#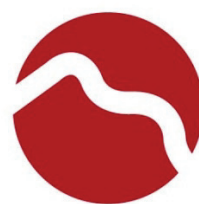 Evaluation of benefits to the EU-15 countries resulting from the implementation of the Cohesion Policy in the Visegrad Group countries

Final report

ibs

INSTYTUT BADAŃ STRUKTURALNYCH

Warsaw, December 2011

Editor:
Julian Zawistowski

Authors:
Piotr Bartkiewicz
Ewa Cukrowska
Joanna Gębska
Andrzej Regulski
Julian Zawistowski
Małgorzata Zub

Authors of thematic chapters:
Piotr Rosik (transport)
Krzysztof Szczygielski (innovation)
Aleksander Szpor (environment)

Economic models:
Paweł Kowal
Maciej Bukowski
Marek Antosiewicz

Cooperation:
Andrzej Chęsiak, Andrzej Kamiński, Iga Magda, Marta Ponichter, Joanna Pospieszyńska-Burzyńska, Małgorzata Ryczer, Łukasz Skrok

Cooperation in V4 countries:
Vladimir Sodomka (Czech Republic)
Martin Obuch (Slovakia)
Alicja Dąbrowska, Viktoria Bognar (Hungary)

Translation:

Michał Biela

Project realised for the Department of Structural Policy Coordination at the Ministry of Regional Development by:

Instytut Badań Strukturalnych

ul. Rejtana 15 lok 24/25

02-516 Warszawa, Poland

e-mail: ibs@ibs.org.pl

www.ibs.org.pl

tel + 48 22 629 33 82
fax +48 22 395 50 21

Reytech Sp. z o.o.

ul. Rejtana 15/25

02-516 Warszawa, Poland

e-mail: reytech@reytech.pl

www.reytech.pl

Summary

This study aims to estimate how EU15 economies are affected by the EUR 140 billion (in fixed prices of 2005) spent on the implementation of the Cohesion Policy in the Visegrad Group countries (i.e. Czech Republic, Slovakia, Hungary and Poland).

Our analysis shows that the impulse for development resulting from the Cohesion Policy in the V4 countries translates into a significant increase in their output and hence their consumer, investment and intermediate demand that to a large extent concerns goods and services from EU15 countries.

Analysing the shape and scale of the Cohesion Policy (based on data of the European Commission and V4 countries), its macroeconomic effects (based on our estimates using the EUImpactMOD model) and the characteristics of the V4 countries in terms of import-intensity and foreign trade flows, we show that on average 1 net euro spent by EU15 countries (net contributors) on the Cohesion Policy in the V4 countries results in 61 cents of additional exports to the V4.

These benefits are not evenly distributed among the EU15 countries, which is mainly related to the strength of economic ties between the individual countries in the EU15 and V4. However, the distribution of additional imports among V4 countries depends primarily on the resources allocated to the Cohesion Policy and - to a much lesser extent - on the openness of their economies (and thus the effects are somewhat weaker for Poland and slightly stronger for the other countries).

In absolute terms, Germany has the greatest additional exports (EUR 31.5 billion over the period, which translates into 125 per cent of net contributions to the Cohesion Policy in V4 countries), followed by Italy (EUR 6.9 billion, 54 per cent), the Netherlands (EUR 6.4 billion, 83 per cent), , France (EUR 5.6 billion, 20 per cent) and the United Kingdom (EUR 4.8 billion, 41 per cent). Apart from Germany, additional exports that exceed net contributions can be observed for Luxembourg and Ireland, due to fairly significant additional exports at low net contributions. Three of the EU15 countries - Greece, Spain and Portugal - are net recipients of the Cohesion Policy for the period 2004-2015.

In addition to the quantitative analysis of additional exports, we also analysed external effects generated by the Cohesion Policy in V4 countries in research and development, innovation, environmental protection and transport. Although the benefits in these areas are difficult to quantify in monetary terms, they are relevant for all EU countries, not only the EU15. These effect are potentially very large and in the long-term may prove even more important than extra EU15 exports to V4 countries.

Introduction

This report contains the results of research on how the EU15 countries have benefited from implementation of the cohesion policy in Visegrad countries (V4) – i.e. the Czech Republic, Slovakia, Hungary and Poland. We focus on the assessment of additional exports of the EU15 to the V4 countries, resulting directly from implementation of the cohesion policy (i.e. as a result of the participation of companies from the EU15 in implementation of projects financed from EU funds) and also indirectly (i.e. through faster economic development of the V4 countries). The basic assumptions of the applied methodology are consistent with our earlier research on Poland (in 2009 and 2010).

This report consists of three parts.

In the first part, in order to establish the context of our research, we focus on the description of the EU Cohesion Policy in the previous and the current programming period, with particular emphasis on the balance of benefits and costs of individual states (i.e. showing absolute and relative net contributors and beneficiaries). We discuss the main features of the cohesion policy at a European level and the nature of interventions in the V4 countries.

The second part is a presentation of our key findings. After a brief discussion of the convergence process of the V4 countries to the EU15 and macroeconomic simulations of the effects of the Cohesion Policy, we present total benefits and their constituents, i.e. macroeconomic benefits, including direct benefits. We also present results for individual V4 and EU15 countries; for the latter we also present the relations between gained benefits and incurred net costs.

In the third part we discuss more indirect positive effects of the implemented policies for the EU. We show how national and regional intervention financed from EU funds generates positive externalities for the entire Union in the areas of innovation, environmental protection and transport. Although complete quantitative assessment of the benefits achieved by the EU Member States is not possible, the identified processes indicate the importance of the European Cohesion Policy beyond the quantifiable macroeconomic and direct benefits.

The Report is accompanied by Appendices that document the research – with particular importance, the detailed methodological appendix (the Report itself presents only the most important elements of the methodology) and case studies (which are an important supplementary source of data in the analysis of direct benefits).

1. Cohesion Policy in the V4 countries

1.1. Outline of the EU Cohesion Policy

The Cohesion Policy is to accelerate and facilitate the process of real convergence between regions. The need for such a policy is shown in sustained differences in economic development among Member States of the EU-27,[1] for example in gross domestic product per capita. The slow pace of convergence is evidenced by a comparison of recent data from 2004 and 2010.

Figure 1. Gross domestic product per capita in the EU27, 2004 and 2010, measured in purchasing power parities (EU27 = 100)

Source: http://epp.eurostat.ec.europa.eu/
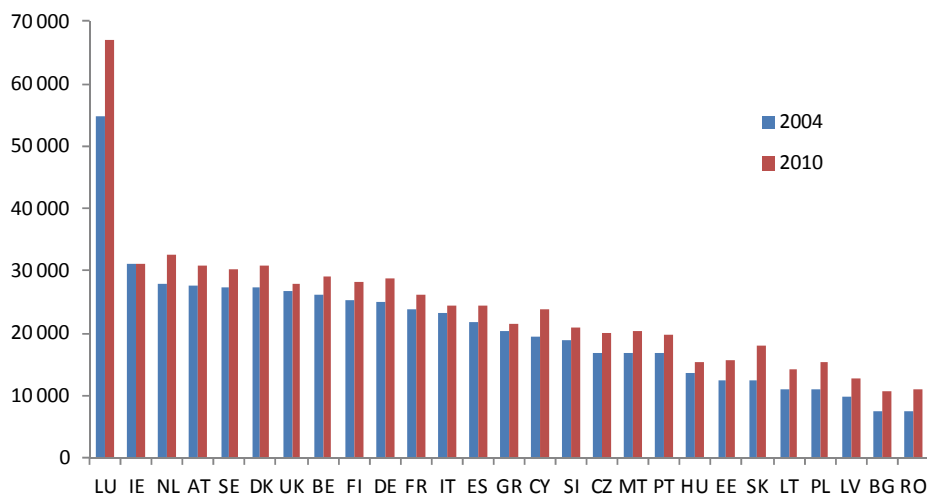
European Union Member States also differ in terms of social development, as evidenced by different levels of the human development index, consisting of: gross output per capita (formerly GDP per capita), life expectancy, and the current average and expected duration of education - issues falling within the area of cohesion policy interventions. The existing differences show the need for an effective cohesion policy, of particular importance for the new EU Member States, as their levels of economic and social development are lower than in the EU15.

The idea of the EU Cohesion Policy, initiated along with the Treaties of Rome in 1957, was intended to enhance socio-economic cohesion among regions of the Member States by supporting development of the poorest areas of the Community. The implementation of the Policy was to be realised by Structural Funds, established as financial instruments for individual sectors of the economy. In 1958, the European Social Fund was created to help adjust the skills of the European workforce, combat unemployment and social exclusion. In 1964, the European Agricultural Guidance and Guarantee Fund was created.

Along with subsequent accessions to the European Community, divergence within the

---

[1] The macroeconomic context with regard to the V4 countries is presented in the chapter 2.1

Community continued to increase, leading to the intensification of efforts to increase cohesion. After the accession of Denmark, Ireland and Great Britain in 1973 the European Regional Development Fund was created (1975) with the task of supporting less developed areas, especially industrialised ones. The Fund plays a key role in the currently implemented EU Cohesion Policy.

The accession of Greece, Spain and Portugal in 1986 was preceded by a profound reform of the Structural Funds launched in 1989. It was then that the official policy goals were formulated: to promote economic growth in the poorest regions of the Community, promote entrepreneurship, and improve the quality of the environment in industrial areas; flexible programs focusing on labour market policies, and acceleration of the structural adjustment of agriculture to reforms within the Common Agricultural Policy.

In 1993, according to the provisions of the Treaty of Maastricht, a new instrument was incorporated into the Cohesion Policy - the Cohesion Fund. It was meant to support large investments, primarily in the area of infrastructure and environmental protection in less developed countries of the Community. The Cohesion Policy in 1994-1999 did not differ substantially from the previous perspective, with the exception that it introduced an additional goal of financial support for the newly admitted states: Austria, Finland and Sweden (1995). Furthermore, the accession of new members of the Community was accompanied by the establishment of the Financial Instrument for Fisheries Guidance, in order to support restructuring of the fisheries sector.

Another reform of the Cohesion Policy was carried out in 1999 and was associated with preparations for the accession of 10 countries (including the Visegrad Group), which took place in 2004. In 1999 the following objectives for the EU cohesion policy were formulated:

- Objective 1: promoting development and structural adjustment of regions lagging behind,
- Objective 2: supporting the economic and social conversion of areas facing structural problems,
- Objective 3: supporting the adaptation and modernisation of policies and systems of education, training and employment.

In 2000 and 2001 the European Union adopted the Lisbon Strategy, revised in 2005. The aim of the Strategy was to make the European Union within 10 years the most dynamic and competitive knowledge-based economy in the world capable of sustainable economic growth with more and better jobs, greater social cohesion, and respect for the environment. Three priority lines of action adopted for the implementation of the strategy included: development of knowledge and innovation, development of the EU's attractiveness as a place to invest and work, and to develop mechanisms to enable businesses to create more and better jobs. At the same time, the EU's cohesion policy objectives were reformulated and defined as:

- Convergence (eliminating the gaps to the least developed Member States and regions - supporting real convergence);
- Regional competitiveness and employment;
- European territorial cooperation.

The EU Cohesion Policy has become particularly important with the enlargement of the EU by 10 New Member States, because the new countries had significantly lower levels of economic and social development than the EU15: average GDP per capita in the newly admitted states was lower than 50 per cent of the EU average. The New Member States are still lagging behind, both at national and regional levels in comparison with the level of development in the EU15. According to a European Commission report (2008) the differences are significant: the average GDP per capita in the EU's richest area - *Inner London* – is almost three times the EU average, whereas the poorest region - North-Eastern Romania - does not reach even one quarter of the EU average. Therefore, in the financial perspective of 2007-2013 the focus is still on further reduction of disparities in economic and social development between individual regions.

In 2004-2006 the "structural activities" (expenditure from the Structural Funds and the Cohesion Fund) from the EU budget cost EUR 99,361 million. This amount accounted for 32 per cent of the total expenditure by the EU and 35 per cent of expenditure targeted to Member States. In 2007-2010 spending on the Cohesion Policy (section 1.2 of the EU budget - *Cohesion for growth and employment*) amounted to EUR 143,642 million and accounted for 30 per cent of the total expenditure by the EU in that period. Both in the previous and the current financial perspective, the Cohesion Policy was the second largest expense category, after the Common Agricultural Policy.

The next financial perspective – for 2014-2020 - is designed in the context of the Europe 2020 Strategy, which includes the following priorities:

- smart growth: developing an economy based on knowledge and innovation;
- sustainable development: promoting a more resource efficient, greener and more competitive economy;
- inclusive growth: supporting the economy with high levels of employment, ensuring social and territorial cohesion.

The priorities for Europe 2020 are partially consistent with the priorities of the Lisbon Strategy: the most important areas still include competitiveness, building a knowledge based economy, the environment, high employment and social cohesion. The new strategy, however, placed greater emphasis on strengthening the digital society, developing research and innovation, the rational use of natural resources, developing entrepreneurship and competitiveness, while maintaining the objectives of employment growth and poverty reduction.

The Europe 2020 Strategy is designed for a time of crisis, in order to overcome its consequences and to respond to new challenges (including global competition, aging, reduction of natural resources). This context is cited in the strategy document published in March 2010, and takes on even greater importance in the face of the growing crisis in 2011 and the search for savings by the EU. During the crisis, difficulties can be expected regarding the convergence of EU regions, and thus the Cohesion Policy is of particular importance. At the same time it can be difficult to provide the means for its implementation, as well as the implementation of other measures necessary for meeting the Strategy's objectives.

Among the challenges the EU new policy is supposed to respond to, convergence of regions has not been exposed as a priority area. However, we cannot speak about neglecting the issue. According to the strategy, *Economic, social and territorial cohesion will remain at the heart of the Europe 2020 strategy to ensure that all energies and capacities are mobilised and focused on the pursuit of the strategy's priorities. The Cohesion Policy and its structural funds, while important in their own right, are key delivery mechanisms to achieve the priorities of smart, sustainable and inclusive growth in Member States and regions.*[2]

1.1.1. Financing of EU policies and the distribution of funds 2004 - 2010

In the 2007-2013 financial perspective, the European Union budget consists of the following divisions (broad categories of expenditure):

1. Sustainable growth
2. Preservation and management of natural resources
3. Citizenship, freedom, security and justice
4. The EU as a global partner
5. Administration
6. Compensations

Section One - Sustainable growth - includes two major subcategories: 1.1 - *Competitiveness for growth and employment*, and 1.2 - *Cohesion for growth and employment*.

The former sub-category of *competitiveness* includes the Seventh Framework Programme designed to support research and smaller programs, including, among others, the Competitiveness and Innovation Framework Programme, the Galileo programme (a programme of space research) and the Marco Polo programme (support for sustainable

---

[2] *COMMUNICATION FROM THE COMMISSION EUROPE 2020 A strategy for smart, sustainable and inclusive growth Brussels, 3.03.2010; KOM(2010) 2020 final version.*

European transport networks).

The Cohesion Policy is included in sub-category 1.2 and includes expenditure from Structural Funds for the following purposes 1) convergence, 2) regional competitiveness and employment, 3) European territorial cooperation, and 4) technical assistance and expenditure of the Cohesion Fund.

In some areas, support is provided under various budget categories. Accordingly, although category 1.1 is titled "competitiveness", the largest part of its funds supporting the competitiveness of enterprises and regions is spent in connection with the implementation of the Cohesion Policy (section 1.2), both under the *Regional competitiveness and employment objective*, as well as under *Convergence*. In category 1.2 - *Cohesion policy* expenditure which falls within the co-financing of projects implemented under the operational programs is the subject of analysis in this report.
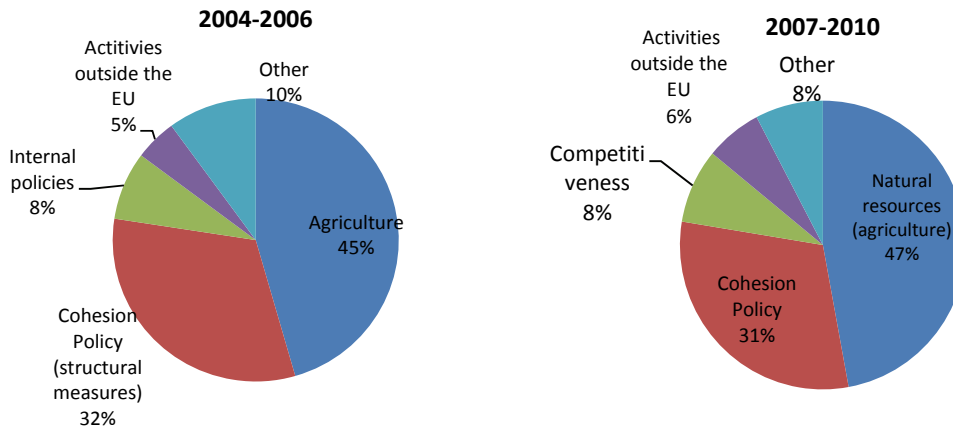
The Preservation and management of natural resources is the second section of the EU budget in the 2007-2013 perspective. It is the largest division in terms of spending - in 2007-2010 47 per cent of the total expenditure. Within this section, the largest category of expenditure covers the Common Agricultural Policy, and the second largest is the Rural Development Policy.

The third section of the EU budget - *Citizenship, freedom, security and justice* - has the smallest share of EU expenditure. It includes, amongst others, actions to protect fundamental rights and freedoms, consumer protection, public health, initiatives for culture, youth, and media. The fourth section of the EU budget, *The EU as a global partner*, covers funds expended outside the Member States, primarily within pre-accession funds. Subsequent sections of the budget include administration (6 per cent of total EU spending) and compensations.

In the previous programming period, specific expenditures were grouped differently, and the Cohesion Policy fell within the category of "structural actions". In 2004-2006, spending on structural operations amounted to EUR 99,361 million.

In the previous financial perspective the areas of Cohesion Policy interventions included support for agriculture and rural development - separate from the Common Agricultural Policy. Expenditure for this purpose constituted 12.2 per cent of total expenditure on structural actions. From 2007, total support for agriculture falls under the Common Agricultural Policy in the category of *Preservation and management of natural resources*.

Figure 2. Distribution of EU spending on the Cohesion Policy 2004-2010 and 2007-2013

2004-2006

- Actitivies outside the EU 5%
- Internal policies 8%
- Cohesion Policy (structural measures) 32%
- Agriculture 45%
- Other 10%

2007-2010

- Activities outside the EU 6%
- Competitiveness 8%
- Cohesion Policy 31%
- Natural resources (agriculture) 47%
- Other 8%

Source: http://ec.europa.eu/budget/library/biblio/publications/2010/fin_report/ and
http://epp.eurostat.ec.europa.eu

The budget of the European Union is formed by the contributions of Member States[3]. In 2004-2010, 78 per cent of the total budget came from the contributions of seven countries. In descending order of participation in the budget these were Germany, France, Italy, Great Britain, Spain, the Netherlands and Belgium. There are no significant differences in the period between 2004-2006 and the current financial perspective. Payments by the Visegrad Group accounted for only 4.9 per cent of total contributions.

Figure 3. Contributions of Member States to the EU budget 2004-2010

- SK; 0,5%
- HU; 0,8%
- CZ; 1,1%
- PL; 2,6%
- NL; 5%
- BE; 4%
- ES; 9%
- UK; 11%
- IT; 13%
- FR; 17%
- DE; 20%
- Other; 15%
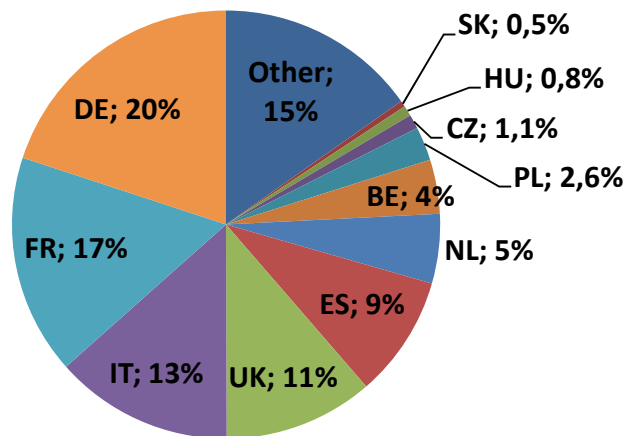
Source: IBS calculations based http://ec.europa.eu/budget/library/biblio/publications/2010/fin_report/

---

[3] In the EU budget, contributions are described as total own resources which include national contributions and traditional own resources (EU custom duties) *http://ec.europa.eu/budget/library/biblio/publications/2010/fin_report/*.

The structure of the beneficiaries of EU aid was to some extent similar to the structure of payers, associated with the size of the countries. The biggest contributors - Germany, France and Italy, were also the major beneficiaries, although the benefits were distributed more evenly between countries than contributions. Participation in assistance for New Member States was much higher than their share in total contributions, as they received 17 per cent of funds spent from the EU budget to its members. 12 per cent of total expenditure went to the Visegrad Group countries, and 5 per cent to other New Member States.

Figure 4. Distribution of total funds spent from the EU budget 2004-2010 to assist Member States
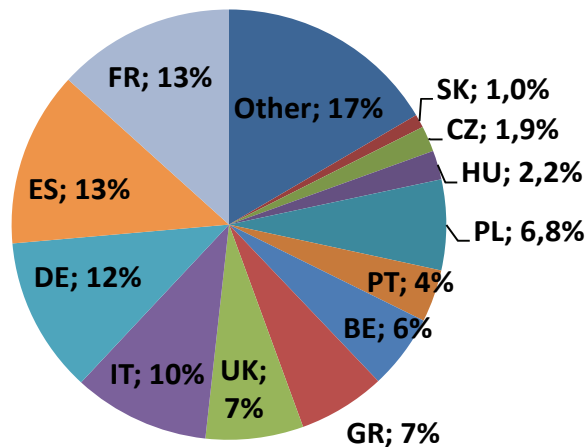
Source: IBS calculations based on
http://ec.europa.eu/budget/library/biblio/publications/2010/fin_report/
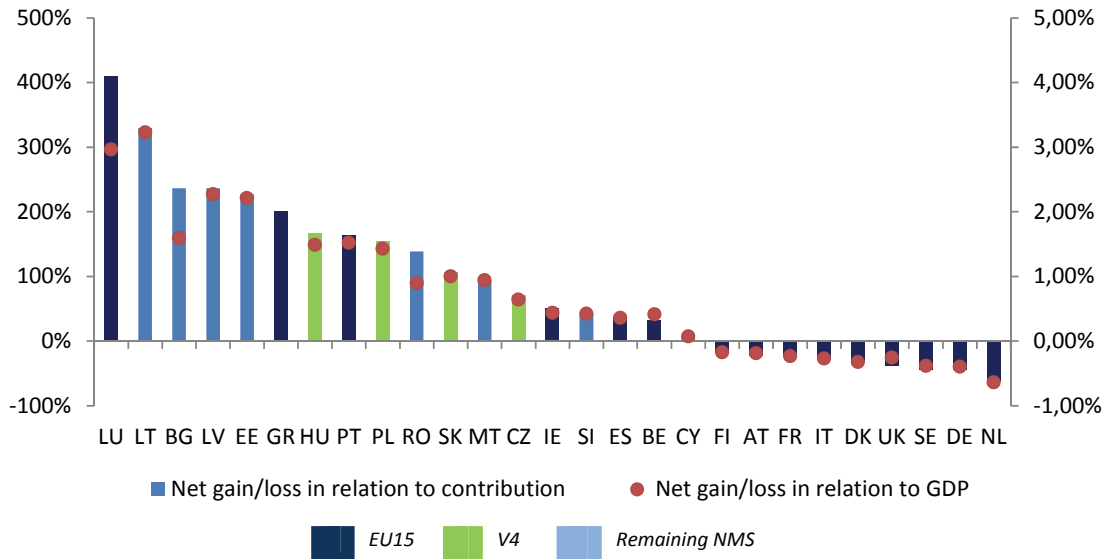*Including the pre-accession assistance for Bulgaria and Romania in 2004-2006*

The share of assistance by the twelve new Member States increased significantly in the current financial perspective - from 10 per cent of expenditure to the Member States in 2004-2006 to 22 per cent in 2007-2010.

