling framework consists from a several important features. It is necessary to disaggregate economy only into few production sectors that are possible to indicate structure and changes in the structure of the economy over time. One of the assumptions is that regional prices are the same as national prices due to the fact that data about regional prices are not published. The external trade of the region consist of trade to abroad and other regions in the Slovak republic. One of the weaknesses of regional HERMIN model is that regional labour market is more open to labour migration from other regions in the country. It is possible that unemployment rate in one region causally influence the labour force in another region or some regions generate more jobs like others.

Gross value added (GVA) produced in the manufacturing sector is determined by a hybrid supply-demand equation. The influence of external factors incorporates the role of foreign direct investment and portfolio investment. The domestic demand factors represent the conventional Keynesian mechanism. The driving variables for production in the manufacturing sector are as follows: world demand, sectorial weighted domestic demand, real unit cost of labour, domestic-to-world prices ratio and time trend. Average annual earnings in manufacturing are determined in a bargaining model by output prices, consumption prices, a tax wedge, an unemployment rate and productivity. GVA generated in the market services sector is influenced by weighted domestic demand, world demand, cost pressures (real unit labour costs) and a time trend to capture residual factors. GVA in the construction sector is defined as function of total building and construction type investment, real unit labour costs and a time trend. The regional HERMIN behavioural model of the agriculture sector is simple and robust. We separate out the key components of agriculture from the rest of the private non-agriculture sector (i.e., manufacturing and market services). A series of simple time trends is used to endogenize these components. The value of GVA arising in the non-market services is measured mainly by wage inputs but also includes a non-wage element. Investment demand and labour demand are defined by cost minimization, using a CES production function with constant returns to scale. Wage inflation in others sector (market services, construction, agriculture and government) are similar to the rate in manufacturing. This approach is based on Scandinavian model of wage inflation. Data regarding total population and population at working age are exogenous and were calculated in the demographic sub-model. Due to complexity of the model we have described only main issues related to methodology applied, for more detail specification please consult (Bradley and Untiedt, 2010).

To successfully carry out intended analysis, data about implementation of SF and CF in the period 2007-2013 in each region (NUTS 3) were needed. Majority of the projects financed from the SF and CF have been implemented in single region. However, a part of the projects were carried out in more than one region and therefore the implementation of the financial resources needed to be divided to the appropriate regions. More detail information about the process of regional allocations disaggregation is available in Radvansky et. al. (2014).

**Anticipation of the influence of Cohesion policy on the economic development (Ex-post vs. Ex-ante assessment)**

Expectations about the influence of cohesion policy have been summarised in the framework document “Ex-ante Evaluation of the National Strategic Framework of Reference” developed by the Economic Institute of the Slovak Academy of Sciences in 2006 (see Sikula et al., 2006). As part of the mentioned evaluation it states that a strategic part of the document dealing with expected influences of cohesion policy is focusing on national economy with the aim to achieve overall convergence of the Slovak Republic to countries of the EU. Regional dimension of cohesion policy was to be achieved rather individually in plans of individual operational programmes. In the summary of the evaluation, page 20, is stated: “The proposed context indicators that would be used to evaluate the realisation of support are often worded so as not to be able to be reported on the NUTS 2 level and bellow, thus it will not be possible to document regional dimension of these interventions.”

In assumptions of the implementation of operational programmes, there are two types of aims defined. The so-called “hard” indicators that can be measured in the course of the implementation process using selected

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13 This issue was discussed in Econmod 2012 at (Radvansky, Fuchs, 2012). It has been shown, that regional prices are statistically significance different.
indicators and so-called “soft” effects, leading mainly to more effective public administration and hard to be evaluated. It is also clear that in the period of planning and ex-ante evaluation (year 2006); the Slovak economy was at a stage of conjuncture. In this period, e.g. questions of qualification structure of population got in the foreground from the aspect of labour market when reducing the number of unemployed. The labour market started to lack potential employees with needed professional skills, mainly in industrial sectors and the sector of ICT. These problems were suppressed at the time of crisis and the main efforts focused rather on maintaining level of employment and supporting existing jobs.

