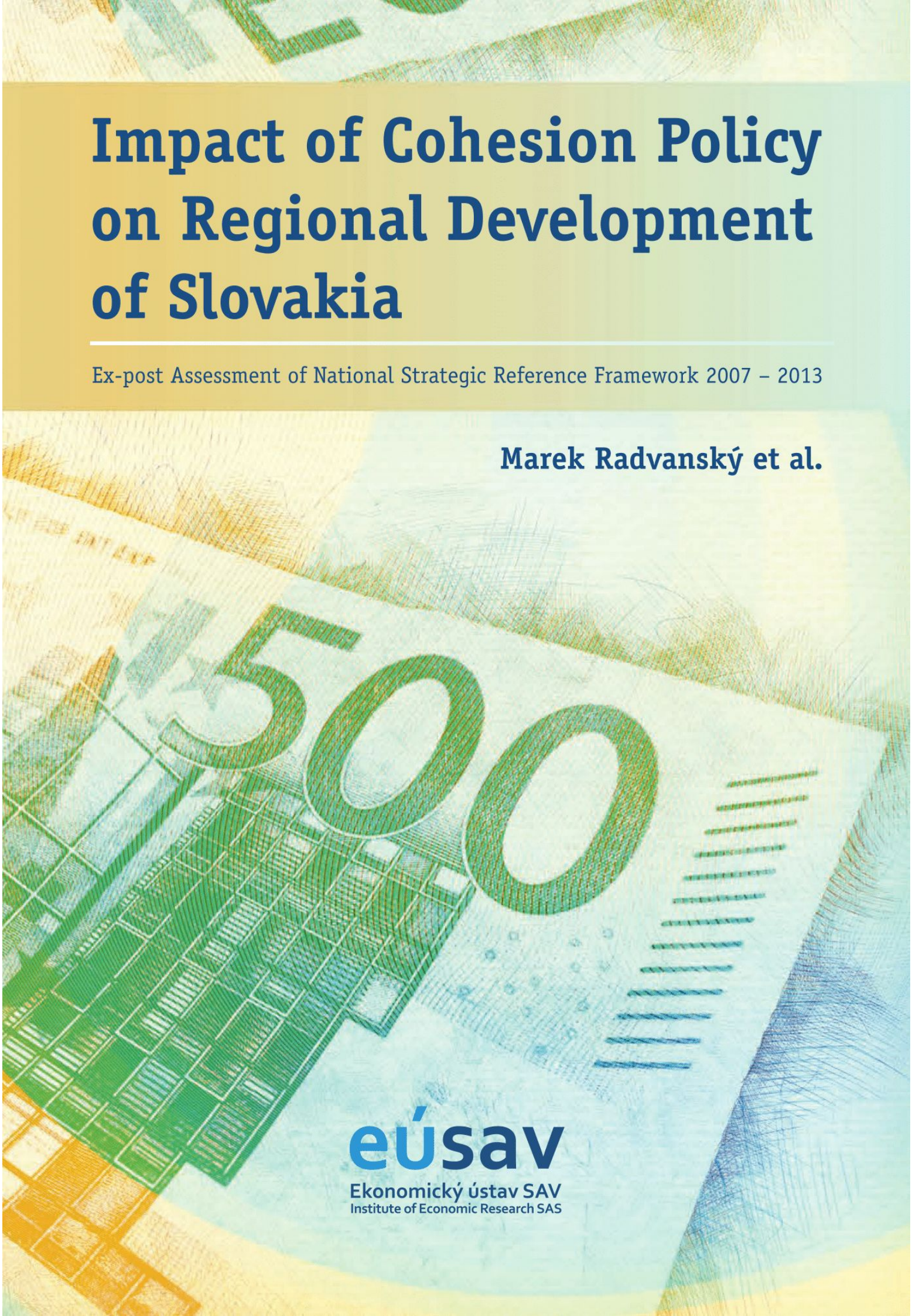
Impact of Cohesion Policy on Regional Development of Slovakia

Ex-post Assessment of National Strategic Reference Framework 2007 – 2013

Marek Radvanský et al.



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IMPACT OF COHESION POLICY ON REGIONAL DEVELOPMENT OF SLOVAKIA

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Contents

Foreword

In the 2007- 2013 programming period around 11.5 billion Euros were allocated for Cohesion Policy to support the economic and social development of Slovak regions. These funds brought significant potential with it for additional economic growth, but have also increased the pressure on its efficient use and management. The preparatory phase of the 2007 – 2013 programming period happened during the peak of the economic growth with relatively favourable conditions in terms of public finances in Slovakia as well as in external environment. Additionally, preparation of the National Strategic Reference Framework (NSRF) as a strategic document was based on the assumptions of a uniform continuous implementation of Cohesion Policy via operational programmes and their individual priority axes. The main objective of the Cohesion Policy in Slovakia, as defined in the NSRF, was to "Considerably increase, by 2013, the competitiveness and performance of Slovak regions and economy, and to increase employment while respecting sustainable development ". The limit for regional support at European level was based on the economic development of regions (NUTS 2 - in Slovakia referring to 4 purely statistical regional units) measured by the threshold level of 75% GDP of the EU average.

During the preparation and planning period of NSRF, Slovakia had the possibility to learn from the previous implementation in other cohesion countries, which were in long term period "dependent" on the EU Cohesion Policy (Greece, Portugal, Spain), as well as from the rather successful implementation in Ireland.

Nevertheless, the factors which have significantly influenced the 2007 - 2013 programming period were significant delays in all phases of implementation since its beginning, through contracting to financial and physical implementation up to monitoring and evaluation. The limited experience of Slovak authorities to implement and manage such large amount of financial support was reflected in significant adjustments of the rules "on the go", lack of stable administrative support, as well as by introduction of unnecessary bureaucratic burden high above the requirements imposed by the relevant EU regulations. The most important reasons were frequent changes in the assignment of responsibilities between the public institutions involved in the implementation of the Operational Programmes. Most importantly, the National Coordinating Authority and the Managing Authority of the Technical Assistance Operational Programme were highly involved in such reorganisations.

The second factor which has greatly affected the rate of implementation and its effects was the economic crisis. Real decline in GDP and rising level of unemployment resulted paradoxically in the increase of the SF and CF effects on the real economy in comparison to the original ex-ante estimates. The ratio of funding to GDP has significantly increased due to crisis and our results indicate significant mitigation of these effects by cohesion spending in the post-crisis period. The recovery period was thus significantly shortened.

In order to achieve the objectives of the policy, it is necessary, that there is a long-term management of EU funds in place and high degree of coordination of process management from national down to local level. Decision support processes based on regular analytical support through continuous and systematic evaluation of the potential impact (ex-post and ex-ante) in Slovakia has absented for a long time and is only slowly developing. The

evaluation culture is only slowly developing in Slovakia. Evaluation is not well integrated into policy making process which rather based on political programmes of parties and discretionary initiatives of the individual ministries. Therefore, it is necessary to better integrate the use of evaluations and evidence based policy methods into policy making in Slovakia. Poland could serve as good example of highly developed evaluation culture focused on policy and impact assessments during the last programming period.

Authors of this publication have several times during the implementation of the programming period analytically illustrated possible negative effects of delays in implementation process as well as possible effects of changes in the structure of the implementation within the operational programs. On the basis of the available analysis it is obvious that real development of Slovakia in several areas (e.g. research and development, informatisation) lagged behind its potential.

In this publication we are pleased to present the results of a unique analytical assessment of the ex-post impact of SF and CF implementation at the level of NUTS 3 regions, using a methodology co-developed with our Polish colleagues and adjusted to the needs under Slovak conditions. Slovakia is only the second country in Europe using the applied regional HERMIN model and the first one with application at NUTS 3 level. The results of ex-post evaluations contained in this publication indicate that the effects of implementation of the SF and CF in this programming period had a significant positive effect on economic development in Slovakia and also significantly helped to reduce the negative effects of economic crisis. As a result, Slovakia was thus able to continue in the convergence process to EU28 average.

Conclusions and policy recommendations presented in this book should be taken into consideration during implementation of SF and CF in programming period 2014-2020. However, due to the design and overlapping implementation periods, the beginning of this period, is affected by a similar delay in actual financial implementation. Authors of this publication hope that much stronger culture of systematic analysis and evaluation processes will be introduced in Slovakia, which will help to improve transparency and awareness about the effects of Cohesion Policy implementation. From an analytical point of view, it would be appropriate to continue in the development of applied methodology with the possibility of its further implementation and results comparison between different EU countries.

We would also acknowledge useful comments from Zbigniew Mogila and Janusz Zaleski from Wroclaw Regional Development Agency, Tomáš Domonkos from Institute of Economic Research SAS, our reviewers Ján Haluška from Infostat and Iveta Stankovičová from Commenius Universinty. Our thanks also go to our colleagues from Central Coordinating Authority of Government Office the Slovak Republic for useful remarks and kind approval to publish this work.

Bratislava, October 2015
Marek Radvanský

Introduction

The purpose of our research presented in this publication is to quantify, with application of an econometric model, the impact of the of Cohesion Policy implementation in the 2007 - 2013 programming period on the economic development of Slovakia. This publication represents the first published regional ex-post analysis of the impact of the Structural funds (SF) and Cohesion Fund (CF) on the Slovak economy. The regional breakdown of our research to the NUTS 3 level is unique also in the EU context and provides detailed analysis of the growth and cohesion-related impacts of the SF and CF across Slovak regions.

The assessment of the Cohesion Policy impacts on the development of Slovakia and its regions is primarily based on the outputs of the HERMIN model. Application of this methodology was necessary, because impact of the SF and CF implementation cannot be quantified merely with basic statistical analysis and comparison of macroeconomic variables before, during and after the programming period. Albeit statistical data do provide information on a set of variables (indicators) in individual periods, they do not give a consistent picture of the alternative possible development, i.e. how would have the economy behave in the absence of the SF and CF interventions. The model enabled us to quantify the impact of SF and CF implementation on various macroeconomic indicators and also captured the impact of several factors simultaneously, including those which are not directly observable, e.g., cross impact of multipliers between economic sectors. In the view of the research goals and given the availability of statistical data, the HERMIN model (developed in the late 1980s to analyse the effects of SF and CF implementation at the national level and improved ever since) has been selected as the most appropriate one. In the recent years, the model has undergone a series of significant methodological changes enabling its application also at the regional level.

Publication is divided into five chapters:

Chapter 1 examines the economic development of Slovakia during 2007 – 2014 programming period at both the national and regional level. The chapter also contains basic information on Cohesion Policy implementation and its estimated impact on Slovakia during the 2007 - 2013 programming period.

Chapter 2 discusses the pros and cons of the available modelling tools and selection of suitable macroeconomic model for estimation of Cohesion Policy impact on national and regional level in Slovakia. This chapter also describes the methodology developed and used for the estimation of regional data.

Chapter 3 presents the main results of the HERMIN model related to impact of Cohesion Policy on the Slovak economy at national level.

Chapter4 is dealing with the impact of Cohesion policy interventions on regional level from different points of view. Each sub-chapter describes the approach used for the analysis of the topic, detailed description of results and summary of the main findings.

The last two chapters are presenting main findings and conclusions followed by policy recommendations for further improvement of Cohesion policy beyond 2015.

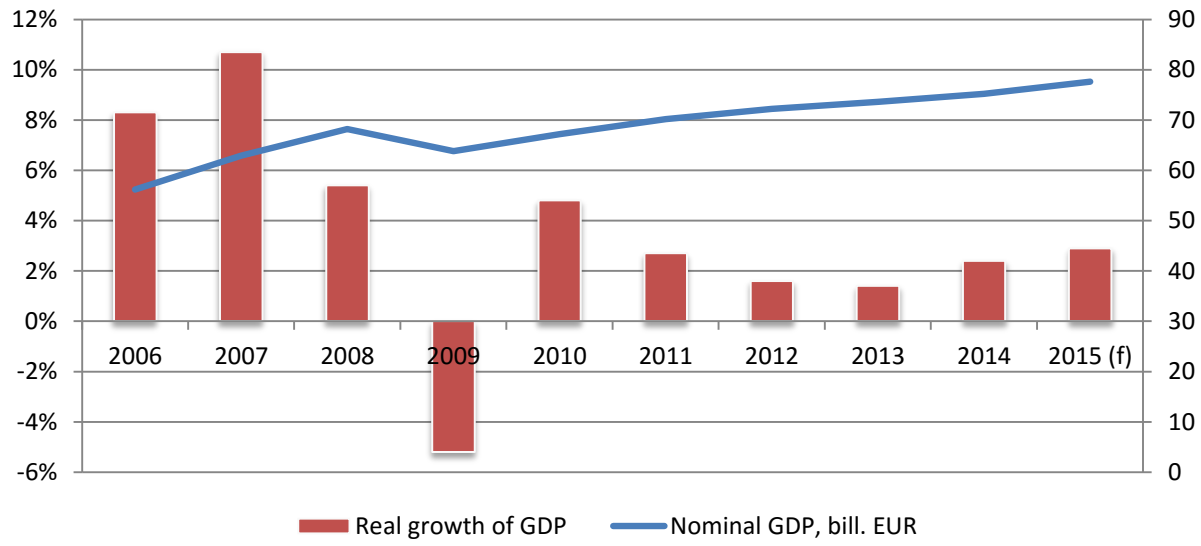
1 Economic development at national and regional level

1.1 Economic development of Slovakia

In the 2007 – 2014 period the economic development of Slovakia was influenced by a number of factors. The completion of the transition process and subsequent participation in the integration process to the European Union (EU) after the accession in 2004 (and integration into the Schengen area in 2007 and adoption of the euro currency in January 2009) represented key milestones for development of Slovakia. The economic boom in Slovakia, which started in 2002 and peaked in 2007, was interrupted by the rise of financial and economic crisis in 2008. The moderate economic recovery in 2010 that followed after the 2009 recession was subsequently muffled by uncertainties that arose across the Eurozone as the debt crisis began to unfold. Until 2013 real economic growth of Slovakia decelerated and since then external environment contributed to gradual GDP growth. However, at the same time, the general government debt was close to the 'debt brake' threshold of 57 % of GDP, which limited the available options of fiscal policy to stimulate economic growth through increased public spending. Therefore, since year 2013 the general government keep the deficits below 3 % of GDP.

One of the key factors influencing our research was the introduction of the ESA2010 methodology. In the case of some indicators (such as GDP or value added), the new methodology brings a slightly different perspective on past development. In our research, we applied the new methodology wherever possible.

Chart 1: Economic development, 2006-2015

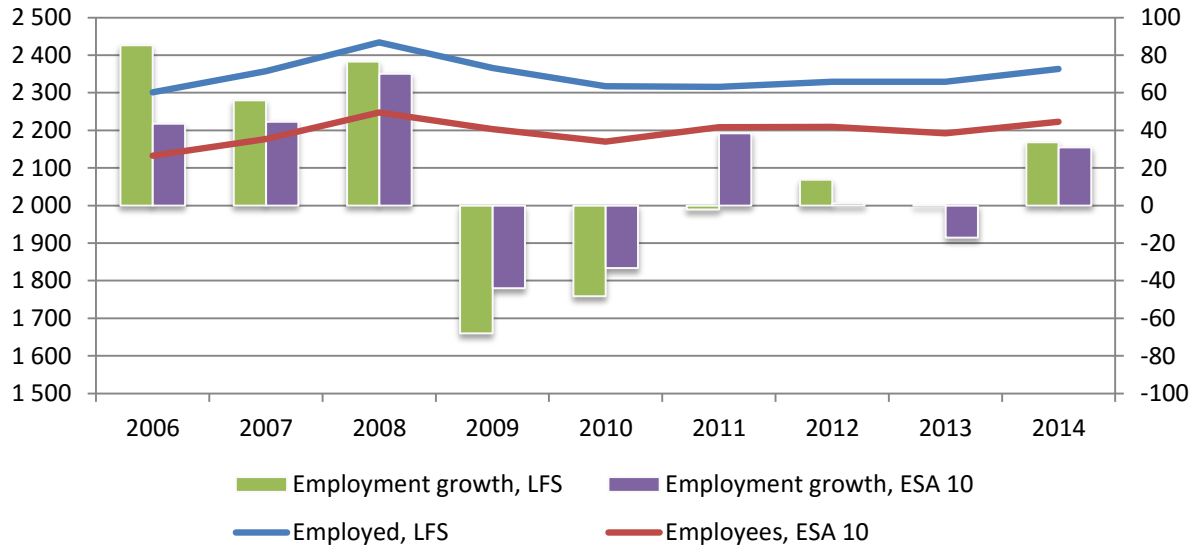


Source: Slovak Statistical Office, ESA 2010

In 2006, both the labour market and stability of economic growth developed positively (Morvay, Okáli, 2006). This trend continued into 2007 when the economy recorded the highest growth rate ever, reaching 10.7 % year-on-year (Chart 1). The growth went down in 2008, falling to about a half of the 2007 rate (down by 5.3 p.p.), yet the economic slowdown caused by the unfolding crisis became particularly noticeable only in the last quarter of that year. The creation of new jobs in this period (2006-2008) followed a stable positive trend as

it was driven by economic growth stimulated by both external and domestic demand. The average number of new jobs created per year reached 50 000, which increased employment by 2 to 4 % annually. The impact of the global financial and economic crisis began to materialise in Slovakia in 2009, which adversely influenced the related convergence process. Slovakia, as a small and open economy, was very sensitive to the decline in external demand. Most significant was influence of decline in the EU demand, which in relation to the shrinking output, had also negative effects on employment. Almost two thirds of the jobs created in the economy during 2006-2008 perished in the first two years of the crisis (2009-2010). When the effects of the financial crisis subsided and the situation got more stabilized, pro-growth correction of negative trend occurred in 2010. The structural changes in the economy prompted by the crisis, coupled with the secondary onset of the debt crisis in some member states and the need for fiscal consolidation, influenced the development in the following years, curbing economic growth until 2013. At the same time, economic growth in Slovakia was driven predominantly by net exports. Thus the slightly positive, yet still downward economic trend fell short of generating new jobs during this period (Chart 2). The first really noticeable employment growth occurred – despite the still relatively low real GDP growth – only in 2014 (over 30 000 jobs). Similarly, after five years of real decline (or stagnation in 2010), households´ final consumption, as one of the main factors of growth driven by domestic demand, began to increase in real terms in 2014 thanks to rising household income that is attributable to higher employment. Hence the implementation of the SF and CF helped to maintain employment, soften the negative impacts of the crisis, and facilitate structural shift in employment towards supported sectors.

Chart 2: Employment (left axis) and employment growth (right axis), thousands of persons

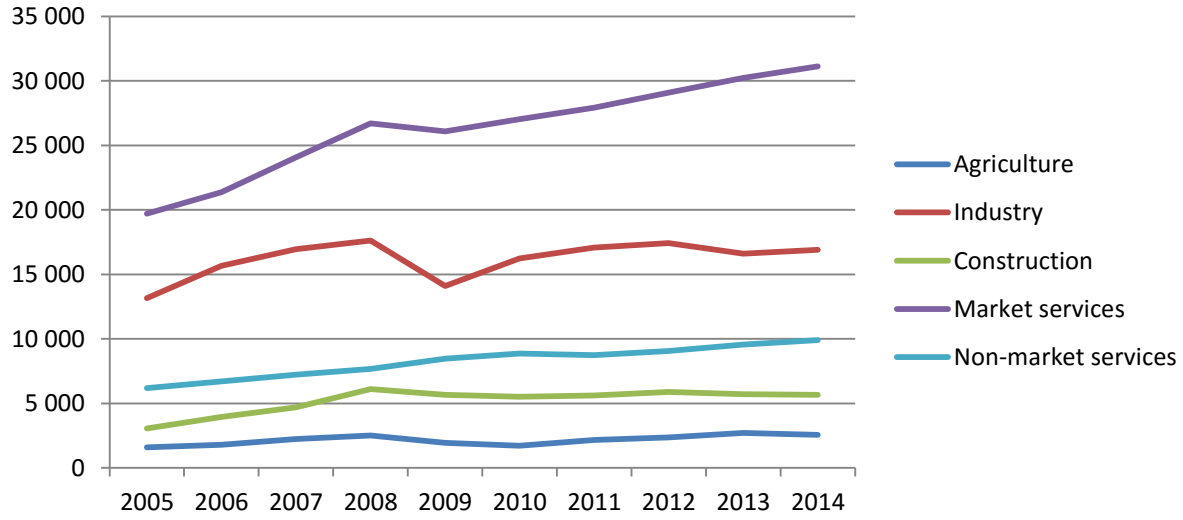


Source: Slovak Statistical Office and calculations by authors

The disparities in the growth and performance of individual sectors of the economy can be illustrated on generated value added (Chart 3). During the period under evaluation, individual sectors developed along different trajectories. The highest share in total value added (average for the entire period) was achieved by the sectors of market services (45.3 %) and industry (27.5 %). Non-market services accounted for 14.1 %, construction sector 9.3 % and agriculture only 3.7 %.

The crisis affected each of the five sectors quite significantly. The highest growth rates in value added were reported in industry (mainly manufacturing) and market services sectors. The growth in the other three sectors lagged considerably. After a moderate decline in 2009, the sector of market services slowly picked up and kept its growth momentum until the end of the period. The industrial sector was very sensitive to the fall in external demand caused by the economic crisis. The initial decline turned into growth in 2010, with some manufacturing production restored at lower employment rates. Since then, the sector has been on a stable growth trajectory. In 2013, value added in the manufacturing sector declined slightly. Relatively resistant to the external macroeconomic shocks was the sector of non-market services that grew at a moderate pace throughout the whole period. Despite the relatively robust consolidation efforts and cuts in public expenditures, the only significant drop in the sector's value added growth rate occurred in 2011. The construction sector developed somewhat differently. In the 2006 - 2008 period of economic boom, the sector robust growth was driven by demand for investments in other sectors of the economy.

Chart 3: Sector value added, million EUR, constant prices



Source: Slovak Statistical Office, ESA 2010

After the crisis year of 2009, value added in the construction sector stabilised, although it still continued to slightly decline in real terms. This was due to both shrinking demand for investments and feeble activity on the real-estate market. The real-estate bubble has burst also in Slovakia, but the impacts were not significant because the crisis set in at a time when the construction sector was only entering the period of massive production. The above mentioned decline was partially offset by investments in infrastructure from the SF and CF. Measured by the size of value added Agriculture is the last sector in which the average nominal growth reached 8 % during period of 2006-2013. Price changes represent an important factor of development in this sector. Rather than by investments from the SF and CF the sector value added was significantly determined by the Common Agricultural Policy.

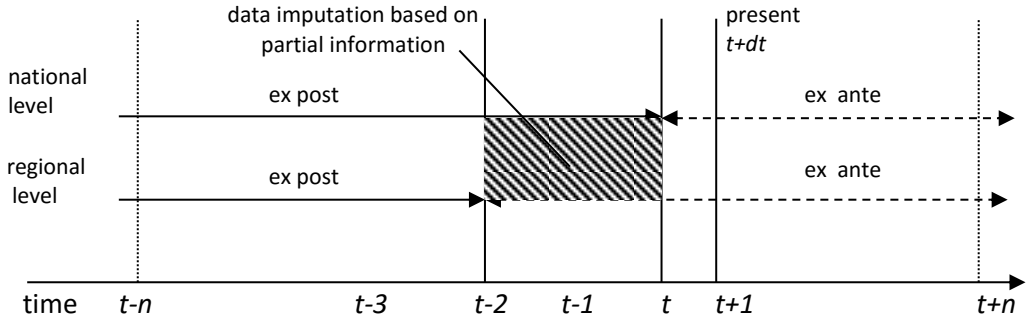
1.2 Regional economic development

At the EU level, both regional development and convergence are monitored at the NUTS 2 level. In the case of Slovakia, four regions are thus evaluated. Since the NUTS 2 level classification in Slovakia represents only statistical aggregation of the regional functional

units that are at the NUTS 3 level (higher territorial units, also referred to as self-governing regions), our analysis focused on this 'more detailed' level. Assessment of the effects of the adopted measures and the impact they have at this level allowed us to provide more detailed research and analysis on the regional convergence within Slovakia.

Slovakia's regional development shows significant disparities in almost all indicators; moreover, the process of convergence towards the strongest region is almost invisible. In comparison with EU member states, Slovakia shows one of the highest regional disparities. The comparison of development among regions is largely impeded by the two-year delay in the publication of official statistics at the regional level. In view of this limitation, for the purposes of research and its goals, the missing regional data were imputed by the econometric-optimisation methods (for more details see section 2.5).

Figure 1: Availability of data at the regional level1 in time



Source: Radvanský, 2014

In terms of regional gross domestic product, seven regions generate comparable GDP (Chart 4). On the other hand, GDP of Bratislava region is more than double the average of the remaining seven regions. A closer look at regional GDP shows that all regions grew in period 2007-2014, yet their pace of growth varied quite considerably (Table 1). Only the Trnava region grew in the crisis year of 2009. The remaining regions' nominal GDP in 2009 declined, from -6.1 % in the Bratislava region to – 9.3 % in the Trenčín region. The highest average GDP growth during 2007-2014 was reported in the Košice region, up by 5.3 % at current prices (compared to the national average of 3.8 %), followed by the regions of Trnava (4.6 %) and Banská Bystrica (4.5 %). The slowest annual GDP growth (below 3 %) was in the regions of Nitra and Trenčín.

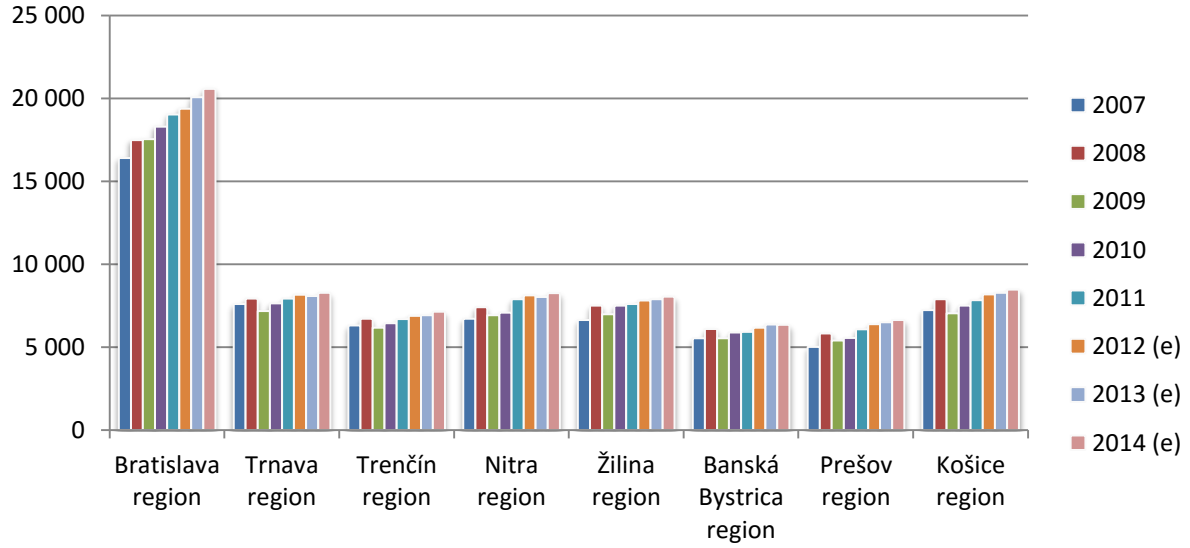
[1]Time t is expressed in years and expresses relationship to the latest published data. Present (year 2015) is marked as t+dt; indicator t is the latest period for which data at the national level have been published, i.e., year 2014. The delay in the publication of the regional data is indicated between the period t-2 and t. Period t-2 is the period for which regional accounts have been last reported, i.e., year 2012. From the viewpoint of the analysis, this is an ex-post period, thus some data at the regional level must still be estimated for imputation.

Table 1: Regional nominal GDP growth, %

	2007	2008	2009	2010	2011	2012 (e)	2013 (e)	2014 (e)	Average growth
Bratislava region	11.7	8.8	-6.1	4.9	4.7	3.1	1.5	2.2	3.8
Trnava region	13.9	6.7	0.3	4.3	3.9	1.9	3.5	2.5	4.6
Trenčín region	10.3	4.2	-9.3	6.4	3.7	3.0	-1.1	2.5	2.5
Nitra region	10.1	6.7	-8.3	4.4	3.9	3.0	0.5	2.9	2.9
Žilina region	8.4	10.2	-6.3	2.0	11.6	3.0	-1.1	2.8	3.8
Banská Bystrica region	15.6	12.9	-6.8	7.4	1.3	2.8	0.9	1.8	4.5
Prešov region	11.9	10.1	-9.1	6.1	0.6	4.2	3.4	0.1	3.3
Košice region	12.3	16.2	-7.4	2.8	9.7	4.8	1.8	2.2	5.3
Slovak Republic	11.9	8.4	-6.4	5.3	4.4	2.9	2.0	2.2	2.7

Source: Slovak Statistical Office and calculations by authors

Chart 4: Nominal GDP, million EUR[2]

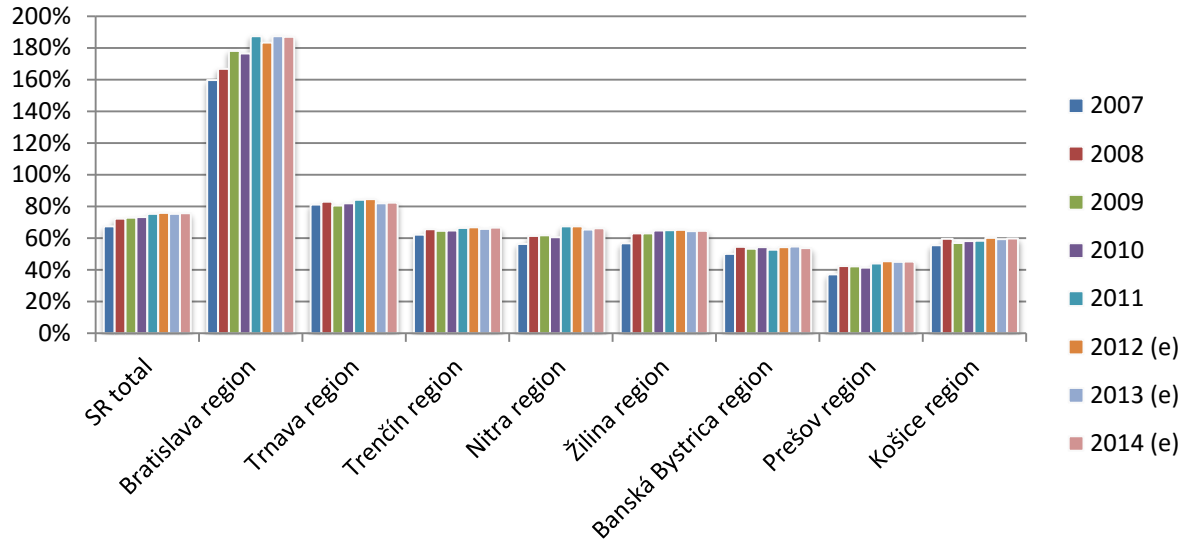


Source: Slovak Statistical Office and calculations by authors

The convergence of Slovak regions towards the EU-28 average is measured by GDP per capita at PPP. This indicator has a number of statistical limitations, especially at the regional level, and offers a slightly distorted view (Chart 5).

[2]Data for 2012 and 2013 have been calculated on the basis of the latest national data using optimisation methods.

Chart 5: Regional convergence to EU-28 average (GDP per capita in PPP)



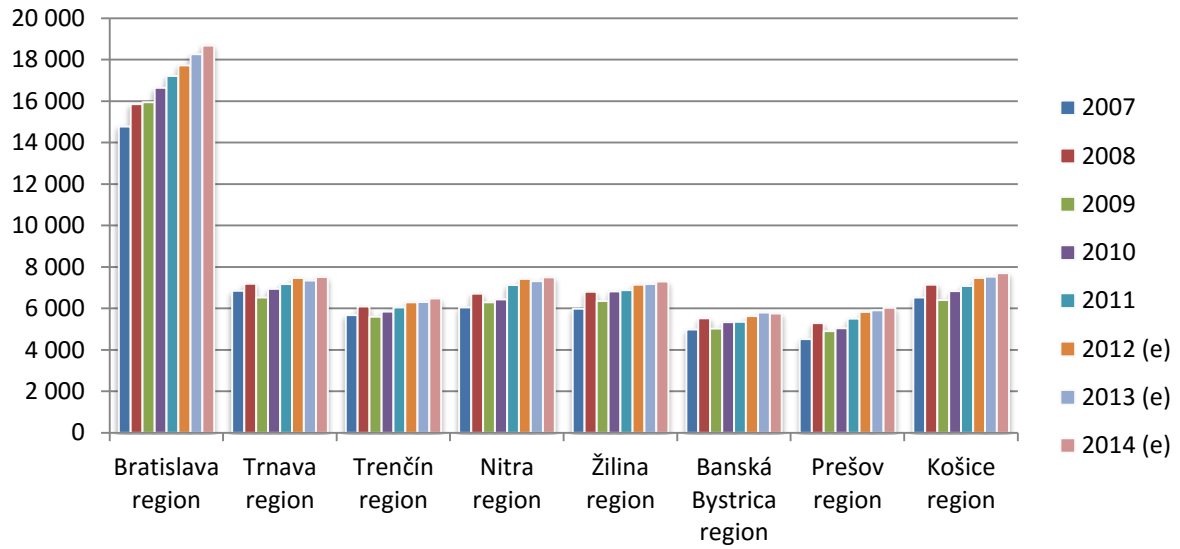
Source: Slovak Statistical Office and calculations by authors

The main sources biasing the explanatory power of indicator (GDP per capita in PPP) are the way in which GDP is reported (based on the registered office of companies), number of employed in the region (share of GDP is generated by workers commuting from other regions, this is mainly the case in Bratislava region) and the absence of price indices (PPP) at the regional level. Hence the real difference between the regions may be lower by a third (see Radvanský, 2014). Nevertheless, regional disparities remain substantial.

In terms of convergence of Slovak regions towards the EU-28 average, their economic performance improved and, in period 2007-2014, the GDP grew from 68 % to 75 % of the EU-28 average. However, from the regional perspective, convergence has been fairly imbalanced. GDP per capita in PPP in the Bratislava region exceeds 180 % of the EU-28 average. This is one of the highest GDPs among all European regions (Bratislava ranks among the 10 richest EU regions). At the same time, its economic growth clearly outpaces the growth of the other Slovak regions. Given the high GDP, even a moderate growth in the Bratislava region contributes to the national GDP more than any other region. Although this increases regional disparities, it drives the convergence of the national economy closer to the EU-28 average. The convergence of the remaining regions was only moderate, or stagnated. In 2008-2013, Banská Bystrica was the only region where convergence in real terms did not occurred. If compared in absolute terms, the situation is least favourable in the Prešov region where the 2014 level of convergence reached only 45 % of the EU-28, which was one of the lowest in the EU. The other regions exceeded 50 % of the EU average, the Banská Bystrica region by a narrow margin (54 %). Apart from the Bratislava region, only the Trnava region exceeded the cohesion target of 75 % when it reached 83 %. The remaining regions are below the target and their average convergence level in 2014 reached about 65 % of the EU average.

The creation of gross value added follows similar path as that of GDP. The creation of gross value added in the Bratislava region is more than double compared to the average of the other regions. In 2014, the creation of gross value added in the remaining regions spanned from EUR 5.7 billion in the Banská Bystrica region to EUR 7.7 billion in the Košice region. The regions of Prešov, Nitra and Košice also reported the highest growth rates.

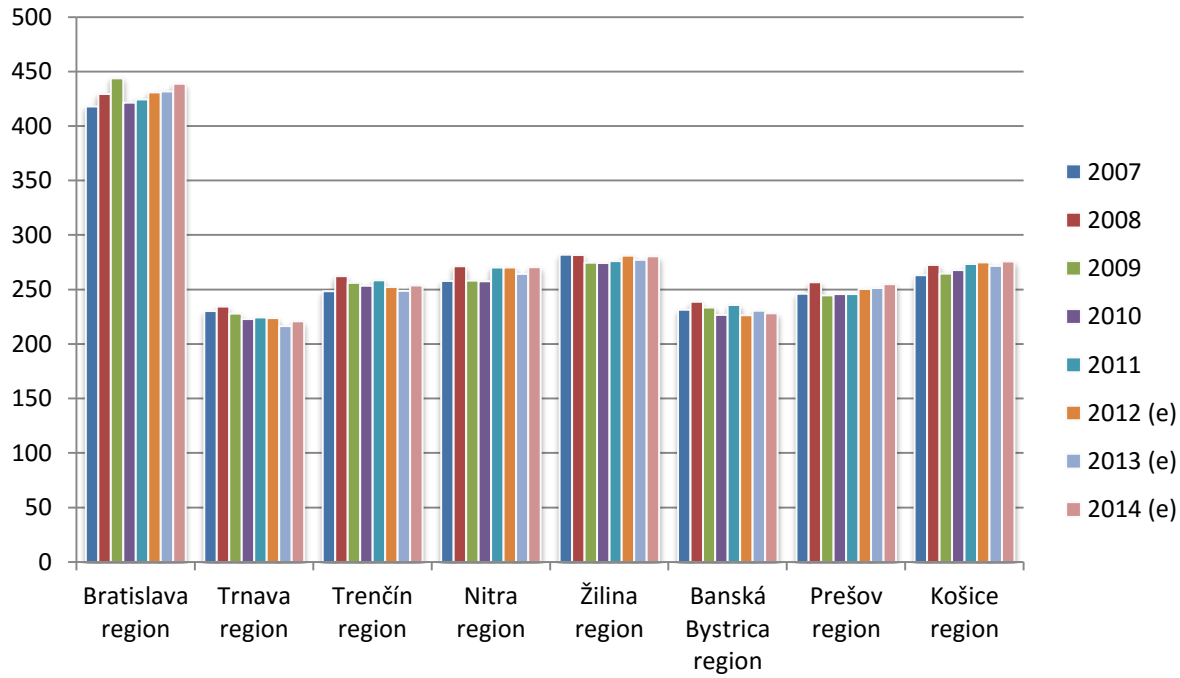
Chart 6: Creation of gross value added by regions, in million EUR at current prices



Source: Slovak Statistical Office and calculations by authors

Our analysis of regional employment is based on the ESA 95 methodology for national accounts. The overall development can be divided into four periods: (1) Employment growth during the 2007-2008 period of economic boom, (2) steep decline in employment during 2009-2010 caused by the global economic crisis, (3) period of stagnation or moderate increase in 2011-2013, and (4) year of significant growth with over 30 000 new jobs in the economy in 2014.

Chart 7: Number of employed, thousands of persons



Source: Slovak Statistical Office and calculations by authors, ESA 95

Even though the Bratislava region is not among the biggest by the size of population, more than a fifth of all employees are formally employed there. Košice was the only region where the number of jobs in 2014 exceeded the 2008 peak of economic cycle (or 2009 for the

Bratislava region). On the other hand, the number of jobs in the Trnava and Banská Bystrica regions is by approximately 10 000 lower compared with the pre-crisis period. In 2014, the employment reached in the remaining regions pre-crisis level, which indicates that the negative implications of the crisis on employment, despite its changed structure, are slowly retreating.

1.3 Cohesion Policy implementation

During the 2007-2013 programming period, the EU Cohesion Policy focused on three main objectives: Convergence, Regional Competitiveness and Employment, and European Territorial cooperation. In order to reach those objectives, individual Member States and their regions were eligible to use support from the following funds: European Regional Development Fund (ERDF), Cohesion Fund (CF) and European Social Fund (ESF).

The total allocation for Slovakia in the 2007-2013 programming period reached almost EUR 11.5 billion. The objectives and the way in which the SF and CF would be used were defined in the National Strategic Reference Framework (NSRF) in 2006. The NSRF was divided into 11 operational programmes that focused on the objectives of 'convergence' and 'regional competitiveness and employment' (ETC[3] programmes are not a part of the NSRF). All operational programmes can be characterised as sectoral/thematic programmes which were managed and implemented at the national level. In light of the global financial and economic crisis and also due to other factors, the financial allocations for individual programmes had to be revised during the programming period.

Table 2: Sources of Cohesion Policy funding and spending at the end of 2014, in EUR

	Allocation for 2007-2013	Spending as of 31.12.2014
ERDF total	6 099 989 765	4 146 648 136
CF total	3 898 738 563	2 303 013 605
ESF total	1 497 739 439	1 037 932 636
NSRF total, 2007-2013	**11 496 467 767**	**7 487 594 377**

Source: ITMS

Based on the available ITMS data, which were provided by the Central Coordinating Authority (CCA), the level of spending from the EU source reached approximately 65 %, at the end of year 2014, of the total allocation. Based on the available data[4], the level of contracting at the end of 2014 reached almost 105 % due to efforts of managing authorities (MA) to maximise the probability of achieving the highest possible absorption of EU funds.