Most Member States, including all countries that have joined the EU since 2004, are net beneficiaries of EU aid. Differentiation in net benefits between Member States was significant. The greatest benefits in terms of aid received compared to contributions made were obtained by Luxembourg (the state with the highest GDP in the European Union) and the smaller new Member States: Lithuania, Latvia, Estonia and Bulgaria.

The Figure below shows payments to EU Member States expressed as a percentage of contributions of these countries in 2004-2010. States for which values are higher than 100 per cent are net recipients of EU support, and other countries are net contributors. The higher the percentage difference between the received help and contribution, the more significant is the received assistance or cost incurred for the national economy (as indicated by the second series in the Figure below: net profit/loss as a percentage of GDP). There is a very strong relationship between the profit/loss to contribution ratio and the relation of the profit/loss to

GDP (r = 0.98). Only in the case of Bulgaria and Romania was the share of assistance lower in total GDP in 2004-2010, which is due to the fact that the accession of these countries to the EU took place as late as 2007.

Figure 5. Net assistance in relation to contributions (net recipients and net contributors) and in relation to GDP 2004-2010


■ Net gain/loss in relation to contribution　　● Net gain/loss in relation to GDP

■ EU15　　■ V4　　■ Remaining NMS

Source: IBS calculations based on
http://ec.europa.eu/budget/library/biblio/publications/2010/fin_report/
Including the pre-accession assistance to Bulgaria and Romania in 2004-2006

The map below depicts received assistance in relation to payments. Net beneficiaries were marked in orange and net contributors in blue. The intensity of colour reflects the size of the difference between the payment and received support. Among the new Member States, those who have the smallest populations benefited the most.

In net terms, the EU budget 2004-2010 was funded by nine countries: the Netherlands, Germany, Sweden, Great Britain, Italy, France, Austria and Finland. The costs incurred by these countries were from 0.17 per cent to 0.64 per cent of GDP of those countries. In 2004-2010 these Member State paid to the EU budget the net sum of EUR 200,076 million. Most of these funds were spent on assisting Member States - net recipients (i.e. the remaining 18 Member States) that received the net sum of EUR 165,705 million.

Due to differences in economic development among Member States, the contributions by the net contributors, relatively small in relation to their GDP, are a significant support for the net beneficiaries: from 0.07 per cent in Cyprus to 3.2 per cent of GDP in Lithuania. Among the Visegrad Group countries greatest net benefits (without reference to population or purchasing power parity) were received by Hungary and Poland, where the received assistance was respectively 1.49 per cent and 1.43 per cent of GDP. Slovakia benefited a little less (1 per cent), and the Czech Republic the least (0.64 per cent).

Map 1. Net assistance in relation to contributions (net recipients and contributors) 2004-2010
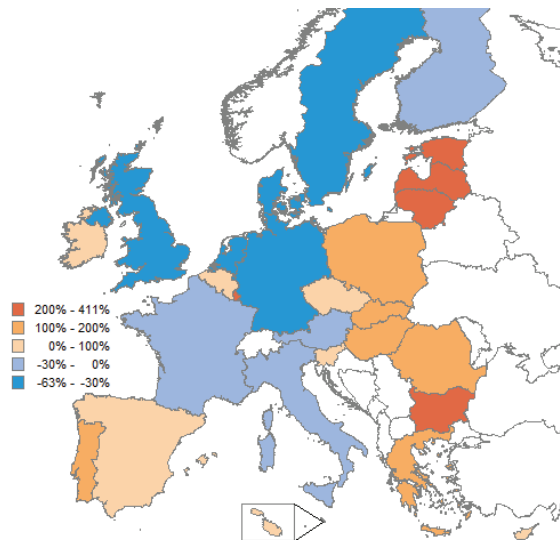
Source: Own calculations by IBS based on
http://ec.europa.eu/budget/library/biblio/publications/2010/fin_report/
Including the pre-accession assistance to Bulgaria and Romania in 2004-2006

1.1.2. Distribution of the EU Cohesion Policy 2004 – 2010

In 2004-2010 the implementation of the EU Cohesion Policy cost a total of EUR 243,002 million, including EUR 242,598 million paid to Member States. Payments relating to implementation of the Cohesion Policy accounted for 34 per cent of the total payments to Member States in that period. Of this amount, 61 per cent was spent in the current financial perspective - since 2007. The EU expenditure for the V4 countries 2004-2010 amounted to EUR 45,400 million.
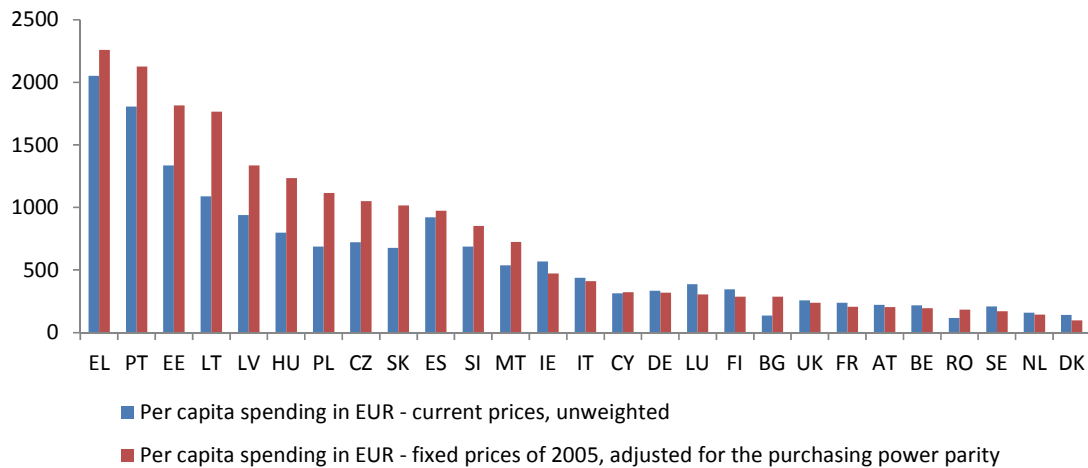
Nearly 81 per cent of funds spent from the EU budget for the Cohesion Policy were transferred to nine EU countries (in order of the amount of received assistance): Spain, Germany, Italy, Poland, Greece, Portugal, Britain and France, and thus primarily large EU countries. The share of expenditure on the Cohesion Policy in new Member States was higher than their share in total EU spending: in 2004-2006 the new Member States received 7 per cent of the Cohesion Policy funds, while in 2007-2010 - 27 per cent.

The dominance of large countries as recipients of assistance under the Cohesion Policy, however, turns out to be ostensible if expenditure per capita is examined. The chart below shows total expenses incurred by the EU under the Cohesion Policy 2004-2010 per capita in the Member States. The blue columns show the average expenditure per capita. However, due to differences in prices across the EU, similar amounts of support have a different value (purchasing power), so expenditure per capita does not provide complete information whether

individual EU countries have benefited in comparable or varying degrees. This information is then provided by the red columns, expenditure per capita adjusted for purchasing power parity (in 2005, after adjusting the amounts of expenditure to fixed prices from that year).

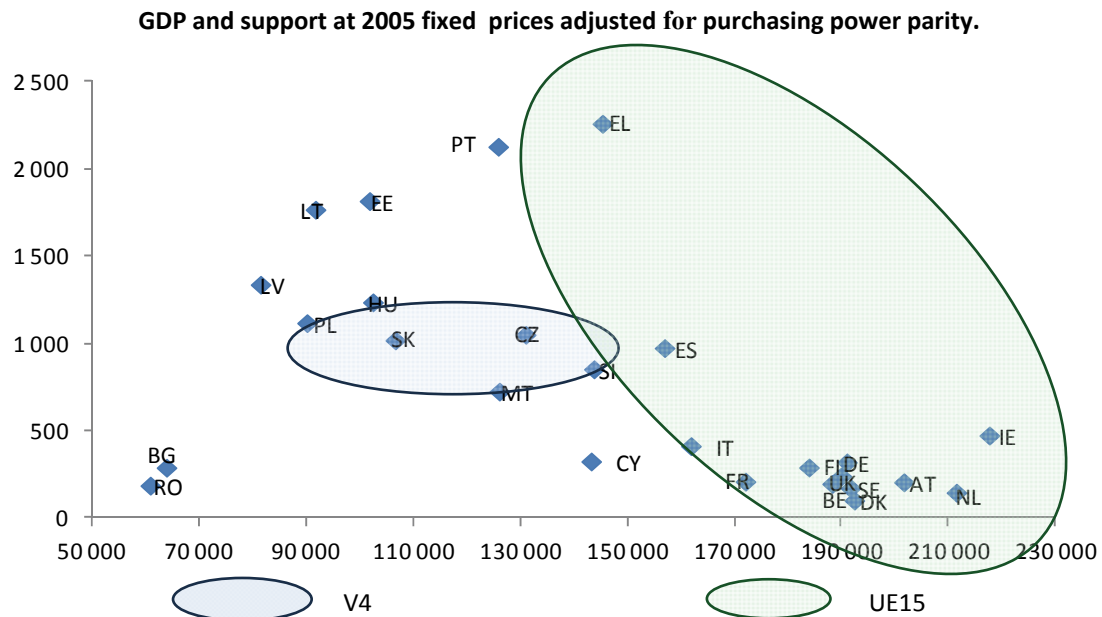Figure 6. The total EU spending on the Cohesion Policy (gross) per capita in the period 2004-2010, in euro

- Per capita spending in EUR - current prices, unweighted
- Per capita spending in EUR - fixed prices of 2005, adjusted for the purchasing power parity

Source: http://ec.europa.eu/budget/library/biblio/publications/2010/fin_report/ and http://epp.eurostat.ec.europa.eu. Population as at 1st January 2010

After taking into account expenditure per capita and purchasing power of support received, the residents of the poorer Mediterranean countries: Greece, Portugal and Spain, followed by the residents of countries which joined the EU in 2004, benefited most from the EU Cohesion Policy 2004-2010. Those to benefit least were the remaining 10 countries of the EU15 (which is understandable due to their higher level of development and intention to align development gaps through the Cohesion Policy), and the inhabitants of Bulgaria and Romania (as they began benefiting from the Cohesion Policy as late as 2007).

There exists a noticeable match between expenditure per capita and the level of development of the country - the intensity of assistance per capita is higher in the poorer countries. However, the relationship between the level of GDP per capita and the total expenditure per capita under the Cohesion policy is not very strong. The correlation between these amounts[4] in the Member States is negative indeed - expenses per capita are higher when the level of economic development is lower. This is not a strong relationship - the correlation between GDP per capita and per capita assistance under the Cohesion Policy (in fixed prices of 2005 adjusted by purchasing power parity) is only -0.44.

---

[4] Unweighted values, in current prices.

Figure 7. The relationship between GDP per capita (horizontal axis) in thousand EUR, and the per capita assistance under the Cohesion Policy (vertical axis) in EUR [without Luxembourg]

GDP and support at 2005 fixed prices adjusted for purchasing power parity.

Source: http://ec.europa.eu/budget/library/biblio/publications/2010/fin_report/ and http://epp.eurostat.ec.europa.eu. Population as at 1st January 2010

22 of the 27 EU Member States show approximately linear dependence (the poorer the state, the higher the assistance). However, five countries were different. In the group of 26 countries (excluding the most extreme case of Luxembourg), the correlation coefficient is -0.44, and in the group of 22 most typical countries -0.87.

1.2. Characteristics of intervention under the Cohesion Policy in the V4 countries

This chapter discusses the implementation of the Cohesion Policy in the Visegrad Group countries in terms of subjects, operational programs and the types of investments.

The implementation of the Cohesion Policy in the Visegrad countries (V4) in 2004-2006 took place primarily through support coming from Structural Funds under Objective 1 *Convergence.* Two of the four V4 countries - Czech Republic and Slovakia - have received additional support under Objective 2 and 3 respectively for the development of Prague and Bratislava. Assistance was also provided through the Community Initiatives EQUAL and INTERREG and the Cohesion Fund.

In 2004-2006 all four countries implemented operational programs aimed at human resource development, rural development and agricultural modernisation, programmes to foster entrepreneurship and the expansion and modernisation of infrastructure. Only Poland established a separate operational programme aimed at the development of fisheries and fish processing. Poland, Hungary and Slovakia also implemented operational programmes of regional character.

The resources provided under the Cohesion Policy for the V4 countries represent the vast majority of funds for newly admitted member states (78 per cent). Of the four V4 countries, Poland was the main beneficiary of EU financial support (52.26 per cent), followed by Hungary, the Czech Republic and Slovakia, where the difference was due to the various sizes of these countries. After adjusting for population and purchasing power parity, the assistance was much more similar among the V4 countries, with the notable advantage of Hungary. It should be noted here that we considered refunds from the EU budget, and therefore the discussed intensity of assistance is associated not only with the allocation of but also with progress in implementing of operational programmes in individual countries.
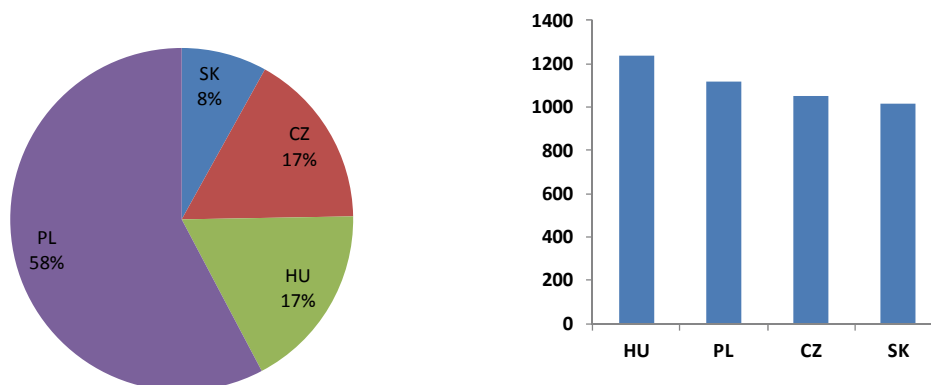
The remainder of this chapter will discuss expenditures understood as EU contributions (i.e. the expected amount of EU refunds) to expenses incurred by the V4 countries. For the period until the end of 2010 we included expenses incurred by the applicants officially approved as eligible and a forecast for the period 2011-2015, presented later in this Report.[5]

A distinct majority of structural resources will be spent in the Financial Perspective 2007-2013. The Figure below shows the lump sums in individual V4 countries (and a projection for the current financial perspective).

Figure 9. EU contribution in two financial perspectives in V4 countries in EUR billion

---
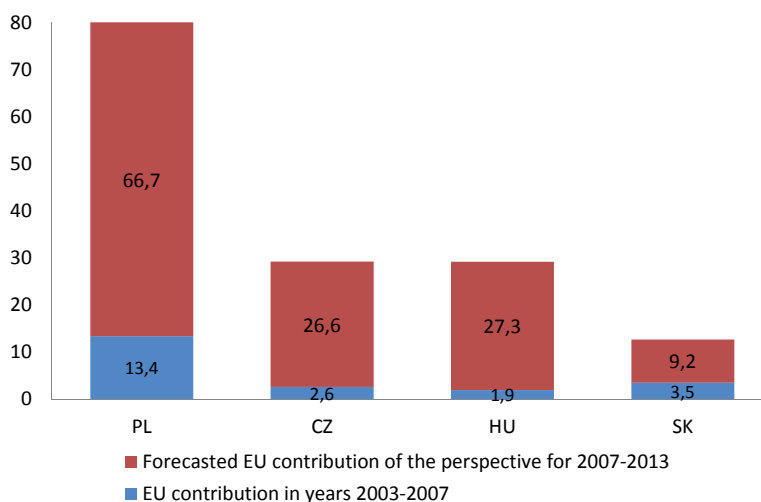
[5] Support to agriculture under the Structural Funds in 2004-2006 is not included due to a lack of clear separation of these expenses from the Common Agricultural Policy in the source data.

Transport infrastructure is the largest category of expenditure – nearly 1/3 of total resources until the end of 2015. Expenditure on all types of infrastructure cover 46 per cent of the total expenditure. Further assistance concerns also environmental protection and energy, entrepreneurship and research, and human capital (active labour market policies - ALMPs and education and training).

Figure 10. Structure of the Cohesion Policy spending forecast for the period 2004-2015 in the V4 countries
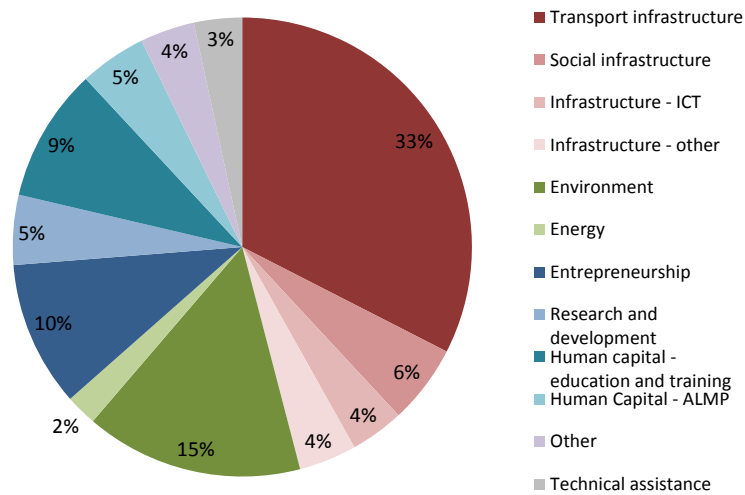
Figure 11. Structure of the Cohesion Policy spending forecast for the period 2004-2015 in the V4 countries
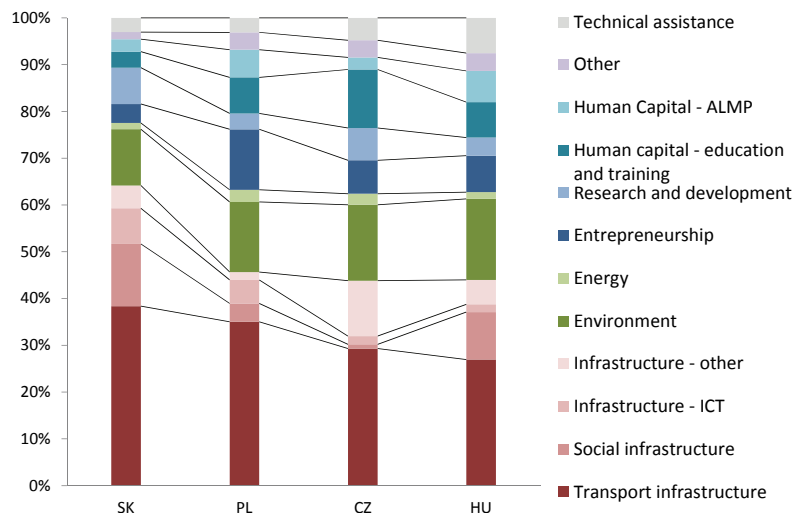
However, there are some differences in the structure of spending under the Cohesion Policy, probably stemming from different needs in individual countries and differences in development strategies.

V4 countries have lead their Cohesion Policies in a similar way. In each country we may observe the dominant position of spending on infrastructure, first of all on transport; spending on environmental protection is also significant.

Figure 12. Structure of spending projected for 2004-2015 in V4 countries in thematic subgroups

Source: Monitoring data of the managing authorities

The structure of spending in Hungary is the most balanced in the V4 and shows the efforts of this country to use the resources of the Cohesion Policy for all the development objectives.

Slovakia has mostly used the structural funds for strengthening its infrastructure – the share of expenditure on this objective is much higher than in the other V4 countries. It means concentration on the basic needs, although Slovakia also used a significant share of the structural funds for building a knowledge based economy.

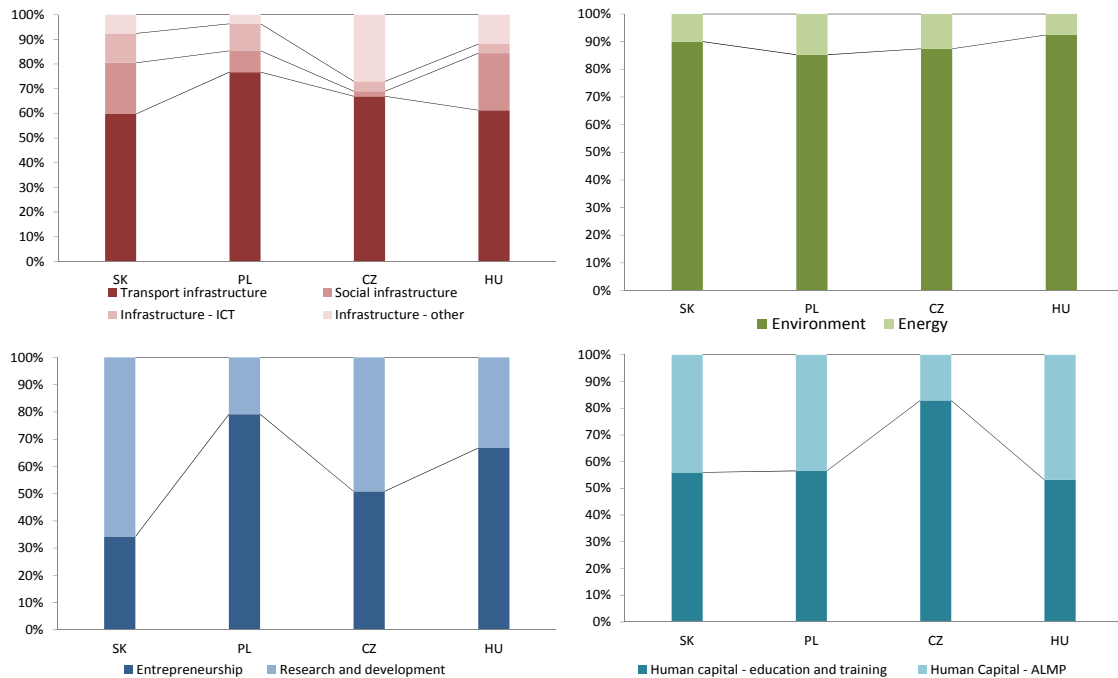The share of spending on research and development and ICT infrastructure was the highest in Slovakia, and spending on education and training (within the support of human capital) in the Czech Republic. The total share of spending on R&D, ICT infrastructure, education and training was also the highest in these two countries (21 per cent in the Czech Republic and 19 per cent in Slovakia). Therefore these two V4 countries are more focused on building a knowledge based economy using the resources of the Cohesion Policy than Poland and Hungary.