The assumptions about the influence of using SF and CF through NSFR were also verified by models. The estimates of ex-ante influences were estimated only on the national level by the recommended HERMIN model (see Kvetan et al., 2006).

When comparing results of ex-ante and ex-post analysis we can see certain similarities. The ex-ante analysis was developed only for the period of 2007-2013 not taking in to consideration the period of completion of the implementation process (t+2). The basic difference in case of ex-ante analysis is that estimated impacts were based on the assumption about equal annual levels of drawing during the programme period without the need for a more significant drawing after 2013. The estimated effects assumed the achievement of cumulative increment of GDP in 2013 above the level of 14 % and value of cumulative multipliers on the level of 1.94. Additional employment of 87 thousand jobs (with overall unemployment rate of 8.7 %) was also estimated. If we look at the ex-ante analysis assumptions, we could see two key elements that did not fulfilled in the real economy. The first one was the economic crisis causing a growth in the unemployment rate. The number of created jobs based on the implementation of SF and CF mitigated the negative impacts on the overall unemployment rate in the Slovak Republic. The other was the unequal allocation of resources over time. In the first two years of real implementation, resources of SF and CF were drawn only minimally with a sudden growth in the rest of the programming period and the need to complete using of a significant volume of resources in the period t+2. The use of such a large volume of resources reduces the overall effectiveness of their allocation (see Radvanský and Frank, 2010).

**Chart 1: Comparing cumulative accrual of GDP due to SF and CF implementation**

![Chart 1: Comparing cumulative accrual of GDP due to SF and CF implementation](chart1.png)

*Source: authors and Šikula et al., 2006*

Decrease in the output of economy of the Slovak Republic caused a decrease in the costs and higher effectiveness of additional resources. In other words, the actual effect of CF and SF on the economy was significantly higher and more positive than expected at the time of drafting the NSFR. The expected structure of effects on individual sectors were quite similar, though their strength is weaker in ex-post analysis in 2013 due to higher unemployment and lower overall GDP created in 2013 when compared to ex-ante assumption as well as higher expected production in the following period (t+2).

**Implementation**

During the period of years 2007-2013 significant amount of resources from European budget were implemented in Slovakia. At the end of the year 2013 the total of 6 bn. EUR was implemented at national level. Regional distribution of those sources was biased towards 5 northeast regions that had implemented almost 75% of all project financial sources. Remaining regions of Bratislava, Trnava and Nitra split the outstanding quarter of sources by following ratio 7.8:10. From the perspective of time distribution of the implementation process it is

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14 As was shown in Radvanský & Frank, 2009, the effect could be even higher, while the drawing would be continuous.
important to stress that significant delay of real implementation occurred and only after year 2009 significant amounts of available financial sources started to be implemented. Highest annual level of implemented sources occurred in Trenčín region in 2013 and achieved more than 400 mil. EUR. At the end of the year 2013 only 52.5% of available resources were implemented and thus significant increase in the speed of implementation was expected. Such expectation inherently carries a plausibility of ineffective use of resources and possible risk that large number of projects will be obliged to pay correction payments back to EU budget.

*Chart 2: Drawing of SF and CF, million EUR*

As it was mentioned earlier, speed of implementation was increasing over time, but only in four regions (BA, TN, PO and KE) achieved level of implementation its top in year 2013. In case of the remaining regions speed of implementation achieved its top in 2012. This was caused by several factors, one of which is the ability of regional economic structures to absorb additional financial sources. This fact undermines the expected additional increase in the speed of implementation. To assess the impacts of SF and CF implementation on regional economies it is important to have information not only about the level of resources implemented, but also its share on the regional GDP.

*Figure 3: Average annual share of implementation relative to regional GDP (2009-2013), %*

*Source: ITMS, authors*
Implemented sources represented relatively small share of regional GDP, but without the contribution of the SF and CF resources economic crisis would have much higher negative effects. Lowest average share of implemented resources occurred in Bratislava region (less than 0.5%) which was caused by relatively high GDP per capita that also resulted in lower eligibility for implementation. In the remaining south-west regions average share of implemented resources on GDP was between 1.1 and 1.3%. Highest average share of implemented resources on GDP (2.7%) occurred in TN and PO in which significant investments into transport infrastructure was supported by SF and CF sources. In 2013 share of implemented resources in these two regions achieved 3.9 and 3.8% respectively.