By the end of 2014, the implementation of SF and CF reached EUR 9.68 billion, including co-financing from the national budget and final beneficiaries. This amount also includes those expenditures which were classified as ineligible, i.e., expenditures financed from EU funds and national budget in conflict with the applicable legislation which have been or are to be recovered from beneficiaries. The applied model includes ineligible expenditures into the amount of spend resources, because from analytical point of view, corrections are implicitly included in the published statistical data as they represent real expenditures in the economy

[3] European territorial cooperation
[4] Source: www.nsrr.sk

regardless the source of their financing and they only reduce the amount of available funds in the economy in the following period. By the end of 2014 the volume of EU contribution reached approximately EUR 7.5 billion, followed by the national budget (EUR 1.3 billion) and the own resources of final beneficiaries (EUR 788 million).

Table 3: Spending of SF and CF as of 31.12.2014[5] , in million EUR

Operational Programme	EU	SB	OR	Total
211 - OPIS	558.1	171.3	2.4	731.8
221 - ROP	1208.1	150.8	67.3	1426.1
222 - OP Technical Assistance	66.3	14.8	0.0	81.2
223 – OP Bratislava Region	59.9	8.9	4.8	73.6
231 - OP Transport	2090.3	441.1	16.3	2547.7
241 - OP Environment	1003.7	146.7	137.2	1287.6
251 - OP Competitiveness and Economic Growth	512.9	86.1	472.0	1071.0
261 - OP Education	339.2	53.1	7.7	400.0
262 - OP R&D	758.8	110.8	48.2	917.8
271 - OP Employment and Social Inclusion	711.0	124.0	27.1	862.2
281 - OP Health	232.9	40.8	5.1	278.8
Total	**7541.3**	**1348.4**	**788.1**	**9677.8**

Source: ITMS, Note: EU – EU funds, SB – co-financing from national (state) budget, OR – co-financing from beneficiaries' own resources.

The highest volume of EU funds has been spent on infrastructure, primarily on projects implemented under the OP Transport, OP Environment and Regional OP. Substantial part of expenditures on research and development from the OP Research and Development was invested in the development of R&D infrastructure. Projects implemented under the OP Education and the OP Employment and Social Inclusion focused on the improvement of level of human capital. The other important priorities pursued by SF and CF under other operational programmes included sustainable economic growth, employment and competitiveness. The effectiveness of the SF and CF implementation in achieving its objectives is described in the next parts of this publication.

The implementation process was accompanied by a number of complications due to which spending in the early years of the period (2007-2008) was only marginal. This delay, together with other factors, increased the volume of funds at risk (of not being spent) later on. At the end of 2013, the implementation rate reached 53 % and the share of contracted projects reached 65 % of the total allocation in programming period. The implementation between 2013 and 2014 declined by almost 6 % year-on-year which, compared to the average annual growth in the three preceding years (over 16 %), represents a sharp turn in dynamics and is one of the reasons reducing the likelihood of implementing all allocated funds successfully. The dynamics of growth in 2014 was negatively affected by the decision of the European Commission to suspend the reimbursement of expenditures in some OPs. The remaining available allocation of funds implementable during 2015 from the EU source represents

[5] The table does not reflect the ineligible expenditures recovered from beneficiaries; therefore the data may slightly differ from those presented in other parts of this report.

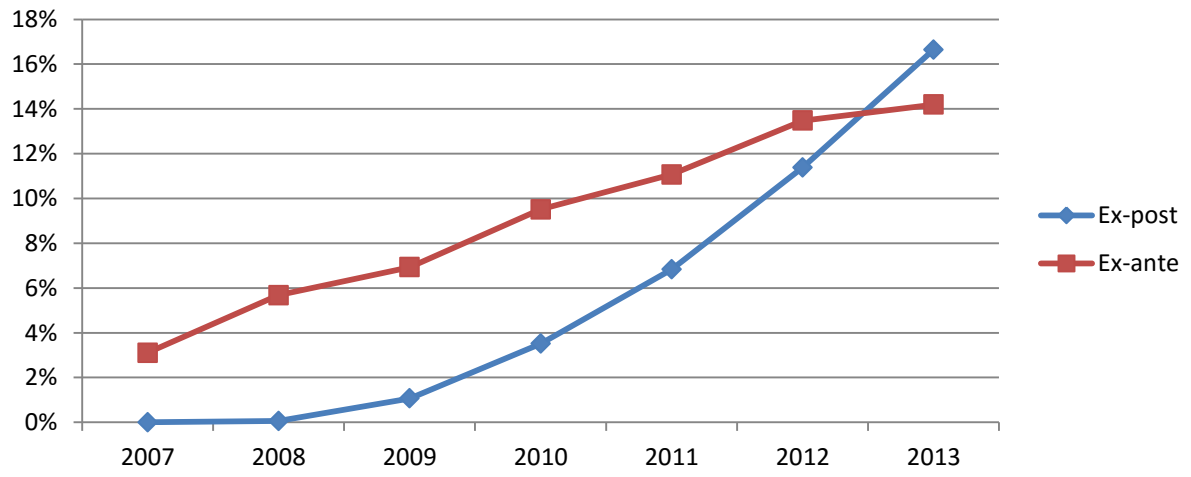
about EUR 4 billion. This volume is so enormous that, given the actual absorption capacity of the Slovak economy, its real implementation is highly improbable and would be ineffective.

1.4 Impact of Cohesion Policy on economic development – main assumptions

In the preparatory phase of the 2007-2013 programming period, the assumptions for the impact of Cohesion Policy were summarised in a framework document entitled "Ex-ante Evaluation of the National Strategic Reference Framework" prepared by the SAS Institute of Economic Research in 2006 (see Šikula *et al.*, 2006). The evaluation states that the strategic part of the document, which describes the anticipated impacts of Cohesion Policy, focuses on the national economy as a whole and its convergence towards the EU average, without direct identification of regional dimension of convergence which was to be achieved later, individually, through individual operational programmes. The summary of the evaluation, on page 20, reads: "*The proposed context indicators which are to evaluate the implementation of support are often formulated in a way which renders their reporting at the NUTS 2 level and below impossible, hence the regional dimension of these interventions cannot be captured*."

The assumptions regarding the use of operational programmes define two types of effects. The so-called 'hard' effects which are measurable in the course of implementation through a set of selected indicators and 'soft' effects, particularly those making the work of public administration more efficient (which are rather difficult to quantify). Obviously, when the ex-ante evaluation was planned in 2006, Slovakia was at the peak of its economic boom. It was a period when, for example, unemployment-related issues were dealt with primarily through the prism of qualification structure, rather than through numbers. Labour market began to suffer from a shortage of potential workforce with adequate skills, mainly in the manufacturing and ICT sectors. However, these problems receded when the crisis broke out and the main effort of the government geared towards maintaining employment and supporting the existing jobs. The assumptions concerning the impact of the SF and CF through the NSRF were also verified on models. The ex-ante estimate of impacts, using the recommended HERMIN model, focused on the national level only (see Kvetan *et al.*, 2006).

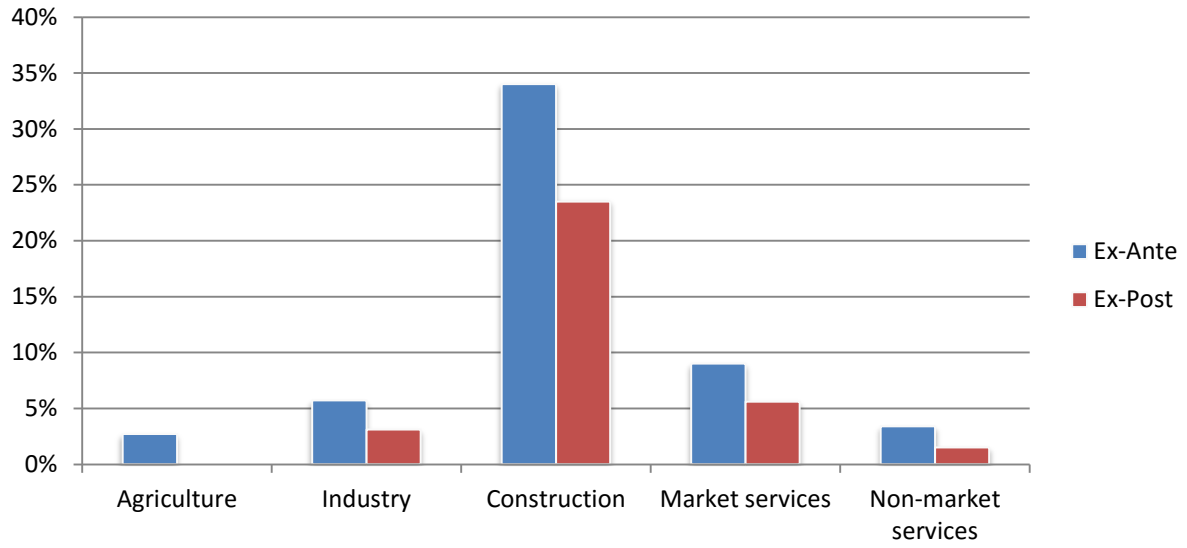
Chart 8: Comparison of cumulative GDP growth increase due to SF and CF implementation



Source: Calculations by authors, Šikula et al., 2006

The comparison of the ex-ante and ex-post analyses shows certain similarities (Chart 8). The ex-ante analysis covered only the period of implementation, disregarding the n+2 rule. The main difference in the case of estimated impacts lies in the assumption of evenly-spread spending of funds throughout the programming period, without the need to accelerate implementation in the post-2013 period. For this reason, neither the effects nor the CSF multiplier were estimated beyond 2013 and are thus not presented. The estimated effects for 2013 anticipated the cumulative GDP growth increment above 14 %, value of cumulative CSF at 1.94 and the creation of 87 000 new jobs (at the overall unemployment rate of 8.7 %).

Chart 9: Comparison of the anticipated effects of the SF and CF implementation on additional output of different sectors in 2013 based on the ex-ante and ex-post evaluation



Source: Calculations by authors, Šikula et al., 2006

In contrast to the ex-ante analysis assumptions, two key factors affected the real economy. The first factor, economic crisis, pushed the rate of unemployment up. The number of new jobs created through the implementation of SF and CF funds softened the negative impacts of the crisis on Slovakia's overall unemployment.

The second factor was the uneven allocation of funds in time. In the first two years of implementation, the SF and CF spending was minimal, followed by a steep increase in the second half of the programming period, prompting the need to draw the remaining funds (in a considerable amount) during the n+2 period. The spending of such a considerable volume of funds reduces the overall effectiveness of their allocation (Radvanský and Frank, 2009).

The first of the above-mentioned factors, i.e. decline in performance of Slovak economy, reduced the costs and increased the effectiveness of additional resources. In other words, the real effect of SF and CF implementation was significantly higher than the assumptions used in the NSRF. The structure of effects on individual sectors developed in line with expectations, although their strength in 2013 was lower. This is due to the higher unemployment rate (14 %) and lower GDP in 2013 compared to the ex-ante assumptions, as well as due to expected higher economic output in following period (n+2).

2 The selection of suitable econometric model and methodology of regional data estimation

2.1 Methodology overview

The following subchapter describes a selection of existing econometric models and their pros and cons for the purpose of Cohesion Policy impact assessment. The Cohesion policy impacts were already analysed in different countries by several qualitative and quantitative methods which include, *inter alia*, model simulations and evaluations based on econometric models. The basic motivation behind analysing the impacts of SF and CF is to find answers to issues that are directly related to the effectiveness of Cohesion policy in terms of reducing regional disparities, effective distribution of financial resources and the need to reform the Cohesion policy in the event of new Member States joining the EU. The first attempts for evaluating the Cohesion policy by econometric model involved the HERMES model-based simulations. However, this model was used for Ireland only. As a successor of HERMES, the HERMIN model increased the geographical coverage within the EU. This model was used to evaluate the impacts of SF and CF in Ireland and Portugal in early 1990s, with Greece and Spain being added later on. In the first decade of the new millennium, set of the HERMIN models was created by the European Commission for all EU-27 Member States. In addition to the HERMIN model, the Commission also used the demand-oriented QUEST model (Varga and in't Veld, 2009) for analysing the Cohesion policy. The most recent efforts are focusing on finding a successor of these models, with various alternative types of modelling approaches being developed for this purpose (such MASST, EUImpactMod, RHOMOLO, GMR-EUROPE, etc.); however, their real applicability remains disputable.

Majority of functional regional models in Europe use the NUTS-2 regional breakdown. Following the decentralisation of governmental powers in Slovakia in 1996, the functional regions are those classified as NUTS-3, i.e., self-governing regions. For this reason, the evaluation was carried out at the level of NUTS-3 regions and at the national level.

The European Commission's Directorate-General for Regional and Urban Policy (DG REGIO) has been using macroeconomic models to evaluate the Cohesion policy's impacts on EU Member States and regions for several decades. The most frequently used models were HERMIN and QUEST III. HERMIN was developed in the 1980s and has been regularly used and updated ever since then. Being a macroeconomic structural model, its parameters are based on econometric estimates. The QUEST III model has been developed and used by the Directorate-General for Economic and Financial Affairs (DG ECFIN). It is a dynamic stochastic general equilibrium (DSGE) model with microeconomic foundations. Both of these models have been used to great success for several decades, with the only downside being that they could deliver only national macro-level results. However, DG REGIO also needed to examine the impacts at the regional level. For this purpose, the possibilities of extending the existing models have been investigated. The European Commission has arrived at a conclusion that none of the existing models would be capable of accomplishing all the tasks set out by the Commission and that a new regional model would have to be developed. For this purpose, the Commission and the Joint Research Centre (JRC) in Seville are jointly developing the RHOMOLO model (Rhomolo: A Dynamic Spatial General Equilibrium Model for Assessing the Impact of Cohesion Policy, JRC Technical Report, 2013) as a comprehensive successor to the existing models, i.e. one that is capable of covering the regional and multi-sectoral aspects.

The main advantages of this model include its broad coverage and ability to take into account the so-called spatial spill-over effects and interdependencies between regions. On the downside, it requires a higher quantity of input data which, in many cases, are not covered by or reported in national statistics in the required structure. In response to this situation, a new regional model built on the HERMIN model foundations has been developed by the Wroclaw Regional Development Agency (WARR) in Poland. The relatively simple structure of HERMIN model is the key strength of this regional econometric model, allowing the analysis of the impacts of Cohesion policy at the regional level. On top of that, it can be applied with success to small and open economies even in cases if data resources are limited. The main downside is that the above mentioned spill-over effects included in case of RHOMOLO are not taken into account.

Other models applied in the modelling of the Cohesion policy impacts include, for instance, the EUImpactMod or the MASST model. EUImpactMod has been specifically designed for the Visegrad Four (V4) countries by the Polish Institute for Structural Research (IBS) as an alternative to the HERMIN model. It is a DSGE model that has been calibrated on the basis of microeconomic and macroeconomic data. The key objective was to investigate how Cohesion policy for the V4 countries affects the EU-15 countries. According to an analysis, Cohesion policy in V4 countries brings a significant increase in their performance and, consequently, consumption, investments and demand which are in particular covered by goods and services from EU-15 countries.

The MASST model (macroeconomic, sectoral, social and territorial) represents a more complex alternative as it combines an econometric growth model at the national and the NUTS 2 regional level with a simulation algorithm. This model is primarily geared towards forecasting the medium- and long-term trends in real economic growth and selected demographic variables, such as population or migration. MASST covers all of the EU-27 countries and all 259 regions in European countries. It is unique in that it applies the top-down approach, i.e., regional growth which depends on national growth and, consequently, due to its integrated feedback mechanism and the bottom-up approach, the national economy growth comes as a function of regional growth with a certain lag (one year). The equations at the aggregate macroeconomic level are estimated using a standard econometric approach, whereas the regional sub-model equations include spatial effects. The downside is that this model requires a large amount of data both at the national and regional level.

The RHOMOLO model

The regional holistic model labelled RHOMOLO is currently developed and run by the EC, JRC and the Netherlands Organization for Applied Scientific Research (TNO). It is a multi-regional and multi-sectoral dynamic general equilibrium model with endogenous economic growth. The model is currently being tested in five European countries at the level of regions: Germany (NUTS 1 because of the small size of NUTS 2 regions), Poland (NUTS 2), Slovakia (NUTS 2)[6], the Czech Republic (NUTS 2) and Hungary (NUTS 2). The model incorporates the economic, social and environmental dimensions in a unique integrated framework.

[6] The Institute of Economic Research of the Slovak Academy of Sciences also participated in the review procedure and the creation of the economic model between 2009 and 2012 as part of the project entitled "*System of regional models for impact assessment*".

RHOMOLO can be used both for ex-ante and ex-post evaluation of Cohesion policy impacts. It also makes it possible to simulate and compare different policy scenarios. The most important features of the model are:

- linking regions within a new economic regional framework;
- having dynamic features with endogenous economic growth;
- including detailed public sector and allowing to simulate interventions from this sector;
- incorporating a multi-level governance system.

Each EU country in the RHOMOLO model is disaggregated down to several regions, which are connected by interregional trade flows of goods and services as well as interregional migration flows. Interregional trade depends upon the preferences of consumers for buying goods from particular destinations and upon the prices of goods and associated transportation costs. Interregional migration flow takes place only within the same country and depends primarily upon the relative difference between the real wages in the region and the country average, as well as upon the relative difference between the rate of unemployment in the region and the country average. Regions with higher real wages and lower unemployment rates would have higher net immigration. Each NUTS 2 (or NUTS 1) region includes various economic agents, such as households, production sector, regional and federal government.

RHOMOLO is a dynamic model which generates various social, economic and environmental outputs by 2030. The economic growth rate is determined by investments in research and development (R&D) and investments in education. By investing in R&D and education each region is able to catch up faster with the technological leader region. Time periods in RHOMOLO are linked by savings and investments. By the end of each time period, households save a certain amount of money which goes to the investment bank and is distributed as investments between the production sectors of the various regions. The allocation of the investment depends on the sector's financial profitability. This model is currently being tested as a comprehensive model for simultaneous estimates of impacts in all regions observed and, for the time being, this model type is not expected to be developed for individual countries. In view of the above facts, it was not possible to use this model for the purposes of evaluating SF and CF impacts in Slovakia.

The QUEST model

The QUEST III model is a global macroeconomic model of DG ECFIN that is used for macroeconomic policy analysis and research. It is a New-Keynesian dynamic stochastic general equilibrium (DSGE) model considered as a modern method of economic modelling. These models are based on microeconomic foundations derived from utility and profit optimisation. QUEST III has been estimated for the Euro area and USA by application of Bayesian methods for parameter estimates. In order to investigate various scenarios, DG ECFIN has developed several versions of the model depending on the type of disaggregation used for sectors and regions. The model can be applied to examine fiscal and monetary policy interactions. For the analysis of structural reforms, an extended version of the QUEST model has been developed to capture both investment in tangibles and intangibles with employment disaggregated into three skill categories. One of the model variants makes it possible to analyse various aspects of climate change and energy policy. All these variants have a different disaggregation calibrated for the euro area, EU-27 or a different regional

unit. The model is not designed and cannot be used for regional analysis of individual countries, but only for larger units.

The model treats economies as open economies and works with exogenous interest rates, world prices and world demand. The goods produced in the home economy are imperfect substitutes for goods produced abroad. The modelled economy is populated by households and firms, hand in hand with a monetary and fiscal authority. Both the monetary and the fiscal authority respect the principles of the stabilisation policy based on pre-defined rules. The model makes a distinction between households whose liquidity is constrained by their disposable income and households which have full access to financial markets. Liquidity-constrained households cannot consume more than their disposable income and are not able to borrow against their future income to achieve an optimal level of consumption. Households which have access to financial markets are achieving an optimal level of consumption, which is a determining factor for making decisions about financial and real capital investments.

Both the RHOMOLO and QUEST models belong to the family of computable general equilibrium models. The principal differences include:

- RHOMOLO is a regional model and includes interregional trade and migration;
- RHOMOLO includes a more detailed representation of production technology;
- RHOMOLO has a more detailed sector dimension;
- Alongside economic aspects, RHOMOLO includes a detailed social and environmental dimension;
- RHOMOLO has a less detailed representation of the financial sector;
- RHOMOLO does not use forward-looking expectations;
- both models have a similar representation of the labour market, unemployment and wage structure,
- they have similar modelling of federal government consumption;
- both models include endogenous economic growth.

The HERMIN model

The origins of the HERMIN model lie in the complex multi-sectoral HERMES model that was developed by the European Commission in the early 1980s (d'Alcantara and Italianer, 1982). HERMIN was initially designed to be a small-scale version of the HERMES model framework in order to take account of the relatively limited data availability in the poorer, less-developed EU Member States and regions on the Western and Southern periphery (i.e., Ireland, Northern Ireland, Portugal, Spain, the Italian Mezzogiorno, and Greece). As a consequence of a lack of detailed macro-sectoral data and of sufficiently long time-series that had no structural breaks, modelling framework had to be based on a fairly simple theoretical framework. This relative simplicity in fact represents one of the major advantages of the HERMIN model.

One of the basic features of the general HERMIN model is the modelling of a small open economy. At the same time, the basic theoretical model takes into account the structure of Cohesion policy instruments. Structure of this model must comply with certain basic requirements:

- The economy must be disaggregated into a small number of sectors that make it possible to identify the key structural shifts in the economy over the assessed period.

- The model must specify a mechanism through which an economy is connected to the external world and which should be able to capture the international trade of goods and services, inflation transmission, labour migration and foreign direct investment. The external (or world) economy is a very important direct and indirect factor influencing the economic growth and convergence of the lagging EU economies.
- Production in individual sectors incorporated in the model is described by production functions using a specific form – Constant Elasticity of Substitution (CES) and Cobb-Douglas (C-D).
- The creator and user of the model must recognise that a possible conflict may exist between actual situation in the country, as captured in a HERMIN model calibrated with the use of historical data, and the structure towards which the economy is evolving in an economic environment dominated by the Single European Market.

The most common way to comply with these requirements is to use a theoretical model structure of the general HERMIN model which consists of four sectors: the manufacturing sector (mainly internationally traded sectors), the market services sector (mainly internationally non-traded sectors which predominantly constitute domestic supply); the agriculture sector; and the public sector (also known as non-market services sector).

In terms of production, the model is composed of three blocks: a supply block, an absorption (demand) block and an income distribution block. It is designed as an integrated system of equations, with interrelationships between all their sub-components and sectors, and is based on the Keynesian assumptions and mechanisms which form the core of the model. In justified cases it also incorporates the features of the neoclassical economic theory, in particular as regards to the supply block. For instance, manufacturing output is not simply driven by demand, it is also influenced by potential impacts of price and cost competitiveness, thus taking into account the assumption that firms seek out minimum cost locations (or countries) for production. The demand for production factors in manufacturing and market services is derived from the assumption of cost minimisation using a CES production function (a production function with constant elasticity of substitution).

Supply block of the general HERMIN model is modelling the aggregate supply (outputs of individual sectors), output prices, nominal wage index, wage inflation, competitiveness, labour demand and investment demand. It also contains equations for aggregate labour supply, unemployment and labour migration. The absorption (demand) block incorporates equations for the modelling of domestic consumption, domestic demand and net trade surplus. The income distribution block contains equations for the calculation of public sector expenditures and revenues, disposable income of households, public deficit, public debt and the current account balance.

The application of this model at the regional level has been developed by WARR, in Poland, with each particular region (NUTS 2 in the case of Poland) being treated as a separate satellite model linked to national data.

The MASST model

The MASST makes it possible to investigate various alternatives of economic development based on selected policy scenarios; in other words, this modelling tool is capable of forecasting the trends in economic growth at the regional level, including the effects of various national and supranational policy scenarios on local welfare. In general, MASST is multiequation econometric model suitable for devising and evaluating various policy

strategies, even though it is not an entirely general equilibrium model. The model consists of two interconnected components: a national block and a regional block. The so-called simulation algorithm interconnecting the national and regional blocks forms an essential part of the model. This feedback mechanism enables the model to include in its forecasts the effects of both national and regional economic policy measures on growth and income redistribution across regions.

In essence, the national block is specified as a "standard" macroeconomic model for the EU-27 countries. By "standard", the authors refer to the type of models used in the 1970s and 1980s by governments and central banks as programming and policy devising tools. (Chizzolini, 2005 MASST: a forecasting model of regional growth). In MASST, only the goods and services market is specified, whereas prices, wages, interest rates and exchange rates are taken as exogenous variables. While this may be considered a limitation of the model, its authors say that it fully meets their needs and that the above mentioned exogenous variables are, in fact, economic policy instruments (interest rate, exchange rate, as well as government expenditures) or policy targets (inflation).

The regional component of MASST is a truly unique addition to regional modelling due to its feedback mechanism which is rarely found in such models. Majority of models are using the top-down or bottom-up approach. In the MASST model, the top-down approach is used at first, with the national component of real growth being transformed into regional real growth. Regional growth is equal to the national real growth plus a region specific "difference" component. Unlike in other regional models, the MASST attempts to estimate a coefficient which describes the specificity of the region; in other words, the authors are trying the answer the question: "What makes a region potentially grow more or less than the nation in the short run?". Using a quasi-production function approach, a component that makes it possible to estimate the difference between regional and national growth is specified as a reduced-form function of factors, such as economic and human resources, structural and sectoral characteristics, spatial processes, integration processes and territorial specificities. All the indicators of human and physical capital, of infrastructure, of sectoral characteristics and territorial specificities, as well as the structural funds, are treated in the model as exogenous variables. The effects such as potential labour force growth, population growth, spill-overs and the impact of integration among regions are entered as predetermined variables, i.e. lagged one-time period, into the specification of the variable showing the difference between national and regional growth.

Demographic variables are determined within a separate block of the model where population depends on migration, fertility and mortality rates. Migration, modelled for three different age groups, depends in turn on lagged per capita income differentials relative to neighbouring regions as well as on local labour market indicators and geographical specificities. The simulation procedure incorporates the growth potential arising from the available regional production factors into next year's national growth, which means that it allows regional and national growth to be consistent within each assessed year.

The EUImpactMod model

The EUImpactMOD V4 model is a structural macroeconomic model belonging to the group of DSGE models. It has both the general properties typical of DSGE models and several specific properties which are as follows:

- the model takes into account the presence of the European Union and its support in the form of SF and CF;
- it is a multi-sectoral model that is capable of analysing the impact of structural funds in different sectors of the economy;
- it incorporates a government block through which decisions about the allocation of structural funds significantly affect the economic development;
- EU funds are divided into three categories: transfers, investment, and human resource development, making it possible to separately investigate their individual impacts on the economy.

The EUImpactMOD V4 is a model of an open economy whose main elements include the domestic economy and foreign countries (i.e., other EU Member States). Foreign countries are basically symmetric in relation to the domestic economy, i.e. having the same types of entities, sectors and markets as those in the domestic economy. The most important differences between the foreign and domestic economies are related to different estimation of parameters for the individual components of the model. It is important to note that the model includes a detailed representation of the relationship between the Visegrad Group countries and the EU. As stated above, it is a multi-sectoral model which takes into account several distinctive sectors:

- agricultural sector (agriculture, forestry, hunting and fishing)
- industrial sectors (light industry, heavy industry, energy, construction and mining)
- service sectors (trade, financial services, public services, transportation and other services)

According to the model, the state of the economy is supervised by the government with income generated from value-added tax, corporate income tax and personal income tax and from profits earned by the central bank. On the expenditure side, the funds are allocated on the basis of predetermined objectives. More specifically, the state allocates funds for the purposes of: public consumption; investments in different types of infrastructure (transport, telecommunications and environmental infrastructure, as well as social infrastructure such as health care); and subsidies for companies from different sectors.

2.2 Reasons for selecting the HERMIN model

From the above mentioned models, HERMIN model seems to be the most suitable type for analysing the Cohesion policy's impacts in Slovakia. One of the main reasons is that it was designed to be applied for small open economies with limited availability of data. Even though the QUESTIII and RHOMOLO models use a more advanced economic modelling and are much more complex, their application in Slovakia can be rather complicated or even impossible due to the problems associated with the availability of complex regional data, or due to the need to include neighbouring regions of the Slovak Republic in order to ensure the required robustness of estimates. The RHOMOLO model is still in its testing phase and cannot be applied on the level of individual countries yet. The QUEST III model can be applied to a limited extent at the national level only.

As far as the HERMIN model framework is concerned, the similar national level constraints as in case of above mentioned (RHOMOLO and QUEST III) have been partly eliminated through the development efforts by WARR, Poland, where a HERMIN type of model incorporating the

regional dimension has been designed. For the purposes of evaluation work, further adjustments to the economic model design were necessary. The upside is that the model has a suitable structure requiring less complex data input while offering a comprehensible interpretation of outputs. However, the possibility to incorporate certain features of the QUEST model (such as microeconomic decision-making by market stakeholders) remains a question. This aspect has yet to be verified during the empirical phase of its application at the regional level. Another option is to adopt the combination of top-down and bottom-up approaches offered by the MASST model. However, even this aspect has yet to be verified during the empirical phase of its application at the regional and national level. Due to the absenting regional dimension, the EUImpactMOD V4 model is not suitable for accomplishing the evaluation objectives and, for this reason, it will be left out of consideration.

Table 4: Overview of functionalities and technical specifications of econometric models

Feature	RHOMOLO	QUEST III	MASST	EUImpacMod	HERMIN
Model type	DSGE	DSGE	Econometric	DSGE	Econometric
Sectors included	Yes	Yes	Yes	Yes	Yes
Demand and supply side	Yes	Yes	Yes	Yes	Yes
Data intensity	Extreme	High	High	Medium	Medium
Regionalisation	Yes	No	Yes	No	Yes
Spill-over effects	Yes	Yes	Yes	Yes	No
Utilisation	Testing phase	Applied	Applied	Applied	Applied
Application for a single country	No	Yes	Yes	Yes	Yes
Complexity	High	Medium	High	Medium	Medium
Time intensity	Extreme	High	High	High	Medium
Suitable for use in Slovakia	No	Low	Low	Medium	High

Source: authors

Previous impact assessments in Slovakia have also utilized HERMIN methodology. Despite that it was implemented only at national level, the results comparison of these application can provide additional information about process and changes in implementation within selected period. Additionally, the effect of application of regional HERMIN model means that Slovakia is the first country with model application on NUTS 3 level for ex-ante and ex-post evaluation of the Cohesion policy impacts. Despite of previous authors experiences about application of this type of model in Slovakia, good ongoing cooperation with Polish experts from WARR have also increased quality of the analysis. On the other hand, the HERMIN model is not capable of incorporating the so-called spill-over effects among regions. However, this is the price to be paid for its simple structure and applicability in Slovakia.

The HERMIN-type models are commonly and typically implemented in at analysing the Cohesion policy impacts on the labour market, economic growth, etc., at the national level by EU commission and member states. Models applied in this publication follows on

the existing and previously applied models. Overview of the main HERMIN model applications in the EU and non-EU countries is given below.

Table 5: Selected HERMIN model applications in Slovakia and abroad

Project title	Content
Ex-ante Evaluation of the National Strategic Reference Framework of the Slovak Republic for 2007-2013	The HERMIN model has been developed and applied to evaluate the impacts of allocations provided from the EU funds.
Ex-ante Evaluation of the Partnership Agreement of the Slovak Republic for 2014-2020	The HERMIN model has been developed and applied to evaluate the impacts of allocations provided from the EU funds.
Support to the national employment policy	Advisory activities for the Ministry of Labour and Social Policy of the FYROM. Development of the HERMIN model for Macedonia (HERMAC)
Extension of the cohesion system of HERMIN models and assessment of the impact of Cohesion policy post-2013	Extending the CSHM to the EU-27, preparation and analysis of the EU Cohesion policy impacts at Member State level, distinction between net contributor and net recipient of EU funding.
Cohesion System of HERMIN Models (CSHM): Technical Assistance 2009-2012	Organisation and implementation of modelling activities, review of ex-post evaluation, preparation of inputs for the EC's Cohesion Report, advisory services and assistance to DG REGIO.
Evaluation of EU Structural Funds (2004-06) Impact on GDP, Lithuania	Creation of the HERLIT model as a HERMIN-type model and its application in an ex-post evaluation for the 2004-2006 period and an ex-ante evaluation for the 2007-2013 period.
The Future of EU Structural Policy in East Germany	Update to the East German HERMIN model and its application in terms of ex-post impacts and an ex-ante evaluation of the Structural Funds for the 2000-2020 period
The economic return of cohesion expenditure for EU member states	An analysis of the economic returns of structural and Cohesion policy expenditure (ERDF and Cohesion Fund) to net contributors to the EU budget ("donor" Member States).
Analysis of the Impact of Cohesion Policy	Ex-ante evaluation of the NSRFs for all "convergence" countries and two macro-regions (East Germany and the Italian Mezzogiorno) for the European Commission's Fourth Cohesion Report.
Development of an Instrument to Analyse the Impact of Cohesion Policy: The Cohesion System of HERMIN Models (CSHM)	Design, development and implementation of a system of economic models for use by the Commission in analysing the EU Cohesion policy impact.
Quantitative Assessment of the Estimated Impact of the NDP/NSRF using a Macroeconomic model for the Czech Republic	Design, development and testing of a HERMIN model for the Czech Republic and application of the new model in an ex-ante evaluation of the Czech Structural and Cohesion Funds for the 2004-2006 period.
Macro-economic impact of the Estonian National Development Plan 2004-2006	Analysis of the Estonian business sector and the creation of a disaggregated macroeconomic model. Economic analysis of the Estonian National Development Plan for 2004-2006 and exploration of the alternative development scenarios for Estonia.
A study of the macroeconomic impacts of reform of EU Cohesion Policy 2000-2006	Ex-ante evaluation of the NSRFs for all "convergence" countries and two macro-regions (East Germany and the Italian Mezzogiorno) for the European Commission's Third Cohesion Report.
Analysing the macroeconomic impacts of EU Structural Policies 2000-2006 in Saxony-Anhalt (Germany)	Design, implementation and application of the HERMIN model in the German region of Sachsen-Anhalt for the medium-term analysis of the Structural Funds for 2000-2006.
Evaluation of impacts of Polish NDPs	Construction of a prototype HERMIN model for Poland including a mechanism facilitating an initial ex-ante evaluation of the draft Polish National Development Plan (NDP) for 2004-2006. Subsequent development of the above model, and further applications for analysing the NDP. Development of a disaggregated version of the Polish model. Design, development and implementation of the Polish HERMIN model for 16 regions for an ex-ante evaluation of the regional operational programmes.

Source: Authors and http://www.herminonline.net/index.php/projects

2.3 Regional data ex-post estimation methodology

For the purposes of further utilization in the research based on HERMIN model methodology, the missing regional data were obtained by means of econometric-optimisation methods. The econometric-optimisation method consisted of determining the value of the observed variable during the period of uncertainty between 2013 and 2014 based on partial information consisting of the actually observed value of a national-level indicator and the observed regional trends in the development of several factors affecting the variable in question. Those include information about the trends in such factors that are already available at the given level (for instance, labour market statistics published at the same time as the national data). For the purposes of the HERMIN model, it was necessary to include the values of the gross domestic product (GDP), gross value added (GVA), employment based on national accounts (L, ESA), employment based on Labour Force Survey (L, LFS), gross fixed capital formation (GFCF), and employee remuneration (ER) in five aggregated sectors of the economy at level of NUTS 3 regions.

An ex-post estimation of the regional variables is based on the available statistical data and on available alternative estimation methods for acquiring such data. In general, two sources of data can be identified at the regional level. The most readily available source of labour market data is the Labour Force (Sample) Survey (LFS). At the time of estimating missing regional data, some regional data were available for the period between 1997 and 2013. The second source of data consisted of regional accounts which were created using the production method, i.e. in the absence of detailed data about consumption components. Nonetheless, the regional GDP estimation, as reported by the Statistical Office of the Slovak Republic using the production method, is balanced out by aggregate (national) level data. The national level therefore served as the boundary for determining the regional data in 2014. As shown in the section 1.2, the lagged reporting of regionalised national accounts is *t-2*, i.e. the currently published data represent data from 2013. Part of the regional data has been estimated by means of the "partial ex-post analysis" using the data that is already available for the given period[7].

The procedure used in the estimation was based on the need to minimise the level of uncertainty. First of all, employment data in line with the European System of Accounts (ESA) has been quantified on the basis of sectoral and regional employment data reported under the Labour Force Sample Survey while applying optimisation and sector boundaries, thus:

$$L_{i,o,t}^{ESA} = f\left(\frac{L_{i,o,t}^{LFS}}{L_{o,t}^{LFS}}\right) + \varepsilon_{t0} \quad \text{with a boundary of } \sum_i L_{i,o,t}^{ESA} = L_{o,t}^{ESA},$$

where *i* represents the *i*-th region, *o* represents the sector (five sectors identical with the model definition) and *t* is the time period. The employment estimation according to ESA is based on changes in structure indicated in the Labour Force Sample Survey and adjusted for the estimation error from the last observed period t_0 (2013).

[7] The described approach is based on the work of Radvanský (2014) *"Possibilities of Analysing the Impact of Cohesion Policy on Slovak Regions and Labour Market"* which has been modified and supplemented with the sector dimension. The above document contains a more detailed elaboration on the estimation of parameters in the regional ex-post and ex-ante model while optimising the instrumental variables (of the economic policy).

Based on the creation of jobs, the gross fixed capital formation for individual regions has been estimated on a sector basis:

$$DFK_{i,o,t} = f\left(GFCF_{i,o,t-1}, L_{i,o,t}\right) \text{ with a boundary of } \sum_i GFCF_{i,o,t} = GFCF_{o,t} .$$

The question remains how to address the deviation (residual) from the last observed period, as it can distort the estimation in the subsequent periods due to the fact that the calculated estimates are based on the long-term stability of the system. One of the possible solutions would be to apply the value of this residual in the last observed period ε_t, while presuming its exponential return to the long-term trend. Analytically, we can derive the value of the observed variable in the period $t + \Delta t$ from an estimate using the equation in a log-log format:

$$\ln\left(GFCF_{i,o}\right) = \alpha_i + \beta_{1,i,o} \ln\left(GFCF_{i,o,t-1}\right) + \beta_{2,i,o} \ln\left(GFCF_{i,o,t-1}\right) + \varepsilon_{i,o} ,$$

where, after making estimate, the parameter of response to the residual in time $t + \Delta t$ can be defined as $\frac{1}{1+\Delta t}\varepsilon_{t0}$, i.e., after making an ex-post forecast of the first missing period (2014), the response parameter would be equal to $\frac{1}{2}\varepsilon_{t0}$, or, in the second period, to $\frac{1}{3}\varepsilon_{t0}$ etc. The estimated value of gross fixed capital formation for the *i*-th region can be expressed as:

$$\widehat{GFCF}_{i,o,t+\Delta t} = e^{\widehat{\alpha}+\widehat{\beta_1}\ln\left(GFCF_{i,o,t+\Delta t-1}\right)+\widehat{\beta_2}\ln\left(L_{i,o,t+\Delta t}\right)+\frac{1}{1+\Delta t}\varepsilon_{t0}}.$$

In the event of variations in the ex-post forecast, it is possible the use the value adjusted by a constant value of the last observed error, thus:

$$\widehat{GFCF}_{i,0,t+\Delta t} = e^{\widehat{\alpha}+\widehat{\beta_1}\ln\left(GFCF_{i,o,t+\Delta t-1}\right)+\widehat{\beta_2}\ln\left(L_{i,o,t+\Delta t}\right)+\mathrm{k}} , \quad \text{where } k = \varepsilon_{t0}$$

with a boundary of $\sum_i GFCF_{i,o,t} = GFCF_{o,t}$.

A similar approach to handling the estimation errors in the last known period will also be applied to other estimated indicators.

We have analysed several alternatives for estimating the values of gross value added. We used the production function assumptions $GVA_{i,o} = GVA_{i,o}(K_i, L_{i,o})$, where *K* represents the regional capital stock or its alternatives:

$$GVA_{i,o,t} = GVA_{i,o,t}(GVA_{i,o,t-1}, DFK_{o,t}, L_{i,o,t}),$$

however, employment seemed to be insufficiently demonstrable for the purposes of estimation. Finally, the following alternative estimation of the gross value added appeared to be suitable:

$$GVA_{i,o,t} = GVA_{i,o,t}(GVA_{i,o,t-1}, DFK_{i,o,t}) \quad \text{with sector- and region-based boundaries, i.e.,}$$

$GVA_o = \sum_i GVA_{i,o}$ and, on an aggregate basis: $GVA = \sum_o GVA_o$.

An estimate of the values of the gross value added parameter at the regional level has been entered as an endogenous variable in the econometric equation for calculating the nominal GDP, i.e. $Y_i = Y_i(GVA_i)$. By applying the condition $Y = \sum_i Y_i$ to the equation, the nominal GDP values were estimated.

Calculation of employee remuneration for 2013 and 2014 is based on the correlation with the trends in employment rate and wages. A detailed estimate of employee remuneration at the regional and sectoral level (wage - $W_{i,o}$) was based on an estimate of labour productivity

expressed as the ratio of the value added, sector-level of wages and the number of unemployed in the region (a value known from the LFSS), i.e.,

$$W_{i,o} = W_{i,o}(PP_{i,o}, U_{i,}W_o),$$

where PP_i represents the labour productivity expressed as the ratio of value added and the employment rate $PP_{i,o} = \frac{GVA_{i,0}}{L_{i,0}}$ and U represents the unemployment.