Among the V4 countries, Poland is the leader in the share of spending on support for enterprises. A significant share of assistance for entrepreneurship, transport network and energy infrastructure, combined with the fact that relatively little has been spent on the improvement of social infrastructure suggests a focus on economic development, putting

social development in second place. Investments in Poland are used mainly for long overdue modernisation of infrastructure and for meeting basic economic needs, rather than for building a knowledge based economy.

A focus on economic development, at the expense of the widely understood quality of social life, can be also observed in the Czech Republic, where a relatively small share of resources has been spent on social infrastructure. However, unlike Poland, the Czech Republic has spent less on the development of transport, and more on education and training, which suggests a better level of meeting basic development needs. In terms of social support, Hungary and Slovakia spend a much higher share of Cohesion Policy resources.

2. The benefits to the UE15

2.1. The Visegrad Group and the EU15 - the impact of the Cohesion Policy

2.1.1. Convergence of the V4 and EU15

The period of implementation of the Cohesion Policy in the Visegrad Group countries is also a period in which these countries systematically reduced the distance separating them from the highly developed economies of the "old" European Union, primarily in terms of income per capita. Admittedly, this process was partially inhibited by the global financial crisis in 2008-2010. Uncertainty about the economic situation in the near future casts a shadow over the possibility of continuing the current rate of convergence, at least for some of the V4 countries.

Nevertheless, the achievements of the V4 countries in 2004-2010 should be viewed positively. In a macroeconomic approach, each of them was wealthier in 2010 than in 2004, both in absolute terms and in comparison to the EU15 average. Naturally, growth has not been equally high in all countries. Indeed, although some of them (Poland and Slovakia) recorded a significant more than 10 percentage point reduction in the distance to the EU15 in 2004-2010, change in the relative level of wealth in Hungary was minimal.

Table 1. Convergence of the Visegrad Group countries to the EU15, GDP per capita in purchasing power parity

Country	2004		2010	
	Income	EU15=100	Income	EU15=100
Czech Rep.	16 900	69	20 100	75
Poland	11 000	45	15 300	57
Slovakia	12 300	50	18 100	67
Hungary	13 600	56	15 500	58
EU15	24 500	100	26 900	100

Source: IBS elaboration based on Eurostat data

Besides the Czech Republic, the V4 group also has a relatively low level of employment (80-85 per cent of the EU15 average), so one should expect that the gap between these countries will also steadily decrease in this area. However, in this field it has been much less successful. Although the Visegrad Group as a whole has experienced growth in employment in the period of prosperity before the financial crisis, the economic downturn has so far stalled the process of convergence in terms of employment[6]. Poland has been the only country among the V4 countries which noted a continuous increase in employment, making up about half the distance from the EU15 from 2004 to 2010. Naturally, Poland at the time of EU enlargement

---

[6] Employment rate in 2010 in the Czech Republic and Slovakia was similar to that in 2004.

had the largest reserves of labour among the new Member States, as employment in Poland was one of the lowest in the EU and unemployment one of the highest.

Figure 13. Employment rate in the V4 countries as a percentage of the EU15 employment rate
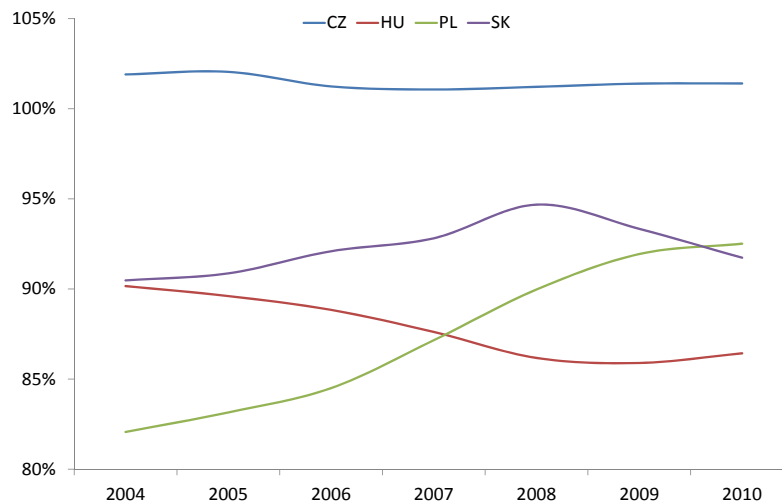
Notes: the term level of employment rate denotes the employment rate in the 15-64 age group.
Source: own elaboration (IBS) based on Eurostat data.

Although there is strong economic data to evidence economic growth in the Visegrad countries and a reduced distance to the developed countries of the European Union, it is much more problematic to pinpoint the sources of this growth. The basic question is whether the reduction in distance from the EU15 countries had been due to the growth in labour productivity, or thanks to the existing reserves of growth. It is important as in the long run increased productivity is a much more efficient factor of convergence (growth reserves, for example low economic activity, may be used only once).

Not all the countries of the Visegrad Group significantly reduced the gap in labour productivity. In particular in Hungary and Poland productivity growth has not been faster than in the EU15. In effect, the average worker in these countries is not even half as efficient as their counterparts in France or Germany. Compared with Poland and Hungary, Slovakia stands out with productivity convergence at a rate of 2.5 percentage points per year in 2004-2010. The relatively meagre productivity growth in Poland and Hungary, not more than 1 percentage point per year, is somewhat surprising.

Thus, the convergence to the EU15 during implementation of the Cohesion Policy had different sources in different countries. In Poland, it was probably extensive in nature, associated with the creation of large numbers of jobs and a drastic reduction in mass unemployment, which was a problem of utmost importance at the very time of accession to the EU. The Czech Republic, and in particular Slovakia, owe their convergence to their growth in labour productivity at a rate consistently higher than in the EU15. The sources and nature of productivity growth are beyond the scope of our research, but it should be noted that labour

productivity growth can result from both the accumulation of capital, as well as from technological progress (adaptation of existing technology and organisational solutions, and creating new ones).

Figure 14. Productivity growth in the Visegrad Group countries, in relation to the EU15
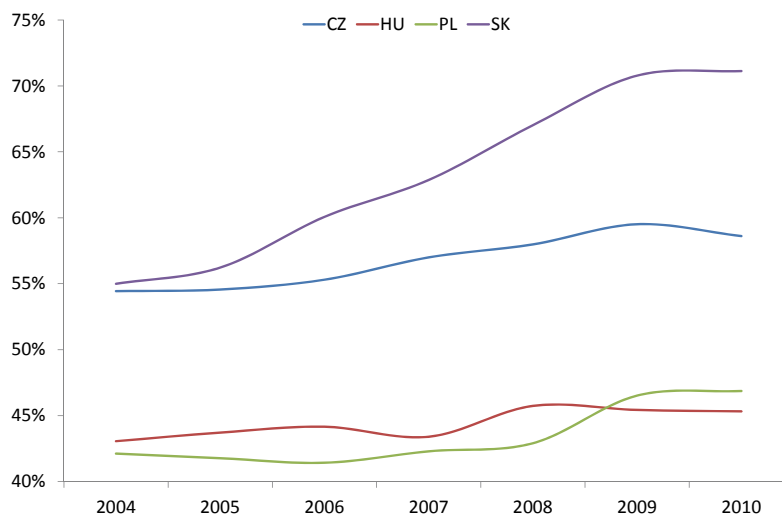
Notes: Productivity is calculated as gross value added generated in the economy (value in EUR in purchasing power parity) per hour worked.
Source: IBS elaboration based on Eurostat data

2.1.2. Cohesion Policy – its impact on the V4 economies

The introduction of EU funds, and the great number of projects funded in majority by resources from the EU budget contributed by more affluent EU countries, is one of the strongest factors influencing the economic reality of the Visegrad Group. In the period 2004-2010, projects implemented under the Cohesion Policy amounted to EUR 140.1 billion. The broad spectrum of projects results in diverse channels of influence by the European funds on the V4 economies. Each project has a specific character and can concern domains as diverse as infrastructure investment, technology transfer to the private sector, support of research and development, improving the quality of human capital or quality of life of urban citizens.

The overall assessment of how the influx of European funds changes Visegrad economies requires the use of analytical tools capable of grasping the scale and specific spectrum of projects financed by the European funds. Therefore, in order to estimate the macroeconomic effects of the Cohesion Policy in the Visegrad Group, we prepared an EUImpactMOD macroeconomic model, allowing estimation of the impact of the Cohesion Policy on economic growth, employment and other basic macroeconomic indicators, which can be used to monitor the process of convergence to wealthier European Union economies[7].

---

[7] These estimations are the result of assumptions established for the sake of this analysis. The primary assumption concerns the full of use of all programmes realised in the V4 countries under the Cohesion Policy. We assume that these resources will have been spent by the end of 2015.

Figure 15. The impact of the Cohesion Policy on Visegrad country GDP (in per cent GDP - GDP deviation from the path "without EU funds")

Source: own elaboration (IBS) based on results of the EUImpactMOD V4 simulation
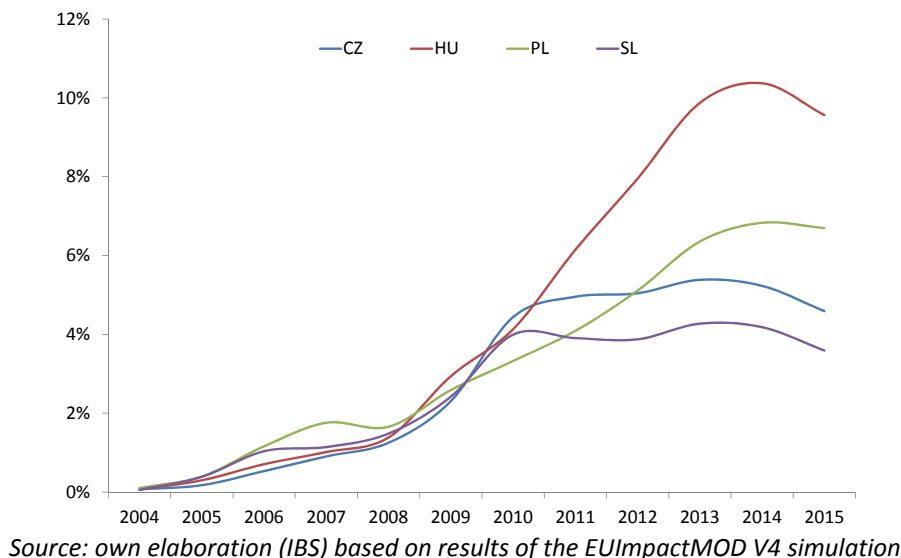
Analyses carried out using our macroeconomic model suggest that the role of EU funds in creating economic growth in the Visegrad Group countries has been, is, and will be considerable. In 2010, the largest in terms of the scale of implementation of the Cohesion Policy, the positive effects are estimated at 3-4 per cent of GDP and about 2 per cent of the number of employees, depending on the country. In other words, the lack of redistribution of funds from the EU15 to the Visegrad Group countries would have resulted in lower wealth and fewer jobs. Furthermore, the positive role of the EU funds for the economies of the V4 systematically increases.

The dynamically growing role of the Cohesion Policy reflects two intertwined processes. On one hand, the scale of spending in the Cohesion Policy grew steadily in the years 2004-2010. On the other hand, the effects of its implementation are spread over time, and the positive consequences of the implementation of projects financed from the European funds will be felt for many years to come. Consequently, as indicated by our simulations, the impact of the Cohesion Policy on the V4 economies will reach its peak in 2013-2014, i.e. during the transitional period between the current and next EU financial perspective.

Although the results for the Czech Republic and Slovakia are similar to Poland (which in turn are identical with the results of similar analyses carried out by IBS for the Ministry of Regional Development, due to the very similar model variant and practically the same data), the effects for Hungary since 2011 are distinctly higher than for the remaining V4 countries. It results mostly from the fact that Hungary was most hit by the financial crisis in 2008-2009 (and hence the resultant actual lack of convergence of Hungary to the EU15 in 2004-2010). Furthermore, spending under the Financial Perspective 2007-2013 in Hungary has been slightly slower than in other V4 countries, and hence relatively higher sums will be spent in 2011-2015. Therefore

the projected EU spending in Hungary is significantly higher (in relation to GDP) than in other V4 countries, and accordingly the effect of the Cohesion Policy is also much higher.

Figure 16. The effect of the Cohesion Policy implementation on exports (left graph) and imports (right graph) of Visegrad countries (in per cent of exports and imports – deviation from the path without EU funds)
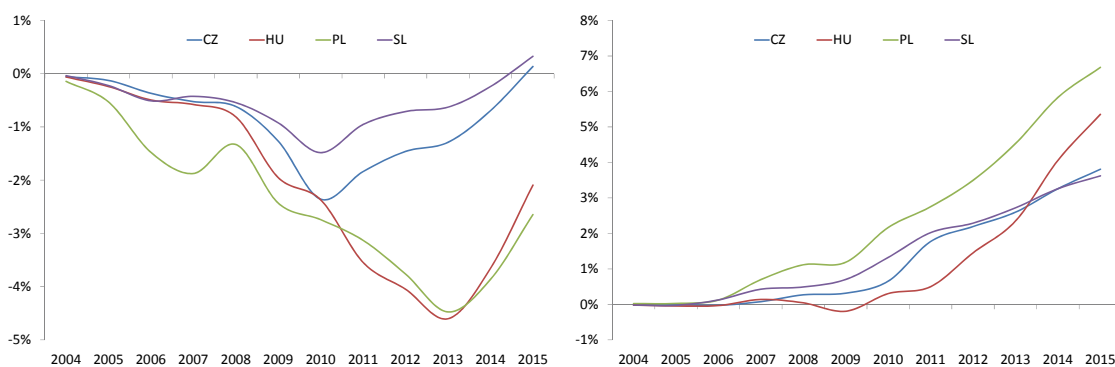
Source: own elaboration (IBS) based on the simulation of the EUImpactMOD V4 model

In the context of our further analyses, the effect of the Cohesion Policy on imports in the V4 countries is less important than the effect on GDP. By definition, European assistance must have some effect on the balance of payments, for example through a decrease in exports and increase in imports (not necessarily from and to V4 countries). Model analyses give a chance to determine the effect of European assistance on both these aggregates; the results are presented in the Figures below. Both the decrease in exports and (to a lesser degree) the increase in imports vary greatly among the examined countries, mostly depending on the openness of their economies and sectoral structures. As the extra exports from the EU15 to the V4 are associated with higher V4 imports, the effect on imports is the most crucial for the level of exports. At the same time, we may understand these changes in imports (and why they differ from changes in GDP) if we analyse changes in exports. As can be seen from our results, BOP accounts in Poland and Hungary are balanced largely thanks to a decrease in exports; especially in Hungary, the final effect on imports is much lower than on GDP.

2.1.3. Win-win situation: the Cohesion Policy in the V4 and the EU15

According to the provisions of the Cohesion Policy, its implementation is meant to contribute to the decrease in differences in economic development of the regions of the EU and its internal integration. Without a doubt, spending under the Cohesion Policy brings economic benefits to those countries/regions which receive the funds. So does this mean that the direction of the impact of the Cohesion Policy is only one-sided, i.e. is it only poorer countries that benefit from actions aimed at ensuring internal cohesion of the European Union?

Determination of how individual countries benefit from the implementation of the Cohesion Policy in the EU is particularly important because there are clear differences in the EU budget

contribution/payment ratios between Member States. In Chapter 1 we showed that the contributions of the more developed EU15 economies to the EU budget are higher than the received payments, which means that they finance the Cohesion Policy to a greater extent than other EU countries. Does this mean that the economic development of regions in the EU and its internal integration is based on rich countries supporting poorer countries? The identification of benefits achieved by the Cohesion Policy shows that in fact benefits are mutual, and the picture of net contributors financing the development of net recipients is an over simplification. Rich EU15 countries, which largely finance the Cohesion Policy, also obtain considerable benefits, which results in strengthened international cooperation and thus integration and development across the EU.

Figure 17. Analysis of the formation of macroeconomic and direct benefits to EU15 countries related to the implementation of the Cohesion Policy in the V4 economies
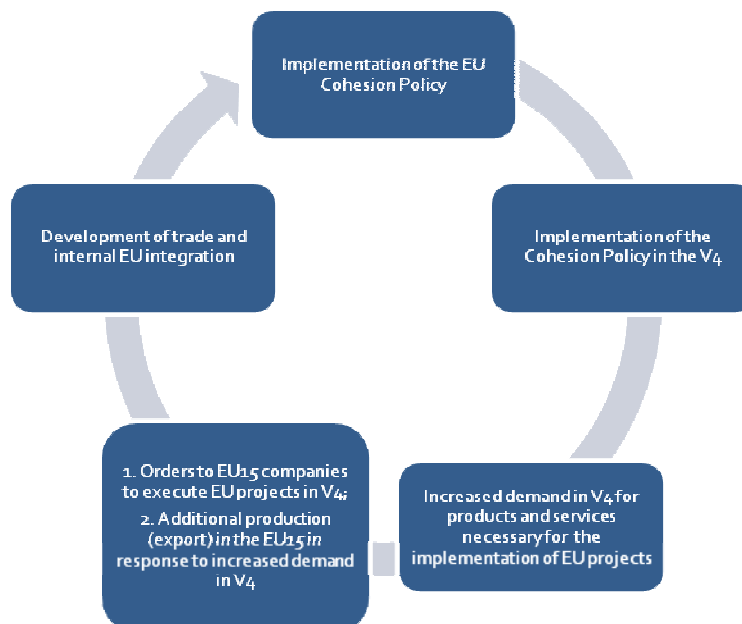
Source: IBS elaboration

First of all, we must distinguish between the two main channels through which the Cohesion Policy can positively affect development of the EU15. The main channel of impact of the Cohesion Policy in the EU15 is the macroeconomic channel. As a result of a number of EU projects the V4 countries experience faster economic growth (as described in the previous section), which creates additional demand for certain goods and services. As a result, the increase in demand leads to increased production not only in those countries but in other EU countries thanks to common rules facilitating trade within the EU (exports)(see Figure 17).

Moreover, the increase in demand may take place in sectors with different levels of technological advancement. Consequently, increased demand may lead to increased trade (exports) between countries of the EU15 and the V4 in specific economic sectors, thus leading to accelerated development. At the same time analysis of macroeconomic benefits is meant to

identify the impact of changes in exports on other economic indicators in the EU15 such as GDP and employment - although the impact of the Cohesion Policy in the V4 is small in these categories taken together (i.e. with the allowing for the contributions of Member States).

In order to determine macroeconomic benefit analysis, our model used macroeconomic data from different sources. We determined the value of additional exports from different EU countries, generated in response to increased demand in the V4 countries by the implementation of EU projects. Additional exports were then decomposed into individual economic sectors, which allowed the identification of sectors that receive outstanding economic benefits which lead to their development. The effects of these macroeconomic mechanisms are described in detail in Section 2.3.

The second channel in which benefits are transferred is direct, which consists of contracts related to EU projects in the V4 countries obtained by EU15 companies. These benefits are obtained in the form of cash, i.e. it is possible to determine their value as the value of the contracts. Therefore, these benefits are called direct benefits. The direct benefits can be divided into benefits related to obtained contracts (i.e. incomes of EU15 companies that have EU15 headquarters) and benefits related to the ownership of capital (i.e. profits provided by entities belonging to the EU15 companies but with headquarters in the V4 countries). Although data on direct benefits are obtained in a manner entirely distinct from the estimation of macroeconomic benefits, the estimation of direct benefits should be treated as an element (subset) of macroeconomic benefits, as macroeconomic estimates per se include all the effects of policy implementation.

In order to determine the direct benefits, it is essential to know the value of contracts outsourced to EU15 companies. Furthermore, it is necessary to identify the sectors that usually receive contracts in order to determine which economic sectors benefit most. In the study of direct benefits, we conducted a Computer Assisted Web Interview (CAWI), which was addressed to all the beneficiaries of EU funds in the Visegrad Group, under the financial perspective 2007-2013. The questionnaire included questions that related to the execution of projects, in particular the country of origin of the contractor and the nature of the commissioned tasks. As a result, it was possible to identify the countries of origin of the main contractors of the EU projects implemented in Poland, the Czech Republic, Slovakia and Hungary. The direct benefits are described in Section 2.4.

These two channels (macroeconomic and direct) can be simulated and presented numerically. The combined results are presented in Section 2.2 (where direct benefits are a subset of the total benefits).

Moreover, in addition to the aforementioned benefits, there are also positive externalities in the form of increased potential of innovation and science across the EU, increased ecological safety and the development of international transport networks. These effects are difficult to measure, but are very important in a European dimension, and to some extent - also globally. Therefore, the third part of this study is dedicated to these effects.

A detailed diagram of EU15 benefits related to implementation of the Cohesion Policy in the countries of the V4 is shown in Figure 18.

Figure 18. Identification and classification of channels through which the EU15 benefit from Cohesion Policy implementation in the V4
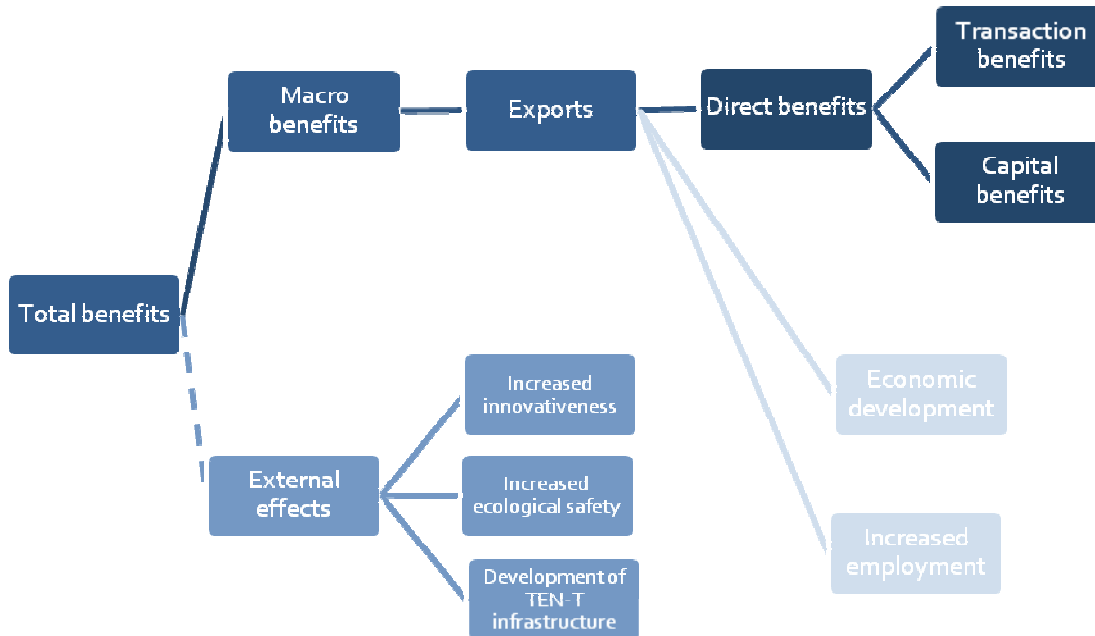
Source: IBS elaboration

The determination of benefits obtained by the EU15 from implementation of the Cohesion Policy is thus important both from the point of view of the goal of the regional policy and the costs of its implementation. The fact that the Cohesion Policy has a positive effect on both the V4 and EU15 is in line with the objectives of internal EU integration, contributing to the deepening of regional economic cooperation, strengthening trade and acceleration of overall growth.