Estimated effects of CF and SF implementation on Slovak regions

GDP

Results of model calculations shown that implementation of SF and CF financial resources in Slovakia had significant impact on performance of regional economies. On the regional level we can see significant differences between NUTS 3 regions in their economic performance expressed in additional GDP generated as result of SF and CF implementation. In 2013 GDP of Trenčín region would be lower by 10% without the implementation of the European resources from the cohesion policy programmes 2007-2013. On the other hand stands the Bratislava region which implemented low amounts of funds in relative terms and additional regional GDP generated due to SF and CF implementation reached in year 2013 just 2%. Trnava and Nitra regions would have their economic performance lower by 4% of GDP in 2013 without implementation of SF and CF financial sources. Implementation of European funds during the programming period 2007-2013 significantly mitigated negative impacts of global economic crisis on the Slovak regions.

Chart 3: Additional cumulative growth of GDP due to SF and CF implementation, c.p., %

Due to delayed implementation in the first two years of the programming period impacts of SF and CF funds on the growth rate of GDP was only marginal. After year 2009 more significant impacts on GDP occurred in most of the Slovak regions. Most significant impacts on the GDP growth was in regions in which large infrastructural projects were build, Trenčín and Prešov regions. In year 2013 GDP of Trenčín region would grow slower by more than 3 p.p., in case of Prešov region most significant contribution of CF and SF implementation to regional GDP growth occurred in year 2011, approximately 2.5 p.p. From the remaining regions only in Žilina region in years 2009 and 2010 contribution of European funds implementation added more than 2 p.p. to regional GDP growth.
Table 1: Difference in the growth of real GDP due to SF and CF implementation in percentage points

<table>
<thead>
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Source: authors

CSF multiplier

The CSF multiplier is a comprehensive indicator measuring the effectiveness of the SF and CF, which represents the additional effect of each euro spent from SF and CF on GDP in EUR. It quantifies the cumulative growth of GDP compared with the baseline scenario i.e. the cumulative value of expenditures of the NSRF as a share on GDP. Based on the calculated values of CSF multiplier, Bratislava region seems to be the most effective. This region represents economically strongest region in the Slovak Republic and its absorption potential is high above the volume of allocated resources. Equally, the nature of projects realised within Bratislava region represents projects with high share of added value, which is generating higher multiplying effects. Multiplying effects are relatively higher in this region also because a large part of implemented resources was used to pay the wages in sectors of services that are more labour intensive. These wages then relatively quickly generate additional indirect demand effects in the economy of the region. In this region, CSF multiplier reached at the end of 2013 a relatively high value of 2.79, however the share of implementation on GDP in any of the years of implementation did not exceed 1%.

Chart 4: The development of CSF multiplier for individual regions

Source: authors

The group of followers in effectiveness includes Žilina, Trnava and Nitra regions that profited from their economic strength and relatively higher share of expenditures supporting industry and services sectors. The lowest effectiveness measured by CSF multiplier from economically stronger regions was reached in Trenčín region. This was due to a high share of expenditures on infrastructure from which multiplying effects occur only later in time. Considering the relatively lower share of wages, investments into infrastructure are accompanied by lower indirect effects on regional economy. Similar effectiveness was also reached by the economically
weaker region of Košice in case of which the effectiveness was partially pulled by expenditures for research and development and for supporting industry and services. The last group is made up of economically weaker regions of Banská Bystrica and Prešov, in which a significant part of resources was directed to building and modernising infrastructure. Positive is the fact that the value of the multiplier gradually increases in case of all regions and in case of none region it is lower than 1 in 2013. As effective we can consider regions in which CSF multiplier reached the value higher than 2. This threshold was determined according to Bradley and Untiedt (2009) in which this level of CSF multiplier was reached by medium effective countries during the programming period 2000 – 2006. The main source of differences in the regional multiplier is the structure of implemented projects while higher effectiveness was recorded in regions where projects with relatively higher level of labour intensity were supported.