The estimation of employee remuneration represents a logical assumption concerning wages paid (*WP*) for an estimated number of employees at the regional and sectoral level, i.e.

$$WP_{i,o} = WP_{i,o}(12 \times W_{i,o} \times L_{i,o}), \text{ where } \sum_i WP_{i,o,t} = WP_{o,t}\ .$$

The results from the estimation of the abovementioned parameters have been included in the model as well as the values of the regional- and sector-level variables. The reason why they are not included in the publication is that the volume of outputs represents more than 250 time series (7 parameters x 8 regions x 5 sectors); mainly because of the high level of detail used for outputs at the sectoral and regional level.

In those cases where the results fall short of meeting the expectations, it is possible to consider recalibrating certain parameters or making adjustments to the specification of the model, as well as using alternative estimates. However, when it comes to analysing the scenarios, this procedure would not be necessary because regional comparisons are made against the baseline scenario and not directly for the purposes of forecasting the parameters in the future. Parametric boundaries at the aggregate level for the ex-post period (year 2014[8]) are limiting the possibility of estimation error increase.

3 Impact of Cohesion Policy at different absorption scenarios

Description of model approach and its limitations

The impact of SF and CF implementation at the regional level was assessed using the regional econometric structural model HERMIN[9] developed in Poland by the WARR[10] team in long-term cooperation with the author of original model methodology (J. Bradley). The structure of the regional econometric model reflects the specifics of individual regions. In terms of this analysis, it entails the implementation of eight regional models which are mutually interlinked only at the level of aggregate statistical indicators. This is the reason why the models are lacking deeper simultaneous connection between the endogenous variables and inter-regional linkages. Due to this, the model is not able to fully capture the spill-over effects between individual regions. Due to the absence of linkages between regions, it is impossible to directly examine inter-regional growth effects induced by SF and CF implementation. However, the advantage of designed models is that they are not that much demanding in terms of statistical input, yet, in certain aspects, their requirements go beyond the sets of data provided by Statistical Office of the Slovak Republic even if this

[8] Data for year 2015 were forecasted.
[9] The main sources included the databases of Eurostat, Statistical Office of the Slovak Republic and ITMS.
[10] Wroclaw Regional Development Agency (www.warr.pl)

simplified approach is applied. Regional disaggregation reaches the NUTS 3 functional level. The missing statistical data for the current period (2014), which are published with a delay, have been supplemented through calibration conditioned by the economic base using econometric-statistical and optimisation methods. Other limitations of the model include the assumption that funds are allocated according to specific priorities, which provides only an indirect link to the economic output of individual sectors. Moreover, the model takes only direct effects on the public sector efficiency in to consideration, without quantifying alternative impacts on the public sector employment. Through analytical calibration on historical data in each region, HERMIN is able to estimate the spill-over effects between individual sectors of a particular region, which represent a positive feature of the model. Thanks to this assumption, the model is able to predict the development of a particular sector through multipliers also in a situation where the sector is not influenced by direct effects (e.g. industry). As regards the creation of new jobs, the model assumes that all jobs are conducted by the workforce available in the region; in other words, the model does not capture the aspect of inter-regional workforce migration, which is in general low and occurs almost exclusively in case of Bratislava region. When interpreting the results, this fact must be taken into account because the model does not reflect the impact of migration on increased household income and consumption in the region from which workforce originated.

Scenarios

The concept of the model's simulation is based on three scenarios. The baseline scenario, also called benchmark scenario, describes the economic development in the context of real economic development. This aspect represents the main difference between the ex-post analysis and ex-ante evaluation where the baseline scenario is developed on the assumption of zero SF and CF implementation. The baseline scenario is thus based on the actual economic development of Slovak regions according to the officially published statistics, complemented with a set of data updated through regional calibration. Alternative scenario 1 describes how individual regions would develop without SF and CF implementation. The SF and CF implementation for 2007-2014 is defined as actual spending of funds based on the indicative disaggregation of data from the ITMS. The SF and CF implementation in 2015 is based on the assumption of reaching the 89-% absorption target and an evenly spread intensity of spending among regions[11]. Alternative scenario 2 describes how individual regions would develop if SF and CF implementation reached 100 %[12]. Also in this case, the 2007-2014 EU funds implementation is based on real development, while the 2015 implementation represents the spending of residual allocations in individual regions. Therefore, if these alternative scenarios were compared, the difference in the allocation would occur only in 2015. In the other words 2007-2014 development does not influence the type of the alternative scenario. The net impact of the SF a CF on the economic development of individual regions is the difference between the baseline scenario and alternative scenario. The following chapters of the publication describe in detail the results achieved under alternative scenarios when zero implementation of the SF and CF in the economy

[11]For the sake of approximation of the pace of implementation 2015 we assumed the spending of 35 % from the total cumulating spending in 2007-2014 in the given region.

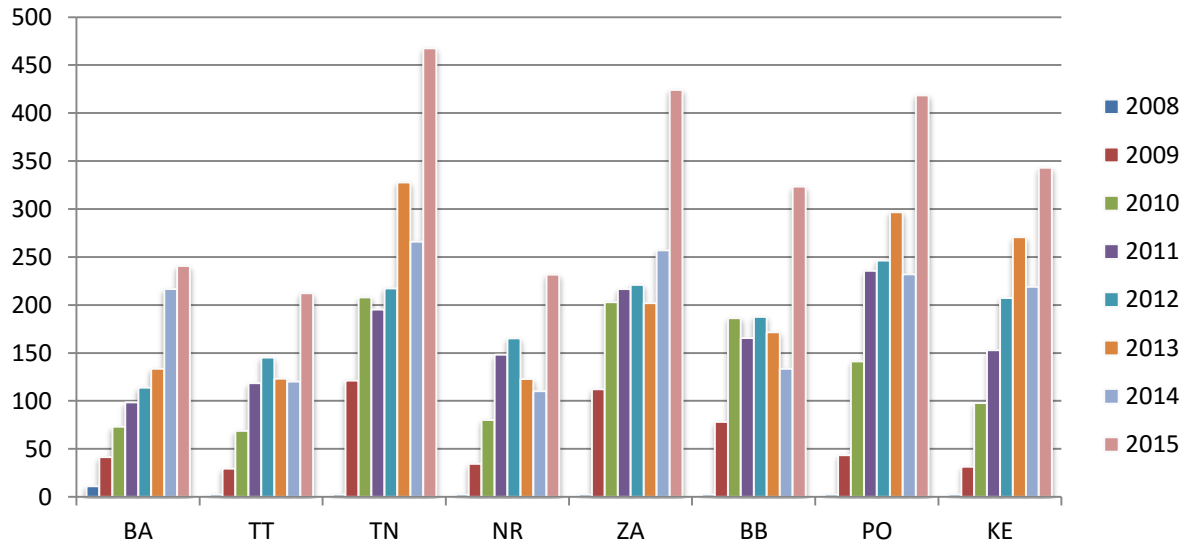
[12]The difference between alternative scenarios 1 and 2 lies only in the estimated volume of EU funds to be spent in 2015, i.e., unfinished implementation period (an ex-ante element). If the actual spending in 2015 differs from the estimate, it should not have any significant impact on the values presented for 2014.

would occur. In more detailed quantification of impacts (Chapter 4), the results of the 89 % spending of the SF and CF scenario are presented. Chapter 3.3 discusses alternative impacts assuming 100-% implementation. This scenario represents the "maximal" potential effect of implementing the entire available allocation. However, this scenario disregards the impact of other factors on the effectiveness of funds (e.g., structure and accrued/deferred expenditures)[13]. In developing the 2015 forecast, the input exogenous variables in the model were based on a conservative estimate, which is the same for both alternative scenarios.

3.1 Impact of Cohesion Policy at regional level at 89 % absorption rate

Amounts of EU funds implemented in case of the 89-% scenario are presented in Chart 10. The highest volumes were spent in the regions of Trenčín, Prešov, Žilina and Košice. If the 89-% scenario assumptions are to be met, spending of EU funds would accelerate in all regions of Slovakia during 2015.

Chart 10: Spending of SF and CF, in million EUR, 89% scenario



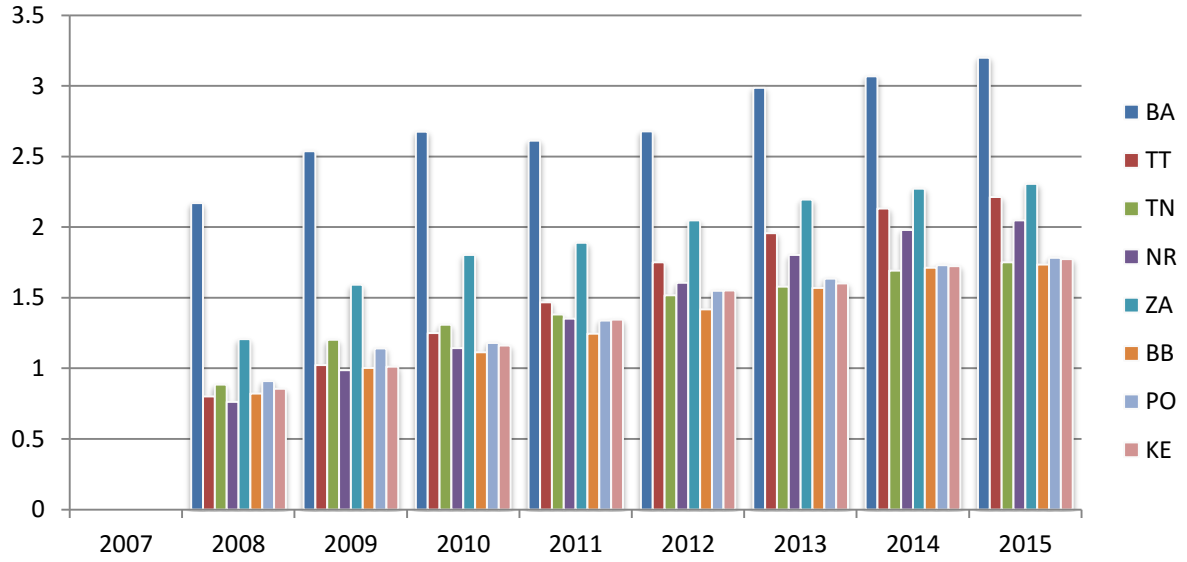
Source: ITMS and calculations by authors

The CSF multiplier represents one of the most important indicators for assessing Cohesion Policy impacts at the regional and national level. The indicator quantifies the effectiveness of invested funds measured by amount of regional GDP generated. The higher the value of the multiplier, the higher the effect of EU funds (put simply, additional effect (in EUR) on GDP per euro invested from the SF and CF). The multiplier is calculated as a ratio between the cumulative additional GDP and cumulative SF and CF investments in the region. In simplified terms, the multiplier shows how one euro invested from the SF and CF contributed to additional GDP growth expressed in euros. The following Chart 11 and Table 6 illustrate how the multiplier developed in individual regions under 89% scenario. The highest cumulative multiplier was reached in the Bratislava region. Its value increased to 3.1 in 2014 and 3.2 in 2015. In 2014, the multiplier in the Trnava and Žilina regions reached 2.1 and 2.3, respectively. The lowest value of the cumulative multiplier in 2014 (1.7) was reached in the

[13] See, for example, Radvanský, Frank, 2010

regions of Prešov, Banská Bystrica, Košice and Trenčín. The region of Banská Bystrica would reach the value of 1.7 also in 2015.

Chart 11: CSF multipliers by individual regions



Source: calculations by authors

Investments from the SF and CF funds could create more than 124 000 new jobs in 2015 in case of 89% scenario conditions hold. For the year 2014 the model indicates the creation of almost 79 000 new jobs. The highest number of new jobs in 2015, over 22 000, can potentially be created through SF and CF implementation in the Trenčín and Žilina regions. This increase may be due to the fact that these two regions reported the highest SF and CF implementation in nominal terms. At the same time, these two regions invested the highest volume of funds in the development of physical infrastructure connected to a sector which is relatively labour intensive. Under this scenario, more than 20 000 new jobs could also be created in the Prešov region in 2015. The forecast for the region of Banská Bystrica is 14 000 new jobs in 2015. The lowest numbers of new jobs created in 2015 through Cohesion Policy investments will be in the Bratislava and Trnava regions where the model indicates the creation of more than 11 000 new jobs.

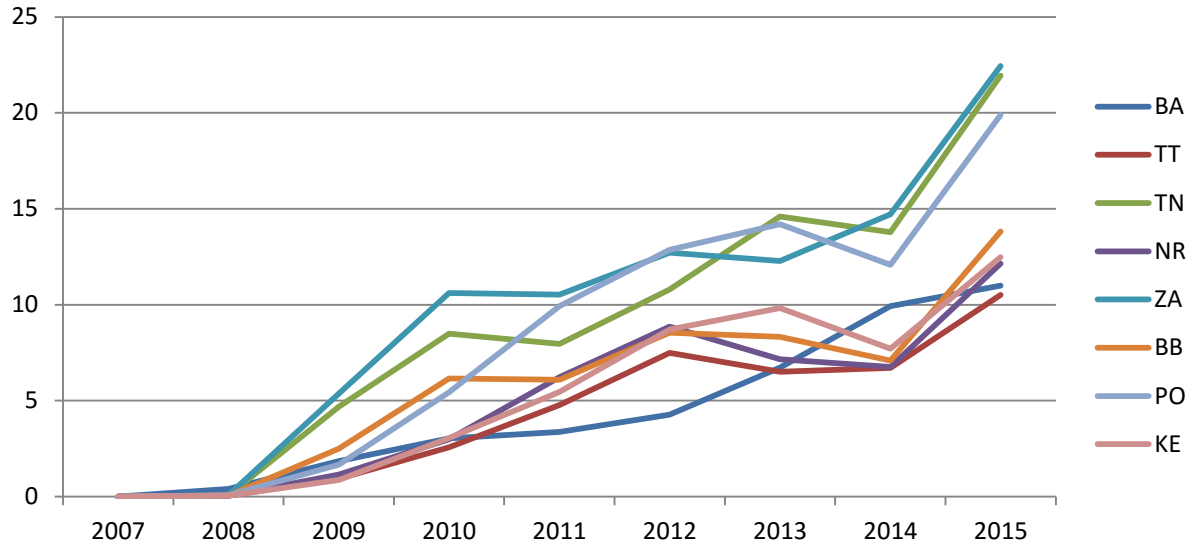
Table 6: CSF multipliers by individual regions

	2007	2008	2009	2010	2011	2012	2013	2014	2015
BA	0	2.2	2.5	2.7	2.6	2.7	3.0	3.1	3.2
TT	0	0.8	1.0	1.3	1.5	1.8	2.0	2.1	2.2
TN	0	0.9	1.2	1.3	1.4	1.5	1.6	1.7	1.8
NR	0	0.8	1.0	1.1	1.4	1.6	1.8	2.0	2.0
ZA	0	1.2	1.6	1.8	1.9	2.0	2.2	2.3	2.3
BB	0	0.8	1.0	1.1	1.2	1.4	1.6	1.7	1.7
PO	0	0.9	1.1	1.2	1.3	1.5	1.6	1.7	1.8
KE	0	0.9	1.0	1.2	1.3	1.6	1.6	1.7	1.8

Source: calculations by authors

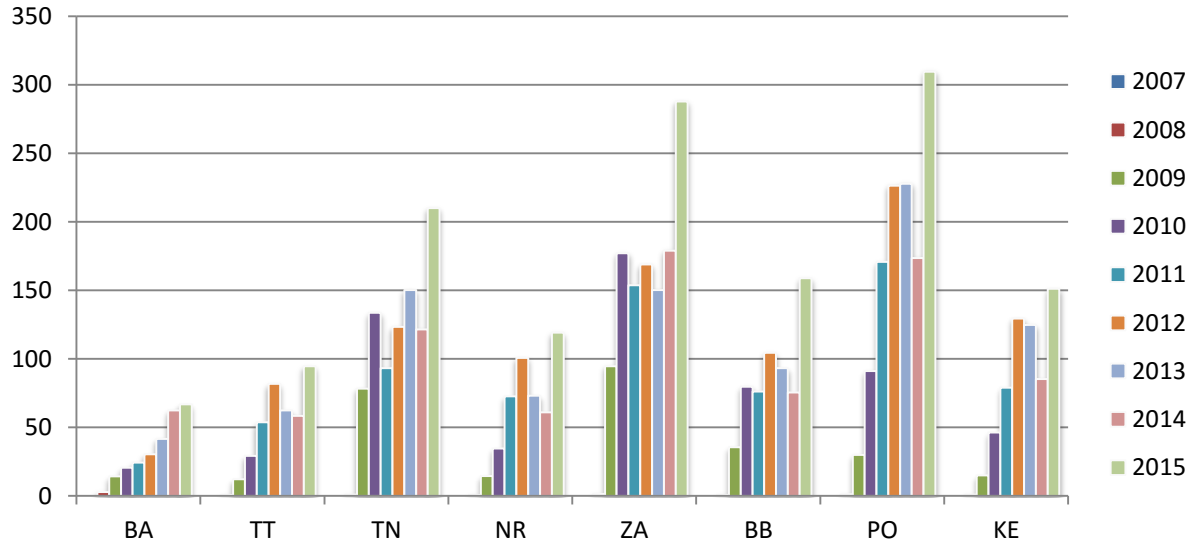
The 2014/2013 decline in the number of newly created jobs in the regions of Banská Bystrica, Košice, Nitra, Prešov and Trenčín was primarily due to the decrease in amount of SF and CF invested. The Trnava region maintained the number of the new jobs created in 2014 mainly thanks to the stabilisation in the spending of EU funds between years 2013 and 2014. The 2014/2013 increase in the number of new jobs in the Bratislava and Žilina regions is attributable to the acceleration in the SF and CF spending. We expect the number of new jobs to further increase in 2015 in all regions mainly due to the enormous expected increase in the spending of EU funds towards meeting the 89-% target.

Chart 12: Number of new jobs created, thousands of persons



Source: calculations by authors

Chart 13: Additional gross value added in the construction sector, in million EUR

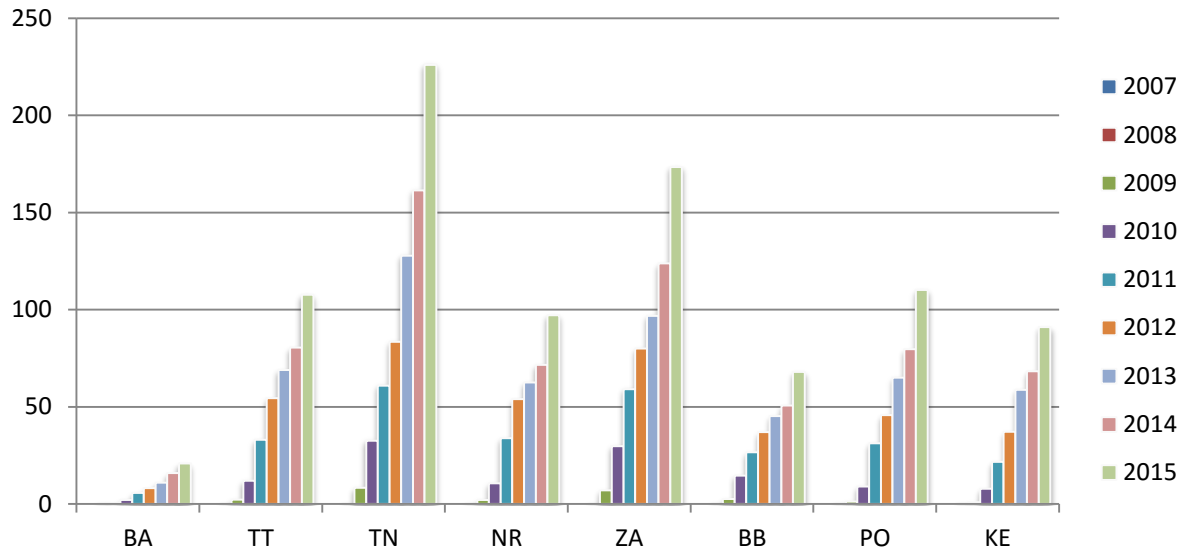


Source: calculations by authors

The highest additional increase in gross value added created in the construction sector was recorded in the Žilina and Prešov regions where it reached more than EUR 170 million in 2014; the forecast for 2015 is EUR 309 million in the Prešov region and EUR 288 million in

the Žilina region. Also the Trenčín region exceeded the threshold of EUR 100 million in the additional gross value added created in the construction sector in 2014.

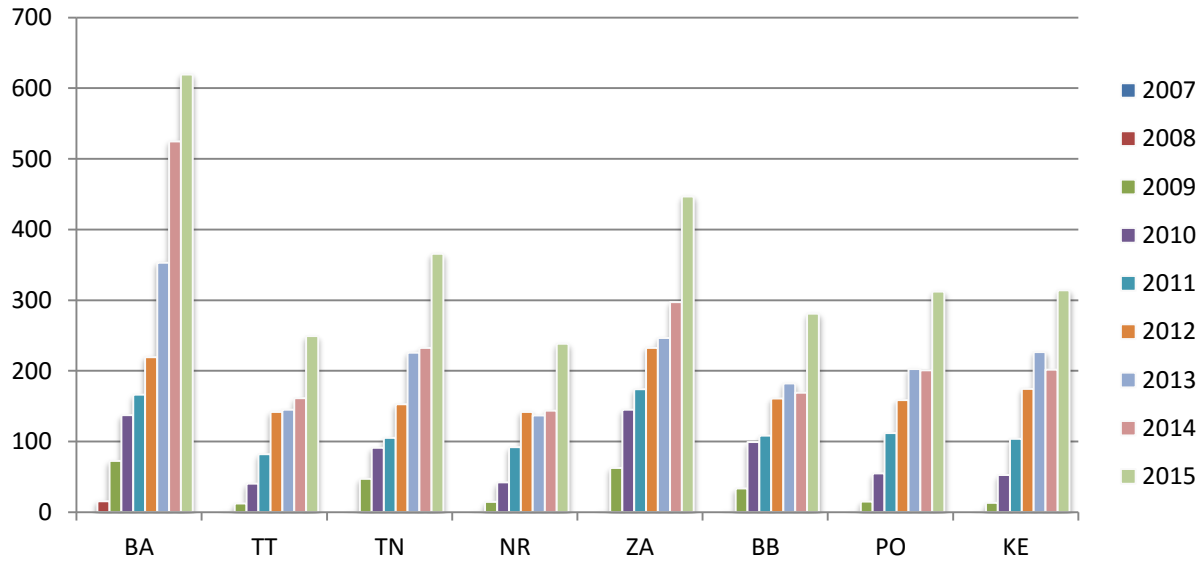
Chart 14: Additional gross value added in industry, in million EUR



Source: calculations by authors

The lowest increase in gross value added in this sector was in the Bratislava region. In 2015, we expect the additional gross value added created in the construction sector to increase in all regions due to the nominal increase in SF and CF funded investments in physical infrastructure.

Chart 15: Additional gross value added in market services, in million EUR



Source: calculations by authors

The most significant increase in the SF- and CF-induced creation of gross value added in industry was again recorded in the Trenčín region where the increase was clearly above the figures reported by other regions. The increases in gross value added in the remaining regions were comparable, except for the Banská Bystrica region where SF and CF

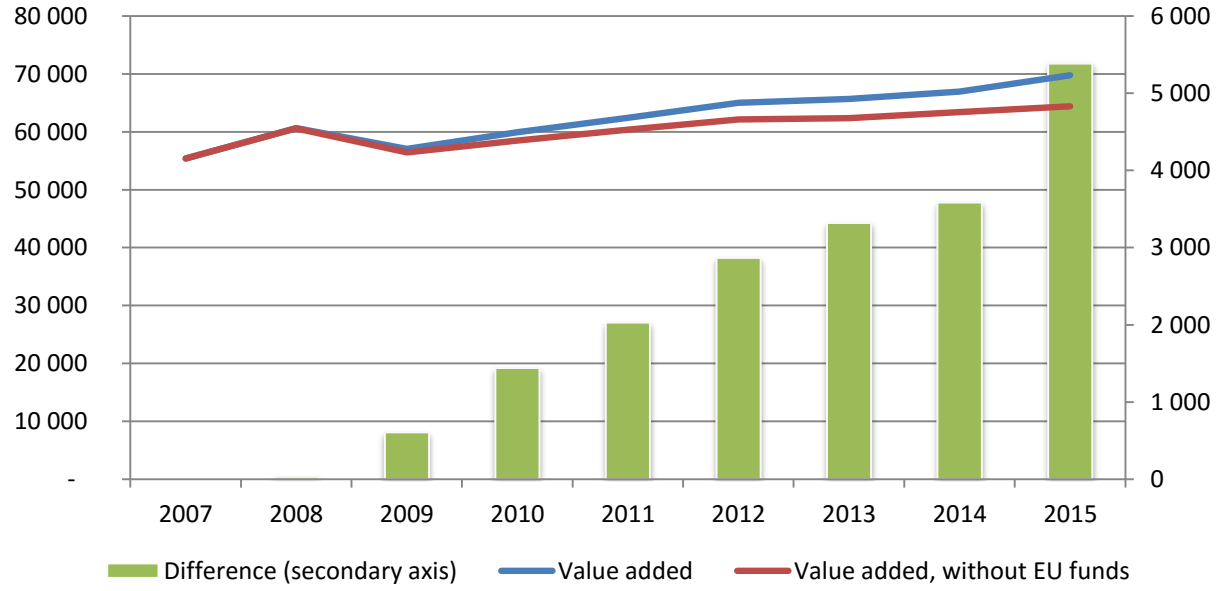
investments would increase gross value added in industry by EUR 68 million in 2015 compared to only EUR 51 million in 2014. The increase in gross value added in industry in the Bratislava region was even lower, by EUR 16 million in 2014; our expectation for 2015 is EUR 21 million. In 2015, we expect the additional gross value added created in industry to increase also in all remaining regions due to the expected nominal increase in SF and CF investments.

The highest increase in the gross value added created in the sector of market services was recorded in the Bratislava region due to the increased implementation of EU funds in the region. In the regions of Žilina, Trenčín, Košice and Prešov, the additional gross value added created in the sector increased by more than EUR 200 million in 2014. Under 89% scenario, we expect the additional gross value added in these regions to exceed EUR 300 million in 2015, while the additional gross value added would increase in the Bratislava region about EUR 620 million.

3.2 Impact of Cohesion Policy at national level at 89 % absorption rate

The effect of using SF and CF at the national level in 89 % scenario was estimated using regional econometric model HERMIN. A detailed description of the model is provided in chapter 2 of this publication. National-level results are estimated based on partial regional-level results. Our analysis and interpretation of the results also took into consideration the outputs from the national HERMIN model, but a greater emphasis was put on the results of the set of regional models.

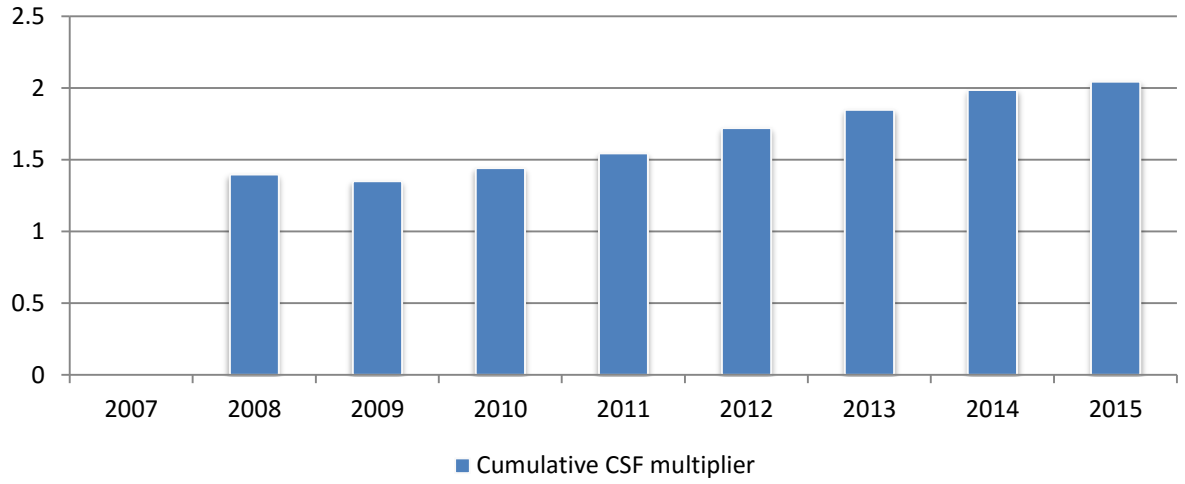
Chart 16: Gross value added at current prices, in million EUR



Source: Slovak Statistical Office and calculations by authors

The cumulative CSF multiplier for Slovakia followed an upward trend. It reached a zero value in 2007 because no resources were spent from the CF and SF. Between 2008 and 2010; it stayed around the 1.4 level. Subsequently, we observe an upward trend in the CSF multiplier that reached nearly 2 in 2014. We expect the multiplier to exceed this level in 2015.

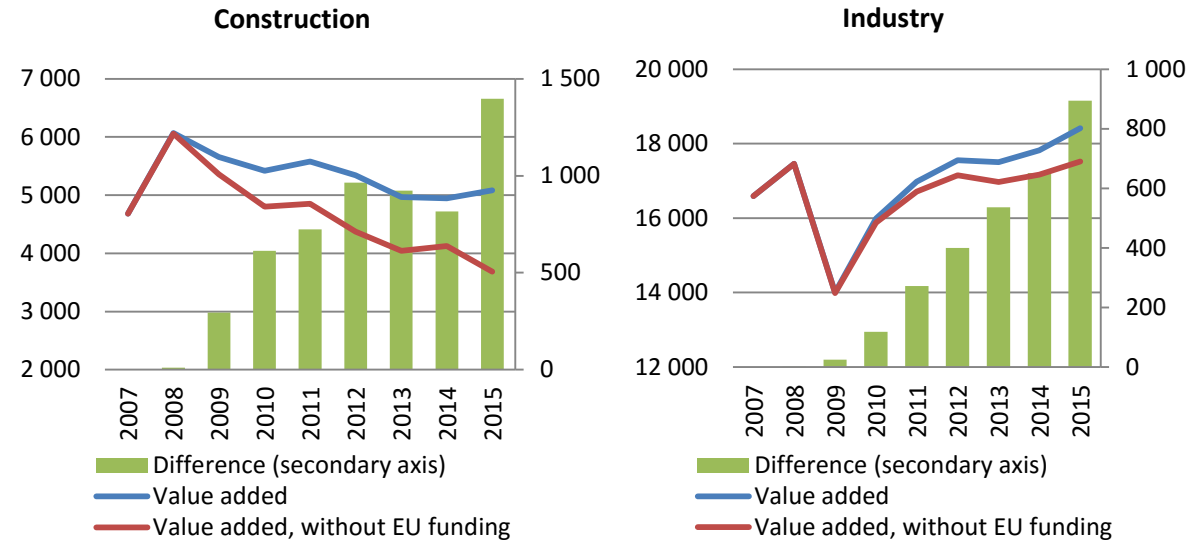
Chart 17: Cumulative CSF multiplier for Slovakia

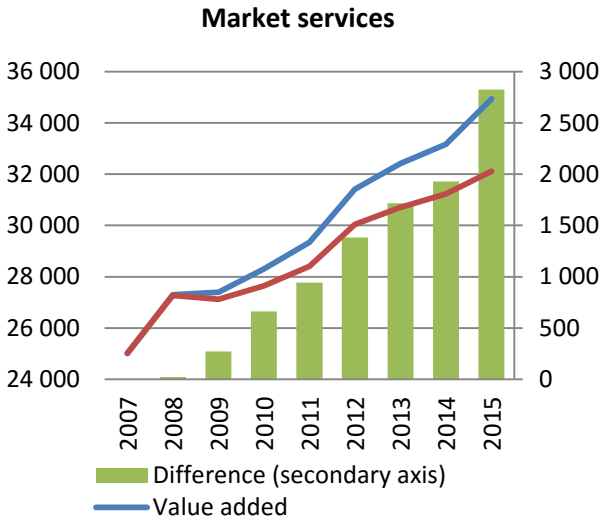


Source: Slovak Statistical Office and calculations by authors

The total value added follows a stable upward trend over the programming period, with the impact of investments measured by the CSF multiplier resulting from the implementation of the Cohesion Policy showing a clearly growing positive effect on the creation of gross value added. In 2014, the effect of spending of SF and CF would be slightly above 5.7 %; the rate should increase to as much as 8.4 % of total gross value added by 2015. A higher growth in gross value added is primarily affected by increased spending of SF and CF in 2015. This change was primarily driven by market services and construction sectors, while the industrial sector had the lowest impact. The market services sector accounted for 50 % of the change on average over the reporting period, the construction sector contributed 33 % and industry 11 %. Agriculture and non-market services accounted for the rest.

Chart 18/a-c: Gross value added in construction, industry and market services, current prices, in million EUR

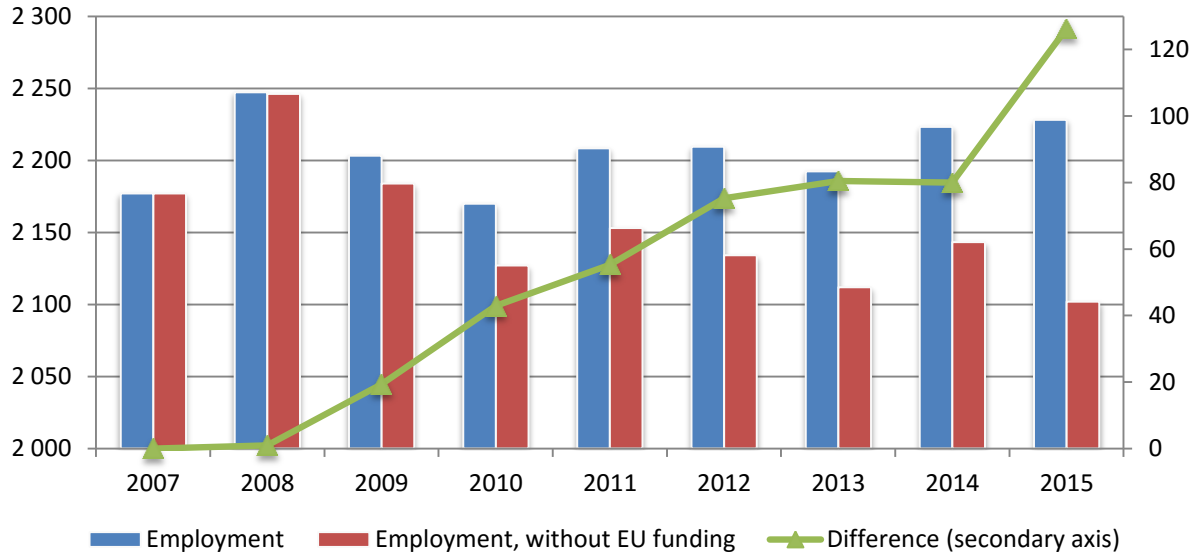




Source: Slovak Statistical Office and calculations by authors

The SF and CF implementation had the highest relative impact on the creation of gross value added in construction and market services, the weakest occurred in the industry sector. In addition, the building of transport infrastructure led to a significant growth in output of the construction sector. If infrastructure projects had not been implemented, this sector would have seen a major drop in its output. Market services, being the largest sector subject to the analysis, show the most significant direct and indirect impacts driven by IT modernisation, investments in innovative services, etc. At the same time, indirect positive impacts from other sectors create a considerable portion of additional growth in this sector. A multiplier effect of an increased demand in other sectors and a growth generated by higher household demand were most prominently felt in this sector. Of the three primary sectors analysed, the industry sector showed the least intensive response to the impacts of the SF and CF implementation in the national economy. The key reason is that the industry adapts relatively slower to a change in demand, yet this sector produces output that is more sustainable in a long-term. Therefore, its response to a change in investment demand, as well as to demand from other sectors is less intensive. We can further expect that indirect effects of spending had and will have a lesser impact on the volume of production in the industry when compared to the construction and market services sectors.

Chart 19: Employment development, thousands of persons

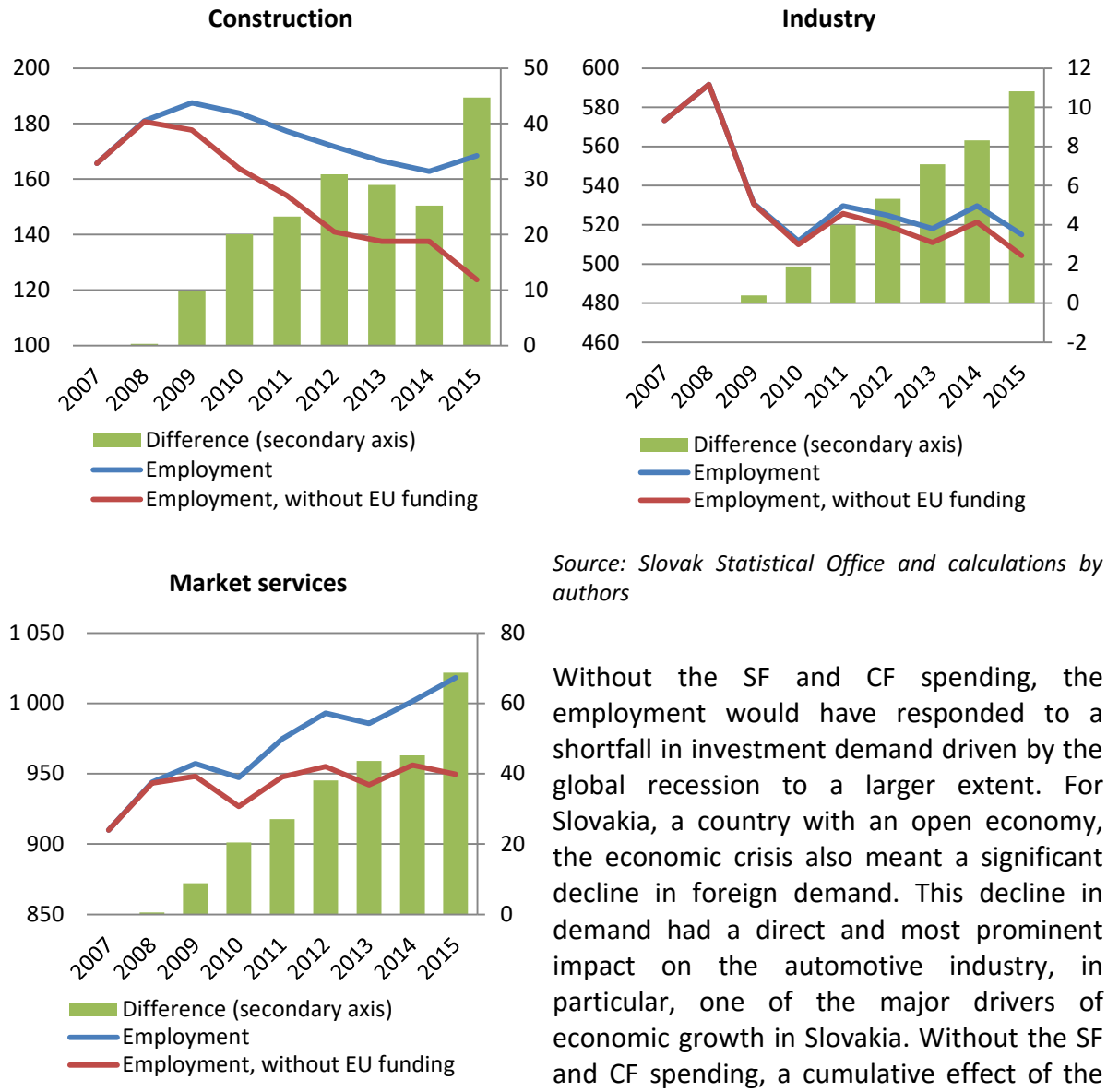


Source: Slovak Statistical Office and calculations by authors

The examination of the SF and CF spending impacts on employment at the national level showed a considerably positive impact of the Cohesion policy on the creation of new jobs

and the number of employed persons. Without the contribution of the SF and CF, the number of the employed would have been significantly lower. The total number of the employed would have been lower nearly by 79 000 persons (which represents more than a 4 % decrease in employment) in 2014, and nearly by 124 000 persons (representing a decrease in employment of almost 5.7 %) in 2015 in case of no SF and CF spending An additional growth in employment is expected in Slovakia in 2015 primarily as a consequence of increased SF and CF spending envisaged under the 89 % scenario.

Chart 20/a-c: Employment in construction, industry and market services, thousands of thousands of persons



Source: Slovak Statistical Office and calculations by authors

Without the SF and CF spending, the employment would have responded to a shortfall in investment demand driven by the global recession to a larger extent. For Slovakia, a country with an open economy, the economic crisis also meant a significant decline in foreign demand. This decline in demand had a direct and most prominent impact on the automotive industry, in particular, one of the major drivers of economic growth in Slovakia. Without the SF and CF spending, a cumulative effect of the crisis would have probably been more intensive and employment would have recover at a considerably slower pace in 2010 and would have been followed by a decrease in the number of the employed rather than by its stagnation. These effects would have indirectly been felt in the construction sector which generated a substantial portion of investments implemented in other sectors. In general, the average sustainability of jobs was estimated to

sit somewhere between 25 and 40 %[14]. Indirectly induced demand for labour roughly accounts for 50 % of total demand.