2.1.4. Methodology: basic information

The methodology of this research is derived from work by IBS in 2008/2009 (on Poland and the previous financial perspective). From the methodological point of view, there are three main sections of this study:

1. Microeconomic analysis (CAWI)
2. Economic modelling (EUImpactMOD V4)
3. Macroeconomic analysis (multi-stage estimation of benefits to the UE15)

The aforementioned methods were supplemented by in-depth interviews with representatives of V4 administrations to obtain technical and organisational information significant for the realisation of this research, and a better understanding of the specificity of project

implementations. A detailed description of all methods is presented in the Appendix; below we provide a short and non-technical review.

Microeconomic analysis

The microeconomic analysis was based on a *Computer Aided Web Interview* (CAWI) and analysis of the resultant data. The main outcome of the microeconomic analysis is the estimation of direct benefits, i.e. benefits related to contracts obtained by companies from the EU15 and companies owned by entities from the EU15. Naturally, indirect benefits are only part of total benefits to the EU15 resulting from implementation of the Cohesion Policy in Poland and other V4 countries. The contracts granted to foreign companies and dividends paid to foreign owners should be supplemented with indirect effects, associated with the accelerated economic growth in the EU15.

The microeconomic survey covered all initiators of projects in the current financial perspective who we could contact. The respondents were sent questionnaires and Excel files (in the case of large projects) prepared in national languages. The respondents were requested to answer a number of questions on the nature of the supported project, the general activity of the beneficiary, incurred costs, and the contractors and suppliers involved in the project. The most important information concerned information on the tasks realised by the contractors, the location of their headquarters and the country of origin of the majority capital. Based on the received answers, it was possible to determine the size of benefits that EU countries directly obtain from the implementation of the Cohesion Policy in the V4. The results were weighted in order to extrapolate them towards the whole population.

The data concerning the expenses of the recipients served to assess the structure of EU spending, i.e. to what extent individual economic sectors in the V4 benefit from the inflow of European funds. This was estimated by assigning individual types of expenses incurred by the recipients to specific sectors. For example, spending on telecommunications should be associated with 'post and telecommunications'. On the other hand, expenses by the recipients for their own employees (wages) influenced the economy through the employees consumptions.

The microeconomic survey provided all the data necessary for the determination of indirect benefits (both related to contracts and capital ownership), while the results were also used for the estimations of total benefits.

EUImpactMOD V4 model

The EUImpactMOD model, already used by IBS in the assessment of the effects of European funds in Poland, was adjusted for the specificity of each of the four Visegrad Group countries.

For each of the V4 countries, we performed an analysis of the effect of EU funds on the output, exports and imports, obtaining results in the form of a deviation from a baseline scenario (i.e.

assuming the lack of EU assistance). These results, although interesting in and of themselves, have no direct significance for the subject matter of the analysis, but were used in a subsequent stage of this research – the estimation of additional exports of the EU15, i.e. total benefits.

Macroeconomic analysis – estimation of additional exports
The estimation of additional EU15 exports consists of 9 steps and uses both publicly available macroeconomic data (on the structure of V4 imports, and data on the flows of goods and services between sectors and input-output matrixes), the results of the microeconomic analysis, and estimation of the effect of EU funds on the V4 economies obtained using the EUImpactMOD model.

Figure 19. Stages of the macroeconomic research
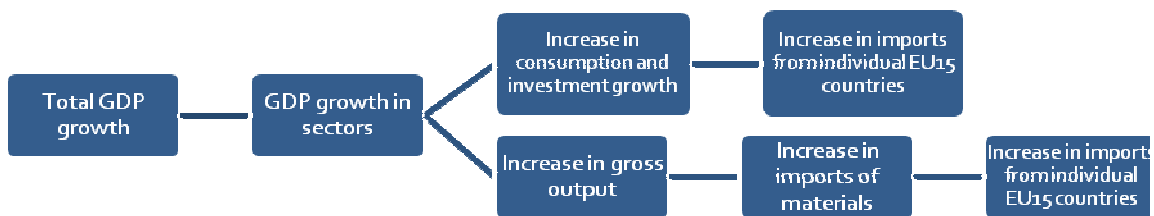
Source: IBS elaboration

The idea behind the macroeconomic study is the need of a most detailed understanding of relationships between economic growth resulting from the inflow of EU funds to the V4 and the increase in imports from the EU15. The general relation between GDP and imports is one of the most basic and unquestionable relations known in economy.

In national accounts, imports are divided into; (1) imports of consumer goods (consumer imports) and goods meant to increase corporate assets (investment imports); and (2) imports of products and processed goods that are intermediates used in the production of other goods in the country (imports of materials or manufacturing imports). The methodology of the macroeconomic analysis makes a distinction between these two major components of imports. The detailed approach of our research is reflected in the fact that estimations of additional imports from the EU15 were made at the level of individual industries (59 in total) – to the extent allowed by public macroeconomic data.

Finally, estimation of additional imports from the EU15 to the V4 made it possible to assess how implementation of the Cohesion Policy in the Visegrad Group contributes to an increase in employment and gross domestic product in the EU15. To this end, we used existing literature (the results of empirical research) on the (positive) effects of foreign trade on the developed economies.

2.2. Summary of benefits to the EU15

In this sub-section we present an assessment of the total benefits received by the EU15 with the implementation of the Cohesion Policy in V4 countries in a division of predefined types of benefits. We present total benefits in the light of their constituents, i.e. indirect and microeconomic benefits. In the next two subsections we proceed to discuss total benefits through the presentation of their sectoral structure and a detailed description of microeconomic benefits.

According to estimations, the total value of benefits obtained by the fifteen countries of the EU15 through implementation of the Cohesion Policy in the V4 countries in the period 2004-2015 will amount to EUR 74.69 billion (in fixed prices of 2005). It is important to bear in mind that the determined microeconomic benefits relate only to the 2007-2013 programming period, which means that these are *de facto* benefits observed in the period 2007-2015. No accounting of the 2004-2006 programming period (and therefore the expected benefits observed in 2004-2008) was due to limitations with the CAWI research methodology, the basis of estimates of microeconomic benefits.

Notwithstanding the fact that direct benefits have been estimated only for the current financial perspective, this has no effect on the estimates of total benefits - in accordance with our methodology, the direct benefits are a subset of the total, designated by modelling methods. However, omitting the previous perspective in estimating the direct benefits means that their actual share in the total benefits is underestimated by a few percentage points.

Table 2. Estimation of EU15 benefits (2004-2015)

Category	EUR billion (2005)
Spending on the Cohesion Policy in the V4	140.10
EU15 spending on the Cohesion Policy in the V4	130.06
EU15 net spending on the Cohesion Policy in the V4 (net contributors)	117.74
Total benefits to the EU15	74.69
including EU15 net contributors	72.21
Indirect benefits	66.49
Direct Benefits	8.64
including benefits related to obtained contracts	7.38
including benefits related to ownership of capital	1.25
Total benefits as a percentage of gross EU15 spending on the CP in the V4	57.43 per cent
Total benefits as a percentage of net EU15 spending on the CP in the V4	61.33 per cent

Source: IBS elaboration

The vast majority of the expected benefits from implementation of the Cohesion Policy in the V4 will be observed in 2011-2015. This is mainly due to the fact that the occurrence of macroeconomic benefits is largely delayed. Left-side asymmetry in the distribution of benefits in time is also the result of the significant duration of spending within the frameworks of EU

programmes (see Figure 20). The value of the EU15 total benefits achieved through the implementation of EU programmes in the V4 countries constitutes more than half the total spending under the common regional policy in the V4 countries (exactly 53.3 per cent).

Figure 20. Breakdown of the total benefits to the EU15 countries from implementation of the Cohesion Policy in 2004 to 2015 - breakdown by type of benefit (left graph) and the distribution of expenditure (in billion euro at 2005 prices) in the framework of the Cohesion Policy in V4 in 2004 -2015 (right graph)
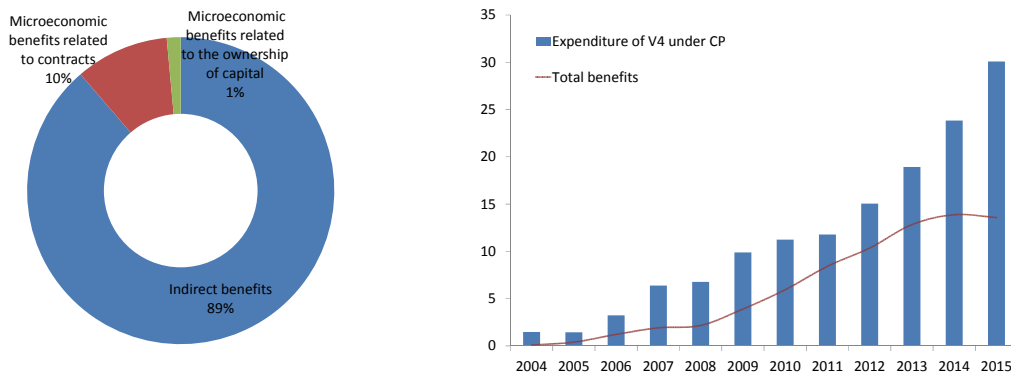
Source: Own elaboration based on CAWI, the results of the economic analysis of information from monitoring systems in the V4 countries

It must be borne in mind that the average share of extra exports in total exports of the EU15 to V4 countries in 2004-20015 is 3.28 per cent. Furthermore, the distribution of this share is asymmetrical in time, which reflects the increase in the share of extra exports in total exports from the EU15 to Poland, the Czech Republic, Slovakia and Hungary.

The structure of the overall benefits broken down into direct benefits (related to the obtained contracts and ownership of capital) and indirect benefits is similar across the EU15 (see Figure 21). In the vast majority of EU15 countries, indirect benefits represent about 90 per cent of the total benefits generated by implementation of the Cohesion Policy in the V4 countries. Spain and Portugal are notable exceptions, with a relatively high share of microeconomic benefits, mostly related to obtained contracts. This may be due to the fact that both countries are geographically distant from the V4 and a large proportion of their exports to the V4 countries may to a greater extent be directly related to the execution of EU projects, rather than an indirect increase in exports in response to increased demand in the V4.

Figure 21. Structure of total benefits by type of benefit across the EU15
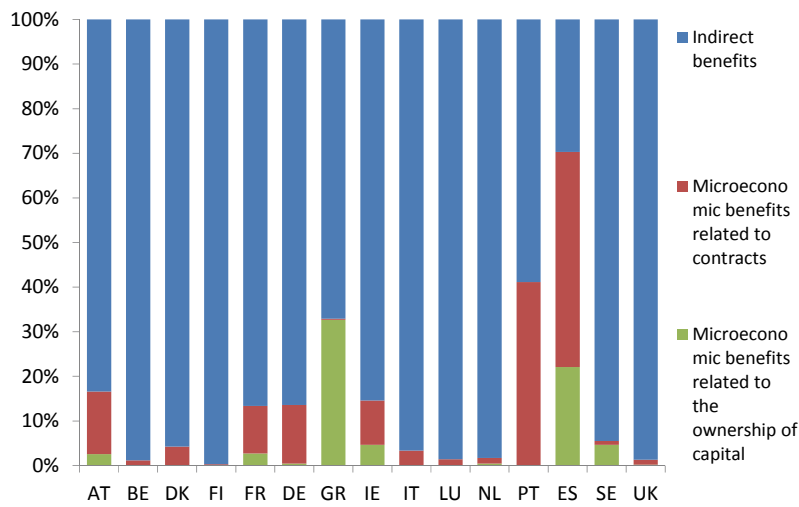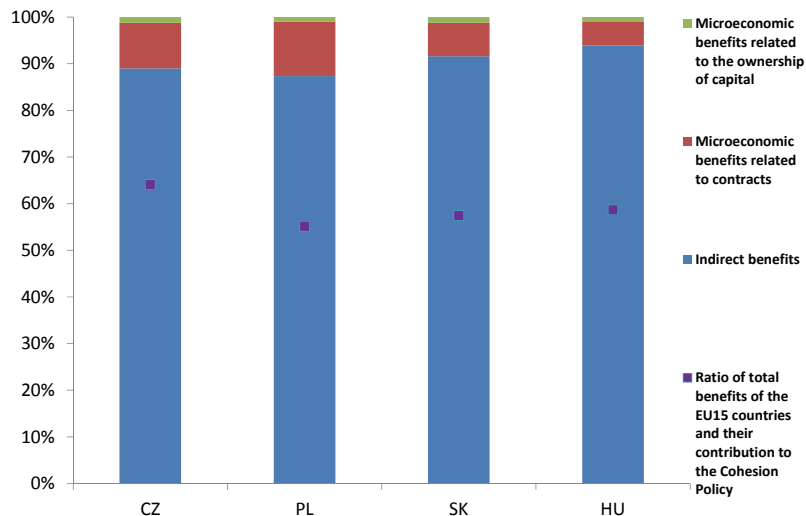
Source: IBS elaboration based on CAWI results and macroeconomic analysis

The structure of total benefits in the EU15 broken down by country from which these benefits are derived, is illustrated in Figure 22. According to estimates, the benefits of the Cohesion Policy in the Czech Republic and Poland to a greater extent result directly from contracts related to the projects. Reasons for this are difficult to explain exactly: this may result from many factors, including the structure of the programmes under the Cohesion Policy, the specificities of the national market, the number of domestic enterprises operating in the market, etc. In addition, the highest relative benefits in relation to expenditure incurred in the implementation of the Cohesion Policy come from Hungary, and the least from the Czech Republic and Poland. It should be noted that the share of spending under the Cohesion Policy in the Czech Republic and Hungary in the total expenditure in the V4 is similar (ca. 19 per cent).

Among the EU15 countries, Germany dominates in terms of additional exports, followed by the Netherlands, Italy and France. The sectoral structure of extra exports from the EU15 is quite balanced. Only in Ireland do we observe significant differences, with a significantly higher percentage of technologically advanced products. However, on average extra EU15 exports are dominated by high and medium tech products (about 51 per cent) (see Map 2).

It is also interesting to compare total benefits to the real costs incurred by each EU15 country under the Cohesion Policy. The 'real costs' denote contributions to the EU budget (gross costs) and the difference between the contributions of individual EU15 countries into the EU budget and their spending under the Cohesion Policy (net costs).

Figure 22. Structure of total benefits to UE15 countries resulting from implementation of the Cohesion Policy in the V4 countries – by V4 country

Source: IBS elaboration based on CAWI results and macroeconomic analysis

Map 2. Additional exports and their sectoral structures, by EU15 country
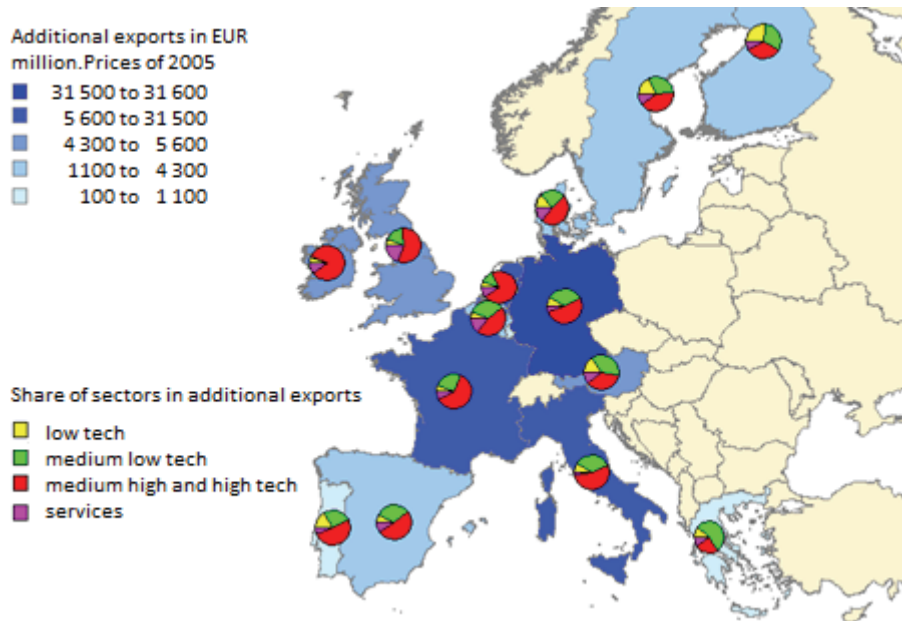
Source: IBS elaboration based on macroeconomic survey

According to calculations, benefits obtained by the countries of the EU15 in the form of additional exports significantly reduce the real costs of financing the implementation of the common regional policy in the V4, both in gross and net terms. Map 3 compares the estimated additional EU15 exports to the V4 countries with the gross cost of the Cohesion Policy addressed to the V4. The graph clearly shows that the benefits to the EU15 countries resulting from implementation of the Cohesion Policy reduce their costs of implementation in the V4; in

the case of Germany, Ireland and Luxembourg benefits more than compensate for these costs. Similar relationships occur when we additionally take into account spending under the Cohesion Policy realised by individual EU15 countries, i.e. net expenses (see Map 4).

Map 3. Comparison of total benefits of EU15 countries with gross contributions of EU15 countries to the EU budget in the part directed to the implementation of the Cohesion Policy in V4.
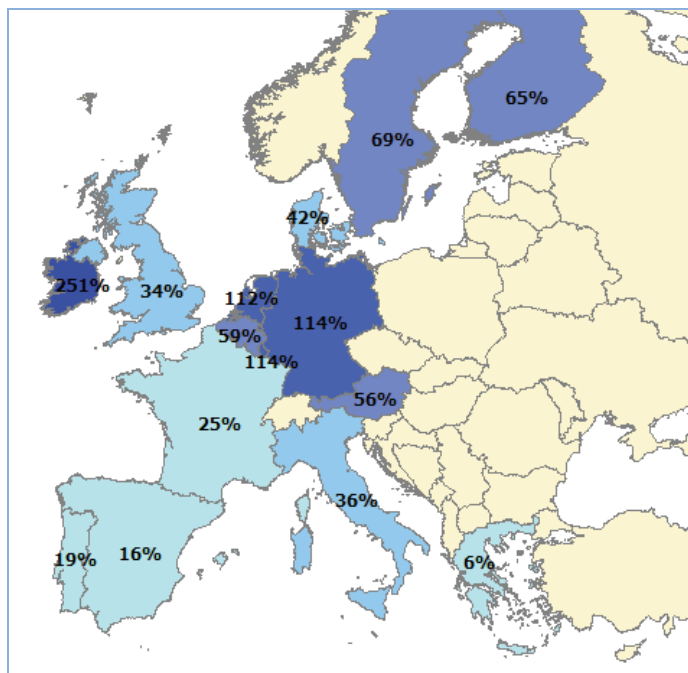
Source: IBS elaboration based on the results of the macroeconomic survey and EU data.

In the case of Germany, the main trading partner of the V4 countries, this ratio is as high as 125 per cent. It is slightly higher for Ireland, however in this case it is associated with a low baseline (very low participation of Ireland in financing the Cohesion Policy) with relatively high export effects. These results can also be interpreted as a gain for the EU15 from the Cohesion Policy in the V4 countries: in the EU15, every euro allocated to the Cohesion Policy brings additional exports of 61 cents.

Map 4. Comparison of total benefits to the EU15 to net contributions of individual EU15 countries, in the part related to implementation of the Cohesion Policy in V4
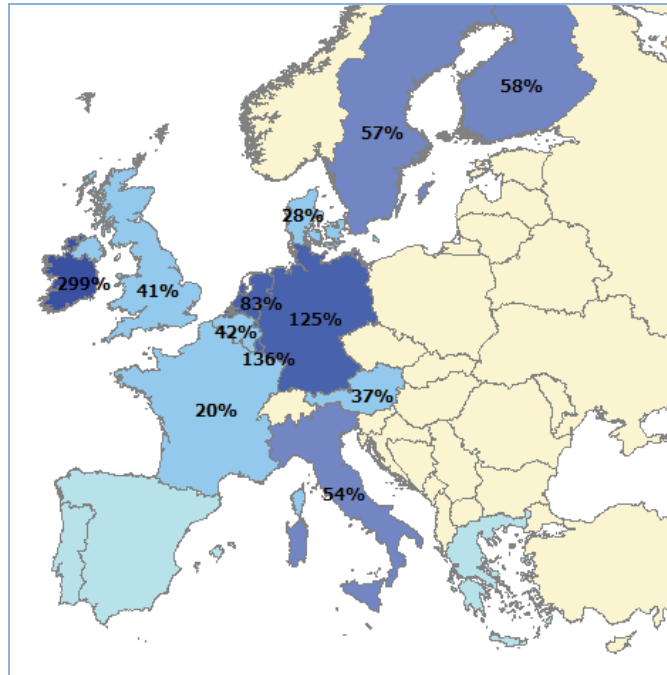
Source: IBS elaboration based on macroeconomic research and data from EU budget spending reports

It is interesting to compare the real cost of implementation of the Cohesion Policy in the V4 countries to the structure of additional exports, by V4 country. This analysis allows the determination of the V4 country to contribute most to lowering the costs of implementing EU projects in the V4. Accordingly, Map 5 takes into account the share of each V4 country in the generated additional EU15 exports to Poland, the Czech Republic, Slovakia and Hungary.

According to these calculations, Austria will benefit most from the implementation of the EU projects in Hungary and Poland – the share of additional EU15 exports to both these countries is about 30 per cent. Most of extra exports of the remaining EU15 countries will be directed to Poland. This results comes as no surprise, as total imports in Poland are the highest in the V4.

Map 5. Total EU15 benefits, by V4 country (the target country of the additional exports)
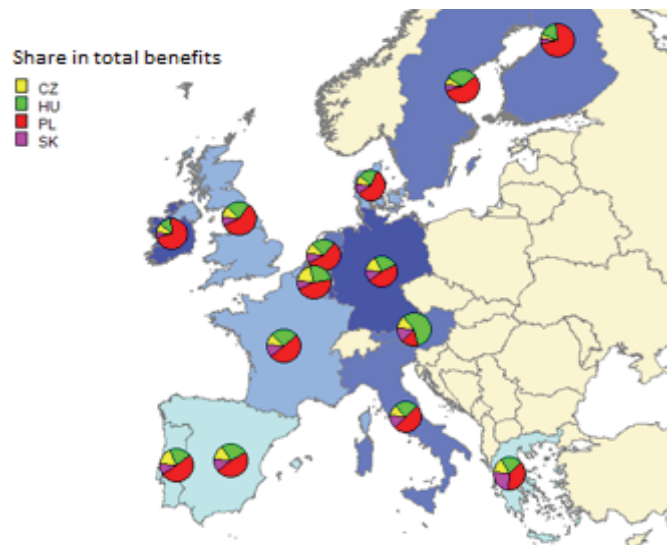
Source: Own elaboration based on macroeconomic analysis and EU budget spending reports

It should be emphasised here that contributions of individual EU15 countries refer to contributions to the Community budget, in that part of the budget which is distributed only among the V4 countries, not all the Member States. Therefore it is also important to look at the overall cost of implementation of the Cohesion Policy, not just the cost of its implementation in the V4.