Table 2: The development of the value of CSF multiplier for individual regions

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<td>1.3</td>
<td>1.6</td>
<td>1.8</td>
<td>2</td>
<td>2.2</td>
</tr>
<tr>
<td>ZA</td>
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<td>1.7</td>
<td>1.8</td>
<td>2</td>
<td>2.2</td>
<td>2.3</td>
<td>2.4</td>
</tr>
<tr>
<td>BB</td>
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<td>1</td>
<td>1.1</td>
<td>1.3</td>
<td>1.4</td>
<td>1.5</td>
<td>1.7</td>
<td>1.8</td>
</tr>
<tr>
<td>PO</td>
<td>0.9</td>
<td>1</td>
<td>1.2</td>
<td>1.3</td>
<td>1.5</td>
<td>1.6</td>
<td>1.6</td>
<td>1.7</td>
</tr>
<tr>
<td>KE</td>
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<td>1</td>
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<td>1.4</td>
<td>1.5</td>
<td>1.6</td>
<td>1.8</td>
<td>1.9</td>
</tr>
</tbody>
</table>

Source: authors

Employment

More than 110 thousand of “additional” jobs would be created in Slovakia in 2015 thanks to the SF and CF implementation, while in 2013 it was more than 80 thousand. The highest potential to create jobs as a result of SF and CF implementation is concentrated in the Trenčín region. This increase results mainly from the fact that most of SF and CF drawing was allocated in the Trenčín region. The given region recorded also the highest drawing of resources for building of physical infrastructure which is relatively labour intensive sector. More than 15 thousand jobs would be created in Prešov, Košice and Žilina regions by 2015. The least number of jobs will be created thanks to implementation of resources from the cohesion policy in the Bratislava region where model results in 2015 indicate creation of only around 7.5 thousand jobs.

Chart 4: The number of totally created job opportunities, thousands of persons, 89% scenario.

Source: authors
One of the limitations of the HERMIN model is that it does not contain the spill-over effects between individual regions. It means that the model does not reflect effects of additional employment between individual regions. The model also does not expect filling a job created by an employee from another region. We must therefore bear in mind the possibility to fill in a job position e.g. in construction in Trenčín region by labour force coming from another region of Slovakia and this possibility is not included in the HERMIN econometric model, but it should be considered when utilizing the results.

Important factor of SF and CF implementation impact on the labour market represents not only number of job created, but also its structure and sustainability. Sustainability of created jobs is important factor of efficiency of EU investments. Sustainability was defined as probability that created position will prevail at least 3 years after the end of programming period. Implementation of SF and CF would create 22,800 jobs in Trenčín region from which share of sustainable jobs would be 44% (10,100 jobs). At the national level, we expect the impact of SF and CF on employment to be approximately 110,000 additional jobs (compared to the situation without implementation) in 2015. From the additional jobs created approximately 40,000 represent sustainable jobs. In the market services sector nearly 58,000 jobs in 2015 might be created, of which 24,000 jobs (42 %) are identified as sustainable. In the construction sector around 37,000 jobs in 2015 should be created as result of SF and CF implementation. Given the nature of jobs and projects in construction, the number of sustainable jobs compared to other sectors would be at the lowest level (less than 20 %). The lowest number of jobs is expected to be created in the industry (around 10,000) however, in this sector there is the highest estimated sustainability of jobs - almost 98 %.

**Chart 5: Creation of new and sustainable jobs by region and sector, in thousands persons**

One of the interesting issues is that development of unemployment level will be much problematic more after crisis period (Chart 7). Stabilization of unemployment after crisis period will began about 2 percentage points higher than it was observed in reality (with implementation of SF and CF). Also, the relative stable situation in unemployment rate during period 2011-2014 will result in slight increase during same period. As the result, difference between observed unemployment level in 2015 and expected unemployment level without implementation of CF and SF will be somewhere more than 5 percentage points.