Labour market development in Slovakia is dependent on the economic development in individual sectors of the economy. If the SF and CF had not been implemented, the industry sector would have been most moderately responding, in terms of demand for labour, to the decline in investments. In 2014, the number of workers would have dropped by nearly 1.6 % in this sector; in 2015, the drop would be slightly above 2.1 %. The employment in the industry sector is driven by the production which is sustainable in the long term, responding more moderately to a change in investment demand. Similarly, the capital intensity of production in this sector is higher than its labour intensity. As far as employment is considered, the largest beneficiary of the SF and CF spending was the construction sector (in relative terms). Without the SF and CF spending, the total number of the employed in this sector would have been down by more than 18 % in 2014 and more than 26 % in 2015. Despite the fact that the implementation of the SF and CF resources had the most positive impact on the employment in the construction sector, the overall employment in the sector has been falling since 2009 anyway. Labour demand in market services would also have seen decline if the SF and CF spending had not been made. This sector would have employed nearly 5 % less people in 2014 and just above 7 % less people in 2015. This notably positive effect of the Cohesion Policy in the two sectors was driven by direct, as well as indirect impacts. We can observe an increase in the additional employment in 2015 in all sectors. The increase is primarily caused by an enormous growth in the spending of the SF and CF funds in 2015 driven by the assumptions under the 89 % scenario.

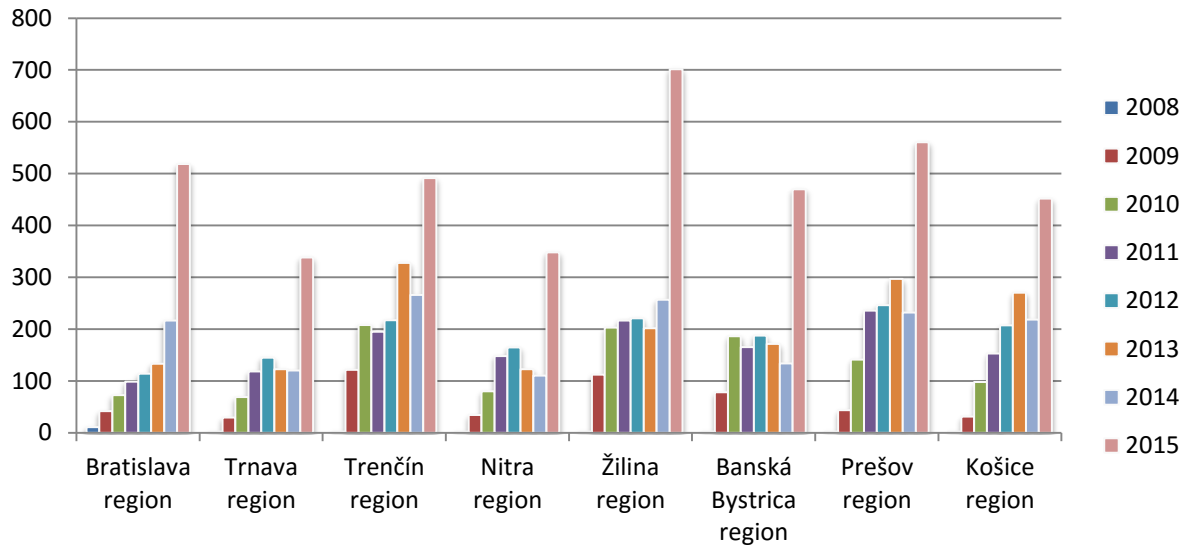
3.3 Impact of Cohesion Policy at national level at 100 % absorption rate

The spending of SF and CF in the case of alternative scenario 2, assuming 100 % absorption is shown on Chart 21. However, in order to absorb 100 % of total allocation, a several-fold increase in the current pace of spending would be necessary in the last year of the programming period. The absorption of such an enormous volume of financial resources in 2015, when a real beginning of the spending of the funds under new programming period 2014-2020 is expected, is unlikely and would lead to ineffectiveness. In 2015, the spending of the SF and CF resources under the current 2007-2013 programming period alone would have to be twice the 2010-2014 average rate of the SF and CF spending.

Since alternative scenario 1 (89 %) and alternative scenario 2 (100 %) contain different assumptions concerning the volume of the funds spent for 2015 only, the remaining part of the chapter will only analyse the differences between the effects of this two scenarios for this year. First, it is necessary to illustrate the differences in the total absorption of funds. Table 7 shows the difference in allocations under alternative 89% scenario and alternative 100% scenario.

[14]In addition to its structure, the distribution of spending in time is pivotal with respect to the sustainability of jobs. A more even financial implementation during the whole programming period would provide higher sustainability rate of new jobs.

Chart 21: SF and CF spending, EUR million



Source: ITMS and calculations by authors

The difference in the volume of SF and CF resources absorbed in all regions would exceed EUR 1.2 billion in 2015. The largest aggregate difference between the alternative scenarios at the regional level can be seen in case of Bratislava and Žilina regions, where 100 % absorption would roughly bring in additional EUR 278 million. The Trenčín region is on the opposite side of the spectrum, with a difference of some EUR 25 million which indicates that the absorption of the EU funds is expected to approach a 100 % level of regional allocation even under 89% scenario.

Table 7: Differences in the spending of EU funds under alternative scenarios 1 and 2 (89% and 100%), EUR million

	BA	TT	TN	NR	ZA	BB	PO	KE
2015	278.1	126.0	24.0	116.7	277.4	146.9	142.1	108.8

Source: calculations by authors

The spending of additional resources from Structural Funds in the economy under 100% scenario will also increase the creation of gross value added, compared to 89% scenario, translating into an additional growth in GDP in all regions. In the case of the Trenčín region, a relatively lower volume of additionally created gross value added can be expected compared to the expected volume of additional implementation. For the remaining regions the efficiency of additional spending of resources measured in additional value added would be relatively higher. It means that additional resources implemented under 100% scenario has a potential to generate an additional value added in all regions.

Table 8: Differences in gross value added under alternative scenarios, EUR million, current prices (cumulatively for all sectors)

	BA	TT	TN	NR	ZA	BB	PO	KE
2015	622.9	170.8	17.2	159.3	415.7	173.4	179.7	202.5

Source: calculations by authors

Taking a more detailed look at the efficiency of additional resources under 100% scenario, it can be observed that their implementation would has a negative impact on the total

efficiency in all regions. Only in Bratislava and Žilina regions would the efficiently stagnate or, respectively, slightly increase. For the Trenčín region, the additional gross value added would be lower than the volume of additionally spent SF and CF resources, indicating that this region has exceeded the limit of its absorption capacity. For other regions, the volume of additional GDP generated by the implementation of additional EU funds would exceed the volume of additional funds spent, but their efficiency would be lower than the one of the funds spent so far. This fact indicates a non-efficiency resulting from a massive increase in the volume of the funds spent in these regions compared to previous years. When comparing CSF multipliers under alternative scenarios, a higher volume of resources spent would contribute to a higher growth in GDP in all regions. On the other hand, the values of CSF multipliers are smaller for individual regions under 100% scenario, due to the reduction of efficiency of the SF and CF. The only exemption are CSF multiplier values in Žilina region in which a moderate increase in efficiency is expected under 100% scenario. These facts indicate that the efficiency under 100% scenario were lower than under 89% scenario due an enormous increase in the spending of resources. However in the case of Žilina region, based on the results we can state that the volume of allocated resources did not exceed the limit of its absorption capacity even under 100% scenario.

Table 9: Differences in CSF multipliers in the results under alternative scenarios

	BA	TT	TN	NR	ZA	BB	PO	KE
2015	0.01	-0.09	-0.07	-0.06	0.16	-0.12	-0.01	-0.06

Source: calculations by authors

If the assumptions under 100% scenario are met, the model estimates show a generally more positive impact of the spending of EU funds on employment in comparison to 89% scenario. More than 45 000 additional new jobs would be created in 2015. The largest increase in employment would be seen in the Žilina and Bratislava regions. The Trenčín region would see the lowest growth in employment, as only some 500 additional new jobs would be created.

Table 10: Difference in employment under alternative scenarios, thousands of persons

	BA	TT	TN	NR	ZA	BB	PO	KE
2015	9.2	4.5	0.5	4.8	11.0	5.2	5.3	4.9

Source: calculations by authors

The following tables (Table 11, 12 and 13) include data comparing the results of 100% scenario against 89% scenario. The tables illustrate the impact of the additional allocation on the gross value added in individual sectors. The most significant increase in gross value added produced in the construction sector would occur in the Žilina region for which 89% scenario anticipates a relatively lower uptake of resources for infrastructure development.

Table 11: Difference in gross value added produced in the construction sector under alternative scenarios, EUR million, current prices

	BA	TT	TN	NR	ZA	BB	PO	KE	SK
2015	54	44	6	51	156	61	88	65	524

Source: calculations by authors

Table 12: Difference in gross value added produced in the industry sector under alternative scenarios, EUR million, current prices

	BA	TT	TN	NR	ZA	BB	PO	KE	SK
2015	7	18	2	15	36	10	12	14	114

Source: calculations by authors

Table 13: Difference in gross value added produced in the market services sector under alternative scenarios, EUR million, current prices

	BA	TT	TN	NR	ZA	BB	PO	KE	SK
2015	441	86	7	74	179	80	64	101	1032

Source: calculations by authors

The Trenčín region is on the opposite end, where only a moderate additional increase in gross value added, by EUR 6 million, in the construction sector could be expected. The most significant increase in the gross value added produced in the industry sector would again be expected in Žilina region. These are, however, rather marginal effects, given the size of the industry sector. A very moderate increase would be felt in the remaining regions. The gross value added would increase by some EUR 440 million in the market services sector in the Bratislava region, representing a nearly 2.5-times higher growth compared to a region whith the second highest, i.e. Žilina region. The highest additional effect of additionally resources, when comparing the two alternative scenarios, would be observed in case of the market services sector where the total volume of additionally produced gross value added would exceed EUR 1 billion.

3.4 Effects of implementation changes in 2014 and 2015 on effectiveness

This sub-chapter describes the main differences between results presented in this publication which incorporates the real implementation of the EU funds that occurred during 2014 with the results presented in the 2014 Evaluation Report[15]. Main goal is to illustrate changes in efficiency of SF and CF implementation due to different regional and time allocations. Main differences between 2014 Evaluation report and current 89% scenario assumptions about the structure and volumes of total implementation are presented in Table 14. In time of 2014 Evaluation report preparation there were expectations about increasing amount of total spending in year 2014, while real data shown significant decrease in comparison to 2013 (Chart 10). To keep the planned spending at the same level of 89% that was also expected in the Evaluation report 2014 it was inevitable to expect more significant increase of spending in 2015. Relatively problematic scenario to reach implementation close to the 100 % of total allocation became very improbable and would require spending of twice as much funds in comparison to previous years (please consult Chart 10 to overview of allocation related to 89% scenario and Chart 21 to 100 % scenario). The currently applied scenario related to 89 % implementation is thus for 2014 by 282 mil. EUR lower and by almost 521 mil. EUR higher in 2015 than was expectations presented in 2014 Evaluation report.

[15] Evaluation report is available at: nsrr.sk/download.php?FNAME=1411462887.upl&ANAME=EVALUATION_REPORT_20140630_.pdf

Table 14: Difference in EU funds uptake, EUR million, current prices

	BA	TT	TN	NR	ZA	BB	PO	KE	SK
2014	67.5	-16.3	-102.1	-25.7	31.9	-57.1	-97.9	-82.4	-282.2
2015	66.8	53.3	38.5	73.4	161.8	101.0	34.3	-8.0	521.2

Source: calculations by authors

The difference in spending in 2014 Evaluation report compared to the actual spending contributed to the generation of more than EUR 200 million of additional GDP in 2014 in the Bratislava region. In Žilina region, additional resources (EUR 31.9 million) generated EUR 19 million only; it indicates that the 2014 Evaluation Report expected a higher efficiency than the efficiency actually achieved in the region. The values of additional GDP expected in 2015 indicate a substantial decrease in the marginal efficiency of additional resources, except for the Bratislava region.

Table 15: Difference in GDP formation, EUR million, current prices

	BA	TT	TN	NR	ZA	BB	PO	KE	SK
2014	231.4	-60.5	-184.0	-50.0	19.0	-56.9	-97.5	-194.6	-393.1
2015	245.2	-4.3	-122.4	45.7	192.1	74.4	32.4	-140.5	322.7

Source: calculations by authors

The lower spending of EU funds in 2014 resulted in a decrease of the creation of new jobs, approximately by 16 000 jobs, compared to expectations of the 2014 Evaluation Report. The largest decrease occurred in Trenčín and Košice regions. On the other hand, the higher than expected spending of EU funds in 2014 generated additional employment in Bratislava and Žilina regions. In 2015, the expected employment should be higher to previous expectations by nearly 9 000 overall. A positive development is expected in all regions except for Trenčín and Košice where only a slight compensation of the 2014 decrease will occur.

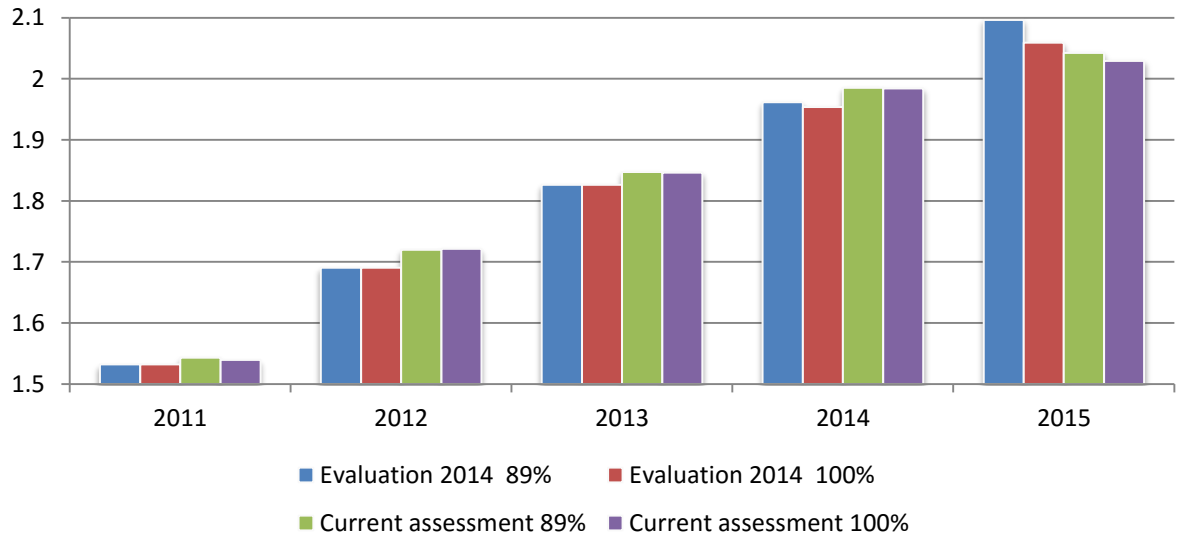
Table 16: Difference in employment, thousands of persons

	BA	TT	TN	NR	ZA	BB	PO	KE	SK
2014	3.6	-1.4	-6.3	-1.7	1.1	-2.2	-3.2	-6.2	-16.3
2015	3.6	0.7	-3.5	1.9	6.2	2.8	1.6	-4.4	8.9

Source: calculations by authors

Main goal of this comparison was to provide illustration of the attained values of CSF multipliers in the 2014 and 2015 results of which under both scenarios are shown on Chart 22. A slightly lower spending in 2014 and adjustments in regional data for the 2011-2014 period based on updated data pushed the multipliers' level upwards in this period. A higher expected allocation of funds in 2015 has clearly indicated a decrease in their efficiency under the current evaluation. The same can be seen when comparing the scenarios under the same evaluation at an 89 % and 100 % absorption rate. The spending efficiency was calibrated on the basis of real values until 2014 (or until 2013 in the less recent evaluation). The decrease in the actual spending rate in 2014 and its expected sharp rise in the last year of the programming period indicate a one-off decline in the CSF multiplier growth rate compared against the previous evaluation (Chart 22). Main conclusion based on this comparison is that the significant increase of spending leads to decrease of its efficiency.

Chart 22: Comparing estimated level of CSF multiplier under the current evaluation and the 2014 evaluation



Source: calculations by authors

4 Impact of Cohesion Policy implementation

4.1 Economic development at the national and regional level

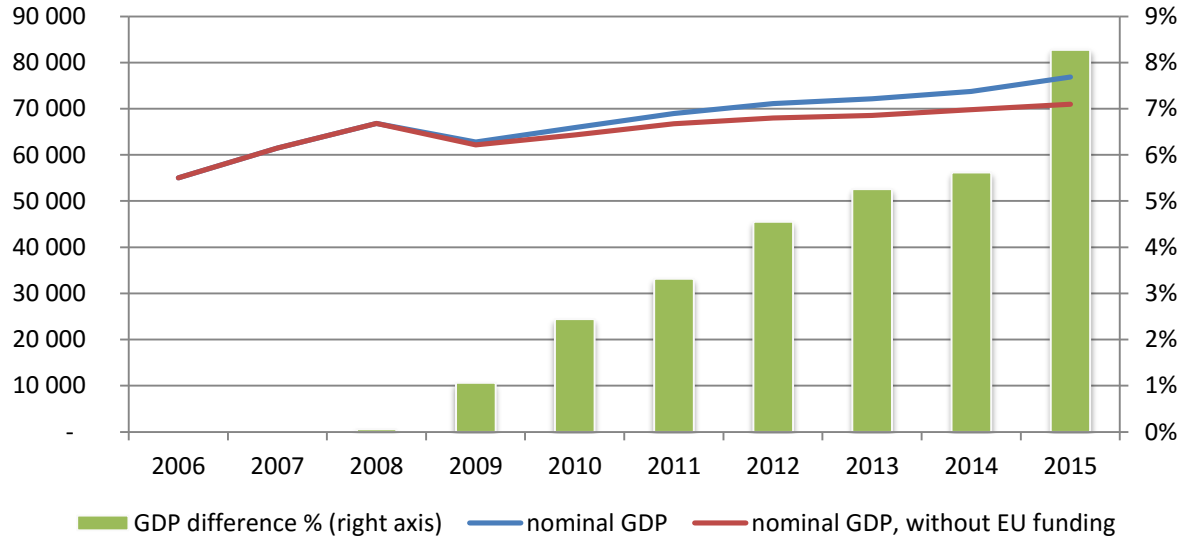
In order to assess the impact of the Cohesion Policy on the overall economic performance, attention was primarily given to analysing and comparing basic economic indicators comprising individual outputs from regional econometric model HERMIN. The results were then supplemented by the data obtained from aggregated national econometric model HERMIN. Those are mainly data about GDP in real and market prices, total employment, wages and household consumption. Individual parameters were analysed and compared at the national and regional level.

In order to analyse impact of SF and CF on economic development, two scenarios under the econometric model were compared. The first one, a so-called baseline scenario, is based on the actual state of affairs in which Slovakia spent financial resources from SF and CF during the 2007-2014 period. Throughout entire Chapter 4, we assume an increase in the pace of the spending EU funds spending in 2015 in comparison to previous years, resulting in a total SF and CF absorption at a level of 89 % of the original allocation. However, it must be noted that spending if this level of spending of the EU funds would be reached it would have to be 60 % higher in 2015 than in the most successful year of 2013. The alternative scenario describes economic development in individual Slovak regions without the support from SF and CF. The difference between the two scenarios represents a net effect of the spending of financial resources from the SF and CF.

The results of the econometric model indicate that the spending of financial resources from the SF and CF has a considerable positive impact on economic development throughout the entire implementation period. An additional growth in Slovak GDP begins to materialize from 2009; an additional cumulative growth in GDP formation in current prices is expected at a rate of 5.3 % in 2013, 5.6 % in 2014 and 8.3 % in 2015. It is a share of GDP in a given year including the EU funding against the scenario excluding the EU funding (Chart 23). On the other hand, an immediate effect of the expected massive spending in 2015 would bring a substantial contribution to an additional growth in GDP. A larger difference in 2015 is also caused by the fact that more evenly distributed spending would increase the level of nominal GDP in 2014.

An additional cumulative GDP formation in current prices in 2015 resulting from the implementation of EU funds is expected to reach of 30 % of GDP (16.7 % in 2013 and 22.3 % in 2014).For the sake of clarification, it is an amount of GDP generated by the implementation of the EU funds in previous and current year (a purple-shaded area in Chart 23). In other words, the implementation of the SF and CF funds for the entire period is expected to generate additional 30 % of last years´ GDP. The difference in the GDP growth is determined by the difference in GDP produced in a given year with and without the EU spending, the second value (cumulative GDP formation) gives the sum of these values over the implementation period. Due to the SF and CF implementation, a year-on-year real growth in GDP was on average higher by 0.9 percentage points during the 2009 - 2015 period. The difference in GDP in current prices under the baseline and alternative scenario exceeds EUR 5.8 billion in 2015 (the 2013 difference was EUR 3.6 billion and the 2014 difference was EUR 3.9 billion).

Chart 23: GDP development at the national level, in EUR million at current prices (left axis) and in % (right axis)



Source: calculations by authors

Table 17 shows the effect of the additional real growth in GDP at the regional level resulting from the spending of financial resources from SF and CF based on the results of regional econometric HERMIN model. In 2007 and 2008, no significant additional growth in GDP was observed, mainly due to the minimum level of spending of financial resources from the SF and CF. More distinct growth in GDP can be observed from 2009 when the actual spending of financial resources from the SF and CF also accelerated. Between 2009 and 2014, the most prominent additional growth in GDP driven by the implementation of EU funds was observed in the Trenčín, Žilina and Prešov regions. The Trenčín region saw the largest additional growth, by 2.4 p.p. in 2013, mainly due to the impacts of infrastructure projects. Additional growth between 0.5 p.p. and 1.1 p.p. was annually observed in the 2009–2014 period in case of Slovakia. The real spending of the SF and CF in 2015 will be of key importance as it has a potential to bring an additional growth of as much as 4.5 p.p. in Slovak regions. (Table 17).

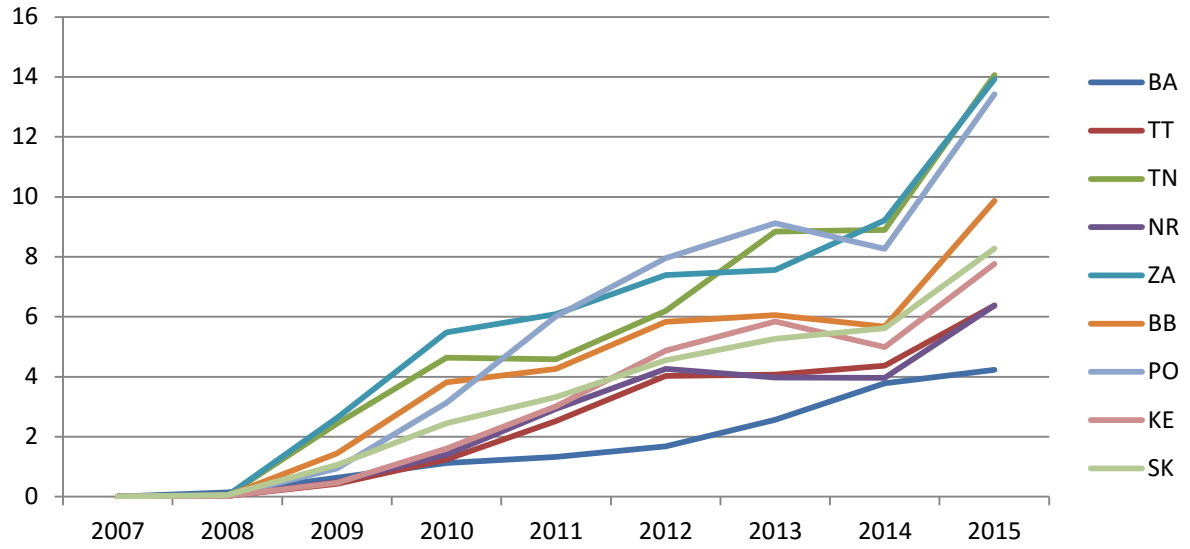
Table 17: Additional real GDP growth driven by SF and CF spending, in p.p.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	average
BA	0.0	0.1	0.5	0.5	0.2	0.3	0.9	1.2	0.5	0.5
TT	0.0	0.0	0.4	0.8	1.3	1.5	0.0	0.3	2.0	0.7
TN	0.0	0.0	2.2	2.2	0.0	1.6	2.4	0.1	4.6	1.4
NR	0.0	0.0	0.4	0.9	1.7	1.3	-0.3	0.0	2.4	0.7
ZA	0.0	0.0	2.4	2.9	0.6	1.2	0.2	1.5	4.3	1.5
BB	0.0	0.0	1.3	2.4	0.4	1.5	0.2	-0.4	3.9	1.1
PO	0.0	0.0	0.8	2.2	3.0	1.9	1.1	-0.8	4.7	1.4
KE	0.0	0.0	0.4	1.2	1.4	1.8	0.9	-0.8	2.7	0.8
SK	0.0	0.1	0.9	1.4	0.9	1.2	0.7	0.3	2.6	0.9

Source: calculations by authors

At the regional level, the largest difference in GDP formation driven by the SF and CF spending was observed in Trenčín and Žilina regions (14 %) A higher than 10 % difference in growth is also expected in the Prešov region (13 %). In 2014 all these regions posted additional GDP formation around the level of 9 % (Chart 24). On the other hand, the Bratislava region shows a difference in growth, driven by the EU spending, just above 4 % in the 2007-2015 period; it is largely caused by the size of its GDP and the volume of the SF and CF financial resources implemented, which only increased more substantially after year 2013.

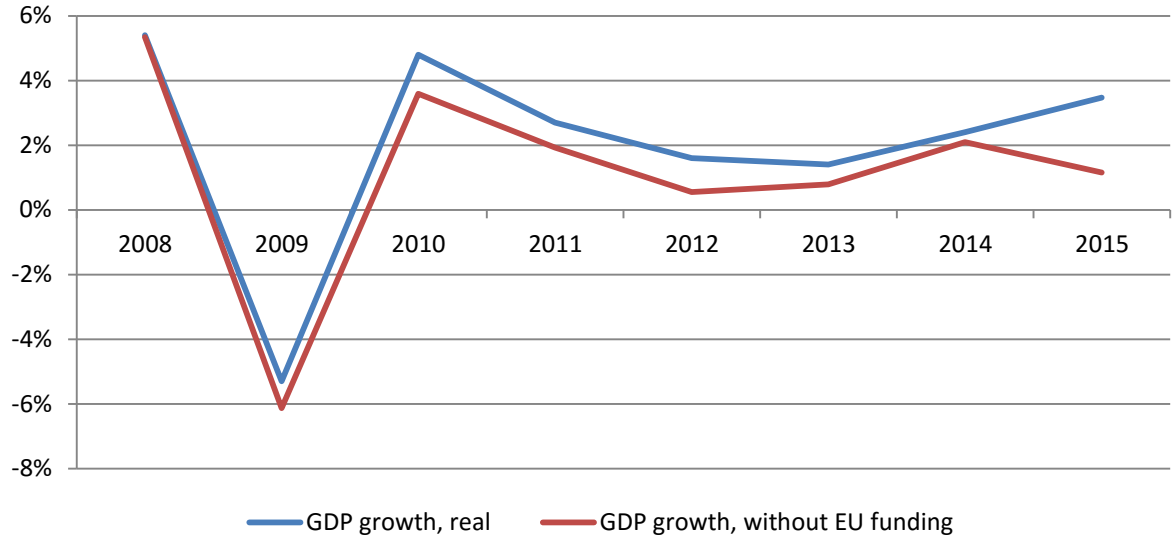
Chart 24: Additional cumulative GDP growth driven by the spending of SF and CF, in %, current prices



Source: calculations by authors

Compared to a projected development without the SF and CF spending a higher GDP growth was observed each year. In the crisis year of 2009, Slovak GDP would have dipped by additional 0.9 of a percentage point, with a year-on-year decrease in GDP at a rate of 6 %.

Chart 25: Estimated real growth in GDP with and without SF and CF, in %

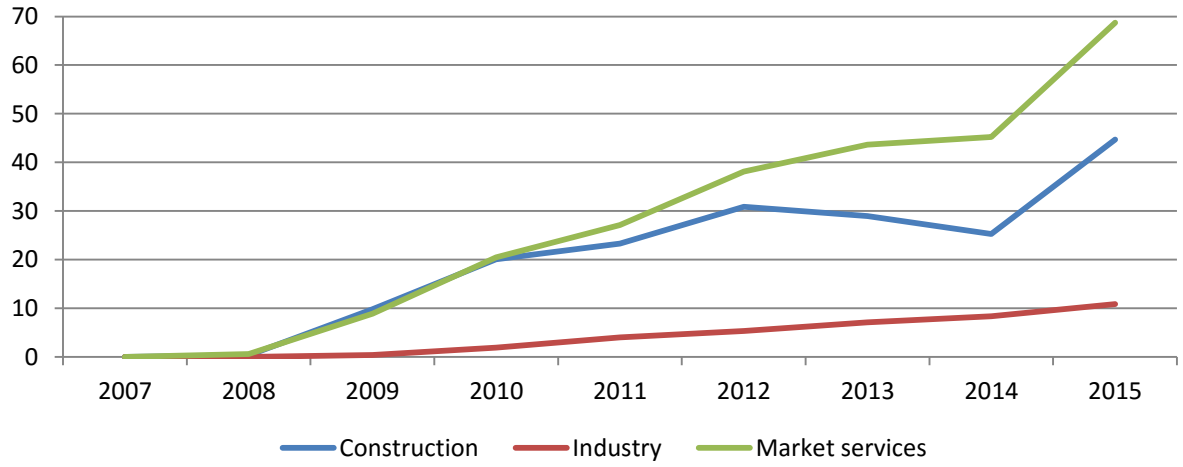


Source: calculations by authors

Slovak GDP grew 4.1 % in 2010, with the contribution from the spending of financial resources from the SF and CF that represented 1.4 percentage points. A relative deceleration in spending in 2014 with expected substantial growth in 2015 would result in a considerable growth in GDP, with the additional effect of the SF and CF spending amounting to as much as 2.6 p.p. Growth forecasts presented by a majority of institutions[16] do not envisage such a strong increase and anticipate a higher rate of unspent SF and CF resources in 2015.

A total of 45 000 jobs should be supported in the construction sector until 2015 backed by the spending of Structural Funds. The industry sector maintains the slowest but stable pace of creating new jobs. This sector created more than 8 000 additional jobs until 2014 due to the implementation of financial resources from the SF and CF. In 2015, more than 10 000 jobs should be created. This slower growth rate is caused by weaker direct links between the industry sector and the spending of financial resources from the SF and CF. Driven by spill-over effects among sectors and its strong links to other manufacturing sectors, making market services grow indirectly along with all sectors, the market services sector shows the highest additional employment. This sector created 45 000 additional jobs until 2014 due to the spending of financial resources from the SF and CF. In 2015, the market services sector is expected to employ nearly 70 000 additional persons compared to a situation without the spending of financial resources from the SF and CF.

Chart 26: Additional employment, thousands of persons



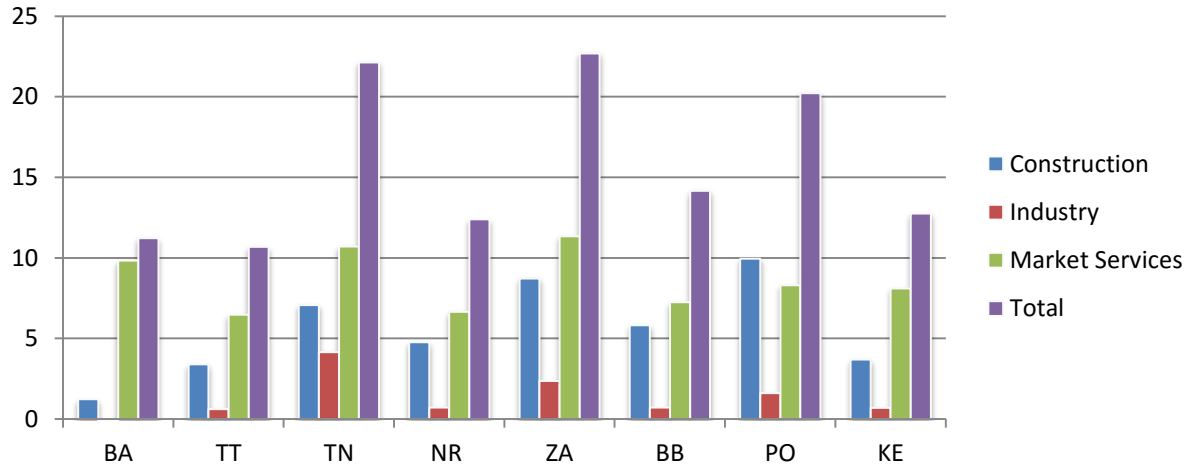
Source: calculations by authors

At the regional level, the highest number of new jobs is expected in the Trenčín, Žilina and Prešov regions where more than 20 000 new jobs might be created until 2015. The Banská Bystrica region is next with nearly 14 000 jobs. At the assumed 89 % absorption rate more than 10 000 jobs are expected to be created in all Slovak regions.

One of the limitations of the HERMIN model is that it does not count for spill-over effects among individual regions. It means that the model fails to capture effects of additional employment among individual regions. In addition, the model does not expect that a new job will be filled by a person from another region. Therefore, the possibility of filling a new job vacancy, for example, in the construction sector in the Trenčín region by an employee from another Slovak region needs be taken into consideration. The regional econometric HERMIN model does not explicitly cover this possibility.

[16] See, for example, the monthly Eastern Europe Consensus Forecast, London.

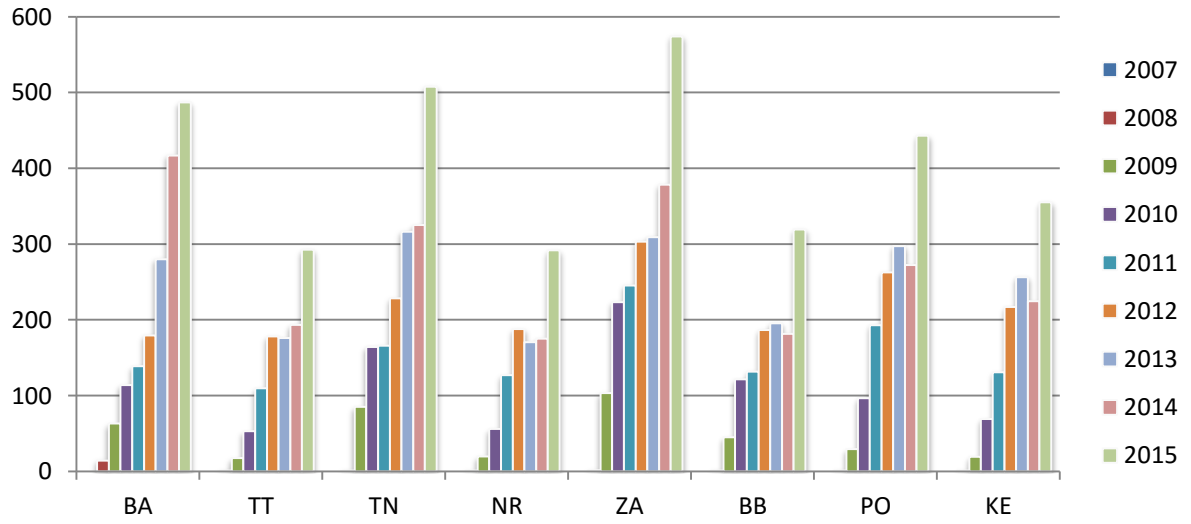
Chart 27: Number of new jobs in 2015, thousands of persons



Source: calculations by authors

Household consumption indirectly indicates the impact of the SF and CF on the wellbeing of households which may differ from GDP per capita. To that end, monitoring this indicator should be a priority from the cohesion and economic policy perspective. An increased household consumption as a net effect of the Cohesion Policy implementation was observed as late as 2009. Subsequently, a more distinct growth in additional household consumption was observed across all regions in 2010, due to the increased SF and CF spending and creation of new jobs. Since 2010, household consumption has followed an upward trend, but at a somewhat slower pace nearly in all regions. The rise in household consumption is primarily driven by higher employment levels in all regions. In period 2007 - 2015 the largest additional household consumption was recorded in the Žilina, Trenčín and Bratislava regions. In the Bratislava region, having a relatively low volume of funding and number of new jobs created, this growth is caused mainly by the structure of employment with wages above the national average. The smallest increase in household consumption driven by SF and CF implementation was observed in Nitra and Trnava regions. We expect that due to the acceleration of SF and CF implementation at the end of the programming period, the household consumption will further increase in 2015.

Chart 28: Growth in household consumption driven by SF and CF spending, in million EUR



Source: calculations by authors

The SF and CF implementation increased the household consumption by 7.6 % between years 2007 and 2015. The rise in consumption is primarily driven by increased employment but a growth in average wage also contributed to this development. The development in household consumption shows regional differences. The largest cumulative growth in household consumption of 12 % was observed in the Trenčín region. The second largest growth in household consumption compared against to the no-spending scenario is expected to occur in Žilina region at 11.4 %. Nitra region has the lowest expected cumulative household consumption, staying below 6 %. The Bratislava region shows a low relative increase in consumption caused by a significant difference in the value of household consumption in this region. Affected by the spending of financial resources from the SF and CF, household consumption increased in individual regions, and also contributed to the mitigation of negative impacts of the economic crisis on economic growth.

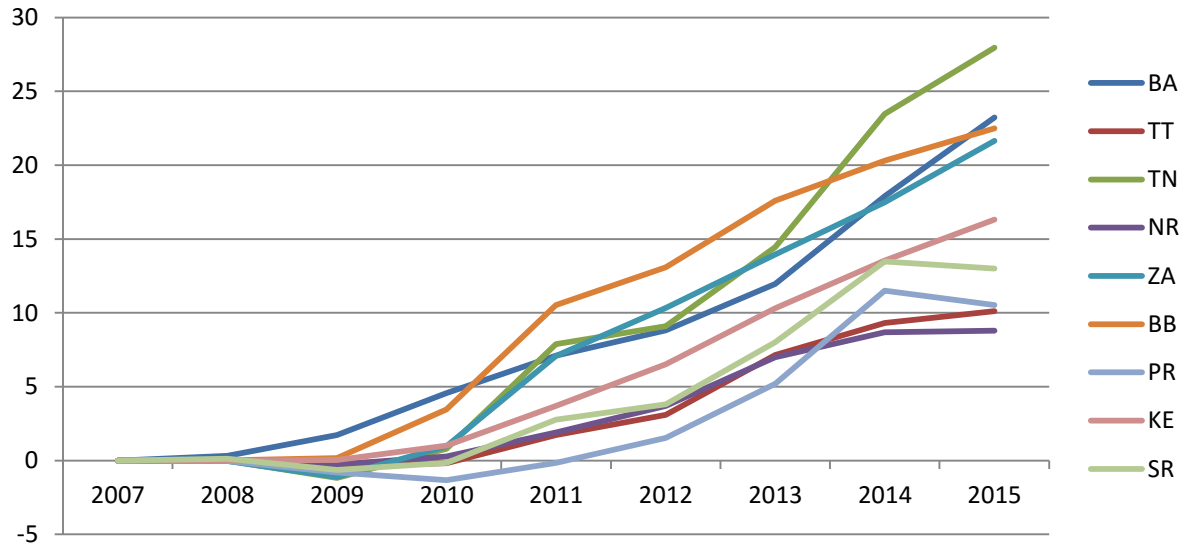
Table 18: Growth in household consumption – cumulatively for 2015

	BA	TT	TN	NR	ZA	BB	PO	KE	SK
2015	6.6 %	6.8 %	12.0 %	5.5 %	11.4 %	6.5 %	7.3 %	5.9 %	7.6 %

Source: calculations by authors

The average wage was positively influenced by the spending from the SF and SF especially in 2011 - 2015. The average wage in Slovakia should increase by EUR 13 in 2015 compared to the scenario without the SF and CF spending, accounting for an increase by 1.2 %. The highest growth is expected in the Trenčín region where the average wage should be up by nearly EUR 30, or 2.9 %. A higher than EUR 20 increase in the average wage should occur in the Banská Bystrica, Bratislava and Žilina regions. A growth below national average was observed in the Trnava, Prešov and Nitra regions where the average wage should rise by EUR 10, or 1 %. The wage growth was not among the SF and CF objectives and represented not very significant yet positive effect of the SF and CF spending.

Chart 29: Additional growth of average wage, in EUR



Source: calculations by authors

Summary

The impacts of the spending of financial resources from the SF and CF in the period 2007 - 2015 were analysed using regional econometric model HERMIN. The difference between the two scenarios was identified as a net effect of the implementation of financial support.