In summary, the total benefits received by the EU15 from implementation of the Cohesion Policy constitute almost half the funds spent on the Cohesion Policy in the V4 countries in the entire period 2004-2015. Furthermore, the total benefits are to only a small extent the result of contracts obtained by EU15 companies to execute EU projects in the V4. A much larger share of total benefits is generated indirectly. With the exception of Spain and Portugal, this structure of overall benefits can be observed across the entire EU15. In addition, additional EU15 exports resulting from spending on Structural Funds and the Cohesion Fund in the V4 countries significantly reduce the actual cost of financing the Cohesion Policy among EU-15 countries, and in the case of Germany, Ireland and Luxembourg it more than compensates for this cost.

2.3. Macroeconomic benefits

The purpose of this subsection is to define the macroeconomic benefits to the EU15 from implementation of the Cohesion Policy in the V4 countries. Macroeconomic benefits mean the

benefits derived from additional exports resulting from increased demand in the V4 countries for goods and services provided by the EU15. In this section we answer the question on how far the Cohesion Policy in the V4 countries has contributed to the growth in demand of these countries for goods and services imported from the EU15.

In order to answer this question we performed an economic analysis which used secondary data from various sources (such as input-output tables, the structure of foreign trade and exchange services). A detailed description of the methodology is presented in the annex to this Report. It should be noted, however, that the focus was on both the EU15 as a whole, and separate EU15 economies and their sectoral structure.

Analysis of macroeconomic benefits to EU15 countries was made in relation to the effects observed in the previous period and cumulatively for 2004-2015. The analysis took into account two programming periods: 2004-2006 and 2007-2013. Moreover, the analysis also included 2014-2015 as it is assumed that during these years payments are still being made under the current perspective. Thus the analysis took into account the impact of payments from Structural Funds and the Cohesion Fund in the two programming periods to the four countries of the V4 group.

In addition, additional EU15 exports generated by increased demand in the V4 countries through implementation of EU programmes have been analysed in terms of sectoral structure. To this end, we performed a decomposition of the estimated additional exports into various sectors of the fifteen European Union countries. Final results of this stage of analysis were obtained using a matrix of sectoral structure of V4imports.

Due to the thematic scope of the results, we decided to divide the presentation into five parts. In the first two parts we focus on the overall macroeconomic benefits to the EU15, understood as additional exports to the V4 countries. In the third and fourth parts we perform a decomposition of additional exports into the different sectors of the economy. In the fifth part we try to identify other channels through which the additional exports influence EU15 economies.

In particular, we discuss the following issues:

1. **What is the value of additional exports from the EU15 to V4 in response to increased V4 demand resulting from spending under the Cohesion Policy?**
2. **How significant are the aforementioned additional exports compared to the total exports from the UE15?**
3. **Are there economic sectors which, thanks to additional demand, experience significant growth and thus accelerated development?**
4. **How important is the increase in the value of EU15 exports in individual economic sectors to the EU15 export structure?**
5. **Do additional exports have an impact on social cohesion and prosperity in the EU15?**

2.3.1. Additional demand for goods and services imported by the V4 from the EU15

Economic analysis indicates that following implementation of the Cohesion Policy in the V4 countries, the EU15 countries experienced a significant increase in the value of exports to these countries.

Throughout the period analysed, i.e. 2004-2015, spending under the Cohesion Policy in the V4 countries has led to additional exports by the EU15 to a total value of EUR 74.69 billion (in fixed prices of 2005). For 2004-2010 this value is EUR 15.53 billion (in fixed prices of 2005). This means that by 2010 we observed just over 20 per cent of the total anticipated additional exports from EU15 countries to the V4 as a result of spending under Structural Funds and the Cohesion Fund in these countries. The distribution of the estimated additional exports in time is strongly asymmetrical and the vast majority of additional exports is observed for the period 2010-2015 (see Figure 23)

The reasons for the observed asymmetry in the distribution of additional exports include the asymmetry of spending (spending is higher in the current perspective and also most expenditure is accumulated in the later years of implementation) and delayed macroeconomic effects of the Cohesion Policy and hence delayed additional exports from the EU15.

Figure 23. Estimation of additional exports from the EU15 to the V4 from implementation of the Cohesion Policy in 2004-2015 (EUR billion in fixed prices of 2005) and total expenditure under the Cohesion Policy in the V4 - by year
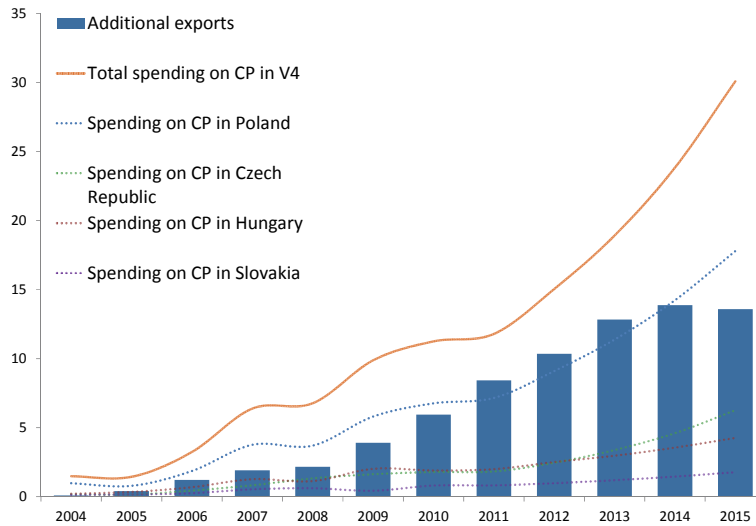
Source: Own calculations based on the results of macroeconomic survey and information from monitoring systems in the V4

There are clear differences in the distribution of additional exports to V4 countries from the EU15 due to implementation of the Cohesion Policy in the V4 countries, per individual V4 country. According to the estimates of additional exports from the EU15 countries to the V4, half of the exports will be addressed to Poland (see left Figure 24). It is worth noting that in the case of Poland and the Czech Republic the percentage of real contribution of the EU15 to the Cohesion Policy implemented in those V4 countries is lower than the share of additional exports to these countries. It is an interesting observation for Poland, as its economy is one of the least open in the V4 (see Figure 23). This relationship means that the countries of the EU15 may benefit to a greater extent from the implementation of the Cohesion Policy in Poland and the Czech Republic.

Box 1. Methodology of macroeconomic research

The methodology of the macroeconomic analysis consists of several steps, in which different types of secondary data are used such as data from Eurostat, OECD and the EUImpactMOD simulation model. As a result of macroeconomic analysis we estimated that the part of additional exports from EU15 countries to the V4 resulting from the increased demand due to implementation of the Cohesion Policy.

In the first step, using the results of the EUImpactMOD simulation model, we estimated <u>the value of additional GDP</u> resulting from the implementation of the Cohesion Policy in individual V4 countries. Then we made a breakdown of estimated additional exports to <u>the different sectors</u> of the V4 economies. In the second step, using the coefficients of import intensity and the estimated additional GDP in the V4, we calculated the additional import of goods and services used in the process of consumption and investment in the V4 resulting from the implementation of EU programmes. Then we estimated an increase in gross output (i.e. GDP plus intermediate consumption) of V4 economies broken down by sectors. Determination of gross output of the V4 economies has allowed us to estimate the value of additional <u>imports of production</u>.

As a result, after combining the value of imports of consumption, investment and manufacturing imports, we determined the value of additional imports by the V4 resulting from increased demand due to the implementation of EU projects. By combining the estimated value of imports of consumption and investment and manufacturing imports, and through a re-application of the import structure matrix for the imports by the V4 from EU15 economies, we estimated the total value of additional imports to the V4 by individual sectors of the EU-15 economies.

Finally, in the final steps of economic analysis, we compared the values of additional imports of V4 countries (i.e. EU15 exports) broken down by sectors of the EU15 economies to the total exports of the EU15. Moreover, the value of additional exports from the EU15 to the V4 was compared to contributions (reduced by received payments) to the EU budget by each EU15 Member State. This allowed an assessment of the relative cost of financing the EU15 Cohesion Policy implemented in the V4 countries.

In the final step of analysis we used the estimated value of additional exports from the EU15 economies to the V4 to analyse the impact on macroeconomic aggregates such as GDP and employment in the EU15. This analysis was based on some estimates of the marginal effects of changes in the value of exports on GDP per capita and labour productivity presented in empirical economic literature.

Figure 24. The share of extra exports from the EU15 to individual V4 countries in total additional exports to V4 countries (left graph) and the structure of V4 import by type of demand (right graph)

Source: IBS elaboration based on the results of macroeconomic studies and Eurostat data
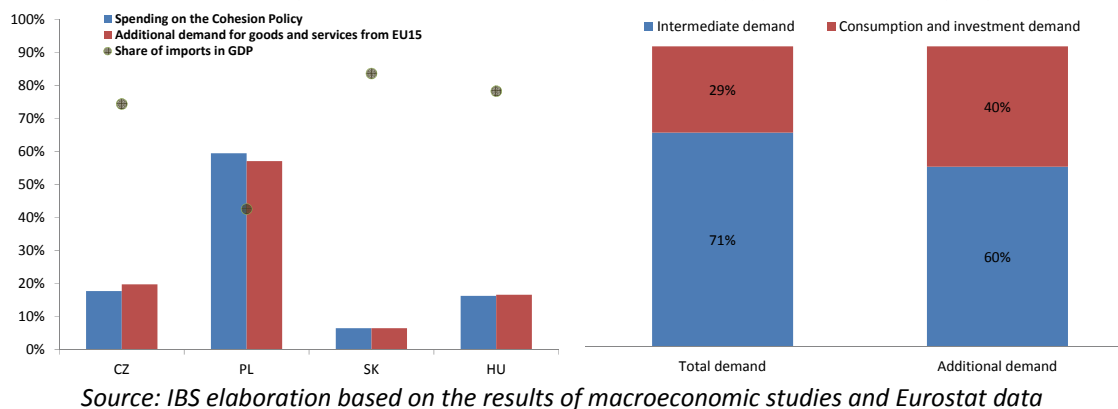
Moreover, the demand generated in V4 countries through implementation of the Cohesion Policy differs from that previously observed (see Figure 24 right graph). In total demand, the ratio between consumption and investment demand and intermediate demand is approximately 1:2. However, this ratio in demand generated by implementation of the Cohesion Policy is close to 2:3, as the additional demand is less oriented at intermediate products. Thus, the increase in demand applies to consumption and investment to a greater extent than would appear from the observed structure of total demand.

According to estimates, Germany will obtain the largest macroeconomic benefits due to increased demand for goods and services imported from EU15 countries (see Figure 26). This result is consistent with expectations arising from the fact that Germany is the largest trading partner of all four of the V4 countries . Similarly, we may observe significant benefits for the Netherlands, Italy and France, which after Germany are the next largest exporters to the V4. Estimation of the value of additional exports is therefore consistent with the structure of total exports by value of exports by each EU15 country to V4 country.

Box 2. Macroeconomic benefits by V4 country

Benefits that EU15 countries obtain from implementation of the Cohesion Policy in individual countries of the V4 total EUR 74.69 billion, from the individual countries respectively:

- **Czech Republic – EUR 14.77 billion**

- **Poland – EUR 42.62 billion**

- **Slovakia – EUR 4.87 billion**

- **Hungary – EUR 12.43 billion**

In a breakdown by individual V4 countries, the distribution of macroeconomic benefits by EU15 countries generated by increased exports is similar to the aforementioned one. Figure 25 shows both the benefits to individual V4 countries as well as their spending under the Cohesion Policy. In the case of Poland and Hungary, there is a significant lag to benefits over time. In the case of Slovakia, the distribution of benefits over time is relatively more even.

Figure 25. The value of extra EU15 exports to individual V4 countries - A) Czech Republic; B) Poland; C) Slovakia; D) Hungary
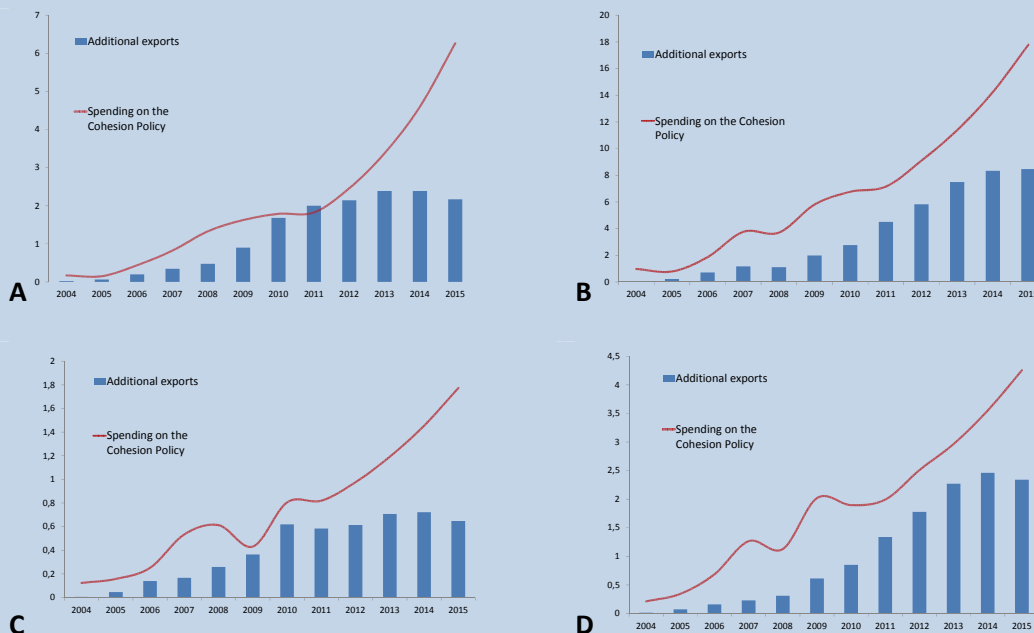
Source: Own calculations based on the results of macroeconomic studies and information from monitoring systems in V4 countries

Figure 26. Estimation of additional exports from the EU15 to V4 countries as a result of the Cohesion Policy 2004-2015 (EUR billion at 2005 prices)
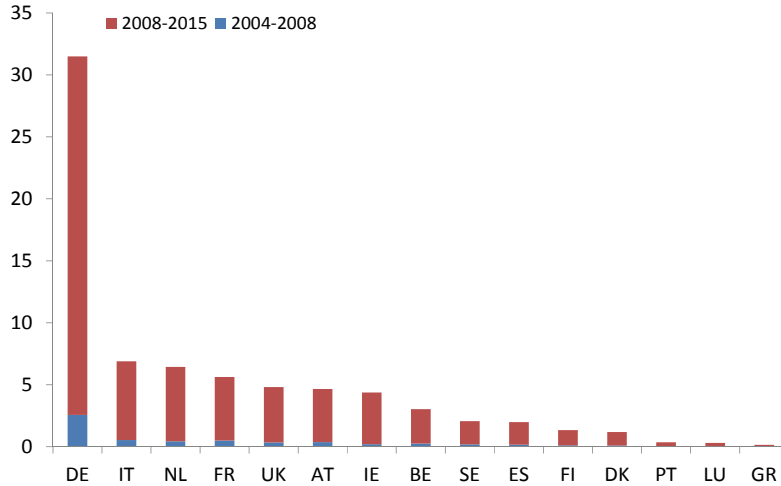
Source: own elaboration based on macroeconomic surveys

On the basis of the undertaken calculations, it can be concluded that Germany, the Netherlands, Italy and France account for 68 per cent of the total additional exports from the EU15. According to the summary estimates for 2004-2015, this share in the remaining years will be at a similar level (67 per cent, see Figure 27). After the addition of Austria, this combined share by these five countries will be 74 per cent. Hence five out of fifteen countries of the EU15 will account for almost three-quarters of exports generated by increased demand in the V4.

Figure 27. The share of estimated additional exports of individual EU15 countries in total additional exports of the EU15 to the V4 as a result of implementation of the Cohesion Policy in 2004-2015
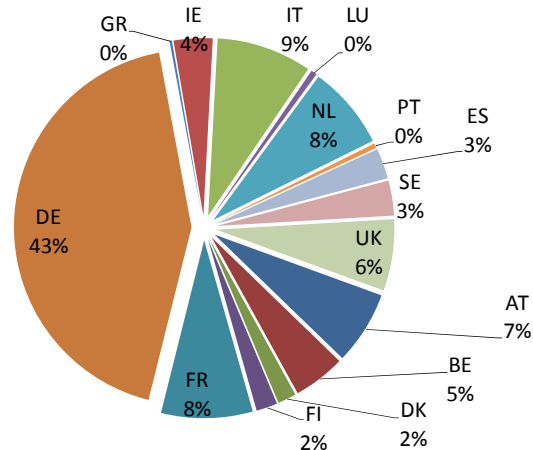
Source: IBS elaboration based on the results of macroeconomic studies

Box 3. The share of extra exports of individual EU15 countries in the total additional exports - the differences for V4 countries

In all four Visegrad countries, Germany dominated estimated additional exports from the EU15. As already mentioned, this is not an unusual observation and results from the fact that Germany is the main trading partner of the V4. There exists a great variation for Austria: the share of Austria in total additional exports to Hungary and Slovakia is 13 per cent and 11 per cent, respectively. For the Czech Republic it is 9 per cent and for Poland only 3 per cent. Hence, the structure of additional exports broken down by the exporting economy shows dependencies resulting from trade structure and geographical location. It should also be noted that the share of Ireland in additional exports to Poland is relatively higher than other countries. Taking into account the fact that Ireland predominantly exports technologically advanced products (especially electronics), the structure of additional exports to Poland is advantageous for the development of this sector.

Figure 28. Share of estimated additional exports of individual EU15 countries in total additional exports of the EU15 to each V4 country - A) Czech Republic; B) Poland; C) Slovakia; D) Hungary.
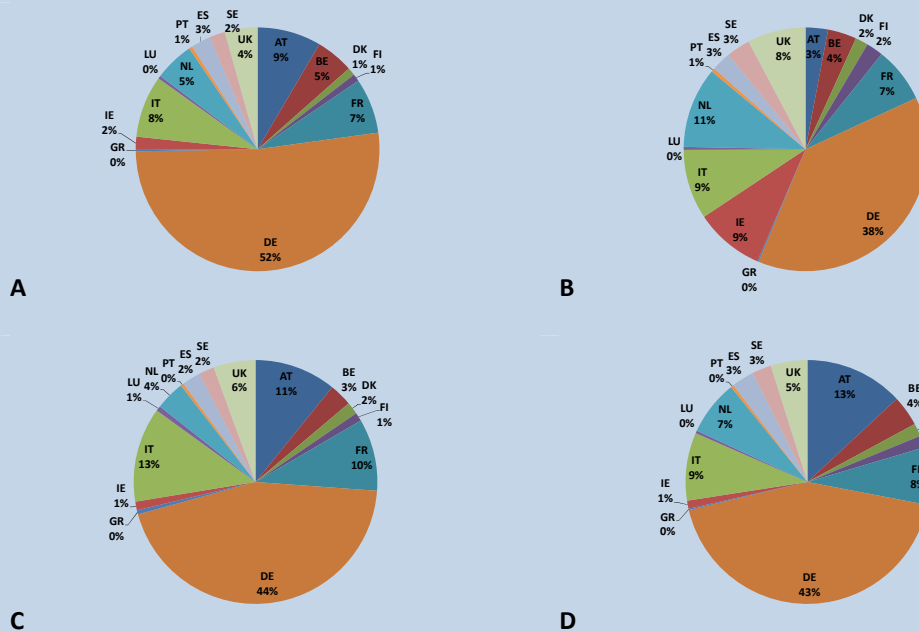
Source: IBS calculations based on the results of macroeconomic studies

However, with the exception of Austria and Ireland, the share of extra exports from individual EU15 countries is similar in the total value of additional exports generated in response to increasing demand in individual V4 countries.

2.3.2. The impact of additional exports on total EU15 exports

The previous section discussed additional exports of the EU15 economies that were created in response to increased demand for goods and services in the V4 countries resulting from implementation of the Cohesion Policy. It is important, however, to refer these values to total EU15 exports to the V4. This presentation of results will in fact determine the significance of these extra exports in relation to total EU15 exports to the V4.

The left panel of Figure 29 shows the dynamics of changes in the value of total EU15 exports to the V4 countries 2004-2015. In 2009 there was a marked decline in the value of exports due to the general economic downturn associated with the financial crisis of 2008.

The share of additional exports in total exports of the EU15 is shown in the right panel of Figure 30. The results show that the average share of additional exports in total exports of the EU15 to V4 in 2004-2009 amounts to 1.07 per cent. Importantly, the distribution of the shares in time, similar to the distribution of the value of additional exports, is strongly negatively skewed (see Figure 29). The much greater share of additional exports in total exports of the EU15 to V4 in 2010-2015 results from growth in the value of additional exports in those years.

Figure 29. Value of total exports of the EU15 to V4 in EUR billion(left panel); and the share of additional exports of the EU15 resulting from increased demand in the V4 countries due to implementation of the Cohesion Policy, in total exports of the EU15 to V4 (right panel) - by year
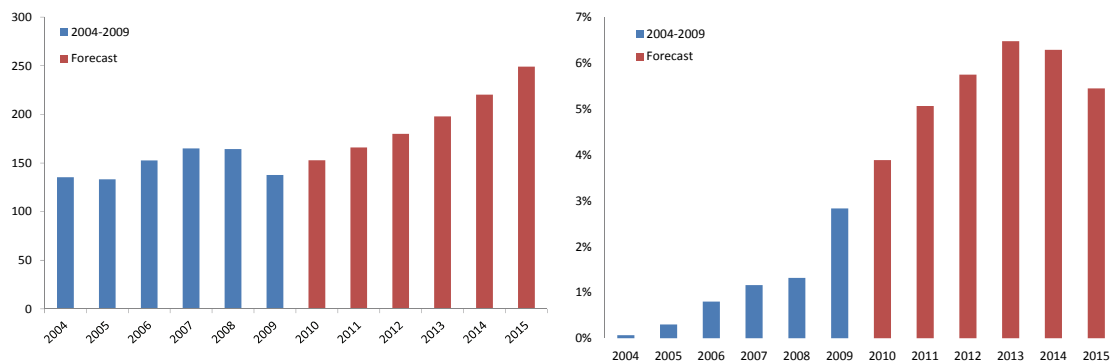
Source: IBS calculations based on Eurostat data and projections of export volume 2010-2015 by the IMF

The value of total exports is very different for each EU15 country. Figure 30 shows the dynamics of changes in total exports, broken down by exporting country. According to the data, Germany is the main EU15 exporter to V4 countries. The average value of total exports (over the period 2004-2009) by Germany to the Czech Republic, Poland, Slovakia and Hungary is EUR 67.5 billion (in fixed 2005 prices). This average volume of total exports by Germany to the V4 is drastically higher than other EU15 countries. The average value of total exports to the V4 by the second largest exporter - Italy - is only EUR 14.4 billion and by the third, France, less than EUR 13 billion. The average value of exports sent to the V4 from all EU15 countries across the 2004-2009 period is EUR 9.9 billion.

The sectoral structure of exports from individual EU15 countries is presented in Figure 30.