*Source: authors, ITMS*
Regional Convergence

Economic cross-country comparisons are usually based on indicators of country performance and price level per number of inhabitants, usually used is GDP in the PPP per capita. The comparison of the development of GDP in PPP per capita to the average development in the EU 28 Member States thus describes the level of achieving the real convergence to the average of the EU countries. Real convergence was related to the current number of EU Member States. Up to the enlargement in 2004, it applied to EU 15, after the enlargement in 2004 to EU 25, in 2007 to EU 27 and indicators were last retrospectively recalculated in 2013 as of the last EU 28 enlargement.

During past twenty years Slovak economy underwent turbulent economic transformation, which began with loss of one-third of economic performance at the beginning of 1990’s and was followed by attempt to achieve the average level of developed EU economies. In 2000, performance of the Slovak economy reached level only slightly above 50% of the EU 28 average. After joining the EU, the Slovak Republic reached in the period of conjuncture (2004-2008) a sudden rise of real convergence from 57 to 72% of the EU average. Due to the fact that actual implementation of SF and CF occurred only after 2009, it affected the real convergence in the period of the economic crisis.

Table 3 – Effects of CF and SF on development of GDP per capita in PPP, capita (2012 - 2013 forecast, 2014-2015 outlook)

<table>
<thead>
<tr>
<th>Year</th>
<th>SR with CSF</th>
<th>SR without CSF</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>68%</td>
<td>68%</td>
</tr>
<tr>
<td>2008</td>
<td>72%</td>
<td>72%</td>
</tr>
<tr>
<td>2009</td>
<td>73%</td>
<td>72%</td>
</tr>
<tr>
<td>2010</td>
<td>73%</td>
<td>72%</td>
</tr>
<tr>
<td>2011</td>
<td>75%</td>
<td>72%</td>
</tr>
<tr>
<td>2012f</td>
<td>76%</td>
<td>73%</td>
</tr>
<tr>
<td>2013f</td>
<td>76%</td>
<td>72%</td>
</tr>
<tr>
<td>2014o</td>
<td>77%</td>
<td>72%</td>
</tr>
<tr>
<td>2015o</td>
<td>78%</td>
<td>72%</td>
</tr>
</tbody>
</table>

Source: authors

The real convergence of Slovakia to the average of the EU countries had not stopped during the crisis period which represents only a slight shift compared to previous development. Higher increase in convergence in the period of years 2008 to 2015 was achieved only in 2011, but this development was caused by stagnation of other EU countries, not due to higher economic growth of the Slovak Republic. In the period after joining the EU in 2004 – 2008, Slovakia reached year-on-year average growth of convergence at the level 4 p.p. In the years 2008 – 2015, the average year-on-year growth of convergence in the Slovak Republic is estimated in the basic scenario at the level of 0.8 p.p., thus at this period, only slight convergence was achieved. In an alternative scenario without implementation of SF and CF, zero growth of real convergence of the Slovak Republic to the average of the EU countries was estimated, while negative growth of convergence was achieved in several periods (see Chart 8).
Chart 8: Estimate of the contribution of SF and CF implementation to the indicator of convergence - GDP in PPP per capita (2012-2013 forecast, 2014-2015 outlook), percentage points

Source: authors

In process of convergence of Slovak regions to the average of the EU, we can observe significant regional disparities measured by GDP in PPP per capita. Bratislava region achieves significant growth of GDP in PPP per capita and represented the main source of convergence potential of the Slovak Republic (it is among the ten strongest NUTS 2 regions of the EU with around 190% of EU average). This was caused by the economic strength of the metropolitan region of the Slovak Republic that was able to generate more significant investments also for the other regions of the Slovak Republic. Among other factors, it was also stagnation of population and the fact that a part of production in Bratislava region is created by people commuting to work from other regions, they make up for one fourth of workers. Thus a part of GDP per capita is created by workers not calculated in the population of Bratislava region, which positively distorts this indicator in the region. Only Trnava and Nitra regions managed to contribute to the regional convergence during this period more significantly (above the average of SR). In the basic scenario, we can also see a slightly positive growth of convergence in Žilina, Prešov and Košice regions. In Trenčín and Košice regions, it is rather stagnation in the convergence process and Banská Bystrica region achieved at this time a decrease in the real convergence also in the scenario with implementation of SF and CF. When comparing the development of convergence in the scenario without implementation of SF and CF we can state that the real convergence would have been achieved only in three regions of the Slovak Republic (Bratislava, Trnava and Nitra regions). In other regions of the Slovak Republic, a significant decrease of this indicator would have been achieved. For better overview, only the convergence process of NUTS 2 regions to the average of EU 28 in both scenarios is depicted in Chart 9.