The spending of financial resources from the SF and CF contributed to a higher GDP growth between 2009 and 2014, in particular, having helped to mitigate the consequences of the crisis on the Slovak economy. Driven by SF and CF spending, Slovak average annual real GDP growth would be by more than 0.9 p.p. higher for the 2007 - 2015 period than it would be under a no-spending scenario. A cumulative real growth in GDP is expected at a level of 8.3 % in 2015 (the difference against actual GDP value in 2015).

Nearly 79 000 additional new jobs were created until 2014 when compared to a no-spending scenario, majority of them in the market services and construction sectors. For 2015, we expect over 120 000 additional new jobs to be created thanks to the spending of funds available under the Cohesion policy. The highest SF and CF driven growth was observed in the Žilina, Prešov and Trenčín regions. The Bratislava region saw the lowest growth, due to a low weight of the funds spent to the volume of its GDP. The implementation of financial resources from the SF and CF had a positive impact both on the overall economic development and on individual sectors of the national economy. A relative slowdown in the spending of the EU funds in 2014 and its expected significant increase in 2015 may bring along substantial positive effects, but model calculations also hint on possible limitations of this scenario.

Additional differences in GDP growth have been proved in all regions. The highest growth was observed in the Žilina, Prešov and Trenčín regions in which the largest financial allocations on infrastructure projects were concentrated. The lowest difference in GDP formation without the SF and CF implementation of 4 % was recorded in the Bratislava region. Driven by increased employment and growth in average wages, additional household consumption followed an upward trend.

Affected by the spending of financial resources from the SF and CF, household consumption increased in all regions, thus again contributing to the mitigation of negative impacts of the economic crisis on economic growth. It is evident that households would have faced a more complicated situation if no SF and CF spending had occurred.

4.2 The competitiveness of Slovak regions

The very concept and definition of competitiveness is broadly discussed in academic literature. Dijkstra (2011) defines regional competitiveness as the ability to offer an attractive and sustainable environment for firms and residents to live and work. Filó (2007) defines competitiveness as the ability to compete, to win and retain a position in the market, to increase market share and profitability, and eventually to consolidate commercially successful activities. The World Economic Forum defines national competitiveness as a set of institutions, policies and factors that determine the level of productivity of a country (Schwab and Sala-I-Martin, 2012; Schwab and Porter, 2007). Meyer-Stamer (2008) defines competitiveness of a region as its ability to generate high and rising incomes and improve the livelihoods of the people living there.

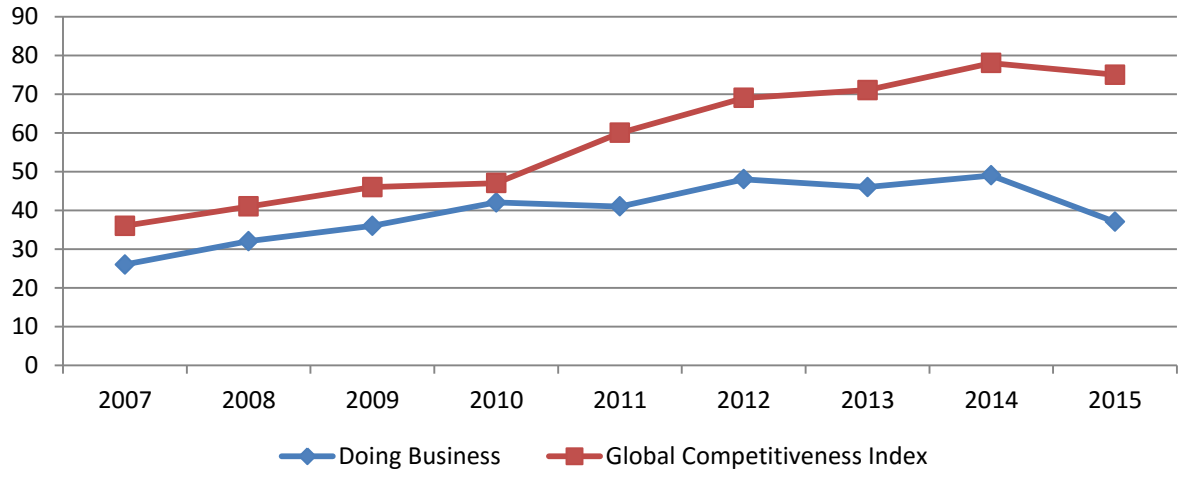
For quantitative assessment of the impact of the Cohesion policy on Slovakia's competitiveness using a macroeconomic model, the unit labour cost per employee indicator (in EUR) and its impact on labour productivity per employee were considered.

Since, from the analytical point of view, the outputs from the model are limited to two indicators only, it is necessary to use additional data relevant to assessing competitiveness at the national and regional level. For the purposes of analysing the competitiveness development at the national level, information from the World Bank's Doing Business (a report evaluating the business environment as an important factor of competitiveness) and from the World Economic Forum's Global Competitiveness Index was used.

In order to assess development in regional competitiveness, the model outputs were supplemented by a Regional Competitiveness Index (RCI) published by the European Commission. Published since 2010, the RCI is a relatively new instrument used to assess regional competitiveness. The Regional Competitiveness Index determines the order of NUTS 2 regions in the EU-28.

The set of the indicators used is a combination of modelled estimates (hard data) and data in the form of global competitiveness reports that provide an overview of Slovakia's position in competitiveness rankings and its development over time. Using this type of data is also essential in view of the fact that statistical indicators alone do not provide a comprehensive picture of all changes in competitiveness. The reason is that competitiveness is affected not only by actual changes in the structure of individual sectors, labour market, science, research and innovation, but also by microeconomic factors such as the quality of regulatory environment, business conditions, legislation, rule of law, quality of institutions, etc.

Chart 30: Slovakia's ranking in global competitiveness and quality of business environment (lower is better)



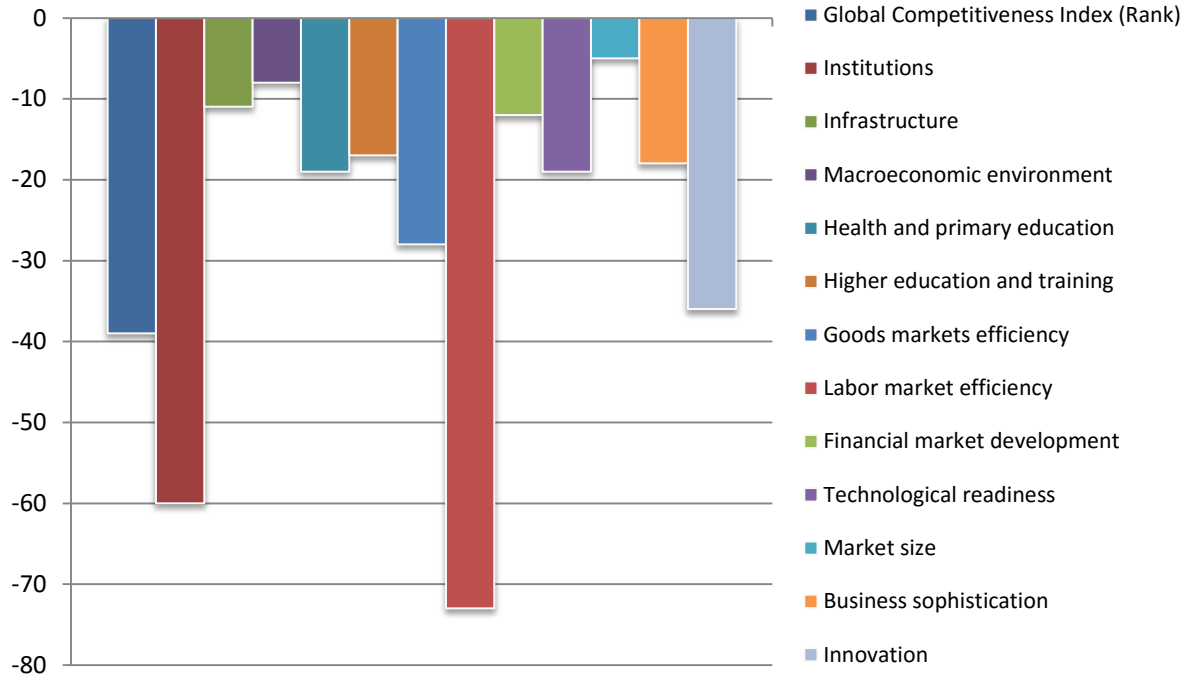
Source: World Bank (2015), World Economic Forum (2015).

Based on the data published by the World Bank and World Economic Forum, we can observe that Slovakia's ranking under both monitored indicators[17] has been continuously deteriorating since 2007 (Chart 30).

[17]The substantial improvement seen in the 2015 Doing Business index is caused by a change in methodology. Taking a closer look at the structure of individual components of the index reveals stagnation rather than an improvement in Slovakia's position.

According to the World Economic Forum's most recent Global Competitiveness Report 2014-2015, Slovakia ended up 75th of 144 countries. Over the past three years, Slovakia's position worsened by four places. Since 2007, Slovakia fell 39 places in the ranking. A decline was observed under all sub-indicators (Chart 31). Slovakia faced the sharpest decline primarily in the quality of institutions, labour market, innovation, macroeconomic environment, business sophistication, higher education and training, and infrastructure. Judging by Slovakia's position in this ranking, we can observe that, compared to other countries in the world, Slovakia has lost dynamics in the development of factors of competitiveness.

Chart 31: Change in Slovakia's overall ranking under the Global Competitiveness Index between 2007 and 2014

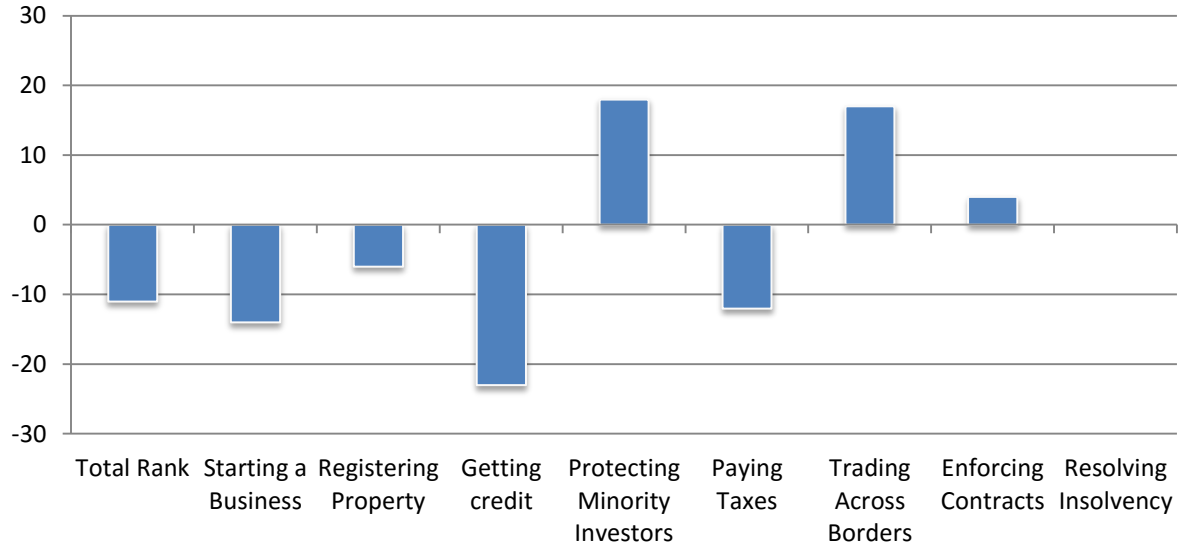


Source: World Economic Forum (2015), calculations by authors

In the 2015 edition of the World Bank's regular Doing Business report, Slovakia ranked 37th[18], down 11 compared to 2007. The sharpest year-on-year decline was identified in the Doing Business 2012 report under which Slovakia lost 7 places on the previous year. Factors having the most negative impact on Slovakia's Doing Business ranking include process of registering property, paying taxes, enforcing contracts and starting a business.

[18] A partial change was made in the methodology and individual indicators making up the Doing Business during the reporting period. However, the substantial fall in the ranking is not attributable to the change in the methodology of index calculation. Moreover, countries that have long been leaders in the ranking are able to ensure the constant improvement of their business environment and promptly respond to changes in external factors in a more flexible way.

Chart 32: Change in Slovakia's Doing Business ranking between 2007 and 2015



Source: World Economic Forum (2015), calculations by authors

In order to identify regional competitiveness, the European Commission (DG JRC and DG Region) prepared a Regional Competitiveness Index in 2010 and 2013. It is a composite index that maps economic performance and competitiveness at NUTS 2 level within the EU. The index combines several sub-indicators that assess individual aspects of competitiveness in 262 NUTS 2 regions[19].The final ranking of individual regions is determined by their scores under individual composite indicators.

In the 2013 regional competitiveness report, the Bratislava region ended up 78th, followed by Western Slovakia in the 191st, Central Slovakia in the 216th and Eastern Slovakia in the 229th place. This NUTS 2 region ranking clearly proves the dominant role of the Bratislava region as the most competitive region in Slovakia (though its final ranking among all EU regions cannot be considered satisfactory). Other Slovak regions ended up in the bottom part of the ranking[20].

The impact of spending from the SF and CF on competitiveness is limited due to the structure and volume spent in areas that are key drivers for increasing competitiveness (research and development, innovation, education, infrastructure). The SF and CF spending contributed to lowering the infrastructural debt in the Slovak economy and created conditions for development in science, research and innovation, but the effects of such investments are only felt over the long term. Factors limiting a more dynamic growth in competitiveness primarily involve deterioration in the quality of domestic business environment, functioning of institutions, existing system of education and training, macroeconomic environment and other factors that are beyond direct control of Cohesion policy interventions and require a concept-driven and long-term approach under the economy policy.

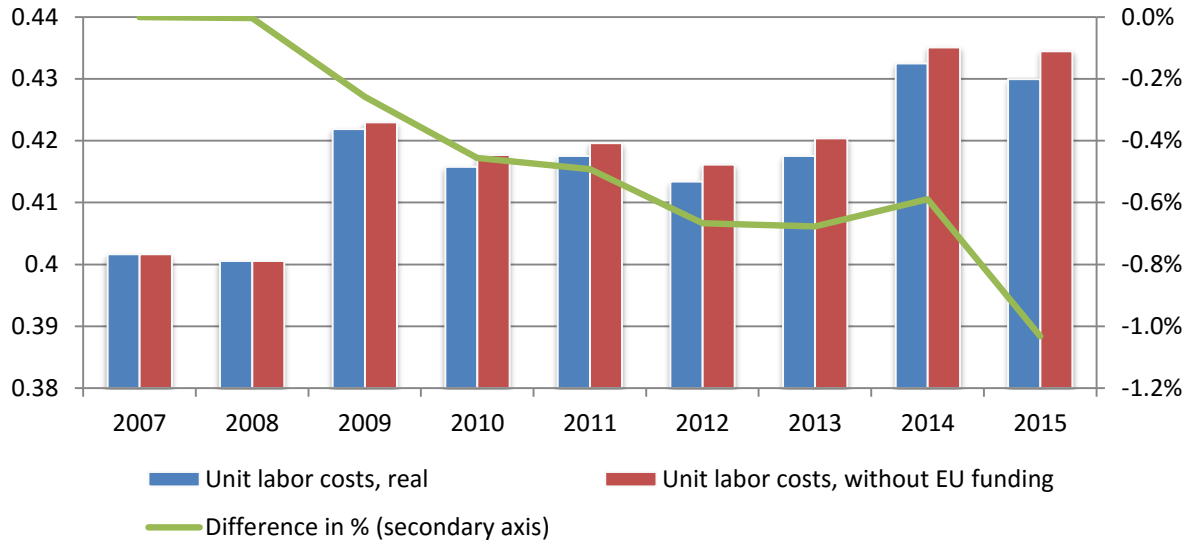
[19]More details about the methodology can be found at http://publications.jrc.ec.europa.eu/repository/handle/111111111/13666

[20]The index is a relatively new tool for comparing economic performance of EU regions. Complete time series for the index are, therefore, not available.

Unit labour costs

Unit labour costs are measured as the value of labour costs per unit of value added, i.e. what is the cost of labour per euro produced in the national economy. If the growth in nominal wages exceeds growth in the value added, unit costs increase, resulting in a decline in competitiveness caused by a higher price of input factors of production. Since the costs of labour are an important determinant of production, policy-makers across the Euro Area have often stressed a so-called golden rule which says that unit labour cost "should not increase faster than ECB inflation target of 2 percent" (Collignon, 2012). It should also be noted that Slovakia, as a small open economy, was attractive to foreign investors over the past decade mainly due to its low labour costs and qualified labour force and investment incentives provided to foreign investors

Chart 33: Estimation of unit labour costs on national level



Source: Slovak Statistical Office and calculations by authors

Unit labour costs showed a sharp increase in Slovakia at the beginning of the reporting period until 2009. This development was caused by a steep economic growth which significantly boosted a growth in nominal wages at the time of economic upturn. Due to the impacts of the global economic recession, labour costs fell in 2010, albeit for a short time, having recovered to the 2009 level (approximately 42 euro cents in labour costs per euro of production) in the subsequent years. A trend without significant swings was typical of the entire period from 2009 until the end of the programming period. A growth in unit labour costs in 2014 and 2015 is mainly caused by economic recovery. In terms of unit labour costs, the spending of financial resources from SF and CF had a positive impact on competitiveness at the national level. In 2014, unit labour costs are nearly 0.6 % lower compared to the scenario excluding the spending of the SF and CF funds. They should be lower by 1 % in 2015.

Labour productivity

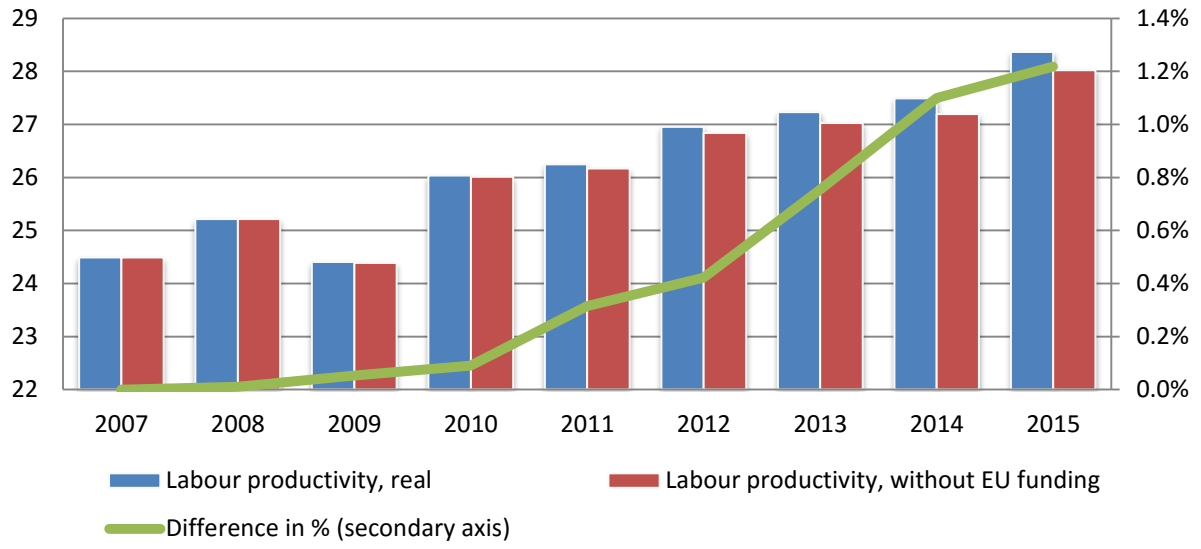
Another important factor of a region's competitiveness is labour productivity per employee. Labour productivity is a standard indicator of competitiveness, supplementing the unit

labour costs indicator. Labour productivity is measured as a value added produced in a certain region per employee.

The implementation of financial resources from the SF and CF contributed to a growth in labour productivity in all Slovak regions. The Bratislava region has the highest labour productivity, despite experiencing one of the weakest impacts of the spending of financial resources from the SF and CF on productivity. It is primarily caused by the existing high level of productivity, as well as by a relatively small volume of the EU funds spent in this particular region at the beginning of the 2007-2013 programming period.

The strongest growth in labour productivity driven by the implementation of financial resources from the SF and CF was observed in the Trenčín, Prešov, Žilina and Košice regions. The weakest effect on labour productivity was felt in the Nitra, Trnava and Banská Bystrica regions. The effect shows a stable upward trend in all eight NUTS 3 Slovak regions. Taking into account the previous development, we can expect a positive growth in labour productivity in 2015, too. This will have a positive impact on the competitiveness of individual regions, as well as of the entire Slovak economy. The effects of the spending of financial resources from the SF and CF on labour productivity in national level are shown on the following chart.

Chart 34: Estimation of Labour productivity on national level, in thousands of EUR, current prices



Source: calculations by authors

Summary

Based on Slovakia's ranking under the World Economic Forum's Global Competitiveness Index, we can observe that Slovakia has encountered a massive decline in a majority of key aspects of competitiveness since 2007.

Factors contributing to Slovakia's poor performance in competitiveness rankings especially involve areas which are, to a large degree, only partially affected by the Cohesion policy interventions. It means they depend on the national economic policy and on measures implemented at the level of regional and local authorities. These factors include the following:

- Quality of institutions providing public services to citizens and businesses (law enforcement and length of judicial proceedings, trust in political system, protection of ownership rights and intellectual property, level of corruption, independence of the judiciary, efficiency of public expenditure).
- Developed transport infrastructure (road, railway, water-borne, air-borne).
- Good macroeconomic environment (stable price level, public debt level).
- Quality of individual levels of education system.
- Scope of available electronic services and access to internet connections.
- Labour costs (cost and/or price competitiveness).
- Quality and transparency of tax system.
- Labour market efficiency and flexibility.
- Location of sectors with a high value added which enhances the capacity of a region to attract highly skilled labour.

Therefore, the impact of the Cohesion policy on boosting competitiveness was largely overshadowed by developments in other factors on which the spending of financial resources from the SF and CF has a limited effect only. It means that the implementation of financial resources from the SF and CF has only a marginal impact on competitiveness which is influenced by applicable legislation and economic policy to a much larger degree.

Given the structure of expenditures with the highest share of expenditures spent on infrastructure, for most of Slovakia's regions we can state that, notwithstanding all other positive impacts of the SF and CF implementation, the effect of the SF and CF spending on national competitiveness is limited. This was partially resulting from long-term underfunding of science, research and innovation sector which used the allocations under the current programming period mainly to complete and modernise its infrastructure. Any positive effects of the EU spending on competitiveness in this particular sector can only be expected in the long term. It would be equally necessary to increase national R&D expenditures which have long been one of the lowest of all EU-28 countries. Additionally, investments in transport infrastructure created conditions for a better intra-regional and inter-regional mobility. However, due to difficulties related to tendering, procurement and construction, this effect was limited to only some Slovak regions.

Unit labour costs did not represent a crucial factor of change in competitiveness over the programming period, especially on the national level. A positive impact of the implementation of financial resources from the SF and CF on price competitiveness (measured by unit labour costs) was observed in the Trenčín, Košice, Prešov and Žilina regions. The spending from the SF and CF had a slightly positive impact on competitiveness (measured by unit labour costs) in the Trnava, Trenčín and Banská Bystrica regions. No significant impact of the SF and CF spending on unit labour costs was observed in the Bratislava region.

As far as competitiveness is concerned, we can observe that the spending from the SF and CF contributed to a growth in labour productivity across all regions, with the strongest effect felt in the Trenčín region and the weakest one in the Trnava region. In terms of unit labour costs, the spending of financial resources from the SF and CF had a positive impact on competitiveness at the national level. The effects of the SF and CF spending moved between 3.63 % and 0.07 % over the programming period. The effects of the EU funds spending on competition (measured by unit labour costs) at the regional differed. While the Bratislava

region saw no significant impact on its unit labour costs, the EU funds spending showed positive impacts in the remaining regions.

Based on the achieved results, it can be stated that the SF and CF implementation positively contributed to increase in some competitiveness factors. However, given a large number of internal and external factors influencing the competitiveness, the position of some of Slovak regions has rather deteriorated and was influenced by factors outside the influence of the Cohesion Policy.

4.3 Real convergence

Economic development is usually compared using a performance indicator index and price level of a country per population, i.e. GDP per capita at purchasing power parity (PPP). Comparing the development in GDP per capita at PPP against the average development in the EU-28 describes the rate of real convergence towards the EU average. Over the years, the real convergence has been expressed relative to the actual number of EU Member States. Before the 2004 enlargement, it was given in relation to the EU-15 average, afterwards it was EU-25, and EU-27 average in 2007. The indicators were last re-adjusted in 2013 after the EU had enlarged to include 28 Member State - Croatia. Two development scenarios will be compared (one at 89 % absorption and one excluding the SF and CF funding). Due to uncertainties surrounding economic development and delayed publication of indicators at PPP (the last published data are from 2011[21]), the calculations until 2014 are described as a forecast, while the data for 2015 are considered an outlook which is likely to have a lower level of accuracy.

This average value is also used to measure real convergence at the regional level. EU's regional and cohesion policies are applied at the NUTS 2 level (four regions in Slovakia), with a threshold of support eligibility in the regions within the EU set to achieving 75 % of EU average. Evidently, this threshold is adjusted slightly downwards with each round of EU enlargement because new Member States usually fall short of the average level. In response to the convergence questions the chapter will address the impact of the SF and CF on convergence at the national and regional level broken down to NUTS 2 and NUTS 3 levels (self-governing regions).

There are several approaches to measure the rate and intensity of convergence. The two most suitable are beta- and sigma-convergence. The beta-convergence is suitable to estimate a time period of convergence between regions, but only occurs provided that a less advanced region grows faster than a stronger region in the long term. Nevertheless, real convergence does not necessarily have to occur. The sigma-convergence is based on analysing the development in the dispersion of a real per capita income between individual regions. If this indicator falls, convergence increases. This approach usually takes into consideration multiple factors and their number depends on the level of latitude (number of regions). Given the insufficient number of regions in Slovakia (8), the impact on regional

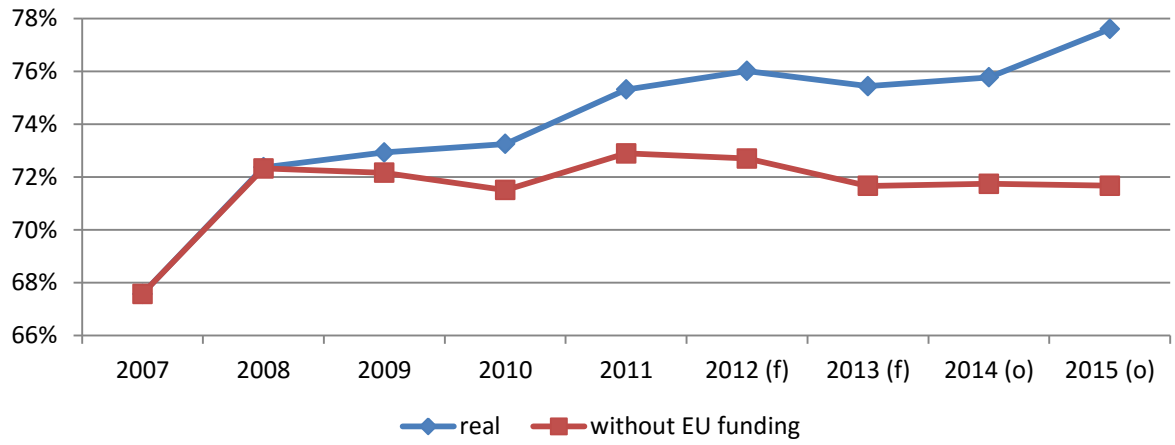
[21]Convergence indicators at the NUTS 2 level were updated for 2012 and 2013 according to ESA 2010 and can be found in Eurostat News Release 90/2015 of 21 May 2015. Nevertheless, there are only minor differences in the convergence rate of NUTS 2 region according to the estimate and according to statistical reporting.

convergence will be measured using a sigma coefficient (measuring the change in dispersion)[22].

Over the past two decades, Slovakia underwent a robust economic transition; after its economic performance dropped by one-third in early 1990s, the country has been trying to catch-up with the average level of advanced EU economies. In 2000, the real convergence in the Slovak economy only slightly exceeded 50 % of EU-28 average. Following its accession to the EU, Slovakia saw a sharp rise in real convergence, from 57 % to 72 % of EU average, in the period of economic upturn (2004 - 2008). In terms of the relevance of its volume, the spending of financial resources from the SF and CF had no significant impact on the rate of convergence before 2009. In other words, the implementation of financial resources from the SF and CF only affected the real convergence at the time of economic crisis.

Under the baseline scenario (taking into account the effect of the SF and CF spending), Slovak real convergence towards the EU average did not stop in this period even though it only rose moderately when compared to the previous development. A higher rise in convergence between 2008 and 2015 occurred in 2011 only, but is largely attributable to stagnation of other EU countries rather than to a stronger economic growth in Slovakia. Following its accession to the EU, Slovakia posted an average year-on-year increase in convergence at a level of 4 p.p. in the 2004-2008 period. For the 2009-2015 period, the baseline scenario estimates an average year-on-year increase in Slovak convergence at a level of 0.7 p.p. This means that the long-term moderate convergence was achieved even during this period. The alternative scenario (excluding the SF and CF spending) estimates a zero growth in Slovak real convergence towards the EU average (-0.1 p.p.), with a negative convergence growth reported in a number of periods (see Chart 35). An important factor in terms of convergence will be the impact of the actual spending of funds in 2015. While in 2013 negative convergence occurred (the second post-crisis bottom of the economic growth under the W scenario) despite the highest volume of the funds spent, in the amount of EUR 1.65 billion. In 2014 convergence was on a slightly positive path due to a higher economic growth. If the 2015 spending was successful, the convergence rate could slightly increase (close to 2 p.p.).

Chart 35: GDP per capita at PPP compared to the EU-28 average (2012-2013 forecast, 2014-2015 outlook)



Source: calculations by authors

[22]Methodologies used to measure convergence are described in more details for example in Buček et al., 2011.

Looking at the convergence towards the EU average at the regional level, we can observe significant regional disparities measured in GDP per capita at PPP. Under both scenarios (Tables 19 and 20), a considerable imbalance in the intensity of convergence of individual regions occurs. The Bratislava region posts a strong growth in GDP per capita at PPP under both scenarios, creating the main convergence potential of the Slovak Republic (as one of the ten strongest NUTS 2 regions in the EU). It is caused by its economic strength and its ability to generate, to a large degree, pull-up effects towards neighbouring regions, as well as by the fact that a portion of the Bratislava output is generated by people arriving for work from other regions who account for a quarter of the region's workforce. Therefore, a portion of per capita GDP is generated by the workforce not included in the population of the Bratislava region, which positively affects the resulting values of GDP per capita at PPP. Nitra region was the only one region with a more considerable contribution to regional convergence (above national average). The baseline scenario also shows a positive growth in convergence in the Žilina and Prešov regions. The regions of Trnava, Trenčín and Košice showed a moderate growth or stagnation in the convergence process. The Banská Bystrica region saw a decline in real convergence (albeit marginal) also under the scenario including the spending of the SF and CF.

Table 19: GDP per capita at PPP compared against the EU-28 average - scenario including SF and CF spending (e - estimate, f - forecast), %

Region	2007	2008	2009	2010	2011	2012e	2013e	2014e	2015f
SK	68	72	73	73	75	76	75	76	78
BA	160	167	178	177	187	183	187	187	192
TT	81	83	81	82	84	85	82	83	85
TN	62	66	65	65	66	67	66	67	67
NR	56	61	62	61	67	67	65	66	68
ZA	57	63	63	65	65	65	65	65	66
BB	50	55	53	54	53	54	55	54	54
PO	37	42	42	41	44	45	45	45	46
KE	56	60	57	58	58	60	59	60	61

Source: calculations by authors

Compared against the convergence development under the scenario excluding the SF and CF spending (Table 20), it can be observed that the real convergence would only occur in Bratislava and Nitra regions. The indicator would drop 1 to 5 p.p. in the 2008-2015 period in all other Slovak regions.

Comparing the estimates of the cumulative SF and CF contribution to the convergence process in Slovak regions (Chart 36), a positive correlation with the volume of the funds provided can be seen, except for the Bratislava region that was able to converge based on investments generated from internal sources and positive labour migration even autonomously. The SF and CF had the strongest impact on real convergence (a growth exceeding 8 p.p.) in the Žilina and Trenčín regions. Despite a relatively positive development in convergence in the Nitra region, the spending of financial resources from the SF and CF was identified to have only a below-average effect on the regional convergence. Important factors in this case include a starting point, demographic development and the rate of SF and CF to GDP of a region.

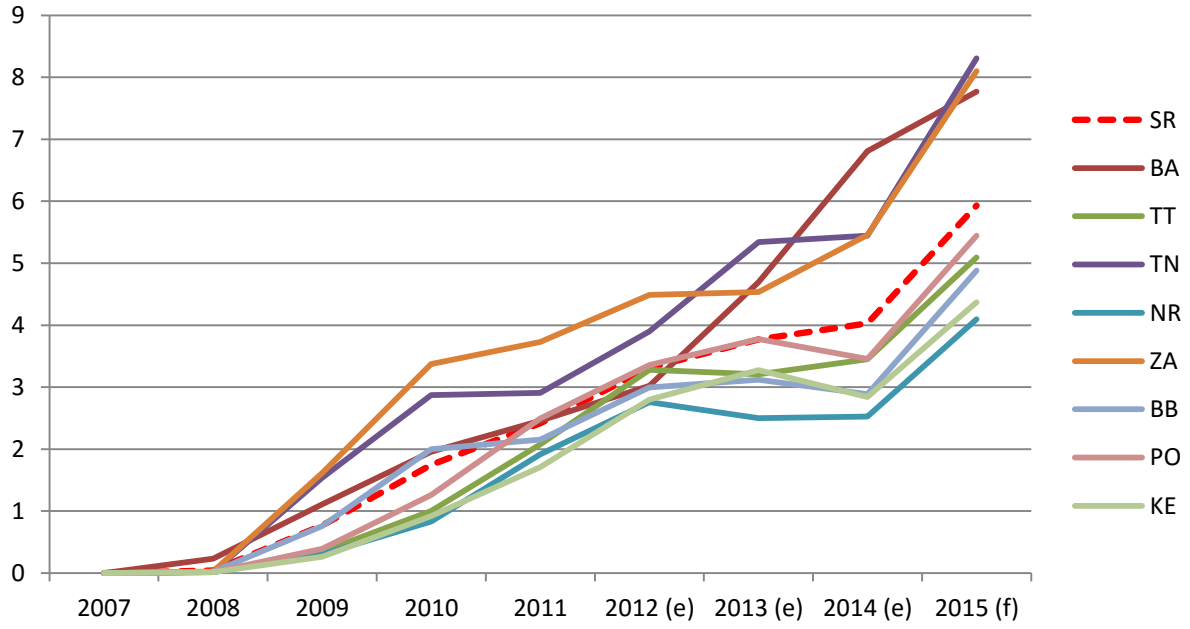
Table 20: GDP per capita at PPP compared against the EU-28 - scenario excluding SF and CF spending (e - estimate, f - forecast) in %

Region	2007	2008	2009	2010	2011	2012e	2013e	2014e	2015f
SK	68	72	72	71	73	73	72	72	72
BA	160	167	177	175	185	180	183	180	184
TT	81	83	80	81	82	81	79	79	80
TN	62	66	63	62	63	63	60	61	59
NR	56	61	62	60	65	65	63	64	64
ZA	57	63	61	62	61	61	60	59	58
BB	50	55	53	52	51	51	52	51	49
PO	37	42	42	40	42	42	41	42	41
KE	56	60	57	57	57	57	56	57	56

Source: calculations by authors

The graphical visualisation clearly shows that a considerable increase in the spending of the EU funds in 2015 should have a substantial convergence effect. Without the increase, the contribution to the convergence process can only be expected around the level of 4 P.P., which is 2 p.p. lower.

Chart 36: Estimated cumulative contribution of the spending of financial resources from the SF and CF to the convergence indicator- GDP per capita at PPP (2012-2014 estimate, 2015 forecast), percentage points



Source: calculations by authors

The annual SF and CF contribution to the convergence of NUTS 3 regions, i.e. a difference in the rate of convergence/divergence to the EU-28 average spending is shown in Table 21. The highest 2009-2015 average contribution occurred in the Žilina and Trenčín regions (1.2 p.p.). From the SF and CF point of view, it is evident that the contribution substantially depends on the development in the volume and the structure of the spending of the EU funds. Due to a nominal decrease in the implementation of the EU funds and a low GDP growth at the national level, we can observe a negative contribution to convergence in some regions in years 2013 and 2014. Obviously, this negative situation is related to the amount spent in the

previous year and, logically, if no funds had been spent in the previous year, any SF and CF contribution would have had a positive nominal effect on convergence. Looking at the previous chart, it is evident that even a positive nominal contribution to convergence does not necessarily mean that real convergence has occurred; it could just simply slowdown the divergence process.

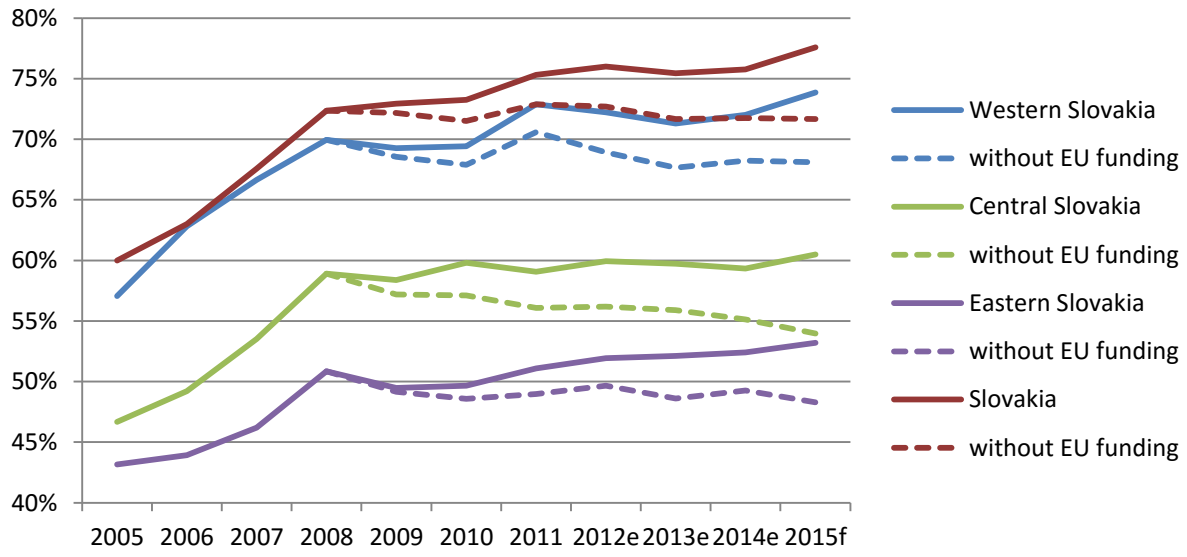
Table 21: SF and CF annual contribution to convergence towards the EU-28 average, p.p.

	2007	2008	2009	2010	2011	2012e	2013e	2014e	2015f	2009-15 average
SK	0.0	0.0	0.7	1.0	0.7	0.9	0.5	0.3	1.9	0.8
BA	0.0	0.2	0.9	0.8	0.5	0.6	1.7	2.1	1.0	1.1
TT	0.0	0.0	0.3	0.7	1.1	1.2	-0.1	0.2	1.6	0.7
TN	0.0	0.0	1.5	1.3	0.0	1.0	1.4	0.1	2.9	1.2
NR	0.0	0.0	0.3	0.5	1.1	0.8	-0.3	0.0	1.6	0.6
ZA	0.0	0.0	1.6	1.8	0.4	0.8	0.0	0.9	2.6	1.2
BB	0.0	0.0	0.7	1.2	0.2	0.8	0.1	-0.2	2.0	0.7
PO	0.0	0.0	0.4	0.9	1.2	0.9	0.4	-0.3	2.0	0.8
KE	0.0	0.0	0.2	0.7	0.8	1.1	0.5	-0.4	1.5	0.6

Source: calculations by authors

A model view of NUTS 2 regions' convergence towards the EU-28 average is shown in Chart 37. A clearly positive impact of the spending of financial resources from the SF and CF on the convergence process is visible under both scenarios. Real convergence towards the EU average occurs in all Slovak regions except for Central Slovakia where the convergence process is rather stagnating. Without the SF and CF spending, two regions would see a negative development in their convergence, Western Slovakia would rather stagnate, and a clearly positive development would only be felt in the Bratislava region[23].