Figure 30. The value of total exports of the EU15 to the V4, by UE15 country by year (EUR billion)
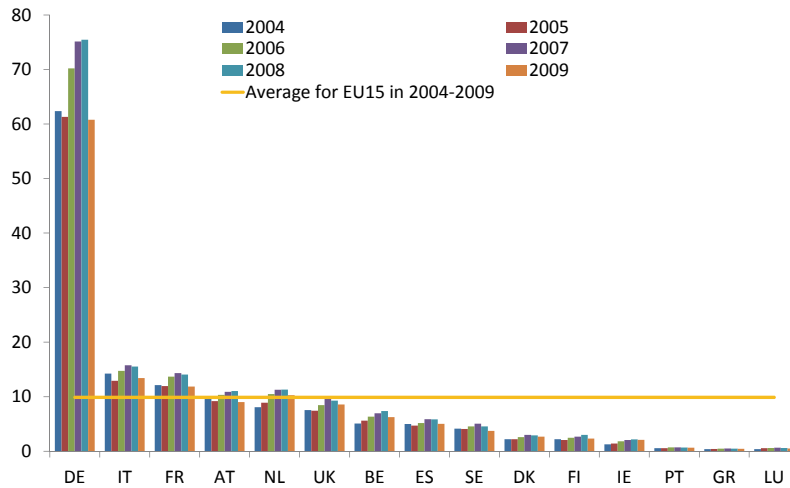
Source: Own elaboration based on Eurostat data

According to the data, Germany, the main exporter to the V4, exports mainly high and medium tech products. Except for Austria, a similar export structure is present for the remaining four leading EU15 exporters of goods and services to the V4. In the case of Austria, the export structure is more even – the share of low tech products especially is higher than in the remaining countries.

Figure 31. Sectoral breakdown of total exports of EU15 countries in 2004-2009, by exporting country
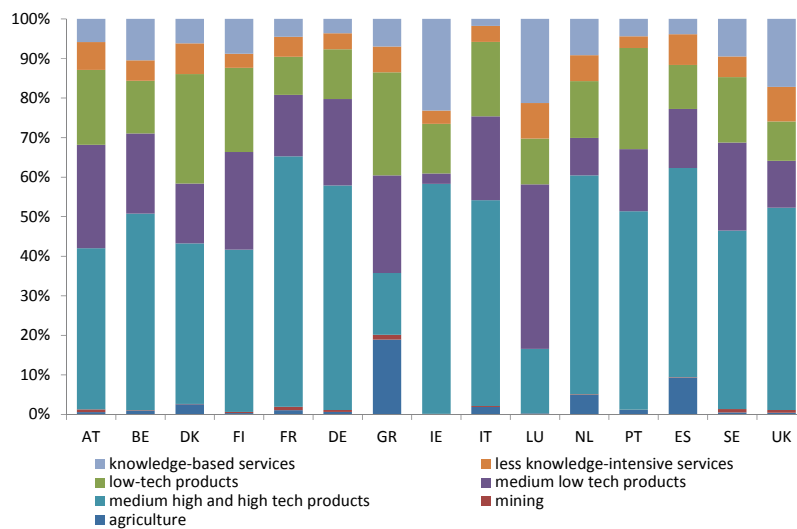
Source: IBS elaboration based on Eurostat data

2.3.3. Sectoral decomposition of the additional demand for goods and services imported from the EU15

In analysing the benefits to the EU15 from implementation of the Cohesion Policy in the V4 countries, understood as additional exports, it is worth examining the sectoral structure of exported goods and services. In other words, it is important to know what goods and services are mainly exported from EU15 to V4 countries as a result of implementation of the Cohesion Policy. The adopted methodology, particularly the use of input-output tables and supply and use tables, allows the identification of the sectoral structure of the investigated additional flows between the EU15 and V4.

Identification of the sectors where the share of additional exports is significant is also important because these sectors may therefore experience accelerated growth. This follows directly from the fact that according to basic economic assumptions, an increase in demand for given goods or services leads to increased employment in a given economic sector (or decrease in wages), or to an increase in the productivity of the economic sector. In particular, productivity growth and hence development of the sector can be expected in innovative sectors, i.e. in manufacturing of high-tech products, where development is driven by increasing demand.

For the sake of this report, we made an aggregation of economic sectors (NACE classification) in accordance with the nomenclature and classification by level of technological advancement proposed by *Eurostat.* The results of the aggregation are presented in Figure 32.

A significant proportion of additional exports in 2004-2015 from the EU15 to V4, as a result of increased demand in these countries through implementation of the Cohesion Policy, is based on medium-tech products (including both medium-low - 25 per cent, and medium-high - 35 per cent). High-tech products constituted 22 per cent of total additional exports, and low-tech products only 8 per cent. According to the adopted classification, the percentage of high and medium-high tech products is much higher than the percentage of medium-low and low tech products (57 per cent compared to 33 per cent).

Figure 32. Additional exports from the EU15 to V4 in 2004-2015 – by sector technological level
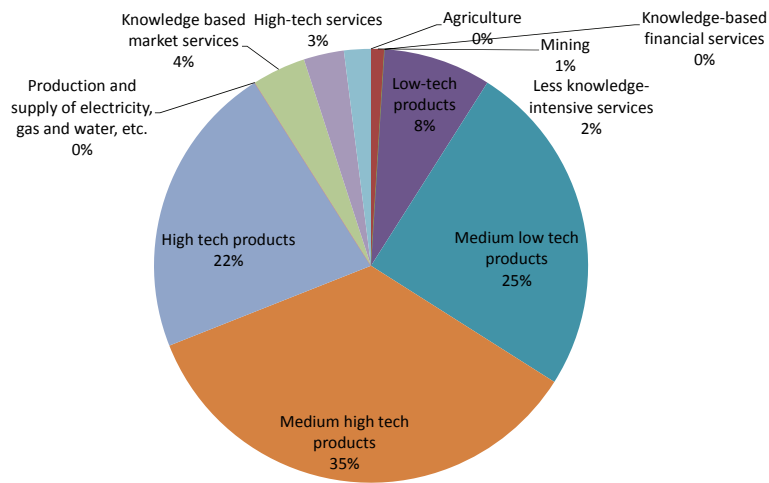
Source: IBS elaborations based on the results of macroeconomic surveys

A similar sectoral structure can be observed in exported services. These are mainly knowledge-based services (7 per cent against 2 per cent, accounting for less knowledge-intensive services). Based on the aforementioned data, one can conclude that the sectoral structure of exported products is advantageous for EU15 economies, as they mainly export technologically advanced products. Hence, the implementation of the Cohesion Policy in the V4 excites demand for high-tech products supplied by the EU15, which additionally positively influences the development of high-tech sectors in the exporting countries.

Closer analysis of the sectoral structure of additional exports of the EU15 to the V4 should focus on the differences in the structure of exports of individual exporting countries, as here we can observe certain regularities. Firstly, Ireland is a leader in terms of technological advancement of exported goods and services (see Figure 33). In light of the results presented in the previous part of this subsection, it should be noted that in addition to the major exporters (Germany, Italy, France and the Netherlands) to the V4, Ireland is also a country that obtained significant benefits from implementation of the Cohesion Policy in the V4.

Distinct differences exist in the sectoral structure of additional exports across the EU15. In countries such as Ireland, the Netherlands and the UK, additional exports of high-tech products are relatively high. The least technologically advanced exports can be observed in Luxembourg, Greece and Austria.

Figure 33. Additional EU15 exports to the V4 in 2004-2015 – breakdown by EU15 country and aggregated levels of technological advancement of economic sectors
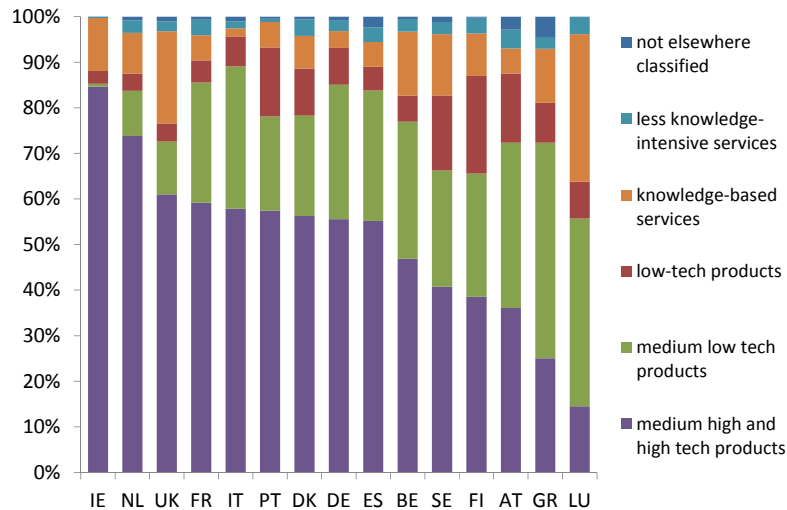
Source: IBS elaboration based on macroeconomic surveys

Importantly, almost all countries that account for the greatest part of the Cohesion Policy related additional exports to the V4 (i.e. Germany, France, Italy and the Netherlands) have a relatively high share of medium and high-tech products in their export structure.

Box 4 The sectoral breakdown of additional exports into individual V4 countries

Comparison of the sectoral structure of CP-related additional exports by the EU15 to the V4 shows interesting regularities. Firstly, the share of high tech products in exports sent to Poland is the highest in the V4 (32 per cent). This means that the additional demand generated by the implementation of the Cohesion Policy in Poland is focused on high technology products more than in other V4 countries.

Moreover, the sectoral structure of additional exports to individual V4 countries is dominated by medium-high technology products, with 32 per cent in Poland and 40 per cent in Hungary.

The sectoral breakdown of additional exports of services in terms of technology level is relatively uniform and similar to Hungary and Slovakia. Exports to the Czech Republic have a relatively high share of low-tech products.

Figure 34. Additional exports by the EU15 to V4 – by technology level of goods and services by individual sectors: A) Czech Republic, B) Poland, C) Slovakia, D) Hungary.

Legend:
- Low-tech products
- Medium low tech products
- Medium high tech products
- High tech products
- Production and supply of electricity, gas and water, etc.
- Less knowledge-intensive services
- Knowledge based market services
- High-tech services
- Knowledge-based financial services
- Agriculture and mining
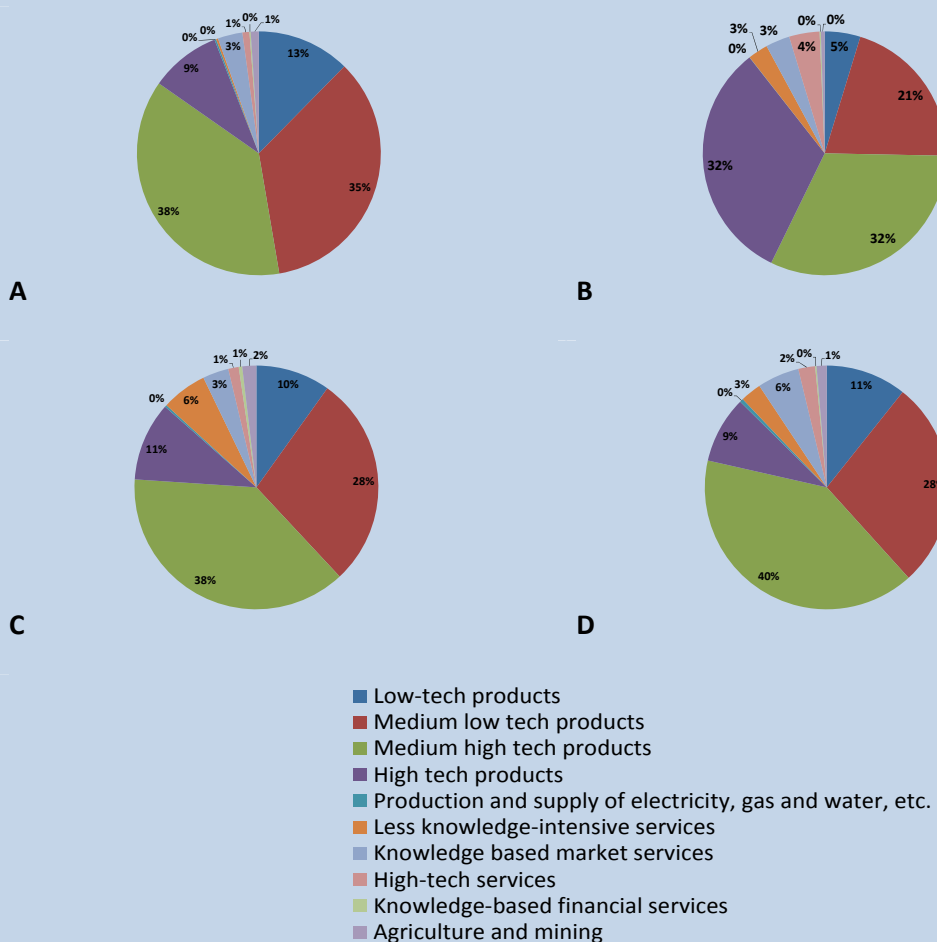
Source: IBS elaboration based on the macroeconomic survey

2.3.4. The impact of additional demand for goods and services imported from the EU15 on the structure of total EU15 exports

In the previous section (2.3.3) we presented the structure of additional exports by the EU15 to Poland, Czech Republic, Slovakia and Hungary, according to the technology level of exported goods and services. In addition to this analysis, it is interesting to determine how the additional EU15 exports generated as a result of implementation of the Cohesion Policy in the V4 have affected the structure of EU15 total exports. This section will present the share of additional exports in various economic sectors in the total exports of these sectors.

Figure 35. The share of additional exports in total exports of the EU15 to V4 - by economic sector
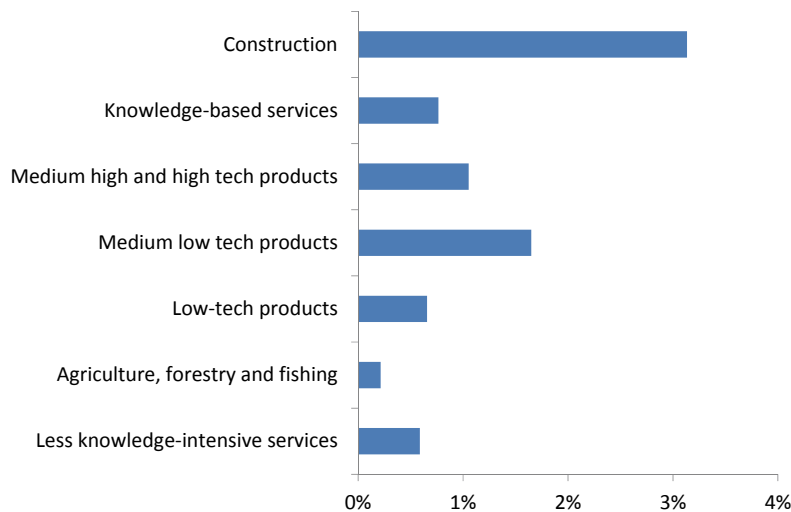
Source: IBS elaboration based on the results of macroeconomic surveys and Eurostat data

According to estimates, the additional export of construction sector products and services has the largest share in total EU15 exports to the V4 (3.5 per cent, see Figure 35). This means that the EU15 construction sector distinctly benefitted from implementation of the Cohesion Policy in the V4. Furthermore, it is worth noting that the share of low and high-tech products is similar and also relatively high (about 1.7 per cent).

Furthermore, additional analysis of the share of additional exports in total exports of the EU15 to V4 broken down by exporting country shows that they are evenly distributed across the EU15 (see Figure 14).[8] Only in the case of Ireland is the percentage of medium high-tech products somewhat higher than in the rest of the EU15. Hence for Ireland the implementation of the Cohesion Policy in the V4 positively influences production in the high-tech sector, which in turn enhances the growth of productivity in this sector and thus also accelerated its development.

---

[8] For the sake of clarity, Figure 36 presents the share of additional exports in total exports by sector only in selected countries, i.e. those with the greatest additional exports: Germany, Italy, Austria, France, the Netherlands, and Ireland. Structure of additional exports in relation to total exports for the rest of EU15 is similar to the structure in Italy, France or Germany.

Figure 36. Share of additional exports in total exports of the EU15 to V4 - breakdown by economic sector and selected exporting country
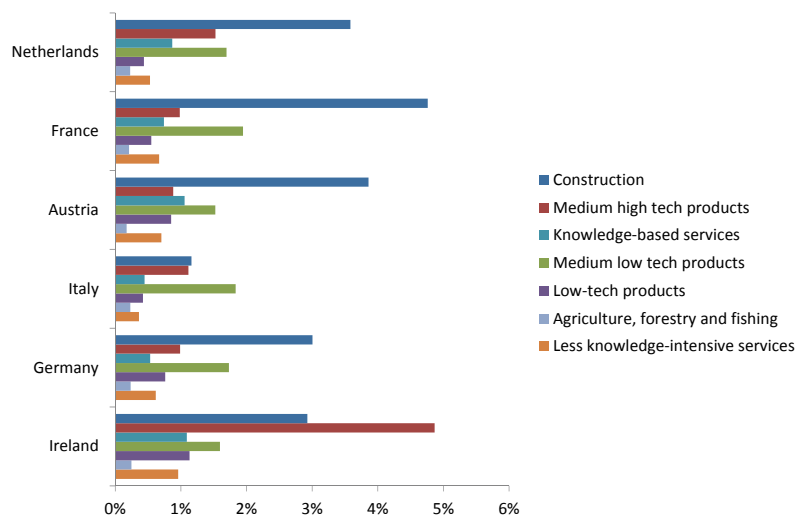
Source: IBS elaboration based on macroeconomic surveys and Eurostat data

2.3.5. Impact of additional exports on GDP and social cohesion in the EU15

The analysis of export growth obtained by the EU15 countries as a result of implementation of the Cohesion Policy in the V4 should be complemented by identification of important channels through which EU15 countries benefitted economically. One of the significant relationships is the impact of the growth of EU15 exports to the V4 on the GDP of individual EU15 countries.

Below, we analyse this relationship through indirect determination, i.e. through analysis of the effect of the EU15 benefits on GDP and employment. The development of enterprises is understood as the growth of production of companies in individual countries, reflected in the growth in GDP in individual countries. On the other hand, we also define the development of companies as their internal development – expansion through increased employment. Therefore in this section we show the effect of benefits to the EU15 on the GDP and employment in individual EU15 countries, and in consquence on the development potential of companies in the EU15.

Undoubtedly a relationship exists between exports and GDP, as exports are one of the components of GDP. However, the fact that exports are a component of GDP is a significant problem for researchers that try to determine the scale of their impact on GDP. In particular, the problem lies in the difficulty with identifying the direction of causality, i.e. the separation of the impact of GDP on exports from the reverse dependency. The researchers involved in analysing the impact of exports on economic growth are hence faced with a number of methodological problems that hamper the identification of the scale of this dependence (for more see Box 5).

Box 5. Determination of the impact of exports on GDP per capita - problems and proposed solutions

The problem of identifying the scale of the impact of exports on economic growth measured by GDP growth is mainly due to the problem of endogeneity in the volume of exports relative to GDP. This means that it is possible that other factors, which are often unobserved, affect both the volume of exports and the GDP of the country. Consequently, exports by countries whose GDP is higher for various other causes, may be greater than in poor countries (Frankel and Romer, 1999). The problem of endogeneity of exports relative to GDP enforces the use of relatively more sophisticated econometric methods of analysis than standard linear regression (ordinary least squares method) whose estimates would have been biased in this case.

Another problem with identifying the scale of this effect lies in the need for taking into account regulatory control and trade liberalisation. The omission of such characteristics would also lead to biased results.

However, the existing empirical economic literature consistently suggests that although the scale of the impact varies depending on the applied methodology, its direction is always the same (positive) (Giles and Williams, 2000).

Therefore, in order to determine the effect of additional EU15 exports on the GDP in these countries, we decided to rely on existing empirical studies including estimates of the marginal impact of exports on GDP. Among the numerous scientific articles investigating the impact of exports on GDP size, we chose four studies. The selection of papers was made on the basis of the methodology applied to solve the previously discussed methodological problems.

Figure 37 shows the estimates of the impact of Cohesion Policy-related additional EU15 exports to the V4 on GDP *per capita* in each EU15 country (i.e. due to increased demand in V4 as a result of the implementation of the Cohesion Policy).

According to the estimates, a growth in EU15 exports will lead to only a slight increase in GDP *per capita* in these countries. The results obtained in the four proposed estimates are similar and oscillate around 0.02-0.05 per cent growth in GDP *per capita.* It is important to note that the estimated impact is given as a total for 2004-2015. Therefore, the impact of additional exports on GDP *per capita* by individual years is negligible.

Figure 37. Estimates of the impact of additional exports to V4 countries, resulting from an increase in demand in these countries as a result of the implementation of the Cohesion Policy, on GDP per capita in 2004-2015
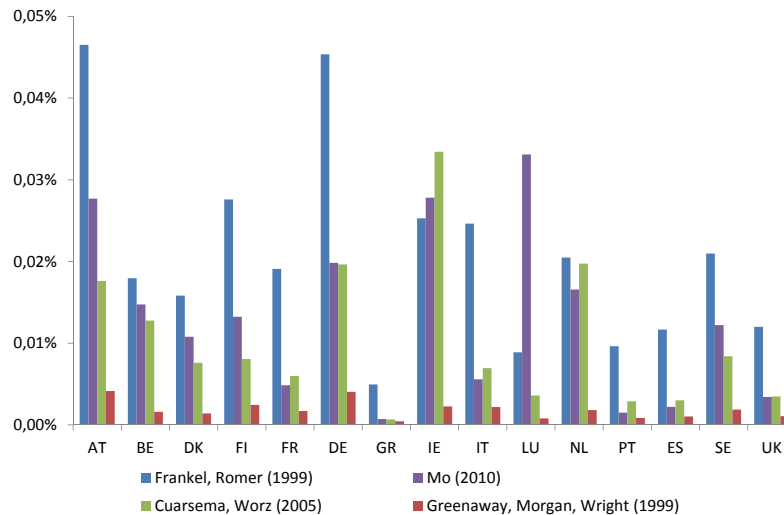
Source: IBS elaboration based on macroeconomic surveys and the marginal impact of exports on marginal GDP per capita according to: Jeffrey A. Frankel and David Romer, Does Trade Cause Growth? The American Economic Review, Vol. 89, No. 3, 1999; Pak Hung Mo, Trade Intensity, Net Export, and Economic Growth, Review of Development Economics, Vol.14, Issue 3, 2010; Jesús Crespo Cuaresma, Julia Wörz, On Export Composition and Growth, Review of World Economics, vol. 141(1), 2005; David Greenaway, Wyn Morgan, Peter Wright, Exports, export composition and growth, Journal of International Trade & Economic Development, vol. 8(1), 1999.

Although the estimated impact of additional exports on GDP *per capita,* considered a measure of economic development, is negligible, it is still a positive impact. So could the implementation of the Cohesion Policy in V4 have also had a positive impact on other macroeconomic aggregates? The aim of the Cohesion Policy is to reduce disparities in economic development of regions and to increase cohesion within EU. It is, therefore, worth looking at whether the implementation of the Cohesion Policy has had a positive effect on social cohesion of EU countries, and thus primarily on the quality of life, level of poverty and social inequality.

Based on *Eurostat* data, it can be concluded that in the analysed period (2004-2010) EU15 countries saw no significant changes in the level of income inequality (measured by Gini coefficient, see Figure 38). At the same time the risk of poverty among EU15 households slightly decreased - in 2004 the risk concerned 17 per cent of households and in 2010 was 16.3 per cent (it is worth noting, however, the lowest level of less than 16 per cent was in 2005).