Chart 9: Model comparison of the development of GDP in PPP per capita to the average of EU 28 countries with the scenario with implementation and without implementation of SF and CF at the NUTS 2 level without Bratislava Region (2012-2013 prognosis, 2014-2015 outlook)

Source: authors
During the monitored period, no real convergence among regions of SR occurred in Slovakia (Chart 10). To the contrary, the process of divergence was rather deepening. When analysing the influence of SF and CF on the regional convergence of the Slovak Republic, we can state that sigma coefficient was lower due to implementation than in the scenario without implementation. It means that in spite of continued real divergence of regions of the Slovak Republic, this process was significantly slower thanks to implementation of SF and CF. From the aspect of SF and CF allocation into regions of the Slovak Republic, it is however also necessary to point out that the convergence process was not a clear priority of the NSFR, since a significant part of resources (namely in an effort to deal with the infrastructural debt) was directed at relatively strong regions of the Slovak Republic.

Chart 10: Comparison of regional convergence measures by sigma coefficient within regions of the Slovak Republic

The Slovak economy experienced the peak of conjuncture before the start of the crisis, while the convergence process was significant in all regions. Pre-crisis forecast suggested a significant macroeconomic growth also for the period of years 2008-13, when the developed economies were going to experience growth of GDP only on levels near to 2%. Therefore we can assume that the convergence process would be more dynamic and more equal in all regions without the emergence of the crisis (especially in weaker regions, the convergence process was weakened due to the crisis in spite of SF and CF implementation). On the other hand, created GDP of Slovakia was lower than expected considering the crisis. Therefore, the share and contribution of SF and CF to the convergence process was overall higher than expected.

Discussion and Conclusions

Paper assessed the effect of NSRF implementation in the period of years 2007 – 2015 on Slovak regions by regional HERIMN model. It represents a first utilization of this approach in Slovakia on NUTS 3 level of regions. With the help of SF and CF implementation, we expect a significant additional cumulative increase of GDP that will represent 7.5% in 2015. This growth is supposed to support creating more than 110 thousand of jobs in 2015 by, mainly in market services and construction. The sector of industry played a supporting role within the structure of economy in process of SF and CF implementation. The growth of construction was mainly caused by significant financial allocations on the renovation and building of new physical infrastructure. The sector of market services recorded the highest increase in all regions.

It has been shown that implementation of SF and CF contributed positively to continuing process of convergence to the average of the EU countries on the national level in spite of the crisis development at this time. Additionally, the start of the crisis slowed down the expected process of convergence and at the same time the relative contribution of SF and CF was greater than expected. What is even more important, without SF and CF implementation, the convergence process would have been reversed in the majority of regions.

On the other hand, Bratislava region is rather different than all other Slovak regions and would be able to grow significantly even without the support of SF and CF due to its economic strength and demographic development. In spite of this fact, supporting Bratislava region is important when considering its specific position and significance in supporting the economic growth of the other regions. The effects of SF and CF implementation on the convergence of Slovakia are permanent and significant. However they only have a slightly long-term positive influence on the convergence process.
Certain differences in the growth of GDP can be seen in all regions. The most significant implementation induced growth was achieved in Trenčín region where the most of the financial resources were allocated in infrastructure projects. The lowest additional cumulative growth was recorded in the Bratislava region, namely 3%. Thanks to increased employment and growth of average salary, the consumption of households had a growing tendency.

As we presented before, applied methodology is still under development and has some significant limitations, mostly in limited transition of spillover effects between regions. Therefore, one must be careful when considering and applying provided results. Despite that, we can assume that presented effects are highly significant and are relevant to cross-regional comparison and analysis of effectiveness in different regions.

References