Chart 37: Model comparison of GDP per capita at PPP convergence towards the EU-28 average, excluding the Bratislava region (2012-2014 forecast, 2015 outlook)

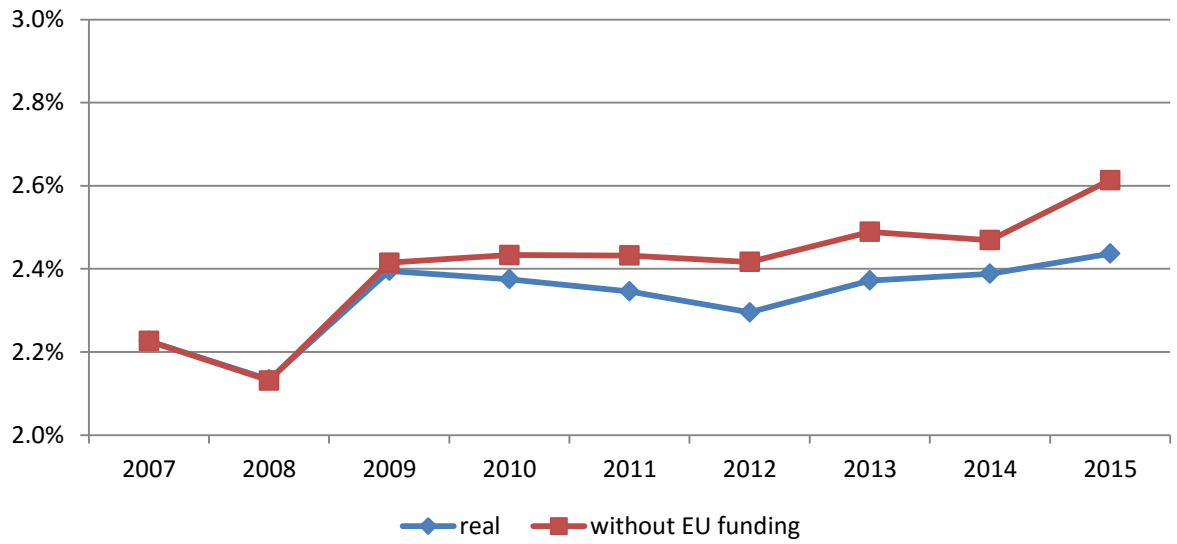


Source: calculations by authors

[23] Bratislava region is not included in the chart due to its extreme values over 180 % of EU average.

The real convergence among Slovak regions did not occur in the programming period and has even slightly increased. It was negatively affected by a lower than expected overall aggregate growth and slower convergence of Slovakia to the EU-28 average. Due to the spending effect, the sigma coefficient was lower than in the no-spending scenario. It means that despite the ongoing regional divergence, the spending of financial resources from the SF and CF decelerated this process significantly. From the point of view of SF and CF allocations to Slovak regions it still needs be noted that the convergence process was not a key NSRF priority as a considerable portion of funds was allocated to relatively strong regions (to address the infrastructure debt).

Chart 38: Comparison of regional convergence measured by sigma coefficient



Source: calculations by authors

Summary

The spending provided under Cohesion Policy contributed to convergence of Slovakia towards the EU average, such convergence would not have occurred if the funds had not been implemented. If economic crisis did not occur convergence of Slovakia towards the EU-28 average would have followed a different path. The Slovak economy was at the peak of its economic growth before the onset of the economic crisis, with all regions experiencing strong convergence. Pre-crisis forecasts indicated a steep macroeconomic growth that would also continue during the 2008 - 2013 period, with advanced economies expected to post a GDP growth at levels close to or below 2 %. Therefore, we can assume that if the global economy had not slipped into a crisis, the convergence process would have taken a more dynamic and more evenly spread path across all regions. However, the crisis slowed down the convergence process despite the SF and CF spending, especially in weaker regions. On the other hand, GDP generated in Slovakia fell behind expectations due to the crisis. This, in turn, resulted in that an overall SF and CF share and contribution to the convergence process was higher than expected in ex-ante assessment (Šikula et al., 2006). Despite the economic crisis, the spending of financial resources from the SF and CF positively contributed to national convergence towards the EU average in this period.

Without the SF and CF spending, the convergence process would have reversed in most regions. The implementation of financial resources from the SF and CF made a considerably

positive contribution to Slovakia's real convergence towards the EU-28 average. Without their contribution, the process would have very likely stopped and convergence would have dropped in six out of eight Slovak regions. From the regional point of view, the SF and CF contribution to the convergence process positively correlates with an expenditure-to-GDP rate of the region. This factor, however, may be slightly overrated, especially by a large volume of infrastructure investments that may have a higher territorial effect on the surrounding regions which the model is unable to capture in full. Owing to its strength and demographic development, the Bratislava region is able to grow significantly even without the support from the SF and CF. Nevertheless, it is important to provide support to the Bratislava region given its specific position and relevance to supporting economic growth in other regions. At the NUTS 2 level, Western Slovakia is likely to approach the level of 75 % of EU average in the nearest future. Without the SF and CF funding, the convergence process of Western Slovakia would remain just below the 70 % threshold. As far as an outlook of a real convergence rate until the end of 2015 is concerned, the most important factor is that the Western Slovakia region will very likely fail to achieve 75 % of EU-28 average, which means that the allocation of financial resources from the SF and CF will not be limited in the 2014-2020 programming period.

Without the SF and CF spending, differences between Slovak regions (measured by per capita GDP at PPP) would be more noticeable (greater). The onset of the economic crisis slowed down the convergence process and, at the same time, the SF and CF contribution was stronger than expected. The effects of the SF and CF implementation on Slovakia's convergence are permanent and significant but have only a moderately positive impact on the convergence process in future. The slowdown and structure of the spending of the EU funds in 2014 had a negative contribution to real convergence of Slovakia towards the EU-28 average, but positively contributed to lower regional divergence. Model results indicate that the assumed high implementation rate of the funds in the last year will have a significant effect on convergence of Slovakia, but a major portion of these effects will only be short-term ones.

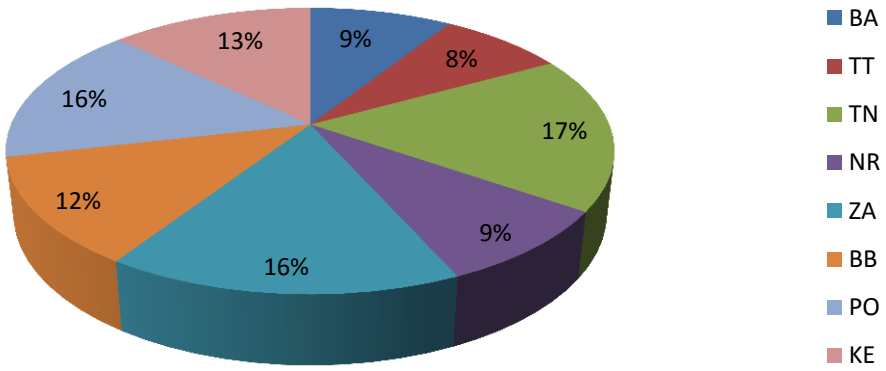
The SF and CF contribution had a positive impact on the mitigation of the divergence process among Slovak regions, even though it failed to reverse this trend. The regional SF and CF allocations had not clear cohesion character. The support provided to economic growth and infrastructure may have, however, a long-term positive impact on other regions. Therefore we recommend defining growth and cohesion priorities for the next programming period in a way that would allow for clearer identification of the effects expected from the SF and CF implementation.

4.4 The efficiency of geographical allocation of EU funds

In order to evaluate the efficiency of geographical allocation of financial resources from the EU funds at the NUTS 3 level, an analysis of the CSF multiplier values for individual regions was used, taking into account objectives pursued by the NSRF. Please note that the values of implementation at the level of regions represent indicative amounts obtained by disaggregating the data available in the ITMS. Since the information about accurate geographical allocations was unavailable, the real spending of funds spent was disaggregated into categories necessary for HERMIN model calculations. The CSF multiplier, describing the relation between a cumulative SF and CF spending at the regional level and additional GDP created as a result of that uptake in a given region, was chosen as an

indicator of the efficiency of the SF and CF spending. The value of the CSF multiplier can be calculated as a ratio of the cumulative value of additional GDP formation generated by the implementation of SF and CF projects (numerator) and the cumulative amount of SF and CF financial resources (denominator) spent from the beginning of the programming period until the relevant year in a region that is subject to evaluation[24].

Chart 39: Share of individual regions in SF and CF spending by the end of 2014



Source: ITMS

The efficiency of geographical allocation of the SF and CF financial resources can be assessed from several perspectives. In the first place, the geographical allocation of the SF and CF resources at the level of NUTS regions largely reflects economic performance of individual regions (regional convergence efforts) and the nature of projects implemented within their territories (addressing areas of concern, e.g. investment debts). Owing to its restricted eligibility to draw EU funds and a relatively low share of implementation in the Bratislava region, approximately 9 % of the total available funds were absorbed by this region at the end of 2014. Due to an increased rate in the spending of EU funds (investments in transport infrastructure and modernisation of public transport) throughout 2014, the Bratislava region was replaced by the Trnava region as a region with the smallest volume of EU funds implemented. Due to an agricultural character of the output[25] on a majority of the Nitra region territory, the region absorbed approximately the same volume of SF and CF financial resources as the Bratislava region. Thanks to a higher concentration of major infrastructure projects, implemented especially along the northern-southern axis of the Považie area, the Trenčín region absorbed almost 18 % of the total SF and CF allocation by the end of 2014. Infrastructure expenditures accounted for more than 76 % of total SF and CF spending allocated to the Trenčín region. A relatively high share of infrastructure expenditure was also observed in the Žilina and Prešov regions, making up 62 % and 60 % of total expenditures, respectively. Banská Bystrica and Košice make up another couple posting a similar absorption level, having absorbed approximately 12 % of total SF and CF expenditures. Similarly to the Žilina and Prešov region, infrastructure expenditures accounted approximately for a half of all funds absorbed in these two regions (52 % in BB, 47.7 % in KE).

[24] $CSF_{mult} = \frac{\sum \Delta GDP_i}{\sum SF_i + CF_i}$, where *i* refers to the years subject to research.

[25] This type of production receives financial support from different EU sources.

In terms of the volume and structure of the funds spent, the geographical distribution of the EU funds spending shows substantial differences at the level of NUTS 3 regions, mainly determined by the objectives pursued.

Another important aspect in examining the efficiency of geographical allocations is to look at the ability of individual regions to absorb available financial resources from the SF and CF. A closer look on the progress in the spending of the EU funds between 2007 and 2014 clearly reveals that the start of their real implementation was delayed. In the first years of the programming period, i.e. in 2007 and 2008, the spending of the EU funds was only marginal relative to available resources, with a major portion of expenditures coming from technical assistance resources used by stakeholders involved in the implementation of the Cohesion policy. The real implementation of financial resources from the SF and CF did not start before 2009, a major portion of the funds spent that year was used to start up infrastructure projects in the Trenčín, Žilina and Banská Bystrica regions. A similar situation also occurred in 2010, with an onset of larger infrastructure projects in the Prešov region. The pace of the EU funds spending intensified after 2011 when the volume of the funds spent for the first time exceeded EUR 100 million in all regions. An upward trend in the intensity of the EU funds spending could be observed in all Slovak regions until 2012. In 2013, the upward trend came to a halt in four regions (TT, NR, ZA and BB), which was accompanied by a moderate decrease in the spending of financial resources compared to 2012. This could indicate that the current level of the spending of financial resources from the SF and CF in some regions has already converged to their absorption capacity.

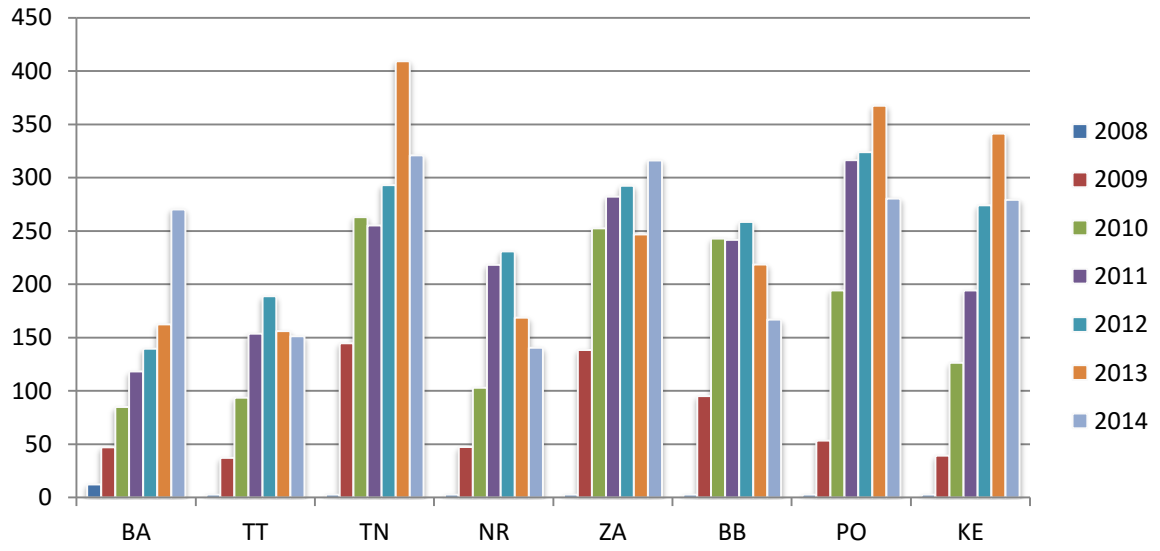
Table 22: Share of funds spent from an EU source compared against region's GDP in %

	2007	2008	2009	2010	2011	2012	2013	2014	2015
BA	0.0	0.1	0.2	0.4	0.5	0.6	0.7	1.2	1.2
TT	0.0	0.0	0.4	0.9	1.5	1.8	1.6	1.5	2.6
TN	0.0	0.0	2.0	3.4	3.0	3.3	5.1	4.2	7.3
NR	0.0	0.0	0.5	1.2	1.9	2.1	1.6	1.4	2.8
ZA	0.0	0.0	1.6	2.9	3.0	3.0	2.8	3.6	5.8
BB	0.0	0.0	1.4	3.3	2.9	3.2	2.9	2.2	5.5
PO	0.0	0.0	0.8	2.6	4.1	4.2	5.0	3.9	7.0
KE	0.0	0.0	0.4	1.3	2.0	2.7	3.5	2.2	4.1
SK	0.0	0.0	0.8	1.6	2.0	2.2	2.4	2.2	3.8

Source: calculations by authors

This statement is also supported by a relatively higher efficiency in the spending of financial resources from the SF and CF in the case of the Bratislava region where such funds made up less than 1 % of regional GDP. A number of complications in the spending of the SF and CF resources occurred in 2014 which translated into a year-on-year slowdown in the EU funds implementation in all regions except for BA and ZA, despite its expected acceleration. One of the main problems of the 2007-2013 programming period is the delayed uptake of financial resources in 2007 and 2008 which seems to be very difficult to be corrected. Other problems restricting the level of spending at the regional level include insufficiently prepared calls for project proposals at the beginning of the programming period, the complexity of the EU funds spending, a relatively high administrative intensity and difficult to meet terms and conditions under certain calls, especially in case of small- and medium-sized businesses.

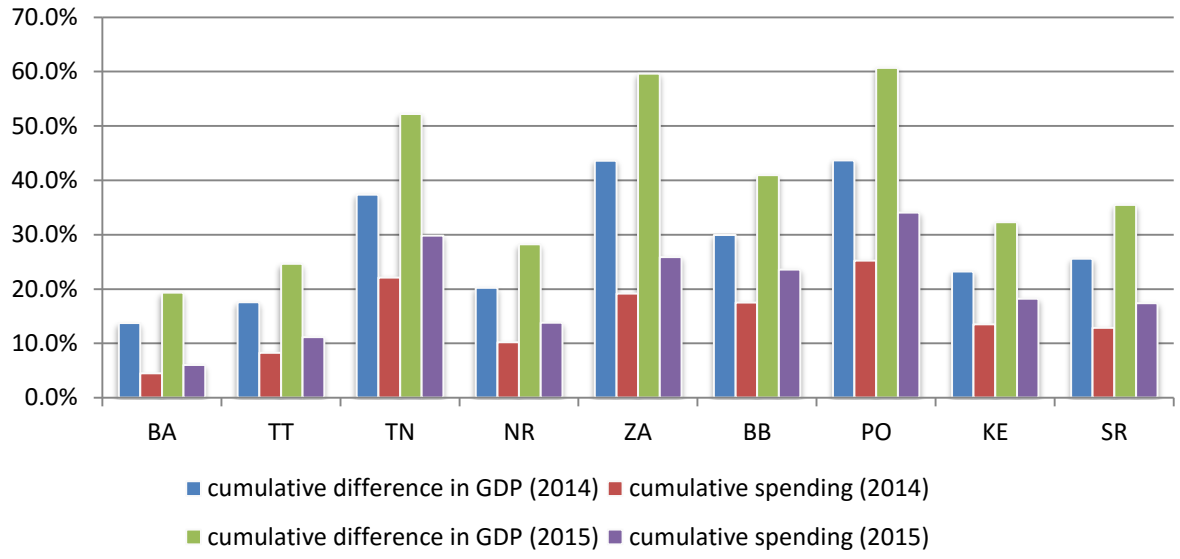
Chart 40: Implementation of EU funds (including co-financing), EUR million



Source: Authors, based on ITMS data

Examining the cumulative value of GDP growth driven by the SF and CF implementation at the level of individual regions gives important information about the efficiency in the spending of the EU funds. At the end of 2014, the highest ratio of additional cumulative GDP to the 2007 GDP of a respective region was seen in the regions of Žilina (38 %), Prešov (35 %) and Trenčín (25 %). The Bratislava region had the lowest ratio, approximately at 12 %, in 2014. Chart 41 shows a similar trend also with respect to impacts expected in 2015; an additional GDP exceeding in aggregate 50 % of GDP from the first year of the programming period can be expected in the Prešov, Trenčín and Žilina regions. The lowest volume of additional GDP generated by the implementation of the EU funds in 2015, at 19 % of the 2007 GDP, can be expected in the Bratislava region. It must be noted, however, that the volume of funds spent in this region only represents some 6 % of the 2007 GDP hence the efficiency of the SF and CF spending would be relatively high in this region.

Chart 41: Comparison of cumulative spending and additional GDP in 2014 and 2015, ratio to the 2007 GDP



Source: ITMS, calculations by authors

The values of the CSF multiplier indicate that Bratislava was the most efficient region in Slovakia. This region has the strongest economy of all Slovak regions and its absorption potential greatly exceeds the volume of allocated funds in spite of a notable acceleration in the past years of the programming period. On top of that, projects implemented in the Bratislava region are projects with a higher value added and therefore generate stronger multiplier effects. Multiplier effects are also stronger in this region due to the fact that a large portion of the funds spent was used for wages in the services sectors with a demand for high skilled labour. These wages are then relatively quick to generate additional indirect effects in the regional economy through a growing household demand. The CSF multiplier was relatively high at 3.1 in this region at the end of 2014, but the EU spending to GDP ratio exceeded 1 % of GDP in 2014 only, which implies relatively weaker effects in absolute terms. A group of regions with a higher efficiency rate comprises Žilina, Trnava and Nitra regions which benefited from their economic strength and a relatively higher share of expenditures used to support industry and services. Of economically stronger regions, the lowest efficiency rate measured by the CSF multiplier was achieved in the Trnava region this resulted from a high share of expenditures spent on infrastructure projects whose multiplier effects will become more visible in a long-term. In addition, infrastructure investments bring along weaker indirect impacts on the regional economy due to a relatively smaller volume of wage costs. Economically weaker Košice region had a similar efficiency rate which was largely driven by research and development expenditures and expenditures to support industry and services. The last group of regions sharing similar values of CSF multiplier consists of the economically weakest Banská Bystrica and Prešov regions in which a substantial portion of funds was allocated to infrastructure development and modernisation projects, thus contributing to investment debt reduction in these regions. A positive fact is that the multiplier value has been gradually growing for all regions and that none of the regions had this value below 1 in 2014. Efficient regions are those in which the CSF multiplier is greater than 2. According to Bradley and Untiedt (2009), a CSF multiplier of 2 represents the level attained by medium efficient countries in the 2000-2006 programming period. A key source of differences in the regional multiplier is the structure of implemented projects, with a higher efficiency rate observed in those regions that implemented projects with a relatively higher labour intensity and higher value added.

Table 23: Cumulative CSF multiplier

	2008	2009	2010	2011	2012	2013	2014	2015
Bratislava region	2.2	2.5	2.7	2.6	2.7	3.0	3.1	3.2
Trnava region	0.8	1.0	1.3	1.5	1.8	2.0	2.1	2.2
Trenčín region	0.9	1.2	1.3	1.4	1.5	1.6	1.7	1.8
Nitra region	0.8	1.0	1.1	1.4	1.6	1.8	2.0	2.0
Žilina region	1.2	1.6	1.8	1.9	2.0	2.2	2.3	2.3
Banská Bystrica region	0.8	1.0	1.1	1.2	1.4	1.6	1.7	1.7
Prešov region	0.9	1.1	1.2	1.3	1.5	1.6	1.7	1.8
Košice region	0.9	1.0	1.2	1.3	1.6	1.6	1.7	1.8
Slovakia	1.4	1.3	1.4	1.5	1.7	1.8	2.0	2.0

Source: calculations by authors

Spending the SF and CF resources on development and/or modernisation of infrastructure is accompanied by a lower value of CSF multiplier, indicating a lower level of short-term effects. However, it creates conditions for the implementation of projects with a higher

value added in the future. Investments in research and development proved efficient, as confirmed by the 2014 value of the CSF multiplier in the Bratislava and Žilina regions, two of the three regions with the highest level of cumulative expenditures on research and development until 31 December 2014. Expenditure spent on the direct support for industry and services have a positive instant effect on the efficiency rate measured by CSF multiplier. Regions whose CSF multiplier value reaches 2 can be considered relatively highly efficient. It can be stated that none of the regions spent the EU funds inefficiently, since the value of the CSF multiplier was greater than 1 in all regions.

Summary

Based on the results achieved, it can be stated that the geographical allocation followed the objectives defined under the Cohesion policy. The Bratislava region was the most efficient in the spending of Cohesion policy funds, which was determined by the sectoral allocation of the funds spent in this region, largely aimed at supporting research and development, services and human resources in institutions in charge of the management and implementation of the EU funds. This was supplemented by expenditures to support industrial production in 2014. The CSF multiplier values in individual regions indicate that the expenditures to support industry and services generated more intensive immediate impacts on GDP growth while the effects of infrastructure investments would become more apparent with a certain delay. Even though the infrastructure investments are less efficient from a short- to medium-term perspective, they are essential to further economic growth in the future. Therefore, in terms of regional allocation, consideration needs be given to the difference between a pro-growth and cohesion allocation of SF and CF resources in the 2014-2020 programming period. The geographical efficiency of allocations measured by the CSF multiplier indicated efforts to meet NSRF therefore it can be concluded that, with respect to the objectives defined under the NSRF, the financial resources were to a large degree spent efficiently in terms of their geographical allocation.

4.5 Gross value added

Model outputs for gross value added in selected sectors at the NUTS 3 level were chosen in order to assess the impact of the SF and CF implementation on the increase in value added generated by individual sectors. The research takes into consideration their absolute values and their relative share in the total gross value added generated in the given region. Gross value added represents a portion of output generated by the operation of an economic entity.

The SF and CF implementation directly generated an additional gross value added in a majority of sectors of the national economy. Since the model considers the development in the agricultural sector as exogenous we excluded this sector from the analysis of direct impacts of the EU funds implementation Model results do not provide a picture of the impacts of the implementation on gross value added in this particular sector. In view of the fact that the largest portion of the EU funds was targeted at the development and/or modernisation of infrastructure, the strongest impacts of the SF and CF resources on the formation of the value added was felt in the construction sector. In 2014, the implementation of the EU funds accounted for almost one fifth of the total gross value added generated in the sector. The weakest impact on the gross value added was observed in the non-market services sector where the EU funds implementation generated an additional growth of only 2.1 % in 2014. In the industry and market services sectors, the

implementation generated additional gross value added of the corresponding sector at level of3.8 % and 6.2 %, respectively. The largest disparities were observed in the construction sector where the EU funds generated an additional growth in the gross value added at a rate of 8.1 % in 2014 in the Bratislava region, compared against roughly 35 % in the Trenčín region. Such disparities were driven by substantial differences in the level of implementation of the projects focused on the development and/or modernisation of infrastructure at the regional level. In 2014, just above 4 % of total infrastructure expenditures were allocated to the Bratislava region while the Trenčín region received as much as 27 %. The strongest impact of the SF and CF implementation on the gross value added in market services was observed in the Trenčín and Žilina regions in 2014 where EU funding generated around 10 % of the gross value added.

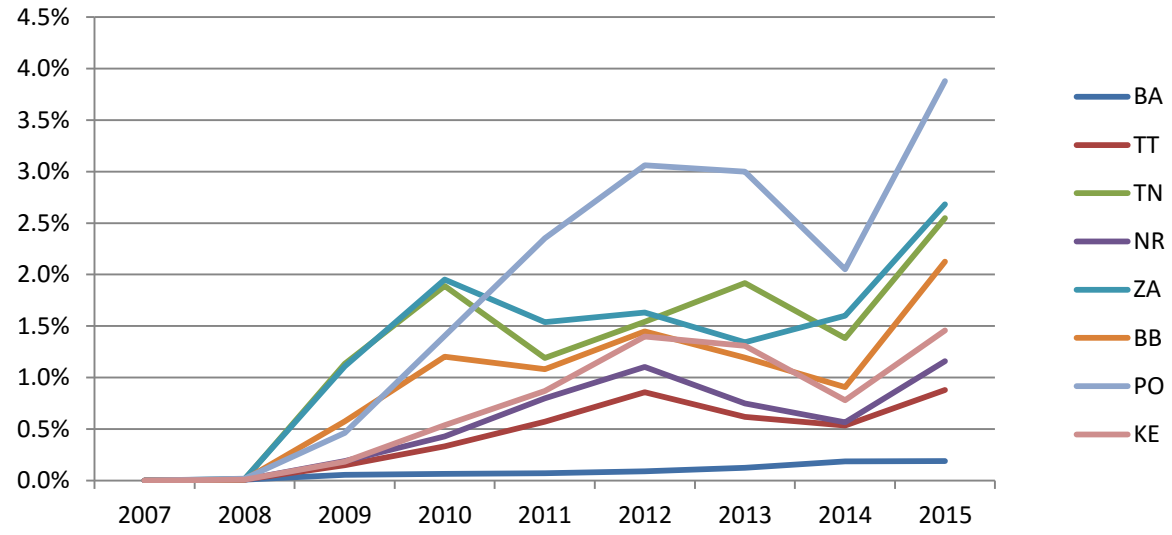
Table 24: Share of additional growth in gross value added in Slovakia, %

Sector	2007	2008	2009	2010	2011	2012	2013	2014	2015
Agriculture	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Industry	0.0	0.0	0.2	0.7	1.6	2.3	3.2	3.8	5.1
Construction	0.0	0.2	5.5	12.7	14.9	22.1	22.8	19.8	37.9
Market services	0.0	0.1	1.0	2.4	3.3	4.6	5.6	6.2	8.8
Non-market services	0.0	0.0	0.2	0.6	1.1	1.4	1.7	2.1	2.9
Total	0.0	0.1	1.1	2.5	3.4	4.6	5.3	5.7	8.4

Source: calculations by authors

A similar development occurred in the industry sector where the strongest impact (8.2 %) of the SF and CF spending on the gross value added was felt in the Trenčín region. Despite the deceleration of EU funds spending by nearly 17 % year-on-year in 2014, the strong effects of the EU funds spending on the formation of gross value added in the Trenčín region were driven by its highest spending rate of all Slovak regions. The Trenčín region absorbed around EUR 270 million in 2014, accounting for 17.5 % of financial resources spent from the EU funds in Slovakia in that year.

Chart 42: Additional share of gross value added of the construction sector in the total gross value added

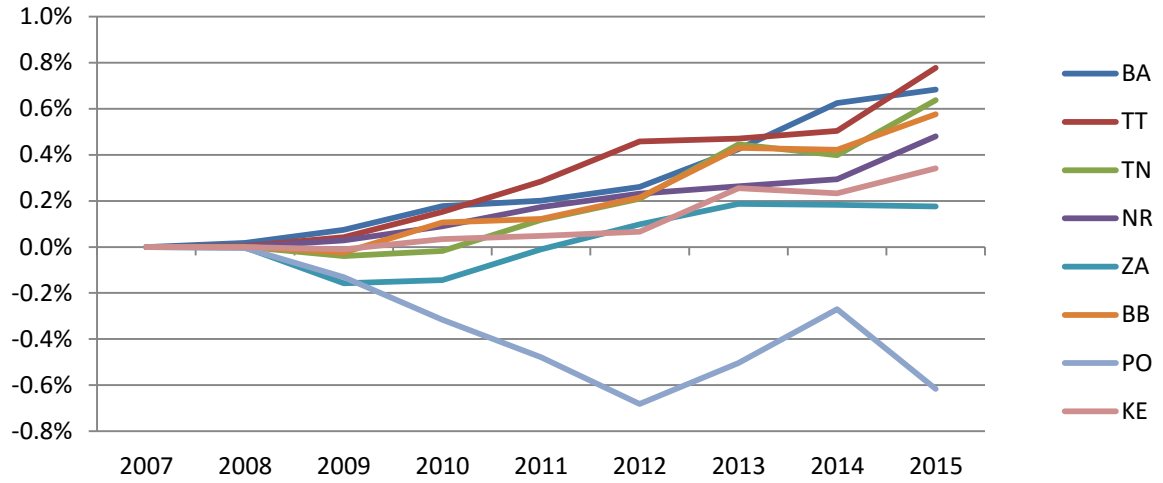


Source: calculations by authors

Taking a closer look at the impacts of the SF and CF implementation on the share of individual sectors in the total gross value added, the sectors can be divided into two groups in most regions. The first group includes sectors whose share in the total gross value added decreases in all regions - agriculture, non-market services and industry. Given a relatively small volume of resources used for the direct support to the industry sector relative to its size, their effect on the growth of gross value added in industry is a cause of the decline in the sector's share in the total gross value added. Due to less efficient implementation of the EU funds, the non-market services sector failed to generate an additional gross value added in a volume sufficient to retain its share in the total gross value added.

The second group of sectors comprises those in which the SF and CF implementation increased their share in the total gross value added - construction and market services. A relatively large volume of financial resources was targeted into the construction (approximately 53 % of total allocations at the end of 2014). Due to the intensive support for investments in infrastructure development and modernisation across all regions, the sector's share in the total gross value added rose in all regions. The market services sector was able to absorb and implement SF and CF resources efficiently, thus increasing the sector's share in the total gross value added. Exemptions in this group are the Prešov region and, in the first years of the programming period, also the Žilina region. In these regions, a steep growth in the share of the construction sector resulted in a temporary and/or permanent declines in this sector's share in the total gross value added.

Chart 43: Additional share of gross value added of the markets services sector in the total gross value added



Source: calculations by authors

Summary

The SF and CF implementation resulted in a growth in the gross value added in all sectors and all regions. Even though the model does not describe a change in the agriculture sector, it can be assumed that also gross value added in the sector moderately increased as result of an indirect effects of the EU funds implementation (a growth in household demand). The strongest impact of the SF and CF implementation on the gross value added across all regions was observed in the construction sector which absorbed more than 50 % of total resources. The weakest effect materialized in the non-market services sector whose ability to efficiently absorb available financial resources from SF and CF was rather limited. The impact of the SF and CF spending on the industry sector corresponds to the sector's size and the volume of funds allocated for the direct support to this sector. The market services

sector was most efficient in using the SF and CF financial resources and also benefited from their indirect impacts The growth in the share of market services in the total gross value added indicates that the EU funds implementation positively affected structural changes in the economy and facilitated its transition to an economy whose structure is closer to that of advanced economies.

Driven by the effects of the SF and CF implementation, an additional gross value added was generated across all sectors of the national economy and across all regions. Though the model does not capture changes in the gross value added generated in the agriculture sector, taking into consideration the growth observed in others sectors it can be stated that the SF and CF had a positive impact also on this sector (mainly indirectly, through a growth in domestic demand). The SF and CF implementation also influenced the structure of the gross value added generated in individual regions and contributed to its transformation closer in structure to advanced economies. The largest change in the gross value added, driven by the implementation of the EU funds, was observed in the construction sector at the end of 2014, which received more than a half of the total allocations. Without the SF and CF spending, the construction sector would have seen a substantial drop in output and employment. The non-market services sector showed only a limited capacity to use the SF and CF resources to increase the formation of its gross value added. Given their size and the volume of funds absorbed, the industry and market services sectors were able to adequately utilise the direct and indirect effects of the EU funds implementation to increase their gross value added.

4.6 The share of private and public value added

The value added generated by the private and public sectors give a picture of the strength and conditions of individual sectors and, to a certain degree, of the situation in the country's business environment. Based on the values of the indicators of the volume of gross value added generated by the business and public sector, we were able to calculate the value of the SF and CF contribution indicator. This indicator represents the difference between the share of the public and business sector in the total gross value added with and without the EU funding. For the purposes of this analysis, the public sector covers public administration, education, and health and social care (NACE Rev.2: sectors O, P and Q). The arts, entertainment and recreation sector was excluded from the public sector, since a large portion of the value added generated in this sector comes from private businesses.

Table 25: Share of the business sector, public sector and SF and CF contribution to value added in %

		2007	2009	2014	2015(p)
Bratislava region	Business sector	86.8	85.9	87.6	87.8
	SF/CF contribution	0.0	0.0	0.2	0.3
	Public sector	13.2	14.1	12.4	12.2
Trnava region	Business sector	89.6	86.8	86.7	87.1
	SF/CF contribution	0.0	0.0	0.4	0.6
	Public sector	10.4	13.2	13.3	12.9
Trenčín region	Business sector	85.5	82.1	81.4	81.7
	SF/CF contribution	0.0	0.4	1.3	2.1
	Public sector	14.5	17.9	18.6	18.3
Nitra region	Business sector	90.7	89.9	89.4	89.5
	SF/CF contribution	0.0	0.0	0.2	0.4
	Public sector	9.3	10.1	10.6	10.5
Žilina region	Business sector	88.5	86.9	87.4	87.6
	SF/CF contribution	0.0	0.3	0.8	1.2
	Public sector	11.5	13.1	12.6	12.4
Banská Bystrica region	Business sector	86.3	84.4	82.2	82.2
	SF/CF contribution	0.0	0.2	0.6	1.1
	Public sector	13.7	15.6	17.8	17.8
Prešov region	Business sector	85.5	83.8	83.9	83.9
	SF/CF contribution	0.0	0.1	0.9	1.5
	Public sector	14.5	16.2	16.1	16.1
Košice region	Business sector	87.8	85.4	87.4	87.3
	SF/CF contribution	0.0	0.1	0.4	0.6
	Public sector	12.2	14.6	12.6	12.7
Slovakia	Business sector	87.6	85.8	86.2	86.4
	SF/CF contribution	0.0	0.1	0.5	0.7
	Public sector	12.4	14.2	13.8	13.6

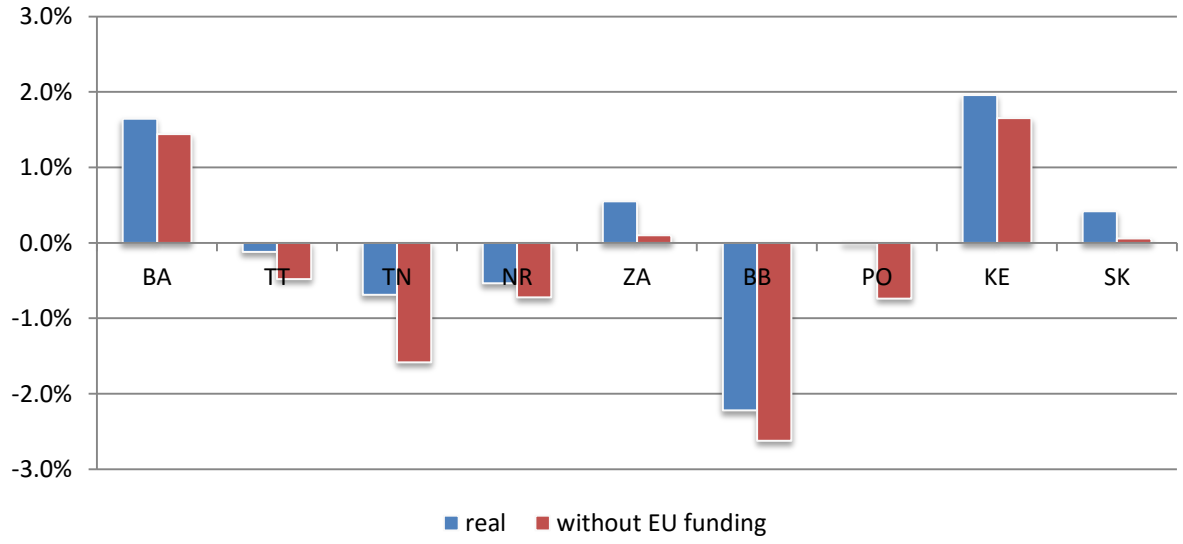
Source: calculations by authors

Share of the business and public sector in the total gross value added during the programming period was largely affected by the onset of the global economic crisis which resulted in a relatively sharp decrease in the business sector's share in 2009.

At the beginning of the programming period, the business sector in Slovakia accounted for 87.6 % of the gross value added, but its share fell 2 percentage points to 85.8 % in 2009. Without the SF and CF implementation, the decline would have been by 0.1 p.p. higher. In 2014, the business sector accounted for 86.2 % of the gross value added, of which 0.5 p.p. was generated by the contribution of the SF and CF implementation. The lowest share of the public sector in the total gross value added was observed in Nitra region, around the 10 % level. With the SF and CF contribution, the share of the business sector is projected to increase to 86.4 % of total gross value added in 2015. The highest contribution of EU funding to the growth in the business sector's share is expected in the Trenčín region (a region with the highest level of spending) in 2015, as much as 2.1 p.p..

Looking at the growth in the business sector's share in the total gross value added between the crisis year of 2009 and 2014 we can observe that, without the SF and CF contribution, this share would have dropped more considerably in most regions. The most significant decrease would have occurred in the Banská Bystrica region, at a rate of more than 2.5 p.p.. The most moderate decrease in the business sector's share in the total gross value added occurred in the Prešov region which has the largest portion of indicative allocation. The second most moderate decrease was observed in the Trnava region. In both regions, relatively large allocations were aimed at infrastructure development which also reflected in a growth in the gross value added generated by the construction sector which belongs to a part of the business sector in the national economy. The smallest contribution of the EU funding to the growth of, or to the mitigation of the decrease in, the business sector's share in the total gross value added between 2009 and 2014 occurred in Bratislava and Nitra region, approximately at a level of 0.2 p.p..

Chart 44: Change in the share of the business sector in the total gross value added between 2009 and 2014



Source: calculations by authors

Summary

The SF and CF implementation contributed to mitigating the impacts of the economic crisis on the business sector. The strongest contribution of the SF and CF implementation to reducing the decrease in the business sector's share in the total gross value added occurred in the Trnava and Prešov regions where a majority of resources was allocated to infrastructure development and modernisation. In the Žilina region, EU funds implementation contributed to a growth in the business sector's share; without the SF and CF spending the ratio between the business and the private sector would have stagnated in the region. The Košice region would have posted the largest increase in the business sector's share in the gross value added without the implementation of the EU funds.

The share of the business sector in the gross value added which represent the size of private activities in the economy, is relatively high in Slovakia, having reached 86.2 % in 2014. The private sector's share peaked in 2008 at nearly 88 %; afterwards, the share of the public sector rose to approximately 14 % due to the economic crisis in 2009 and was preserved throughout 2010, as well. From 2010 on, the SF and CF implementation contributed to a growth in the business sector's share in Slovakia's total gross value added. This contribution represented 0.5 p.p. in 2014 and is expected to increase to 0.7 p.p. in 2015. Without the EU funds implementation, most regions would have seen a larger decline in the share of the business sector in the total gross value added, except for the Žilina region where the ratio between the business and the public sector would have remained unchanged. In case of Bratislava and Košice regions in which the business sector's share would have increased even without the SF and CF spending. The strongest positive effects on the private sector's gross value added were observed in the Trnava and Prešov regions where EU funds supported large infrastructure projects and contributed to reducing the decrease in the business sector's share by 1.3 and 0.9 p.p., respectively. The Košice region would have seen the largest growth in the share of the business sector without the use of the Cohesion policy funds.

4.7 *The NSRF strategic objective fulfilment*

The NSRF has defined a set of indicators to monitor the fulfilment of strategic objective "Considerably increase, by 2013, the competitiveness and performance of Slovak regions and economy, and to increase employment while respecting sustainable development". In order to evaluate the fulfilment of the strategic objective, the progress made in meeting target values of these indicators (energy intensity of the economy, summary innovation index, GDP per capita at PPP compared to EU-15 average, labour productivity compared to EU-15 average, employment rate compared to EU-15 average) were analysed and the impact of the SF and CF implementation on the strategic objective was subsequently assessed.

Table 26 describes the development of NSRF target indicators. The target values have virtually been met for all indicators, except for Slovakia's ranking in the summary innovation index, which worsened last year. Qualitative factors of economic growth in Slovakia thus still remain one of the biggest obstacles to more dynamic economic development.