Box 6. The Cohesion Policy and additional exports in the forecasts of macroeconomic models

Figures 38 and 39 show the impulse response functions of four basic macroeconomic variables in two large EU-15 economies - Germany and France. They represent the rate of variable change induced by shock, respectively foreign shock and public consumption shock, and are derived from general equilibrium models presented in the work of Bukowski, Kowal, Lewandowski (2011).

Figure 38 demonstrates, in accordance with the general result of real business cycle models, a positive foreign shock in both analysed countries,[9] which raises output, exports (as well as investment, consumption and import – omitted in the Figure). The shock also increases probability of finding a job by the unemployed and reduces the probability of redundancies (omitted), thereby increasing employment and wages and reducing unemployment. Some differences exist in terms of direct scale of response to such a shock to the economy and its sustainability - in Germany the direct impact is greater than in France, but expires sooner.

Figure 38. Reaction of GDP, exports, employment and unemployment rates to foreign shock in Germany (left panel) and France (right panel).
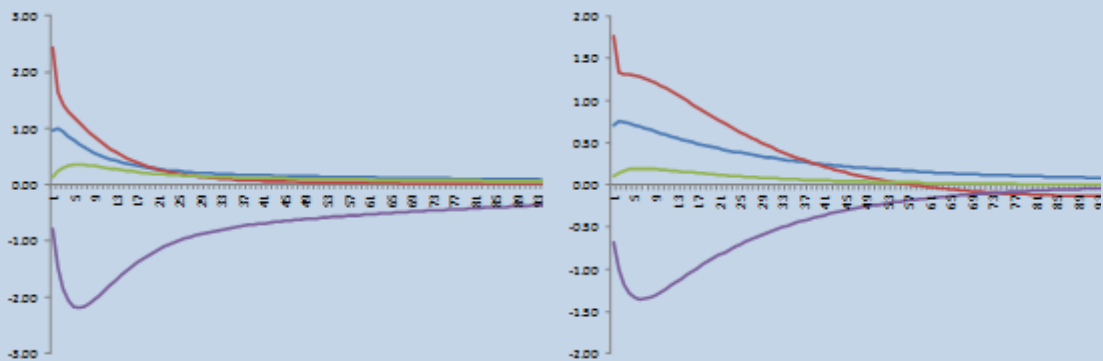
Figure 39. Reaction of GDP, exports, employment and unemployment rate to public consumption shock in Germany (left panel) and France (right panel).
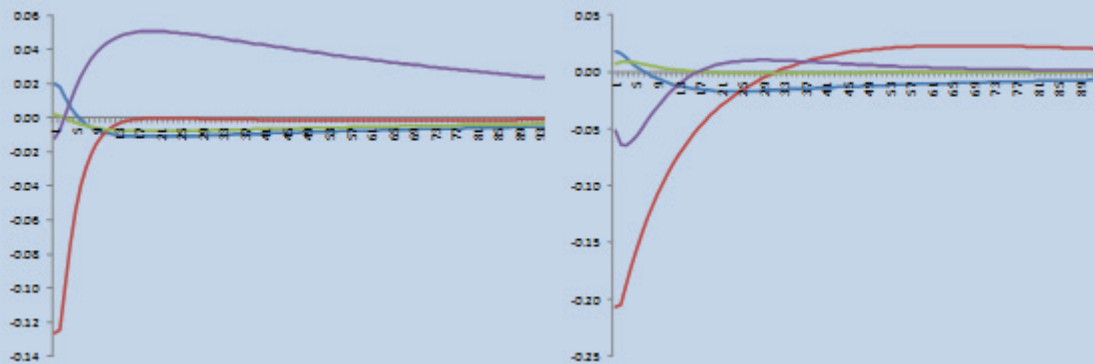
—GDP —Export —Employment rate —Unemployment rate

Source: Bukowski M., Kowal P., Lewandowski P., (2011), Model analysis of labour markets with different institutional structures, IBS (in Polish).

Figure 39 shows, however, that a per unit (positive) public consumption shock, financed by taxation or public debt (which is insignificant due to the Barro-Ricardo equivalence in the RBC models), has a smaller impact on both economies. In the short term, for 6-8 quarters, the shock leads to an increase in output and productivity, but also reduces exports and investment and private consumption (Figure omitted). Therefore, in the longer term its effect is reverse. The same applies to the situation in the labour market, which improves in several quarters after a positive shock of public consumption, but later employment falls and unemployment rises. In Germany, reversing the direction of the impact of

---

[9] And also on all the other countries examined by Bukowski, Kowal and Lewandowski (2011): the Czech Republic, Spain, Sweden, Poland, United Kingdom and United States.

> **public consumption shock occurs faster than in France.**
>
> **If, therefore, the Cohesion Policy implies positive foreign shocks in the EU15, one can expect in a few years time positive and visible effects on the economy (increase in GDP, exports and employment). But if it is financed by the governments of these countries, associated with higher taxes or debt, an increase in output will be accompanied by a negative adjustment of investment and domestic consumption (and exports), balancing the positive impact of the foreign shock. However, since the quantitative assessment of the coexistence of these two shocks in historical data is impossible based on available information, it is also impossible to assess which of these effects predominates.**

The main determinants of changes in poverty levels include changes in tax and social benefit systems (and the effectiveness as a tool of redistribution) and changes in the distribution of income from work, resulting primarily from increased (or decreased) participation in the labour market (OECD, 2007). Available scientific studies allow to conclude that the impact of the Cohesion Policy in the V4 on employment and labour productivity, as in the case of the impact on GDP *per capita,* is negligible. In addition, the Cohesion Policy implemented in the new Member States had no direct impact on tax and social benefit systems in the EU15. Therefore, the Cohesion Policy does not have a direct impact on poverty and social cohesion in the countries of Western Europe.

Figure 40. At-risk-of-poverty rate and Gini coefficient of income diversification in EU15, 2004-2010
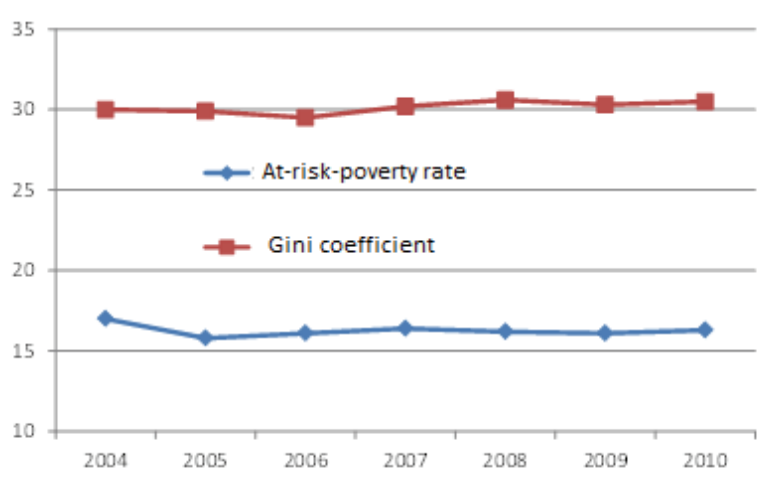
Notes: At-risk-of-poverty rate measured using a threshold of 60 per cent of median equivalent income.
Source: IBS elaboration based on Eurostat data

Moreover, it is worth mentioning the effect of the additional exports of EU15 on employment there. Empirical studies concerning the effect of trade on employment do not provide an unambiguous answer on the direction and scale of the examined dependence. Although intuitively the increase in demand and then in production should increase employment and wages, empirical studies show that this is not a common rule. The estimation of the marginal effect of increased export volume on employment show that this effect is insignificant and close to zero. In consequence, there is no clear empirical proof for any such correlation.

Taking into account the previous results of studies and estimations conducted in this research concerning additional EU15 exports induced by the implementation of the Cohesion Policy in the V4, one may conclude that this effect will be negligible in a macroeconomic scale. One should especially bear in mind the negligible effect observed in most empirical studies and the fact that the value of the additional exports of EU15 generated by the Cohesion Policy implementation is small compared to the total value of exports of these countries.

Figure 41. Estimation of the effect of additional exports to V4 resulting from the implementation of the Cohesion Policy on the labour productivity in 2004-2015
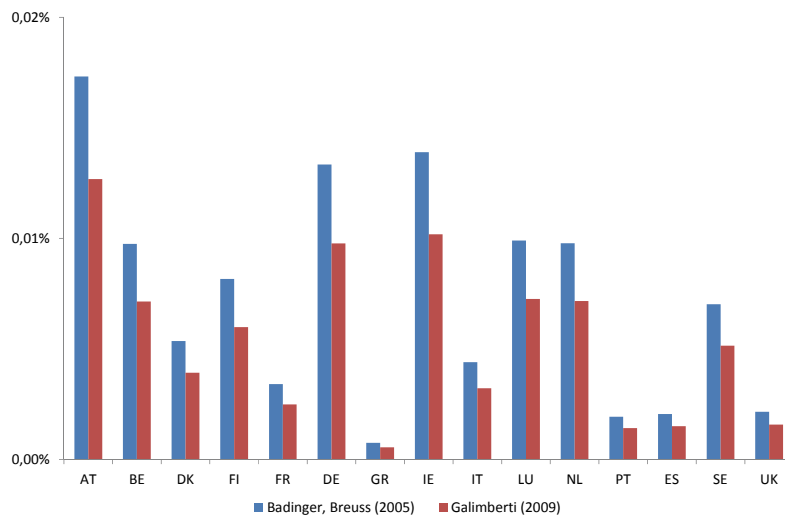
Source: IBS elaboration based on the results of: Harald Badinger, Fritz Breuss, 2008, Trade and productivity: an industry perspective, Empirica, Vol. 35(2), 2008; Jaqueson K Galimberti, Conditioned Export-Led Growth Hypothesis: A Panel Threshold Regressions Approach, MPRA Paper 13417, 2009

On the other hand, one should remember that increased exports may lead not only to changes in employment but also to increased productivity of input factors. This hypothesis has been confirmed in empirical literature; Felbermayr, Prat & Schmerer (2009), Badinger & Breuss (2008), Galimberti (2009) all agree that increased exports lead to higher labour productivity.

The Figure presents the estimation of the impact of additional exports on labour productivity, based on two selected reports. The obtained effect of additional exports on labour productivity, similar to the effect on GDP per capita, is negligible and ranges from 0.002 per cent to 0.02 per cent (depending on the assumed marginal estimation of the effect and the country).

2.3.6. Macroeconomic benefits – summary

In this subsection we discuss the indirect benefits to the EU15, defined as additional EU15 exports due to the increased demand for goods and services resulting from the implementation of the Cohesion Policy in the V4.

Our calculations lead to the following conclusions:

1. The impact of the Cohesion Policy in the V4 has a positive effect on the volume of exports of EU15: the value of the estimated additional exports in 2004-2010 is EUR 15.53 billion, for 2004-2015 EUR 74.69 billion;

2. Benefits obtained by the EU15 countries resulting from the Cohesion Policy do reduce the costs of implementation: the ratio of total benefits for the EU15 to net contributions of the EU15 to the EU budget (the share used for the implementation of the Cohesion Policy in the V4) is 61 per cent on average. This result may be interpreted as each net euro invested by the EU15 in implementation of the Cohesion Policy in the V4 results in additional EU15 exports worth 61 cents;

3. The macroeconomic benefits that have been observed so far constitute only 20 per cent of the total expected macroeconomic benefits to the EU15;

4. Benefits to the EU15 resulting from the implementation of the Cohesion Policy in the V4 are mainly a consequence of increased demand in Poland: the value of additional exports to Poland is EUR 42.62 billion, compared to EUR 14.57 billion, EUR 12.43 billion, and EUR 4.87 billion for the Czech Republic, Hungary and Slovakia, respectively;

5. The share of additional exports in total exports of the EU15 is characterised by a strongly assymetrical distribution in time. In 2004-2009 the average share of estimated additional exports in total exports is only 1.07 per cent. However, according to estimates starting from 2010, this will gradually increase up to as much as 6.5 per cent (in 2013).

6. The greatest macroeconomic benefits resulting from the increased demand for goods and services from the EU15 will be obtained by Germany, followed by other main V4

trade partners: Italy, France and the Netherlands.

7. In the case of Hungary and Slovakia, the share of additional exports from Austria is relatively higher than for Poland and Czech Republic, which results from the trade structure in V4;

8. The sectoral structure of additional exports indicates that countries in which the additional exports to V4 are the greatest, exports are mainly medium-high tech products. The Cohesion Policy in V4 thus indirectly influences the development of the high-tech sector;

9. The sectoral structure of additional exports is rather similar across V4. One notable difference is the higher share of high-tech products in additional exports to Poland;

10. Taking into account the structure of total exports of EU15 to V4, we may observe a significant role of the construction sector in the total value of additional exports of EU15;

11. Macroeconomic benefits only slightly positively influence the GDP per capita in EU15. Similarly, the effect on social cohesion in EU15, poverty level and employment seem to be negligible.

In conclusion, we observe considerable indirect benefits of EU15 countries resulting from implementation of the Cohesion Policy in the V4, both in absolute terms and relative terms. Moreover, the benefits to the EU15 from implementation of the Cohesion Policy in the V4, in the form of increased volume of exports, substantially reduce costs incurred in relation to implementation of the regional policy. Indirect benefits, although observed only a few years after the commencement of funding, are therefore an important channel of integration of the EU through increasing trade that fosters the development of individual countries and all Member States.

2.4. Direct benefits

In this section we present a synthesis of results of a microeconomic study, the aim of which is determination of the direct benefits obtained by the EU15 resulting from implementation of the Cohesion Policy in the V4. These benefits have been estimated based on Computer Assisted Web Interviews (CAWI) conducted on a sample of recipients involved in projects financed under the current financial perspective in the V4. The results presented in this section concern only the current perspective, which means that – except when we explicitly state otherwise – all data and comparisons concern 2007-2015.[10]

---

[10] The choice of projects in the currect financial perspective is caused by a number of factors. First, in this way we could obtain new information, complementary in relation to an analogous research for Poland in 2008 and 2009 (see IBS., 2009 and 2010). Second, a survey on currect or only recently completed projects gives greater chances for up-to-date data. If the questionnaires were sent to the beneficiaries of the previous perspective, the respondents would have had to spend a lot of time searching data in their archives. Finally, the funds in the current perspective are significantly higher than in the previous one. Therefore, even with a similar coverage, we were able to analyse a greater flow of funds under the Cohesion Policy.

Benefits related to obtained contracts	Benefits related to the ownership of capital	Direct benefits
• Firms from UE15 involved in the realisation of projects in V4 • Remuneration of contractors and suppliers from EU15	• Firms with majority foreign capital • Subsidiaries of firms from UE15 • Dividends and transfers to foreign owners	• are part of macroeconomic benefits
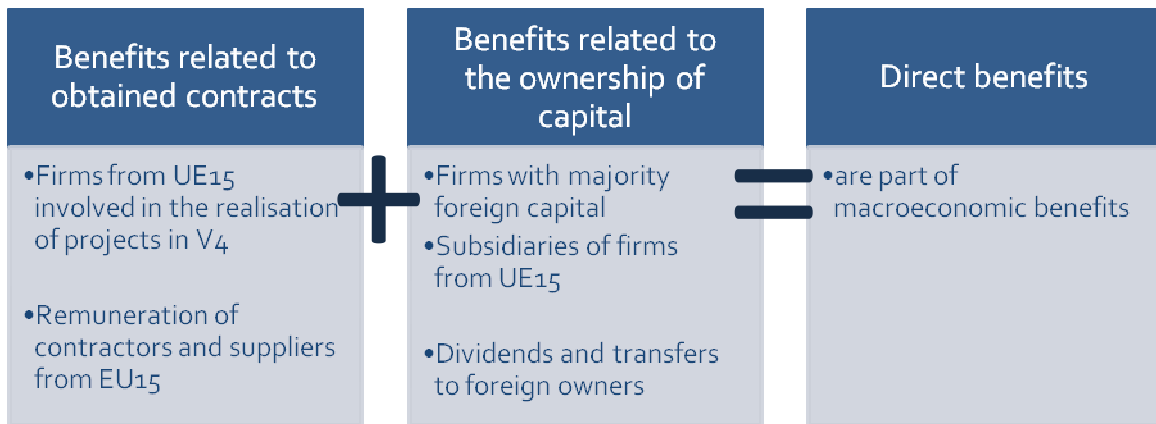
Direct benefits are defined as those benefits to the EU15 resulting from implementation of the Cohesion Policy in the V4 that occur due to the involvement of EU15 companies in projects financed by the EU. These are benefits directly obtained by EU15 companies. It must be stated that the increase in the number and hence the value of orders for goods and services from the EU15 will positively influence the development of companies that are given contracts related to EU-financed projects.

Direct benefits are twofold. On one hand, they result from the direct participation of companies with headquarters in the EU15 in projects in V4 countries, as the contractors (e.g. in construction sector) and suppliers (e.g. of machinery and specialised equipment). Direct benefits are hence the companies' fees for the goods delivered and services performed, regardless of how they are distributed by the company. These benefits are estimated at approximately EUR 7.38 billion (in fixed 2005 prices) over the years 2007-2015. On the other hand, direct benefits should also be associated with direct capital links that exist between companies with their headquarters in the EU15, and their daughter-companies and subsidiaries, whose headquarters are located in the countries of the Visegrad Group. The remuneration of the contractor (supplier) goes to EU15 countries only in part, in the form of dividends and other income related to the ownership of capital, so these benefits are highly dependent on how the participation in projects financed under the Cohesion Policy translates into corporate profits. The estimated size of benefits achieved by EU15 countries through the capital channel is EUR 812.87 million in total for 2007-2015.

Furthermore, it should be noted that from a macroeconomic point of view, the benefits related to the ownership of capital are cash flows that are analogous to those that accompany importation of goods and services from the EU15 to the Visegrad Group. In the current account of the EU15 direct benefits are therefore recorded as receivables. In both cases, the cash flow helps to increase the output of EU15 countries.

The presentation of the results of the microeconomic surveys, due to the diverse range of subjects, is divided into two parts. Firstly, we consider the role played by contractors and suppliers in the implementation of the Cohesion Policy in the Visegrad countries. This section applies in particular to the role of contractors and suppliers from the EU15. Secondly, we present direct benefits achieved by these countries in a geographic arrangement. Thirdly, we make a sectoral analysis of direct benefits in order to determine which tasks are usually performed by EU15 companies and their V4 subsidiaries. The research includes microeconomic in-depth case studies, providing detailed information on selected elements of the Cohesion Policy in the V4 where EU15 contractors play a significant role. There are eight case studies: four for Poland, two for Hungary and one each for the Czech Republic and Slovakia.

Box 7.Methodology of the CAWI survey

The purpose of the CAWI survey is to gather information on the structure of expenditures incurred by the beneficiaries of the Cohesion Policy in the V4, with particular emphasis on financial resources spent on external contractors and suppliers. An Internet survey link was therefore sent to all beneficiaries of EU funds in V4 countries that we were able to contact. Respondents were asked to provide detailed information on the main contractors, including: the size of remuneration, headquarters, country of origin of the dominant capital (if the firm is located in the same country as the beneficiary), performed tasks, and years in which payments were made to the contractor. Questions about the tasks undertaken were designed in such a way as the responses corresponded to NACE classification of economic activities. In this way, we obtained critical information for the study, i.e. the value of contracts, the country of origin and the characteristics of the economic activity.

The success of the survey is closely linked with the availability of contacting beneficiaries in the V4. Due to the numerous data gaps in the databases provided by the institutions implementing and managing operational programs in the four countries, the study has not been carried out on a full sample. In Poland, the survey was distributed to all beneficiaries of national programmes for which we obtained contact details, and to beneficiaries of three regional programmes (Mazovia, Podlasie and Wielkopolska) selected as representative of all regional programmes. In the case of Slovakia and Hungary the questionnaires were sent to beneficiaries of all national and regional programmes. And in the case of the Czech Republic the survey was only possible for the fourth priority axis of the operational programme _Human Resources and Employment_ financed by the European Social Fund. Direct benefits for the remaining operational programmes in the Czech Republic were estimated from results of a study on the current financial perspective for Poland and results for the previous perspective, which were obtained in a study similar to this Report [see IBS 2009 and 2010].
Among the distributed 59 thousand questionnaires, some of which involved several projects at the same time, we received 14 thousand completed surveys, covering in total 12 per cent of the total allocation of the Cohesion Policy in V4 countries in the current financial perspective. For Poland the coverage was 21% and can be regarded as sufficient for drawing conclusions for the entire Cohesion Policy in this country. For other countries the sample realisation was generally lower and showed a high variability, and therefore for programmes and priority axes for which we received too few questionnaires and on too small a portion of the budgets, direct benefits for EU15 countries were based on the results of surveys for Poland. A detailed methodology of imputation, as well as other actions undertaken to achieve the best possible representativeness is presented in the methodological Annex to this Report.

This chapter will cover the following topics:

1. What part of the expenses incurred by the beneficiaries of the projects financed under the Cohesion Policy was sent to foreign companies and, in particular, to the companies from EU15?

2. What was the value of benefits for the EU15 countries associated with capital links with domestic firms - contractors and suppliers in EU projects?

3. What is the role of foreign capital in the implementation of projects co-financed by EU funds?

4. What tasks are usually performed by contractors and suppliers from EU15?

5. What are the tasks carried out by local contractors owned by companies from EU15?

6. What goods were provided by contractors from EU15 and what was their level of technological advancement?

2.4.1. The role of suppliers and contractors in the implementation of projects financed under the Cohesion Policy

The implementation of the Cohesion Policy is difficult to imagine without external contractors and suppliers. The recipients of assistance usually are not individually capable of implementation of the financed projects (which are usually one-off) and hence they need to hire an external entity specialised in specific tasks or having the technical means and knowledge necessary for producing or supplying the necessary products and services. For example, government and local government agencies that organise infrastructural projects do not have their own construction equipment or engineers. In the case of direct assistance for companies, hiring an external partner to provide technologically advanced products and know-how is a *sine qua non* condition of project implementation.

The results of the internet interview showed that the remuneration of contractors and suppliers of goods and services amounted on average to 53 per cent of the project finances under the Cohesion Policy. Their role naturally depends on the type of the project (see the Figure below). As expected, it is relatively the greatest in infrastructural projects where the contractor remuneration ranges on average from 60 per cent to 80 per cent(the highest levels were for transport infrastructure). The remuneration to suppliers and contractors are relatively lower in investment aiming to minimise the influence of people on the environment. External contractors played the relatively smallest role in programmes of direct assistance to business.

Although the role of the contractors and suppliers in the implementation of the Cohesion Policy is very significant, it must be remembered that in the vast majority of cases the contracts are given to national companies. As indicated by the CAWI, in all the four Visegrad countries, the recipients usually hired mostly domestic suppliers and contractors, and the share of companies from the EU15 (and from other European and non-European companies)

was relatively low. In Poland, contractors from the EU15 accounted for about 3 per cent of all spending on projects and 6.6 per cent of all the money given to suppliers and contractors. The analogous indicators in the remaining V4 countries were similar. In total, foreign contractors will have received more than EUR 7.38 billion over the entire period 2007-2013.