Meeting the energy intensity indicator target value was fulfilled without problems also due to relatively little ambitious target set at 663.4kgOE/€1 000. Nevertheless, the energy intensity in Slovak economy falls each year (except for 2013 which saw a moderate year-on-

year increase in this indicator), thus contributing to sustainable economic development. Major contributions to this improvement come from operating programmes aimed at increasing energy savings in production (OP C&EG) and investments in public infrastructure reconstruction (ROP).

Table 26: Development in indicator targets under the NSRF

Indicator	Unit	2007	2008	2009	2010	2011	2012	2013	2014	2015 target
Energy intensity	kgOE/ 1000 €	388.5	377.8	362.8	370	349.8	329.3	337.2	.	663.4
Summary innovation index	ranking	22	22	21	23	22	20	21	22	19
GDP per capita at PPP compared to EU-15 average	%	59.9 %	64.5 %	64.3 %	66.3 %	66.1 %	67.8 %	69.0 %	.	> 60
Labour productivity compared to EU-15 average	%	69.4	72.6	72.8	74.5	73.6	73.8	.	.	>70
Employment rate in 20-64 age group	%	67.2	68.8	66.4	64.6	65	65.1	65	65.9	72

Source: Eurostat, calculations by authors. Data for some indicators were not available at the time of preparation of the report.

The SF and CF spending had a substantial impact on the volume of GDP per capita at PPP, moderate contribution towards labour productivity and a positive effect on the development in the labour market.

Summary

Based on the model estimates and analyses in the previous chapters were able to identify a positive impact of the SF and CF spending on the meeting of partial indicators under the NSRF strategic objectives. The EU funds made a positive contribution towards the convergence of the Slovak economy to the EU average. Those resources helped to mitigate the impacts of the financial and economic crisis on the Slovak economy and encouraged the creation of new, and retention of a portion of the existing jobs. However, they failed to substantially boost competitiveness and economic performance of the regions. This occurred partially due to the fact that several competitiveness aspects were not affected by the Cohesion policy interventions. In this respect, the Cohesion policy mainly offset the impacts of the financial and economic crisis in Slovakia.

4.8 Europe 2020 objectives fulfilment

As a follow-up to the Lisbon Strategy, the Europe 2020[26] Strategy (hereinafter only referred to as Europe 2020) has been adopted as a strategic document defining the EU's key objectives for the next decade. The strategy has set three key priorities: smart, sustainable and innovative growth. The implementation of Europe 2020 is funded from national resources at the level of Member States, as well as from the EU's Cohesion policy funds. In order to implement the objectives, set under the strategy, each Member State was obliged

[26]Europe 2020 strategy.

to transform these objectives into a so-called National Reform Programme[27] that serves as the basic Europe 2020 document at the national level. The progress made in the implementation of the programme is subject to evaluation every year, an action plan for the reform programme is prepared and macroeconomic impacts of structural reforms are assessed. The national reform programme defines and evaluates the main structural measures designed to achieve a sustainable economic growth, create new jobs and improve the quality of life. The reform programme is closely accompanied by a stability programme[28] which defines a medium-term outlook of a country's fiscal policy. The preparation and implementation of the programme is part of an increasingly intensive coordination of economic policies (the so-called European semester) in the form of recommendations by the European Commission and the EU Council.

The preparation and implementation of the NSRF also took into account the objectives set under the Lisbon Strategy and later, in response to the impact of the economic and financial crisis, the Europe 2020 objectives, as well.

With respect to meeting the Europe 2020 objectives, a set of indicators has been defined at the national level, including their specific target values. Given the nature of a majority of indicators, the macroeconomic model cannot estimate what contribution the Cohesion policy interventions have towards the meeting them. For the research purposes, the data taken from the ITMS were divided by priority themes and the amounts of expenditures, allocated and spent under the indicators relevant to inclusive, smart and sustainable growth were identified.

Smart growth

The smart growth primarily refers to enhancing performance in education (encouraging people to learn and adapt their skills to the current demand), research and innovation (creating new products and services generating growth and jobs) and digital society (ICT utilization). The following objectives for smart growth have been defined at the national level:

- 1 % of GDP to be invested in research and development;
- Reduce school drop-out rate to less than 6 %;
- Increase the share of 30-34 year-olds having completed tertiary education to at least 40 %.

The school drop-out rate showed a reverse turn at the end of 2013. While the figure continuously decreased from 6.5 % in 2007 to 4.7 % in 2010, we can see a gradual increase in the school drop-out rate since 2011. The largest year-on-year increase by 1 percentage point was observed in 2013 when the drop-out rate reached the level of 6.3 %. In research and development funding, we observe a positive impact of the spending of financial resources from the SF and CF on the research and development expenditures to GDP ratio. The ratio has gradually increased since 2007, having reached 0.8 % of GDP in 2013. Nevertheless, this figure is still one of the lowest in the EU. While the total research and development expenditures from the SF and CF represented 0.01 % of GDP in 2007, they increased to

[27] National Reform Programme.
[28] The 2014 – 2017 Stability Programme.

0.05 % of GDP in 2013[29]. The implementation of operational programmes targeted at smart growth was negatively affected by a number of factors. The implementation of the R&D operational programme was hindered by an excessive administrative burden placed on applicants while, at the same time, having very weak links to the existing structures for the support of research and development in Slovakia. With respect to digital economy, the implementation of the Information Society operational programme, a key operational programme for information society, had been delayed from the very beginning of the programming period and substantially affected by the political cycle and the lack of related legislation in place at that time.

Meeting the target of increasing the share of 30-34 year-olds having completed tertiary education seems flawless. Their share increased from 29.0 % to 36.9 % between 2007 and 2013. Meeting the 40 % target by 2020 is desirable to a certain extent, but the figure alone says nothing about the quality and qualification of graduates who often fail to find a place on the labour market in a field of their qualification.

The smart growth targets focus on strengthening the qualitative factors of economic growth, such as science, research, innovation, information society and education (Table 27). Under the current programming period, they were addressed by the following operational programmes: Competitiveness and Economic Growth, Research and Development, Employment and Social Inclusion, Bratislava Region, Health, and Information Society. The amount of funds contracted relevant to the smart growth objective represents EUR 4.2 billion in total. The highest shares of funds were allocated to innovation, research and development (39.33 %), education (33.07 %) and Digital Europe (27.6 %). At the end of the reporting period, the highest amount of EU funds was spent on education, training and life-long learning. The overall share of funds spent on the allocated sources reached the level of 54.76 % at the end of 2014. The absorption of the EU funds to promote the development of information and communication technologies still remains at a relatively low level (50 %); the implementation of EU funding in the field of innovation, science and research (47.3 %) cannot be considered satisfactory, either.

Table 27: Allocation and spending of Cohesion policy funds relevant to the Smart Growth objective at 31 December 2014 (EU funds)

Europe 2020 themes	Priority theme	Allocation	% of total allocation	Funds spent as at 31 December 2013	Funds spent in %
Digital Europe	10-15	1 181 302 692.9	27.60 %	588 994 909.5	49.86 %
Innovation, research and development	1-9	1 683 722 072.6	39.33 %	795 839 165.7	47.27 %
Education, training and life-long learning	72-75	1 415 819 411.4	33.07 %	959 414 604.9	67.76 %
Total		4 280 844 176.8	100.00 %	2 344 248 680.0	54.76 %

Source: ITMS, calculations by authors

These figures indicate that despite the progress made in the implementation, there is a substantial portion of funds allocated to areas with a higher potential to positively affect smart growth left unspent, therefore, the contribution of the Cohesion policy remains limited in this area. In addition, given a long-term rate of return and nature of investments

[29]Source: Eurostat: Total intramural R&D expenditure (GERD) by sectors of performance and source of funds.

targeted at smart growth, it is essential to remove the existing barriers to the implementation and increase the spending on allocation share by the end of 2015.

Inclusive growth

Under Europe 2020, inclusive growth primarily refers to increasing the employment rate (creating new and higher quality jobs), investing in training and increasing qualification in order to prepare for expected changes on the labour market, modernising labour markets and social security systems, and distribute growth contributions across all EU regions. The following objectives for inclusive growth have been defined at the national level:

- Increase the employment rate of 20-64 year-olds to at least 72 %;
- Reduce the number of people living below the poverty line by 170 000 to 17.2 % of total population.

Under the 2007-2013 programming period, a total of EUR 1.09 billion was contracted for measures in this area of concern. From which, EUR 859.7 million (83 %) was allocated to measures targeting *employment* and EUR 237.4 million (17 %) to *social inclusion* measures. Employment projects concentrated on improving access to and retention of employment (OP Education, OP Employment and Social Inclusion) and reinforcing the ability of employees, firms, businesses and entrepreneurs to adapt to the changing conditions (OP Competitiveness and Economic Growth, OP Education, OP Employment and Social Inclusion). In the field of social inclusion, the operational programmes focused on improving and promoting social inclusion of disadvantaged people (OP Education and OP Employment and Social Inclusion).

Table 28: Allocation and spending of Cohesion policy funds relevant to the Inclusive Growth objective at 31 December 2014 (EU funds)

Europe 2020 themes	Priority theme	Allocation	% of total allocation	Funds spent as at 31 December 2013	Funds spent in %
Social inclusion	71	237 464 953.1	16.96 %	86 067 878.3	36.24 %
Employment	62 - 70	859 748 615.2	83.04 %	584 576 272.1	67.99 %
Total		1 097 213 568.3	100.00 %	547 328 076.1	49.88 %

Source: ITMS, calculations by authors

Despite a relatively large allocations made in the field of inclusive growth, Slovakia shows a largely negative trend in the development of inclusive growth indicators, mainly due to the impacts of the crisis during the programming period. The employment rate of 20-64 year-olds stood at 65.9 % in 2013, while it was as high as 67.2 % in 2007. Judging by the development in this indicator so far, the target rate of 72 % will most probably not be met by 2020.

Equally, the number of people living below the poverty line has not been developing satisfactorily since 2007 when compared to the target rate of 17.2 % set to be achieved by 2020. Their share in total population was 19.8 % in 2013, down 1.5 percentage points since 2007 only. The persisting problem of the domestic labour market is the long-term unemployment rate which continuously grew between 2007 and 2013, from 8.3 % to 10 %. We can see a moderate decline to 9.3 % in 2014. Taking into account the development seen

so far, achieving the 3 % target value is unrealistic, even with the support by the remaining Cohesion policy funds. We can state that without the SF and CF spending, meeting the aforementioned targets would have been considerably more difficult, even though they fulfilment is currently also questionable.

Sustainable growth

The sustainable growth objectives under Europe 2020 concentrate on the building of a competitive low-carbon economy, environmental protection, introduction of and capitalising on green technologies and practices, improvements in the business environment and introduction of ICT-based smart electricity grids. The following objectives for sustainable growth have been defined at the national level:

- Reduce greenhouse gas emissions growth rate from the non-ETS (Emission Trading Scheme) sectors so that they do not exceed the 2005 level by more than 13 %;
- Increase the share of energy from renewable sources in gross final energy consumption to 14 %;
- Increase energy efficiency by saving 11 % of final energy consumption compared to average consumption between 2001 and 2005.

The development in meeting the national target indicates that the national objectives under Europe 2020 are being met. In 2012, the greenhouse gas emissions from non-ETS sectors fell by 8.4 %, the share of energy from renewable sources reached 10.4 % (the 2020 target is 14 %) of final consumption. The final energy consumption fell by 4.4 % (the 2020 target is 11 %) in 2013 when compared to the 2001-2005 average. As far as the share of renewable energy is concerned, the target value is unlikely to be achieved, due to the cuts in the state support[30] and a relatively small allocation of EU funds in this area.

The sustainable growth objectives were allocated the highest volume of financial resources in the current programming period. A total of EUR 5.4 million has been allocated from the EU funds to support sustainable growth. From which, EUR 3.8 billion (62.7 % of total allocation) is intended to support transport infrastructure development, EUR 1.8 billion (33.9 %) is allocated to environmental protection programmes and the smallest volume of funds, EUR 180 million (3.4 %) was allocated to promote renewable energy and energy efficiency.

Table 29: Allocation and spending of Cohesion policy funds relevant to the Sustainable Growth objective at 31 December 2014 (EU funds)

Europe 2020 themes	Priority theme	Allocation	% of total allocation	Funds spent as at 31 December 2013	Funds spent in %
Transport	16-32, 52	3 838 750 130.1	62.77 %	2 276 673 908.8	59.31 %
Energy	33-43	180 192 818.4	3.35 %	102 392 609.0	56.82 %
Environment	44-51, 53, 54	1 885 070 756.7	33.88 %	997 639 745.3	52.92 %
Total		5 408 693 301.0	100.00 %	2 651 465 332.0	49.02 %

Source: ITMS, calculations by authors

[30]The growth in production of energy generated from renewable sources put a pressure on rising electricity prices for households due to high guaranteed feed-in tariffs for electricity from renewable sources.

The implementation of transport infrastructure projects was affected by multiple factors in the current programming period, which had an adverse impact on the pace of transport infrastructure development. Impacts of the political cycle, the lack of well-prepared projects at the beginning of the programming period, problems associated with environmental impact assessments and public procurement issues were among the main factors hindering the implementation.

Summary

The implementation of the operational programmes relevant to achieving the objectives set under Europe 2020 strategy was approaching 50 % in all of the three Europe 2020 priorities at the end of 2014. The greatest progress in the implementation was observed in education, training and life-long learning. However, most resources in this area were spent on the development and modernisation of educational infrastructure and on actual educational activities (OP Education). A strong demand for the funding of this type of projects hints at an ongoing infrastructural debt in the educational system which had to be removed. The infrastructural investments, however, do not substantially contribute to improving the content and quality of education that are essential to smart growth.

Despite the use of the EU funds, Slovakia is one of the Member States with the lowest share of expenditure spent on research and development relative to GDP. Since 2007, the EU funds have been the key instrument to increase their share, with only a minimum increment in funding from national public funds. In 2007, the total science and research expenditures from the SF represented 0.01 % of GDP and increased to 0.05 % of GDP in 2013

The inclusive growth targets have not been met, but we can state that without the SF contribution, the development in this area would have been much more dramatic. The employment rate of 20-64 year-olds stood at 65.9 % in 2014, while it was as high as 67.2 % in 2007. An upward development in this indicator was considerably muffled by the onset of the economic and financial crisis. The target set to be achieved by 2020 is the employment rate of 72 % in this age group. Considering the current and expected development, this target will most probably not be met.

The contribution of the SF and CF spending to meeting the Europe 2020 objectives is mostly visible under the sustainable growth priority, namely in the environment and energy fields. Due to a slow pace in transport infrastructure development by the end of 2014, the effects of the SF and CF funding is restricted to particular Slovak regions only. Inclusive growth target values set under Europe 2020 are not being met, mainly due to persisting structural issues on the labour market (skills mismatch, high rate of long-term unemployment and related loss of working habits, slow integration of disadvantaged job applicants, etc.) In view of the limited national funding, a major contribution of the Cohesion policy to smart growth is visible in research and development infrastructure modernization and transfer of knowledge into practice. A low rate of the EU funds spending continues hindering a more favourable development in this area.

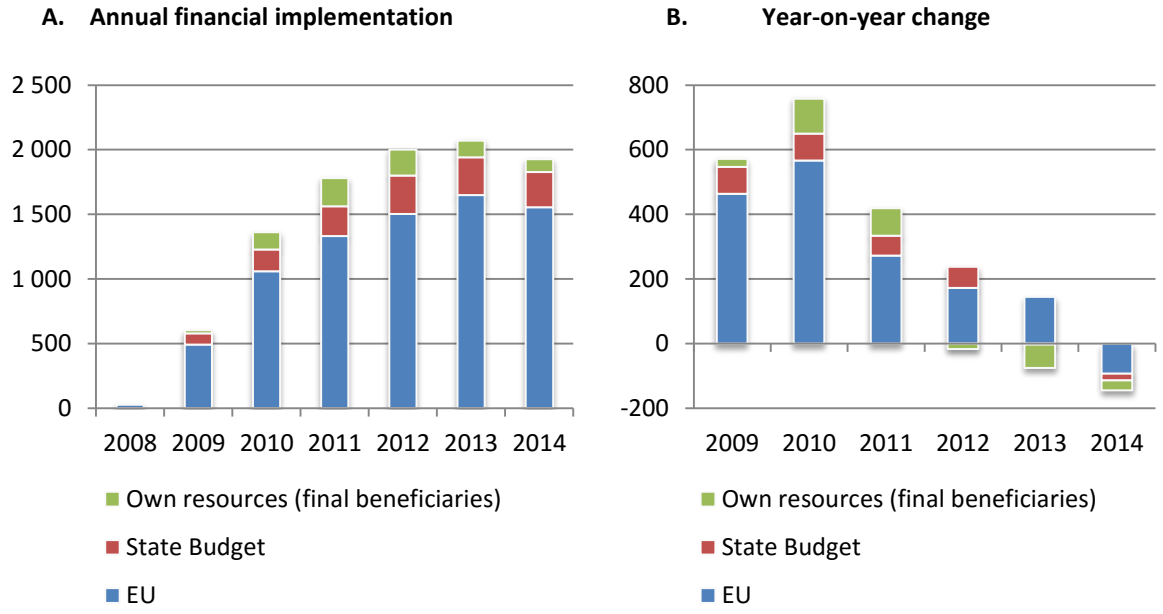
4.9 The share of the SF and CF spending on national and regional GDP

To calculate the share of SF and CF spending on regional and national GDP, we used aggregate annual data from the ITMS sorted by individual sources of financing (EU sources, state budget, own sources) and target sectors for investment (infrastructure, industry,

human resources, services, research and development). Subsequently, individual shares of the EU funds spending (given as the sum of EU sources, state budget and own sources) in the gross domestic product of individual Slovak regions were quantified. The values of regional gross domestic product at current prices for 2008 - 2012 were taken from a database of the Slovak Statistical Office. The regional GDP data for 2013 and 2014 have not been published so far therefore were estimated using the methodology described in Chapter 2.1

Due to the delays in the preparations of the 2007 - 2013 programming period, the spending of financial resources was at a minimum level in 2007 and 2008. As shown on Chart 45, dynamics in EU funds implementation increased in 2009 when a substantial year-on-year rise occurred. In 2009, the total spending of funds stood at EUR 602.9 million, up by EUR 571 million year-on-year.

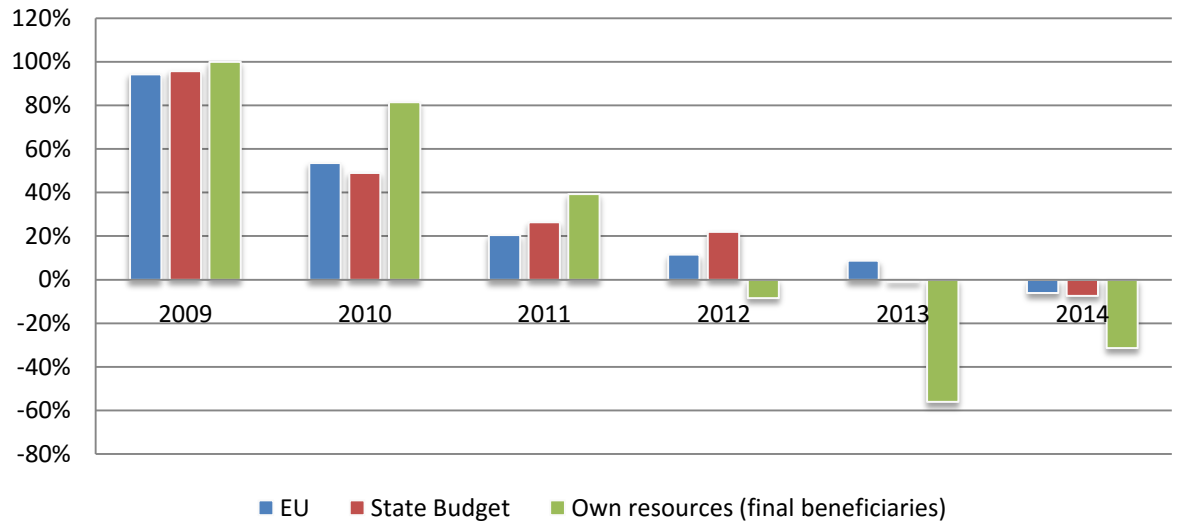
Chart 45/a-b: Spending of financial resources from the SF and CF in Slovakia between 2008 and 2014, EUR million



Source: ITMS, calculations by authors

During the current programming period, the most significant year-on-year increase was observed in 2010. The spending of funds reached EUR 1.36 billion, up by EUR 758 million year-on-year (Chart 45 A). Most of the expenditures in that year were allocated primarily for the infrastructure and market services sectors. To a certain extent, 2010 was a watershed year as it marked the beginning of a gradual decline in year-on-year increases in the absorption of Cohesion policy funds (Chart 45 B). 2014 was the first year when the absorption volume declined against the previous year. In absolute terms, the absorption of funds in 2014 dropped by EUR 144 million against 2013.

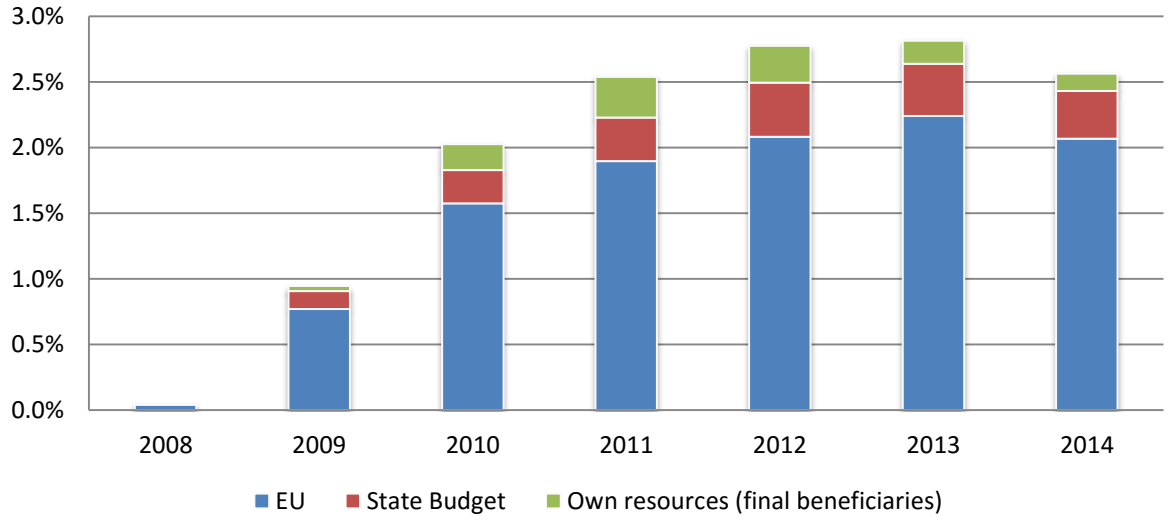
Chart 46: Year-on-year growth of Cohesion policy interventions from SF and CF in Slovakia, in %



Source: ITMS, calculations by authors

The total funds spent from SF and CF relative to GDP is shown in Chart 47. In 2009, the share of funds spent from EU sources, state budget and own sources used for co-financing was slightly below 1 % of GDP. In 2010, it rose to 2.14 % of GDP and gradually reached 2.81 % of GDP in 2013. The lower absorption volume in 2014 against 2013 has also been reflected in the lower spending of funds relative to GDP. In 2014, this share dropped to 2.56 % of national GDP. In light of the Slovak economy's dependence on investments from SF and CF it is clear that, since the outbreak of the financial and economic crisis and the ensuing insufficient domestic demand including the need for fiscal consolidation, the Cohesion policy funds have represented the key source of public investments in the Slovak economy.

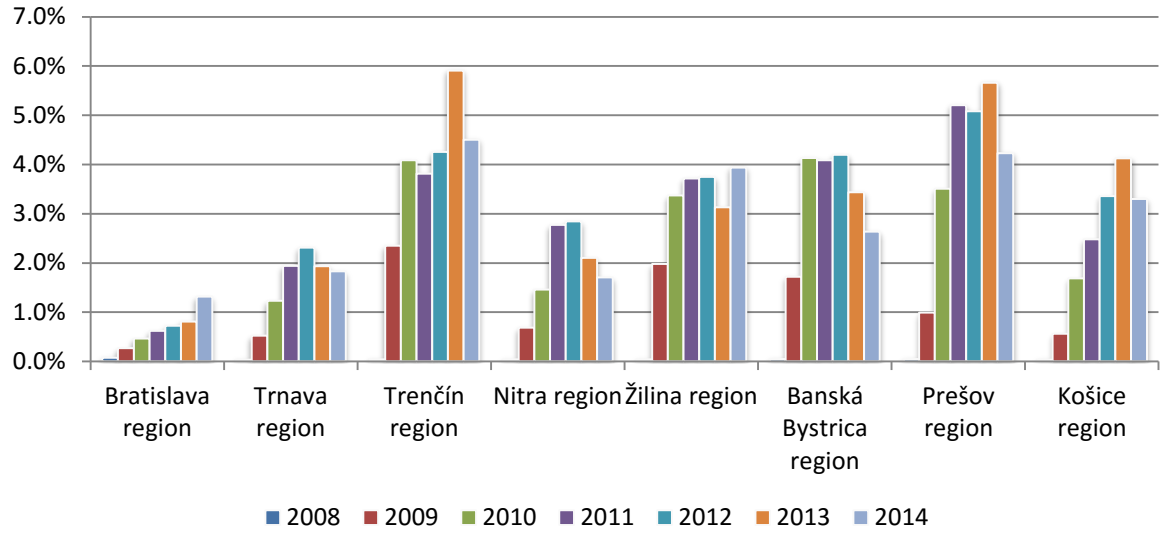
Chart 47: Annual spending of SF and CF in the Slovak Republic as a share of GDP, in %



Source: ITMS, calculations by authors

From the regional perspective, the share of Cohesion policy resources in the GDP of the individual regions is even more significant (Chart 48)[31]. The Bratislava region is the only exception because, as the most economically advanced region, its eligibility to spend was only at minimum volume of resources compared to other Slovak regions. Also, its GDP is much higher than that of other Slovak regions and, therefore, the resulting share of Cohesion policy resources in its GDP is distorted to a certain extent.

Chart 48: The share of Cohesion Policy spending on regional GDP in %



Source: calculations by authors, ITMS

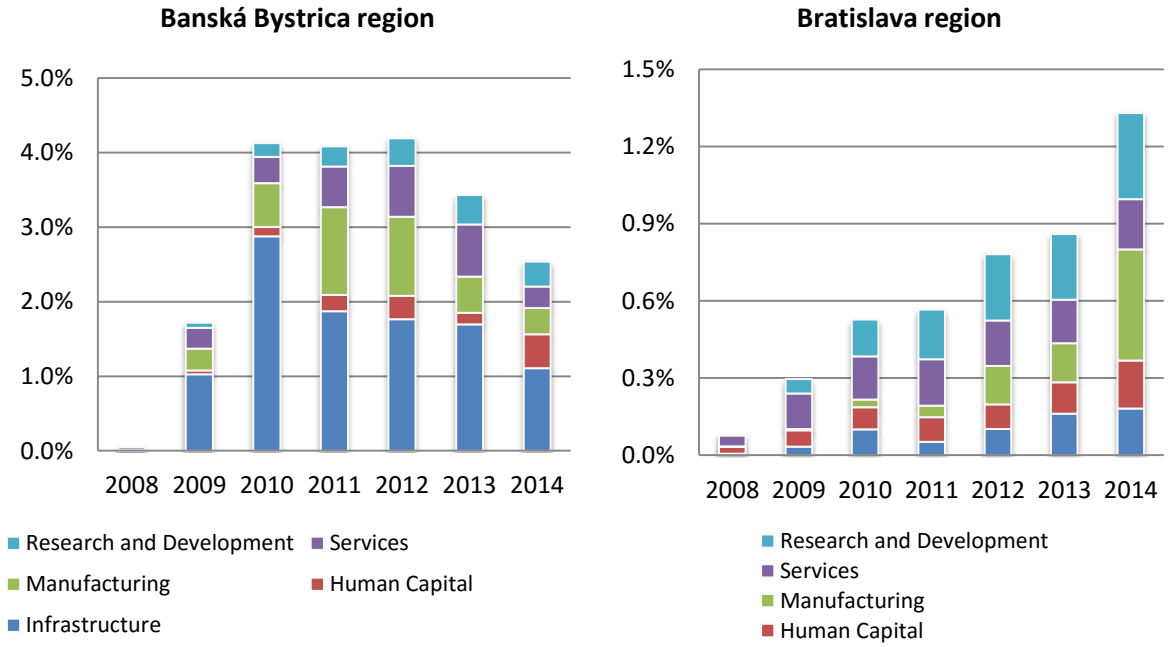
Taking a closer look at individual regions, the highest share of Cohesion policy resources absorption in GDP has been observed in the Trenčín region in 2013 (5.92 % of GDP), the Prešov region in 2013 (5.7 % of GDP), the Banská Bystrica region in 2013 (5.9 % of GDP), the Košice region in 2013 (4.1 % of GDP), the Žilina region in 2014 (3.9 % of GDP), the Nitra region in 2012 (2,8 % of GDP), the Trnava region in 2012 (2.3 % of GDP)[32] and the Bratislava region in 2014 (1.3 % of GDP).

In the Banská Bystrica region, infrastructure expenditures had the highest share in GDP, amounting to 1.5 % on average for the observed period. The highest share of infrastructure expenditure was at 2.9 % of the region's GDP in 2010. The second highest share of expenditures was that of the industry sector, representing 0.6 % of GDP on average. The share of expenditure on research and development peaked at 0.4 % of GDP in 2012 and 2013. In 2014 these expenditures declined to 0.3 % of the region's GDP. The share of expenditures on human capital was the highest in 2014, coming in at 0.5 % of GDP. On average, the expenditures on human capital accounted for 0.2 % of GDP.

[31] The share of GDP is calculated as the sum of EU sources, co-financing from the state budget and own sources of the beneficiaries.

[32] The share is calculated as Cohesion Policy resources implemented in the given year relative to the region's gross domestic product in the given year. The year-on-year fluctuation is primarily due to the completion of infrastructure projects in individual regions, which have been allocated the most financial resources in comparison with other sectors, as well as due to the trend in the region's GDP in the given year.

Chart 49/a-b: Share of SF and CF on GDP in the Banská Bystrica region and the Bratislava region, by sector



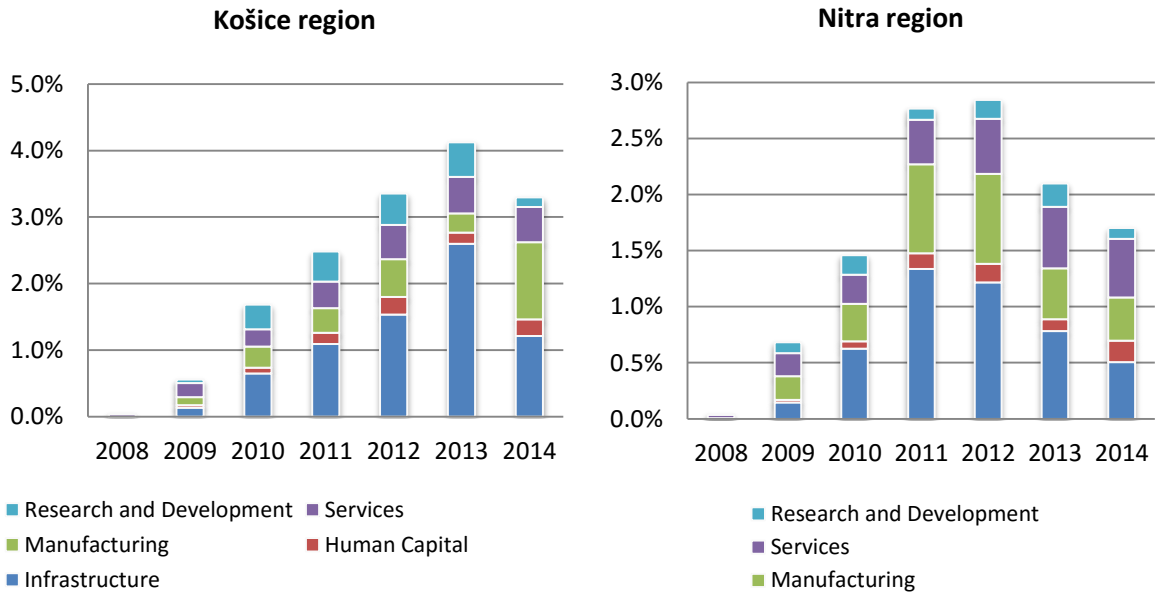
Source: calculations by authors, ITMS

In the case of the Bratislava region and its limited options in implementation of funds due to its high GDP per capita performance measured in purchasing power parity, the absorption of funds relative to GDP is relatively small. In terms of individual sectors, the absorption of funds is distributed more evenly. The highest share of expenditures in the region's GDP was observed in the industry sector, at 0.43 % of GDP in 2014.

Due to a high concentration of science-research capacities as well as the limited eligibility of the Bratislava region to implement financial resources from SF and CF, the share of research and development expenditures in GDP was the second highest, gradually rising from 0.06 % of GDP in 2009 to 0.33 % of GDP in 2014. In absolute terms, they amounted to EUR 242.9 million at the end of 2014 for an average of 0.18 % of GDP. The second highest average share was observed in services, at 0.15 %, followed by expenditures on industry at 0.12 %, human capital at 0.1 % and infrastructure at 0.09 %

In absolute terms, infrastructure expenditures amounted to EUR 125.8 million only. Considering the high utilisation rate of the transport infrastructure in the Bratislava region and its limited options to finance these projects from own sources, this region is considerably handicapped by the limited options to receive funding, which translates into insufficient utilisation of its economic and social potential. As regards the overall absorption, the Bratislava region and the Žilina region were the only regions which managed to increase the volume of absorbed Cohesion policy resources as a share of GDP in 2014.

Chart 50/a-b: Share of SF and CF on regional GDP in the Košice region and the Nitra region, by sector



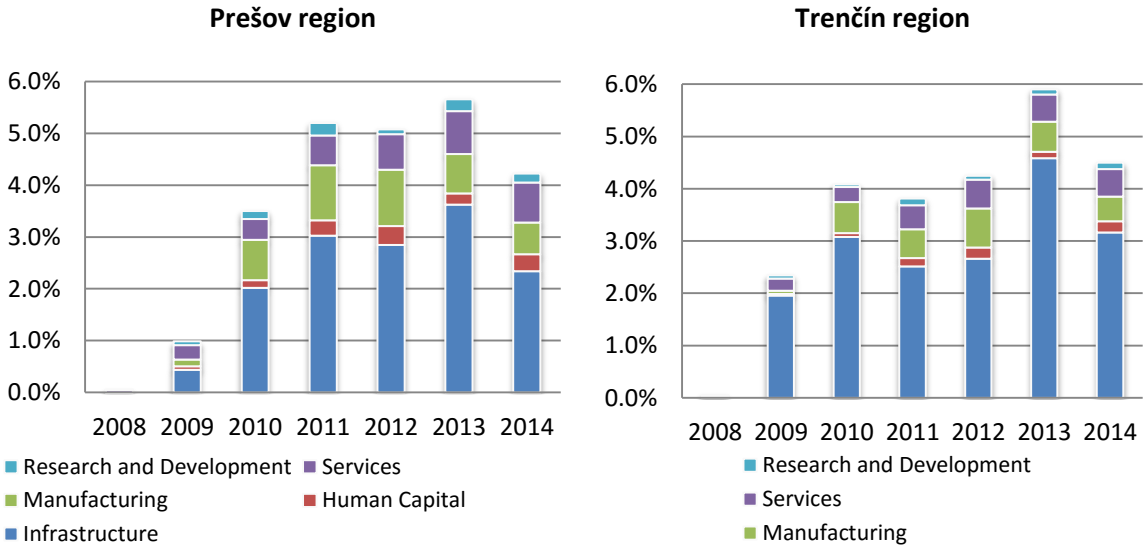
Source: calculations by authors, ITMS

As regards the trends in the Košice region, it can be noted that the highest share of the SF and CF spending in GDP has been achieved in expenditures on infrastructure. This share has been steadily growing since 2009 and reached 2.6 % of the region's GDP in 2013. In 2014, expenditures in this sector only accounted for 1.21 % of GDP. The second highest share in 2014 was observed in the industry sector at 1.16 % of GDP, followed by the services sector at 0.53 %, human capital at 0.25 %, and research and development at 0.14 %. In absolute terms, infrastructure expenditures amounted to EUR 102 million in 2014. At the end of the year, the total volume of funds spent on infrastructure stood at EUR 587 million.

As regards the Nitra region, expenditures were distributed more evenly across individual sectors. In 2014, the share of expenditures on infrastructure represented 0.51 % of GDP, with services coming in at 0.52 %, industry at 0.39 %, research and development at 0.1 % and human capital at 0.19 % of GDP. The average share of industry expenditures was 0.5 % of GDP between 2009 and 2014[33]. In the same period, the average share of infrastructure expenditures represented 0.77 % of GDP. In the case of the Nitra region, it is possible to say that, when compared to regions having similar economic performance, its absorption volumes relative to GDP are the lowest.

[33] The year 2008 has been left out on purpose, because the spending in all sectors was very low, thus significantly distorting the average values relative to the region's GDP.

Chart 51/a-b: Share of SF and CF on regional GDP in the Prešov region and the Trenčín region, by sector

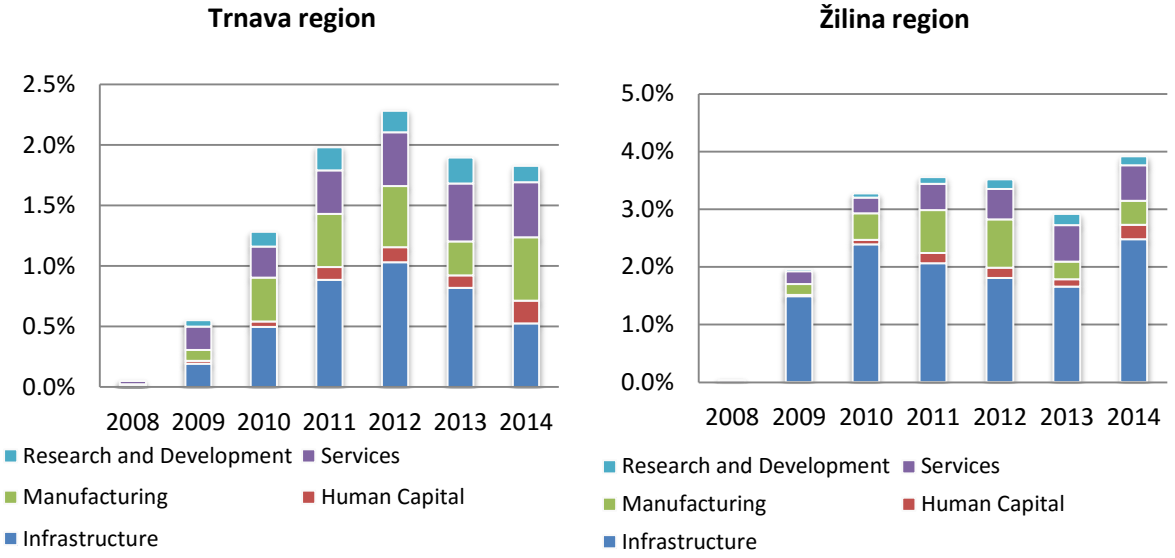


Source: calculations by authors, ITMS

Prešov and Trenčín represent those regions where the highest share of expenditures in GDP has been observed in the infrastructure sector. In the Prešov region, infrastructure expenditure represented 58 % of all expenditures from the structural funds, whereas this figure was as much as 72 % in the Trenčín region. This represents some 2.4 % of GDP on average in the Prešov region or 3 % of GDP in the Trenčín region for the period between 2009 and 2014. In 2014, the share of infrastructure expenditure reached 3.16 % in the Trenčín region and 2.34 % of GDP in the Prešov region (Chart 51). This is primarily attributable to the high costs of infrastructure projects when compared to projects in other sectors. It is also sign of an ongoing infrastructure debt in these regions and the lengthy process of tackling this problem.

In comparison with other regions, infrastructure expenditures in the Trnava region represented 0.6 % of GDP on average. The highest share was observed in 2012, at 1.03 %. In 2014, expenditures on infrastructure were the highest, representing 0.53 % of GDP. Industry had the second highest expenditures from SF and CF as a share of GDP standing at 0.52 %, and was followed by services at 0.45 %, human capital at 0.19 % and research and development at 0.13 % (Chart 52). Of the total expenditures in that year, expenditures on infrastructure accounted for 40 %. In this region, research and development expenditures were at 0.15 % of GDP on average, peaking at 0.21 % of GDP in 2013.

Chart 52/a-b: Share of SF and CF on regional GDP in the in the Trnava region and the Žilina region, by sector



Source: calculations by authors, ITMS

In the Žilina region, the absorption of funds gained the most momentum in 2011 and 2012 when it exceeded 3.5 % of GDP. In 2010, absorption was slightly lower. The highest share in the spending of financial resources from SF and CF was observed with respect to investments in infrastructure. In 2010, they accounted for 2.4 % of GDP and, despite having followed a slightly downward trend since 2010, their share returned to 2.48 % of GDP in 2014. Infrastructure investments as a share of GDP have been on a decline since 2010, gradually giving way to investments in industry, research and development, and services. The turning point came in 2014. As a result of an accelerated spending of financial resources from SF and CF, the Žilina region and the Bratislava region reported a year-on-year increase in absorption as a share of GDP. In 2014, this share reached 3.9 % of GDP, in particular due to spending in infrastructure which amounted to EUR 199 million. Investments flowing from SF and CF into industry were the highest in this region in 2012, reaching almost 0.84 % of GDP. In general, investment in the industry of the Žilina region can be described as one of the highest in comparison with other regions.

Summary

In all regions except for Bratislava, EU sources in combination with co-financing from public sources and the beneficiaries' own sources accounted for a significant portion of the individual regions' GDP. In all regions except for Bratislava, infrastructure expenditures had the highest share in the region's GDP. These expenditures have helped reduce, to a large extent, the existing infrastructure deficits by completing and reconstructing the transport and environmental infrastructure and by improving the amenities of the region. The secondary effect of these expenditures involved the creation of new jobs or maintaining the existing workforce in the construction sector.

In some regions (Trenčín, Prešov and Banská Bystrica), the share of these sources in GDP was slightly higher than in other regions. This can be, on the one hand, attributed to the nature of projects implemented and, on the other hand, to a relatively lower regional GDP in comparison with more advanced Slovak regions.

The specific status of the Bratislava region also had an impact on the structure of supported sectors with a relatively even distribution of absorbed funds across individual sectors (infrastructure, human capital, industry, services and research and development) in proportion to the region's GDP. An increase in expenditures on research and development or, more specifically, the research and development infrastructure, can be regarded positively, as it lays the groundwork for state-of-the-art research in the future. Modernisation of research equipment represents an essential factor which increases the potential of the Slovak science on the international research and development arena.

The SF and CF spending relative to GDP dropped in six regions in 2014. The only regions seeing an increase were Bratislava and Žilina region. In the case of the Žilina region, this increase is primarily attributable to the completion of infrastructure projects worth EUR 199 million.

As at the end of the programming period it is likely to see a more significant increase in the SF and CF spending in proportion to individual regions' GDP due to the expected completion of a number of projects focusing primarily on infrastructure, industry, research and development as well as human capital. Bearing in mind the domestic budgetary constraints, the support from SF and CF had a significantly positive impact on the performance of the individual regions and helped mitigate the impacts of the financial and economic crisis faced by these regions.

4.10 Long-term sustainability of jobs

The number of created jobs represents the number of additional jobs created as a result of using Cohesion policy support. In the applied HERMIN econometric model, sustainable jobs were defined as an average of jobs created during the last two years (2014 and 2015) and maintained for a period of three years (by 2018). Indicator of sustainable jobs uses a different methodology compared to the definition of sustainable jobs (in Central Coordinating Authority's Methodology) for the purposes of their reporting under projects and programmes financed from the SF and CF. The main reason for this is that a particular job is not distinguishable in the model over a longer period of time from the macroeconomic perspective. In the case of analytical representation, this only constitutes the quantification of additional employment attributable to the effects of the SF and CF implementation for all regions and sectors. In general, for instance, a job directly created in the construction sector may cease to exist, but the higher demand driven by the effects of implementation will cause the creation of a new job in the same region and sector. In this case we are calling it a sustainable job, even though it is not an identical job by definition.

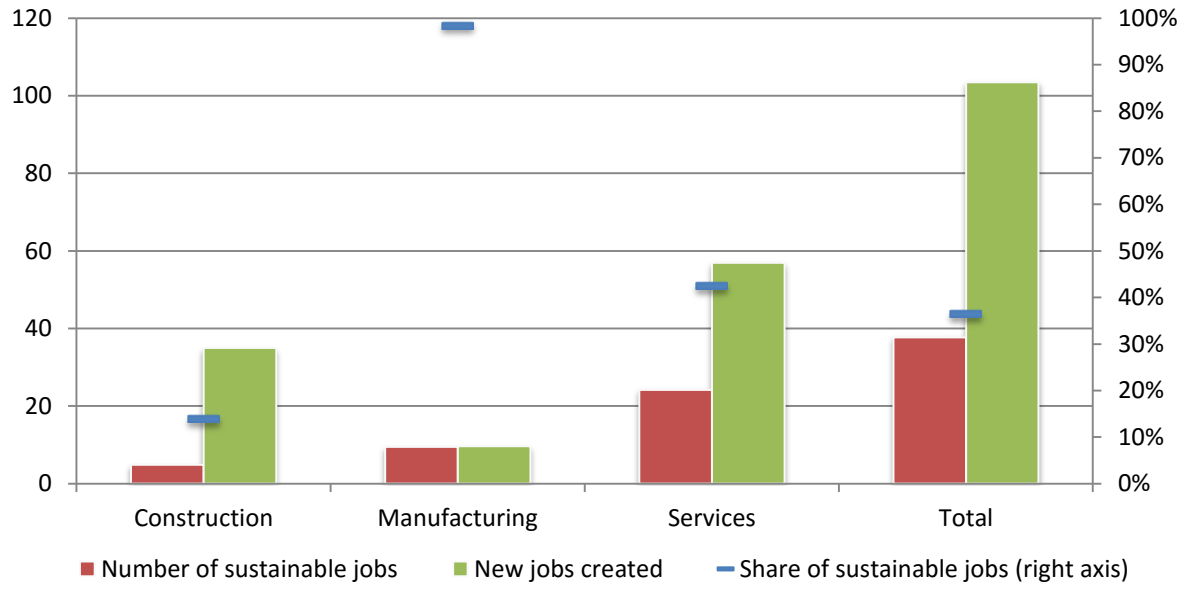
Under the scenario involving the implementation of funds, the total additional employment represented 103 000 jobs when compared to the scenario without EU funds spending[34]. The construction sector is expected to create approximately 35 000 additional jobs in 2014 and 2015 as a result of spending financial resources from SF and CF on infrastructure. The industry sector maintains the slowest pace of creating new jobs. In 2014, this sector created

[34] An average for 2014 and 2015. In 2015 alone, the model indicates as many as 124 000 jobs against the scenario without funds absorption, while taking into account the ability to complete the spending of funds at 89% rate. In 2014, the number of additional jobs represented 79 000 against the scenario without implementation.

more than 9 000 additional jobs as a result of spending the financial resources from SF and CF. In 2015 this number should reach almost 11 000 additional jobs when compared to the scenario without the implementation of funds. In the market services sector, 44 000 additional jobs have been observed in 2014. In 2015, this sector is expected to employ additional 23 000 persons compared to a situation without the spending of financial resources from SF and CF.

At the national level, some 103 000 additional jobs are expected to be created as at the end of the programming period as a result of implementation of the financial resources from SF and CF, and roughly 37 000 jobs of those created should be considered as sustainable[35]. When broken down by sector, most of the jobs will be created in the market services sector, followed by the construction sector and the industry sector. The market services sector should additionally create 57 000 jobs as a result of the SF and CF implementation, with 24 000 jobs expected to be sustainable. The construction sector should create 35 000 additional jobs and, of this number, only 5 000 jobs would be sustainable. Given the nature of jobs in the construction sector, the number of sustainable jobs is the lowest. One of the specific aspects of the construction sector is that employment is limited by the duration of a particular project. Following the completion of any such project, there is a sharp drop in employment due to the sector's high elasticity of demand. The total number of sustainable jobs in the construction sector is only 14 % of the expected number of jobs created. The lowest number of jobs will be created in the industry sector, but their sustainability is expected to be the highest. Interventions under otherwise unchanged external circumstances are therefore capable of creating permanent jobs. In total, some 11 000 additional jobs are expected to be created in the industry sector, with the estimated sustainability rate representing 98 %.

Chart 53: Estimate of created and sustainable jobs in the Slovak Republic

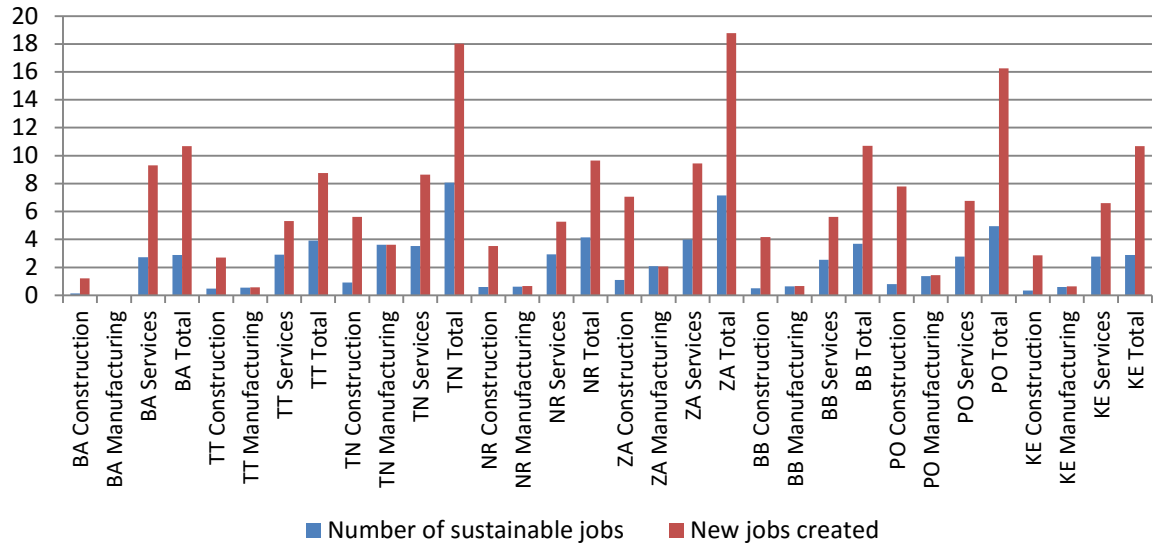


Source: calculations by authors, ITMS

[35] This involves a comparison between employment rates under the scenario with the absorption of funds (the actual figure) and the scenario without the absorption of funds in a given year or as an average for 2014 and 2015.

As suggested by model estimates, the spending of financial resources from SF and CF will create some 10 000 jobs in the Bratislava region, with sustainable jobs accounting for 27 %, i.e. up to 3 000 jobs. In the Prešov region, 16 200 additional jobs are expected to be created, of which 5 000 will be sustainable. The low rate of job sustainability representing 30 % for all sectors is attributable to the high share of employment in construction sector, in which case the sustainability is estimated at 10 % only.

Chart 54: Creation of new and sustainable jobs by region and sector, thousands of persons (new jobs – an average for 2014 and 2015, sustainable jobs – as of 2018)



Source: calculations by authors, ITMS

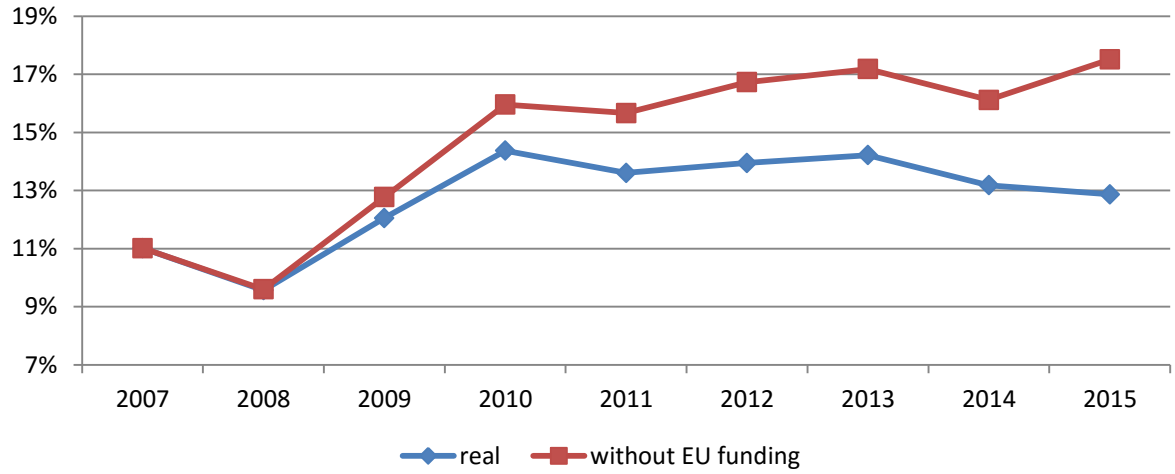
In the Košice region, we expect 10 700 additional jobs to be created primarily in the construction and market services sectors (Chart 54). Almost 3 000 sustainable jobs are estimated in the Košice region, mostly in the market services and industry sectors. In the Žilina region, we expect 18 800 additional jobs to be created, with more than 7 000 being sustainable jobs, particularly in the services and industry sectors. Almost 11 000 additional jobs should be created in the Banská Bystrica region and nearly 4 000 of them will be sustainable, mainly in the market services sector. The number of additional jobs in the Nitra region will represent 9 600, of which more than 4 000 will be sustainable in the long term, primarily in the market services sector (2 900 jobs). There will be fewer jobs sustained in the construction sector (600 jobs) and the industry sector (600 jobs). In the Trnava region, 8 700 additional jobs are expected to be created, of which sustainable jobs should account for 55 %. Trnava region is expected to have the lowest number of jobs created.

Impact of the spending of financial resources from SF and CF on unemployment rates at the national and regional levels

The positive impact of implementation of financial resources from SF and CF on the creation of jobs has naturally influenced the unemployment rate in individual regions. It can be noted that the implementation of Cohesion policy has contributed to lower unemployment rates in all regions. In 2009, the impacts of the economic and financial crisis have negatively affected all regions of the Slovak Republic, albeit with a varying degree of intensity. It was in particular the spending of financial resources from SF and CF which helped significantly mitigate the negative impacts of the crisis in the subsequent years.

The impact of the funds implementation on unemployment rate at the national level is shown for illustrative purposes in Chart 55. The expected creation of jobs driven by SF and CF indicates a decline in the unemployment rate by some 3 to 4 percentage points between 2010 and 2014. From an analytical perspective, this confirms that the negative impact of the crisis on Slovak labour market would have been even worse without the implementation of the funds.

Chart 55: Impact of spending spendingof financial resources from SF and CF on unemployment rate at the national level (illustrative)



Source: calculations by authors

Summary

In 2014, the total additional employment driven by the SF and CF spending represents some 79 000 jobs. In the construction sector, more than 25 000 additional jobs were created in 2014, whereas in the industry sector and the market services sector, the number of additional jobs created was 8 000 and 45 000 respectively. In 2015, more than 120 000 additional jobs were expected to be created, of which 40 000 (33 %) should be sustainable.

We expect that implementation of financial resources from SF and CF helped to induce the creation of more than 103 000 additional jobs at the end of the programming period (an average for the years 2014 and 2015), of which some 37 700 jobs should be sustained until 2018. At the end of 2018, the job sustainability rate is expected to be the highest in the industry sector (98 %) and the market services sector (42 %), with the construction sector having the lowest sustainability rate (14 %). On the national level the ratio between sustained jobs and created jobs will be roughly 36 %. At the end of 2015, the highest number of jobs created due to the implementation of SF and CF is expected in the regions of Trenčín, Prešov, Košice and Žilina. At the end of 2018, the highest share of sustainable jobs at NUTS 3 level is expected in Trnava region (45 %), Trenčín region (45 %), Nitra region (43 %), Žilina region (38 %) and Banská Bystrica region (34 %). Without the implementation of financial resources from SF and CF, the estimated unemployment rate at the national level would have been 3 to 4 percentage points higher in the period between 2010 and 2014. When taking into account only the jobs created in the last year of funds absorption, their sustainability would only be slightly above 30 %.

The implementation of Cohesion policy has substantially contributed to the additional creation and sustainability of jobs, and to mitigating the impacts of the economic crisis on employment. Without the implementation of financial resources from SF and CF in the period between 2010 and 2014, the unemployment rate at the national level would have been 3 to 4 percentage points higher than the observed values.

5 Findings and conclusions

The use of Cohesion Policy funds in the period 2007 – 2015 had a significantly positive impact on the economy of Slovakia. Cohesion Policy has proven its full worth in alleviating the impacts of the global economic and financial crisis on the Slovak economy. Those impacts would have been much harsher, particularly on the labour market, had the SF and CF funds not been available. In the absence of these funds, Slovak GDP would have been lower by 5 % in 2013, by almost 6 % in 2014 and by 8.4 % (estimate) in 2015. The average annual contribution to real economic growth at national level is slightly below 1 p.p.
In 2014, the overall level of implementation was down by almost EUR 300 million against the previous year. Assumption of implementation rate at 89 %implies the need to increase rapidly the actual spending of funds in 2015, which poses a high risk of encountering problems with the absorption capacity of regions, the labour market and the potentially lower efficiency of funds implemented (through the demand pressures on the prices of certain goods and services).

Despite these facts we can still say that, based on the outcomes from evaluation of the SF and CF effects by means of an econometric model (HERMIN), the use of the Cohesion policy resources during the 2007-2013 programming period had a statistically significant and positive impact on the Slovak economy. The effects of using EU's aid have begun to materialise as late as after 2009 in connection with the actual spending of financial resources within the supported projects. There is a direct correlation between the volume of the SF and CF spending and the magnitude of its impact on macroeconomic indicators at the national and regional level, with a relevant factor being the thematic focus of support.

The NSRF strategic objective "to considerably increase, by 2013, the competitiveness and performance of Slovakia's regions and of the economy, and to increase employment while respecting sustainable development" has been met only partially. It is therefore necessary to direct SF and CF interventions into areas which have a potential to generate positive effects (e.g., quality of public administration, science, research and innovation, education, quality of human resources), ensure adequate co-financing from the national budget and encourage the private sector's participation.

The process of real convergence of Slovakia towards the EU-28 average has been facilitated by the implementation of SF and CF in all regions, except for Banská Bystrica, where the divergence process has only been mitigated. Without the funds spent under Cohesion policy, the convergence process would have come to a halt in as many as six out of eight Slovak regions. The Bratislava region, as the economically strongest region, had considerably contributed to maintaining the level of real convergence Without Bratislava region the convergence process on national level would follow a negative trend. The analysis confirmed continuing process of convergence of Slovakia to the EU-28 average over the 2007-2013 programming period, which was also supported by the Cohesion policy resources. The convergence trend is expected to continue also in 2014 and 2015, when the convergence level should account for approximately 77 % of the EU-28 average (measured by GDP per capita in PPP). A slowdown in the spending of funds in 2014, including the changes in structure of spending, had a negative impact on real convergence of Slovakia to the EU-28 average, but, on the other hand, it positively contributed to the reduction of regional divergence. The model results imply that, even though the assumed high absorption of funds

in the last year would have a significant impact on convergence process of Slovakia, a considerable portion of effects could be short-term in nature.

The Cohesion policy impact on employment both at the national and regional level can be described as significant. The global financial and economic crisis has significantly aggravated the problems and imbalance on the labour market. The Slovak labour market (employment and unemployment) was hit by the negative effects of the crisis with a certain delay, but even more intensely. The labour market continued to follow a negative trend after 2009, even though some 79 000 additional jobs have been created by 2014 with the help of financial resources from SF and CF. Without the support from SF and CF, there would be a significant drop in employment. Based on the econometric model, investments from SF and CF should generate a total of more than 120 000 additional jobs by 2015. In terms of sustainability, the average number of additional jobs was 103 000 in the last two years of the EU funds absorption, of which 36 % were sustainable jobs (maintained for at least three years after the end of the programming period).

The highest number of additional jobs will be created in the market services sector where the multiplier effect of a higher growth and demand for job creation will be the most evident. As a result of the implementation of Cohesion policy, the highest share of additionally created jobs will be observed in the construction sector. In this sector, almost 45 000 additional jobs are expected to be created in 2015, but their sustainability is lower than in other sectors, i.e. only 14 %. The effect of SF and CF implementation on employment in the industry sector is noticeably different. In the last year of funds absorption (2015) we expect 11 000 additional jobs to be created in the industry sector, most of the jobs created should be sustainable. Investments from the SF and CF into infrastructure (more than a half of all funds spent) can generate short-term jobs, mainly in the construction sector. However, in the pursuit of employment targets, it is more appropriate to invest in industry and services because these sectors offer longer sustainability of the newly created jobs. At the same time, it is necessary to implement programmes which do not distort market competition at the level of individual sectors or regions, taking also into account the absorption capacity of the sectors and regions concerned.

As regards job creation at the NUTS 3 level, the spill-over effects of economic growth between individual regions are not adequately considered in the model. This limitation can be particularly observed in the construction sector where the significant spending of funds on infrastructure projects is the reason behind overestimated employment in the given region and total production. The construction sector is characterised by one of the highest inter-regional labour mobility rates, which is an aspect that needs to be taken into account in the interpretation of model estimates. Labour migration has a significant impact on the Bratislava region, whereas in other regions, mobility is rather low with a tendency towards intra-regional mobility.

As a comprehensive indicator for evaluating the effectiveness of SF and CF absorption, the CSF multiplier – expressed in EUR – shows the additional effect of each euro spent from SF and CF on GDP. The value of the CSF multiplier was the highest in the Bratislava region during the entire programming period (3.2 in 2015) which is in particular due to the structure of the financial allocation and its volume relative to the region's GDP. Compared to other regions, the Bratislava region had the lowest absorption of funds, whereas the share of funding for infrastructure was also the lowest among all regions. A higher volume of investments in science and research lays the groundwork for a higher potential growth. The

high CSF multiplier value can also be attributed to this region's level of development where even a small amount of absorption brings a high potential growth. On the other hand, the lowest CSF multiplier value was observed in the Banská Bystrica region, standing at 1.7 in 2015. In other regions, the CSF multiplier remained between 1.8 and 2.3 in 2015

The results of the 100% absorption scenario suggested that if the absorption capacity of a particular region is exceeded, the effectiveness of interventions decreases considerably. In other words, higher spending of funds reduces their effectiveness measured by the CSF multiplier. Under the 100% absorption scenario, effectiveness (measured by CSF multiplier) in the Banská Bystrica region declined by more than 6.5 % and in other four regions (TT, TN, NR and KE) by 3.2 % to 4.2 % compared to 89% scenario. In the Bratislava and Prešov regions, effectiveness increased/decreased only slightly. Under the 89-% scenario, the allocated volume is most distant from the absorption capacity in the Žilina region where full absorption of available allocation would increase effectiveness by more than 7 %.

Implementation of the SF and CF has had a positive impact on the creation of value added in all sectors of the economy and across all regions of Slovakia. Investments from EU funds have increased the private sector's share in the creation of value added and helped to alleviate the negative impacts of the global economic crisis on this part of the economy. Without SF and CF investments, the public sector's share in five out of eight regions would have increased. In the private sector, support should mainly focus on projects which create sound business environment, without distorting competition.

The effects of SF and CF can be best demonstrated by the gross domestic product (GDP) and gross value added (GVA) indicators. Both of them are composite indicators which are capable of indicating the overall performance of the economy. In 2014, the additional cumulative GDP growth driven by the SF and CF spending in Slovakia stood at 5.6 %, and in 2015 it should reach some 8.3 %. Cumulative GDP growth represents the difference between GDP generated with the use of resources from SF and CF and the scenario without the SF and CF spending in a given year. It was interesting to find that the real benefits of Cohesion policy, as quantified by means of an ex-post analysis, had exceeded the preliminary estimates of effects presented in the ex-ante evaluation of the National Strategic Reference Framework (2006). This was in particular due to an unexpected slump in the performance of economy in 2009 and the significantly lower rates of economic growth in the subsequent years in comparison with the pre-crisis period expectations. All these facts underlined the importance of funding from SF and CF as a source of public investments in the Slovak economy. Had the overall effect of spending financial resources from SF and CF been assessed as a whole for the years 2007-2015, it would account for some 30 % of GDP in 2015, with the volume of funding from EU sources being roughly half of this value. However, the long-term multiplier effects are significantly higher.

An increased household consumption as the result of a net effect of the spending of financial resources from SF and CF was observed as late as in 2009. The household consumption was primarily driven by additional employment growth, and directly reflected the impacts of SF and CF on the living standards of the population and households. In 2010, an increase in additional household consumption was observed in all regions which were due to the increased spending of available resources and the creation of new jobs. Despite that the actual growth in household consumption has remained, due to post-crisis problems in the labour market, in negative numbers until as late as 2013. In the subsequent years, household consumption continued to rise, with a significant increase observed as late as 2014, while in

2015 it is expected to increase further as a result of efforts to maximise the spending of funds allocated for the 2007-2013 programming period and the gradual recovery of the macroeconomic climate. According to model simulations, the implementation of EU funds could cause the nominal household consumption to increase by 7.6 % in 2015 against the scenario without spending of EU funds. Without having implemented this support, the employment rate and the living standards of the population would decline rather than stagnate (as was the case in particular between 2009 and 2013).

Position of Slovakia in the Global Competitiveness Report rankings has been worsening in the long run. Since 2007, the country fell by 34 positions, with a decline observed in most of the assessed competitiveness factors. Several areas have been assessed in terms of overall environment, such as macroeconomic, legal and institutional, and have an impact on the efficiency in the use of SF and CF in Slovakia even though they are not systematically addressed and countervailed through interventions from SF and CF. The factors that have affected worsening position of Slovakia in terms of competitiveness include the quality of institutions, the quality of the education system, the tax system as well as the efficiency and flexibility of the labour market. In order to evaluate competitiveness at the regional level, labour costs and labour productivity were used as indicators for this purpose. Based on the results of an analysis of quantitative indicators (costs and labour productivity), it can be noted that the use of financial resources from the EU had a slightly positive impact on the competitiveness of Slovak regions.

In addition to the sectoral structure of SF and CF investments, also the spread of investments in time is capable of generating additional effects (benefits) for the economy. The sluggish spending of EU funds in the first two years of the programming period, coupled with lower absorption capacity, represent one of the reasons why Slovakia is unlikely to spend the entire allocation available for the 2007 - 2013 programming period. A more evenly spread implementation of the SF and CF across the entire programming period would generate stronger positive effects for the economy, accelerate the process of its convergence and most probably make a more significant contribution towards mitigating the impacts of the global economic and financial crisis in Slovakia.

6 Policy recommendations

In the context of the main findings and conclusions, recommendations have been made to increase the efficiency of SF and CF implementation and maximise the benefits for development of Slovakia at the national and regional level, as well as to improve the planning and implementation process in particular during the current programming period between 2014 and 2020.

- In terms of allocations and the expected effectiveness of funds absorption, the objectives of Cohesion policy and support for economic growth at the national and regional level can be conflicting. For this reason, it is important to align the Cohesion policy objectives with their impacts on economic development at the national and regional level (national vs. regional convergence) within the preparation of a comprehensive development policy. Better links between national policies and the Cohesion policy objectives will facilitate greater efficiency and their long-term sustainability even after EU funding has come to an end.
- The efficiency of investments from SF and CF, including the ability to generate additional effects, is affected by the environment in which such investments are made. In order to maximise the positive effects of Cohesion policy, it is necessary to pay special attention to the quality of national policies, the legislative framework, implementation environment and other factors that are partially included in ex-ante conditionality. In order to prepare and implement reforms in areas that are decisive for the competitiveness of the country and its regions, it is necessary to use European Investment and Structural Funds (ESIF) resources and, at the same time, monitor the introduction of reforms and their impacts at the national level.
- The SF and CF interventions helped mitigate the negative impacts of external factors to a considerable extent. However, these interventions were not accompanied by structural reforms in the labour market, education system, business environment, etc. and, for this reason; their potential effect on the economy has been reduced. It is therefore necessary to intensify efforts in these areas, including the use of funding from EU, and make the support from SF and CF conditional upon the reforms of systems and national policies. For instance, this could involve support for education infrastructure which would be linked to promoting human resources (high-quality teachers with adequate financial and non-financial motivation), modern curricula and methods as a necessary requirement for achieving synergies in this area. Furthermore, support for increasing the competitiveness of enterprises must be accompanied by economic policy measures establishing stable and predictable conditions for pursuing long-term investment plans (investments in company research and development, as well as innovation development and creation). The potential effects on the business environment are negatively affected by frequent changes in labour legislation and other relevant laws, by changes in tax and contribution rates, lengthy resolution of commercial disputes, etc.
- From infrastructure perspective, the implementation of SF and CF is capable of creating short-term jobs. In pursuing the sustainable employment objective, it is therefore advisable to concentrate the resources primarily in industry and services, where the sustainability of jobs is higher. However, it is also necessary to implement

such programmes that would not significantly distort competition at the level of individual industries, sectors or regions.

- Investments in infrastructure are essential in the long term and help reduce the existing infrastructure debts while improving accessibility. The pace of construction, in particular transport infrastructure (motorways and expressways), has been insufficient for a long time and, therefore, it is necessary to make sure that transport projects be ready for funding during the 2014-2020 programming period. Without an infrastructure of sufficient quality, the regions, and especially those that are economically underdeveloped, cannot generate additional growth despite having other comparative advantages. For this reason it is necessary to create, at the national level, efficient mechanisms that will guarantee the coordination and preparedness for building strategic infrastructure.
- With respect to building a knowledge economy, sufficient financial resources must be allocated from national, public and private sources (beyond SF and CF) to ensure that investments in science, research and innovation which were implemented in the period between 2007 and 2013 are sustainable in the long run. Expenditures in this area have the highest multiplier effect on the economy in the long run. However, their long-term return requires an environment that remains stable for such a period of time. In this area, stabilised human resources, as well as sufficient and stable funding from public and private sources (institutional or contractual), represent an essential condition for their positive impact on the national economy.
- As regards the importance of the SF and CF spending, it must be stressed that these sources are complementary to national sources. For some national policies, the financial resources from SF and CF have become the key source of funding, in particular as regards development activities. National policies should be prepared in a way that sufficient funds are allocated for their implementation in synergy with the spending of financial resources from SF and CF.
- In terms of promoting the private sector, it is necessary to focus on supporting those projects which will improve the overall environment for entrepreneurship without any negative impacts on competition. Private sector entities should primarily be supported through repayable forms of aid that minimise the distortion of the market and competition.
- In order to ensure efficient implementation based on the example of the EC and other Member States, analytical potential should be tapped more extensively, for instance, by applying econometric, optimisation and other types of models. Econometric models are widely used in the preparation of national policies and programmes, as well as in the evaluation of their effects. In the Cohesion policy context, it is advisable to supplement the macroeconomic analyses of the SF and CF effects with other qualitative assessments.
- With focus on the efficiency and timetable of absorption, it is necessary to regularly update the partial and overall objectives in terms of the spending of funds under operational programmes as well as in regions. By using methods conducive to the decision-making processes it is possible to verify the feasibility of objectives within the individual periods. Incomplete absorption of financial resources from SF and CF

has a clearly negative impact on the future growth of the economy and will reduce the potential effects in terms of overall and regional convergence.

- In addition to the volume and structure of investments broken down by sectors, it is also the readiness to absorb funds which significantly affects the ability to generate additional effects of SF and CF and facilitate the development of Slovakia and its regions. Considering the importance of EU's assistance and its demonstrable benefits for economic development, it is necessary to make sure that available resources spent during the 2014-2020 programming period will be spent right from the start of the period. This requires the preparedness of the entities responsible for the management, implementation and control of ESIF, as well as the absorption capacity of beneficiaries. One of the important aspects in accelerating the use of available resources is efficient reduction of the administrative burden in processes associated with the implementation of Cohesion policy.
- From an analytical perspective, it is necessary to create, within the ITMS, a harmonised set of indicators that are necessary for assessing the efficiency in the implementation of projects. The spatial and sector level indicators represent important data for assessing the effects of SF and CF. For the most part, this involves disaggregating the data down to the regional level (NUTS 3), as well as a more detailed categorisation of beneficiaries and their suppliers based on the classification of their economic activities.
- In view of the fact that the NSRF's competitiveness objective has not been fulfilled, it is necessary to strengthen the SF and CF interventions in areas that have the potential to improve the existing state of play (such as the quality of public administration, science, research and innovation, education, quality of human resources).
- Due to uneven implementation of SF and CF over time the creation of jobs during the programming period, their sustainability and efficiency is lower. Every region has a different absorption capacity for receiving support from SF and CF, with a varying degree of effectiveness in terms of operational programmes. These factors should be taken into account in the schedule for the publication of calls, and the calls of the same type within the same region should be spread over a longer period of time.

7 References

BARRY, F., BRADLEY, J., KEJAK, M. and Vavra, D. (2003) “The Czech economic transition: exploring options using a macrosectoral model”, The Economics of Transition, vol. 11(3), pages 539-567.

BRADLEY, J. (2000). “Policy Design and Evaluation: EU Structural Funds and Cohesion in the European Periphery”, in Empirical Models and Policy-Making: Interaction and Institutions, F. den Butter and M. Morgan (eds.), London: Routledge.

BRADLEY, J., GÁCS, J. KANGUR, A. and LUBENETS, N. (2005) “HERMIN: A Macro Model Framework for the Study of Cohesion and Transition”, in Bradley J, Petrakos G. and Traistaru I. (eds) Integration, Growth and Cohesion in an Enlarged European Union, Springer, Berlin, pages 207- 243.

BRADLEY, J., HERCE, J. A. and MODESTO, L., (1995) "Modelling in the EU periphery : The HERMIN project“, Economic Modelling, Elsevier, vol. 12(3), pages 219-220, July.

BRISTOW, G. (2010) “Critical Reflections on Regional Competitiveness”. Routledge, London.

BRADLEY, J. – UNTIEDT, G. (2009). “Analysis of EU Cohesion Policy 2000-2006 using CSHM: Aggregate Impacts and inter-country comparisons”. European Commission.

BUČEK M., KOVÁČ U., GERULOVÁ L.(2011) “Metodologické prístupy k meraniu konvergencie (Methodological approaches to measuring convergence)”, Prognostické práce 3, Bratislava, 2011.

COLLIGNON S. (2012) “How to measure Competitiveness”. 2012, Social Europe Journal. Available at: http://www.social-europe.eu/2012/06/how-to-measure-competitiveness/

D’ALCANTARA, G. and ITALIANER, A. (1982) “A European Project for a Multinational Macrosectoral Model”, Document MS 11, DG XII, European Commission, 1982, Brussels.

DIJKSTRA, L., ANNONI, P., & KOZOVSKA, K. (2011). A new regional competitiveness index: Theory, Methods and Findings. European Union Regional Policy Working Papers, No. 02/2011.

FILÓ, C. (2007) “Territorial Competitiveness and the Human Factors.’ Presented at the International Conference of Territorial Intelligence”, Huelva 2007 (CAENTI) http://www. Territorial–intelligence.eu

KVETAN, VLADIMÍR - MLÝNEK, MARTIN - RADVANSKÝ, MAREK. (2006) “Model HERMIN (The HERMIN model)”. In Ekonomický časopis, 2006, Vol. 54, Issue 10, pg. 994-1008.

OKÁLI, IVAN - FRANK, KAROL - GABRIELOVÁ, HERTA – KORMANOVÁ, LUDMILA - MORVAY, KAROL - OUTRATA, RICHARD. (2006) “Hospodársky vývoj Slovenska v roku 2005 – Economic development of the Slovak Republic in 2005”: (a study prepared upon request of the UN Economic Commission for Europe). Bratislava: Institute of Economic Research of the Slovak Academy of Sciences, 2006. 62 pages

RADVANSKÝ, M. (2014). “Možnosti analyzovania vplyvu kohéznej politiky na regióny a trh práce SR: ekonometrický prístup. (Possibilities of Analysing the Impact of Cohesion Policy on Slovak Regions and Labour Market: Econometric Approach)” Bratislava: Institute of Economic Research of the Slovak Academy of Sciences, 2014. 147 pages.

RADVANSKÝ, M. - FRANK, K. (2010). “Modelling the Impact of Postponed Implementation of EU Structural Funds - The Case of Slovakia”. In EcoMod2010 : International conference on economic modeling [online]. - Istanbul : Istanbul Bilgi University, 2010, 11 s.

RADVANSKÝ, M., DOMONKOS, T., HALUŠKA, J., LICHNER, I., ŠTEFÁNIK, M., WEYERSTRASS, K. (2013) “Labour market analysis and long-term forecast up to 2025. – Forecasting report” results of the Twinning Project “Support to the National Employment Policy” MK2007/IB/SO/02, MSLP, Skopje

SCHWAB, K. AND PORTER, M. E. (2007) “The Global Competitiveness Report 2007-2008. World Economic Forum”. Geneva, Switzerland.

SCHWAB, K., & SALA-I-MARTIN, X. (2012). “The Global Competitiveness Report 2012-2013. (K Schwab, Ed.)”. World Economic Forum.

ŠIKULA, M. a kol. (2006): “Ex-ante hodnotenie Národného strategického referenčného rámca SR. Záverečná správa (Ex-ante evaluation of the National Strategic Reference Framework of the Slovak Republic”. Final report: Requested by: the Ministry of Construction and Regional Development of the Slovak Republic [electronic resource]. Bratislava : Institute of Economic Research of the Slovak Academy of Sciences, 2006. 152 pages

VARGA, J., IN’T VELD, J. (2009) “A Model-based Analysis of the Impact of Cohesion Policy Expenditure 2000-06: Simulations with the QUEST III endogenous R&D model”, European Commission, Brussels.

ZALESKI, J., TOMASZEWSKI, P., WOJTASIAK, A. and BRADLEY, J. (2004) “Revision of the Polish HERMIN model using the new national accounts: 1995-2002”, Wroclaw Regional Development Agency Working paper, Wroclaw.

ZALESKI, J. (2009) „Regionalization of HERMIN macro-economic modelling framework in Poland“, Wroclaw Regional Development Agency Working paper, Wroclaw.

8 List of acronyms, charts and tables in the document

8.1 List of acronyms

BA	Bratislava region
BB	Banská Bystrica region
CSF	Community Support Framework
DG JRC	Directorate-General Joint Research Centre
DG Regio	Directorate-General for Regional and Urban Policy
EC	European commission
ERDF	European Regional Development Fund
ESF	European Social Fund
EU	European Union
ETC	European Territorial Cooperation
HP	Horizontal priority
ICT	Information and Communications Technology
ITMS	Information and Monitoring System
KE	Košice region
CF	Cohesion Fund
MRC	Marginalised Roma communities
NR	Nitra region
NSGR	Nitra Self-governing Region
NSRF	National Strategic Reference Framework
OP IS	Operational Programme Information Society
OP C&EG	Operational Programme Competitiveness and Economic Growth
OP E	Operational Programme Education
OP R&D	Operational Programme Research and Development
OP EaSI	Operational Programme Employment and Social Inclusion
RES	Renewable energy sources
PPP	Purchasing power parity
PO	Prešov region
MA	Managing authority
Europe 2020	Europe 2020 strategy
FCA	Financial Control Administration
SF	Structural Funds
TN	Trenčín region
TT	Trnava region
SD	Sustainable development
ZA	Žilina region

8.2 List of tables

8.3 List of charts

Annex

Annex 1: Structure of national Hermin model

Supply aspects

Manufacturing Sector (mainly tradable goods)

Output = f1 (World Demand, Domestic Demand, Competitiveness, t)
Employment = f2 (Output, Relative Factor Price Ratio, t)
Investment = f3 (Output, Relative Factor Price Ratio, t)
Capital Stock = Investment + (1-δ) x Capital Stock (t-1)
Output Price = f4 (World Price x Exchange Rate, Unit Labour Costs)
Wage Rate = f5 (Output Price, Tax Wedge, Unemployment, Productivity)
Competitiveness = National / World Output Prices

Market Service Sector (mainly non-tradable)

Output = f6 (Domestic Demand, World Demand)
Employment = f7 (Output, Relative Factor Price Ratio, t)
Investment = f8 (Output, Relative Factor Price Ratio, t)
*Capital Stock = Investment + (1-δ) x Capital Stock*t-1
Output Price = Mark-Up On Unit Labour Costs
Wage Inflation = Manufacturing Sector Wage Inflation
Agriculture and Non-Market Services: mainly exogenous and/or instrumental

Demographics and Labour Supply

Population Growth = f9 (Natural Growth, Migration)
Labour Force = f10 (Population, Labour Force Participation Rate)
Unemployment = Labour Force – Total Employment
Migration = f11 (Relative expected wage)

Demand (absorption) aspects

Consumption = f12 (Personal Disposable Income)
Domestic Demand = Private and Public Consumption + Investment + Stock changes
Net Trade Surplus = Total Output - Domestic Demand

Income distribution aspects

Expenditure prices = f13 (Output prices, Import prices, Indirect tax rates)
Income = Total Output
Personal Disposable Income = Income + Transfers - Direct Taxes
Current Account = Net Trade Surplus + Net Factor Income From Abroad
*Public Sector Borrowing = Public Expenditure - Tax Rate * Tax Base*
Public Sector Debt = (1 + Interest Rate) Debt(t-1) + Public Sector Borrowing

Key Exogenous Variables

External: World output and prices; exchange rates; interest rates;
Domestic: Public expenditure; tax rates.

Source: Bradley, J. (1995)

List of Publications of the Institute of Economic Research of SAS

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