Figure 42. Remuneration for the contractors of individual operational programmes by the location of company headquarters
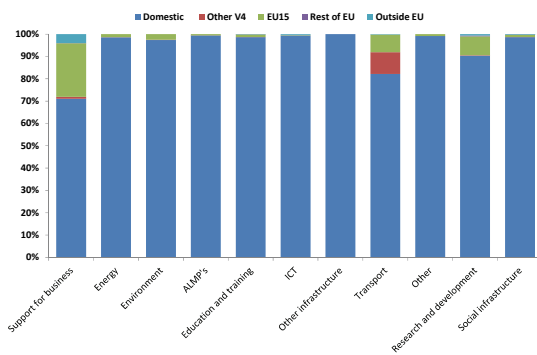
Figure 43**. Remuneration of contractors of individual operational programmes by the country of origin of the dominating capital in the company**
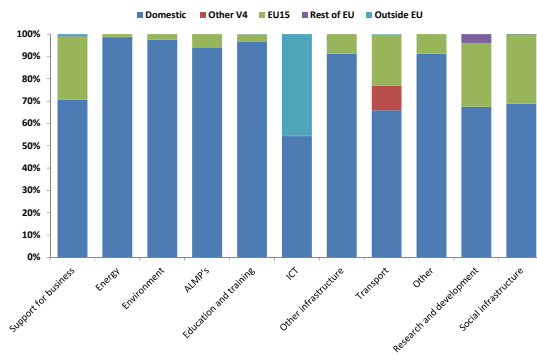
Notes: The Figures concern only operational programmes in the V4 for which we obtained a sufficient amount of data in the microeconomic survey, and therefore does not include imputation and is not representative for the entire Cohesion Policy in the V4 in the current financial perspective.
For Poland, the data concerned all the national and regional operational programmes for the following voivodeships (regions): Mazowieckie, Podlaskie and Wielkopolskie. For Slovakia, data cover the following programmes: : OP Bratislava, OP Competitiveness and Economic Growth, OP Education, OP Employment and Social Inclusion, OP Environment, OP Health and Regional Operational Programme. For Hungary, we included the following operational programmes: AROP, DAOP, DDOP, EAOP, GOP (partial), KDOP, KEOP (partial), KMOP, NYDOP and TIOP. The details of the thematic classification of the Cohesion Policy are included in the methodological appendix.
Source: IBS elaboration based on the results of the microeconomic survey

On the other hand, a significantly higher flow of financial resources is directed to companies that have a majority owner in one of the EU15 countries. It is estimated that companies with foreign capital in 2007-2015 will have received EUR 13.8 billion for goods and services. According to our methodological assumptions, only a small part of this sum can be considered a direct benefit to the EU15.

Table 3. Direct benefits obtained by EU15 resulting from the implementation of the Cohesion Policy in V4 in 2007-2013 (in EUR million from 2005)

Country	Total direct benefits	Benefits related to obtained contracts	Benefits related to the ownership of capital
Austria	774.26	654.71	119.55
Belgium	35.62	32.78	2.84

Denmark	50.17	50.11	0.06
Finland	4.20	3.49	0.70
France	752.83	601.34	151.49
Germany	4 275.78	4 129.43	146.35
Greece	51.23	0.40	50.83
Ireland	637.09	435.05	202.04
Italy	231.11	224.33	6.77
Luxembourg	4.37	4.37	-
Netherlands	108.87	78.26	30.61
Portugal	144.93	144.93	-
Spain	1 394.28	956.59	437.70
Sweden	113.72	18.26	95.46
United Kingdom	63.44	54.08	9.36
EU15	8 641.89	7 388.13	1 253.76

*Notes: * - according to Eurostat data, companies with Portuguese capital that operate in EU15 show a significant loss when compared to turnover. Hence the estimates of CAPITAL benefits for this country are negative.*

Source: IBS elaboration based on microeconomic surveys.

2.4.2. Estimates of benefits obtained by the EU15

It is estimated that the direct benefits to the EU15 resulting from the implementation of the Cohesion Policy in the V4 will have amounted to almost EUR 8.7 billion (in fixed prices of 2005) in 2007-2015, with the vast majority in 2011-2015. Hence despite the significantly higher share of companies with foreign capital in the total financial resources transferred to contractors and suppliers, the EU15 will receive less than 1/12 of these remunerations through this channel. Remunerations to foreign companies are much more significant for direct benefits to the EU15.

Naturally, the structure of direct benefits shows considerable fluctuations depending on the target country. At one extremity we have countries where the 'capital' channel of the influence of the Cohesion Policy in the V4 is relatively more important than for the entire EU15

on average. This group includes Greece, Sweden, France and Ireland.[11] There are, however, also countries with relatively less significant capital ties with the V4, such as Germany, Italy, Denmark and Portugal.

Among the EU15 a distinct majority of contracts (in terms of the number and value of contracts) have been granted to companies with headquarters in Germany (56 per cent of value). This comes as no surprise as the trade and capital ties between Germany and the V4 countries are very strong - Germany is the greatest trade partner for the V4. Spain's benefits come second thanks to the strong presence of Spanish construction companies in Central European markets.[12]

A significant part of the remuneration for contractors and suppliers from the EU15 has also gone to French and Austrian companies (8 per cent and 9 per cent respectively), which again is associated with the intensity of trade between these countries and the V4, and with the size of these economies. The high share of Irish companies is surprising, which according to the results of our CAWI survey can be entirely ascribed to the presence of Irish construction companies in the Polish market.[13]
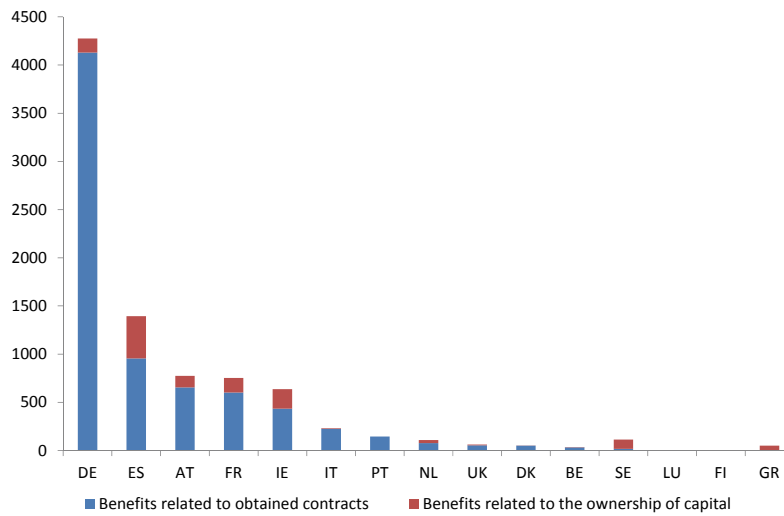
Figure 44. Direct benefits resulting from the implementation of the Cohesion Policy in V4 (in EUR million from 2005)

---

[11] In the case of Greece this results from the fact that in the sample we identified only one and relatviely small contract with a contractor based in that country, whereas in V4 countries there are subsidiaries of Greek construction companies that are involved in the implementation of projects financed by European Funds.

[12] It is worth having a look at the case study on the Measure 6.2 of the Polish Operational Programme Infrastructure and Environment.

[13] Irish companies (SIAC Construction and SRB Civil Engineering) have received a number of large contracts for road construction projects in Poland, e.g. sections of the highway A1 between Łódź and Toruń and one of two sections of the highway A4 from Tarnów to Rzeszów.

Source: own elaboration based on the microeconomic survey.

Direct benefits resulting from the existence of capital ties between EU15 companies and the V4 are much more evenly distributed across the EU15. The greatest share can be observed for Spanish companies (34 per cent)[14], the flows of funds getting to France, Austria, Ireland and Germany, although smaller (10 per cent – 15 per cent) are still significant. In many cases, as can be concluded, the presence of capital ties to a certain extent compensate for the greater geographical distance and relatively poor trade ties.

While discussing why the structure of capital benefits deviates from the structure of contracts obtained by foreign companies, we must point out differences between individual countries in terms of tasks performed by companies with headquarters or capital ties in the EU15.

---

[14] Which is related mainly with the strong presence of the Spanish capital in the construction companies in the region, especially in Poland.

Figure 45. Direct benefits resulting from the implementation of the Cohesion Policy in V4 by country (remuneration of contractors from EU15).
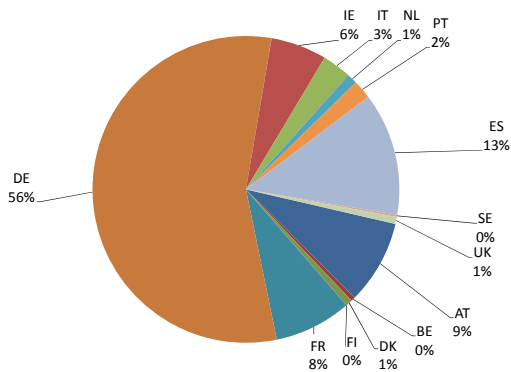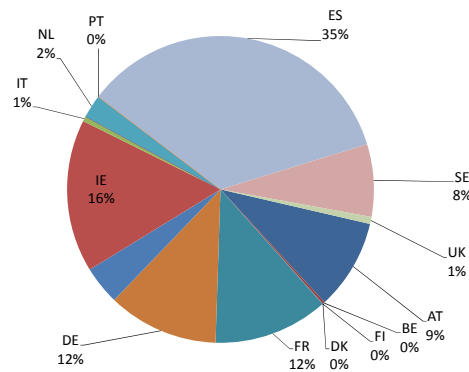
Figure 46. Direct benefits resulting from the implementation of the Cohesion Policy in V4 by country (capital channel).

Source: IBS elaboration based on microeconomic surveys

2.4.3. Direct benefits obtained by the EU15 – sectoral approach

Direct benefits for the EU15, regardless of the channel through which they reach EU15 companies, are dominated by two categories of tasks: construction services and supplying medium - high tech products. It is estimated that in the case of contracts with EU15 companies, construction services will amount to 44 per cent of all resources spent in the entire examined period. It is also projected that another 44 per cent will be spent on high and medium-high tech products.

Observation of the resources flowing to the EU15 through the capital channel gives similar conclusions (see the Figures below). A relatively greater role can be observed for services based on knowledge (mainly business and specialist services). These differences are associated with differences in marginal profits across sectors. As indicated by Eurostat, margins in services are usually higher than in the manufacturing sectors.

Figure 47. Sectoral structure of contract-related benefits obtained by EU15 resulting from the implementation of the Cohesion Policy in V4
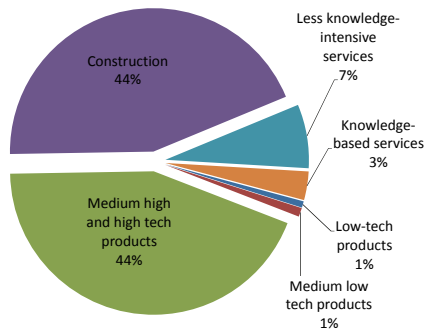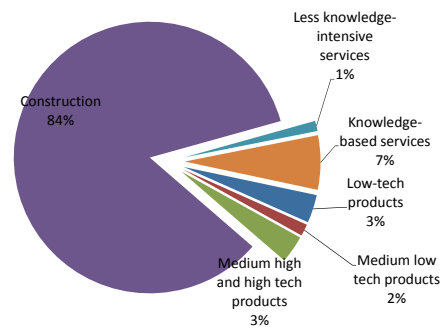
Figure 48. Sectoral structure of capital-related benefits obtained by EU15 resulting from the implementation of the Cohesion Policy in V4
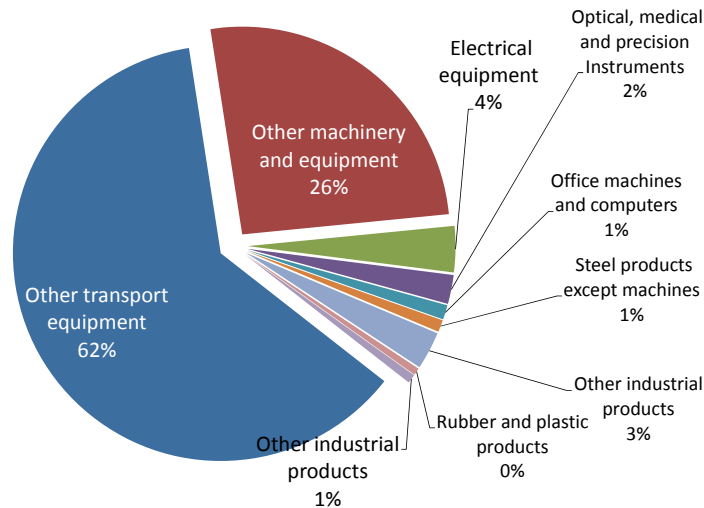
Source: IBS elaboration based on the results of the microeconomic study

The implementation of the Cohesion Policy in the V4 will be accompanied by a great range of technologically advanced products supplied by EU15 contractors. The greatest share is projected for transportation equipment, accounting for almost 60 per cent of the products supplied by EU15 companies. Such a large share of transportation equipment (this category includes trains and trams) results mostly from the large scale of modernisation in theV4 in this area.

The purchase of the transportation equipment occurs both under national programmes (such as OP Infrastructure and Environment), and within regional programmes (especially in Poland and Hungary). Machinery and electrical equipment also constitute a significant part of goods provided by EU15 suppliers– items such as engines, white goods, computers, specialised and precision equipment, as well as optical and medical equipment.

Importantly, EU15 contractors have supplied practically no low-processed goods (such as fossil fuels and agricultural products) and low and medium-low tech products. A slightly higher shares of these products were supplied by domestic companies with the majority capital owned by EU15 companies, but the general proportion of such products remains low. It seems that the demand for low-processed products that is generated by European funds is almost entirely satisfied by domestic companies, probably due to their comparative advantages in these areas.

Figure 49. Structure of products supplied by EU15 contractors within projects financed by European funds (by the value of remuneration)


Optical, medical and precision Instruments 2%

Electrical equipment 4%

Other machinery and equipment 26%

Office machines and computers 1%

Steel products except machines 1%

Other transport equipment 62%

Other industrial products 3%

Rubber and plastic products 0%

Other industrial products 1%

Source: IBS elaboration based on the results of a microeconomic survey

This suggests that in the case of direct benefits, the most crucial advantage that EU15 companies may offer is their ability to manufacture technologically advanced machines, equipment and other goods, which would be difficult to find in V4 domestic markets (at an appropriate price and quality), due to differences in development, structure of economy, and input factors. On the other hand, the implementation of the wide ranging infrastructure development projects in the Visegrad Group countries naturally attracts experienced EU15 contractors, where transport networks (especially roads) are basically complete and the possibility of obtaining contracts is much smaller.

A comparison of the sectoral structure of contractors from individual EU15 countries shows a correlation between the geographical proximity (and hence the intensity of trade ties) of EU15 countries and the sectoral structure. The smaller the distance of a given country from the V4 and the greater its share in the foreign trade in these countries, the greater the role of processed goods in exports of this country to V4, especially high-tech products.

A second correlation is that EU15 countries with a lower share in the foreign trade with the V4 providing services play a more important role. For example, companies from the UK, Ireland, Spain and Portugal have been involved mainly in projects as providers of construction services and specialised services, e.g. consulting and engineering. On the other hand, a vast majority of goods sold to the recipients of the Cohesion Policy in the V4 come from Germany, Austria and Italy.

Figure 50. Sectoral structure of direct benefits (contractors and suppliers from EU15) by country of origin
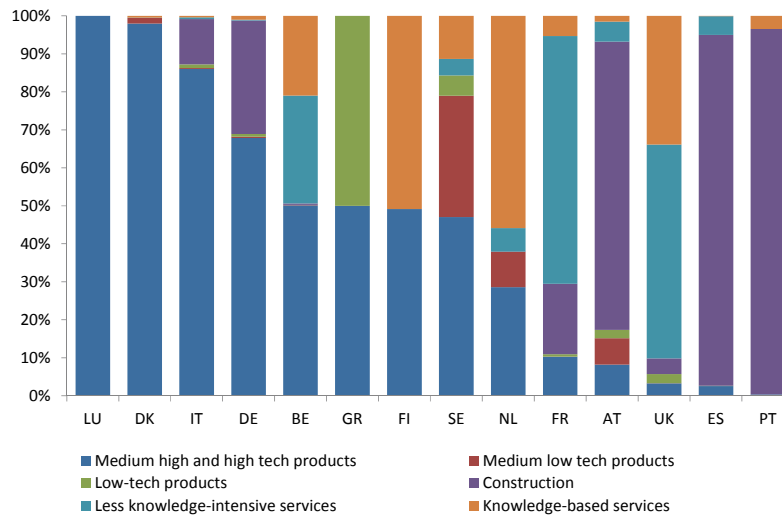
Source: IBS elaboration based on the results of microeconomic surveys

2.4.4. Summary of case studies

Based on the analysis of the presented case studies, we may observe that most EU15 companies have been involved in the implementation of transportation projects, energy projects and those related to investments in companies.

Transportation projects

Many of the transportation projects belong to the group of largest projects. In the current perspective in Poland, the group of 100 largest projects includes more than 30 investments in transportation infrastructure. A similar share can be observed for infrastructural projects in the remaining V4 countries.

The implementation of such projects is very expensive and usually involves a high number of contractors. Based on the analysed cases and the review of CAWI questionnaires sent to the beneficiaries of the largest projects, it can be observed that large transportation investments are very often realised by consortiums and groups consisting of companies from various countries.

Analysis of projects from Measure 6.1 (OP Infrastructure and Environment) from Poland and Measure 2.1 (OP Transport) from the Czech Republic confirms that within road network projects contractors were involved in a very wide range of tasks. Their contracts included for example, construction services, supply of materials and machinery, as well as engineering and designing. A significant part of these contracts concerned companies from the EU15 (in Poland it was 42 per cent of the value of these contracts).

Many of these companies have been operating in the European and global markets for many years. Long experience is their advantage in relation to young companies from Central and Eastern Europe. Frequently, smaller companies from the V4 do not have sufficient capital or equipment to individually perform large transportation projects. That is why they create consortiums with foreign companies, e.g. from EU15. At the same time, for EU15 companies creating consortiums is a very effective way of entering new markets.

Benefits obtained by the EU15 resulting from the implementation of transportation projects in the V4 include the increase in the number of contracts concluded by EU15 companies, which results in an increase in exports. Moreover, development of the TEN-T, the objective for these projects, will enhance transportation links between the EU15, V4 and other significant trade partners of the EU15. It will contribute to a decrease in the time of travel, and increase safety on roads. It means that in fact all EU citizen will benefits from these projects.[15]

Support for business innovation
Support for innovation is another area that has involved a number of contractors from the EU15. In our case studies, we analysed three similar activities realised in Poland, Slovakia and Hungary. For Poland it was Measure 4.4 (*New investments of high innovative potential*) (OP Innovative Economy). The share of contractors from the EU15 in this Measure was 31 per cent. In the case of Measure 2.1 (*Development and Modernisation of Companies Based on New Technologies*) (OP Economic Growth) in Hungary, this percentage was 15 per cent. For Slovakia, we analysed Measure 1.1 (*Innovation and technological transfers*) (OP Competitiveness and Economic Growth), where this share was 4 per cent.

In the case of the three aforementioned Measures we can observe large similarities in the structure of contracts for EU15 contractors, usually concerning the supply of machinery and equipment, e.g. non-electric engines, compressors, mechanical tools, ovens, cranes. In Poland, they provided 20 per cent of machinery and equipment, in Slovakia 3 per cent and in Hungary 22 per cent. Among the contractors German companies are most frequent – 28 per cent of orders for EU15 contractors in Poland and 6 per cent in Hungary. Other frequent contractors include companies from Austria, Italy and the UK.

EU15 countries spend a higher proportion of GDP on R&D than the V4 to enhance the emergence of new and more advanced technologies in those countries. Furthermore, this translates into a higher share of high-tech sectors in those economies and a higher level of business innovation. Thanks to the large supply of advanced technological solutions, EU15 countries are very involved in the implementation of projects meant to support business innovation. Increased demand from the V4 results in higher exports from Western Europe.

The introduction of new technologies consists of the purchase of equipment and machinery, as well as licenses, patents and permits. A large proportion of equipment requires systematic maintenance and the updating of licences and permits. This means that benefits obtained by

---

[15] See section 3.3, on the external effects of the implementation of the Cohesion Policy in V4 countries, in the field of transport.

EU15 countries may be felt even in a later period. Often, new technologies create demand for new services which may be rendered by companies from Western Europe, additionally increasing the obtained benefits.

Another issue discussed in this Report is the support of R&D centres, through investment in specialised equipment. We present an analysis of Measure 2.1 from OP Innovative Economy in Poland. These projects involved contractors from the EU15 who received 21 per cent of the remunerations. International cooperation is a significant element in the organisation of research centres. It is not limited to sharing experiences, but is based on obtaining new tools, technologies and equipment. Hence one can expect a large number of contracts for foreign contractors related to the construction and supply of equipment to research centres and institutions.

Energy and renewables

Investment in renewable energy is an area with a large share of EU15contractors. For Poland we presented a study case for Measure 3.1 in the Wielkopolska Regional Operational Programme, and Measure 4.1 for Hungary (OP Environment and Energy). In Hungary, EU15 contractors received 24 per cent of remuneration, and in Poland 91.54 per cent. German companies were dominant among the contractors.

The development of renewable energy, thanks largely to the active role of the state, was started in the EU15 much earlier than in the V4. Thanks to this evolution, EU15 countries could develop effective and modern solutions for obtaining and using renewable energy, and thanks to the economies of scale they could establish a significant and dynamic sector of renewable energy. This is the reason for the large number of EU15 contractors – their number facilitates competition among them, including a decrease in prices.

Apart from benefits associated with the direct sale of machinery, equipment, technologies or patents, one should also mention other aspects of these projects. A greater use of the renewable energy in the V4 should decrease the emission of harmful gases and other substances into the atmosphere. The benefit would be global in nature, and the improvement in the state of the environment in the V4 would also benefit neighbouring countries (e.g. Austria, Germany).

Summary

To sum up, based on the presented case studies, one can observe that Measures concerning the same area have a similar structure of orders for contractors in individual V4 countries. The implementation of the Cohesion Policy in the V4 increases the imports of goods and services from the EU15. The increase in demand for these goods and services can be long-term. The emergence of new solutions and technologies in the markets can stimulate demand for new services and goods. It must be emphasised that companies from the EU15 may build their image and prestige in the V4 thanks to their involvement in large projects. This can improve their perception in the V4 and in consequence the demand for their goods and services.

Finally, there are also external effects such as a decrease in environmental pollution and improved transport networks.

2.4.5. Direct benefits - summary

In this sub-section we discussed direct benefits of EU15, resulting from the implementation of the Cohesion Policy in V4. Direct benefits were defined as resulting from the participation of firms from the EU15 in projects realised in V4. The benefits include remuneration of contractors and suppliers from the EU15 and this part of remuneration of domestic contractors with majority foreign capital which is transferred to EU15 in the form of dividends and other income.

Based on our calculations, we made the following conclusions:

1. The implementation of the Cohesion Policy and its various projects would not be possible without the participation of external contractors and suppliers of goods and services. These are in the vast majority V4 domestic companies. The total value of direct benefits to EU15 companies is estimated to be EUR 8.64 billion. Remunerations of contractors from the EU15 (i.e direct benefits resulting from obtained contracts) are a considerable part of all remuneration to contractors and suppliers (EUR 7.38 billion).

2. As expected, among the EU15 countries, the greatest part of expenditure is transferred to German contractors. Distinctly smaller role was played by contractors from Spain, Austria, France and Ireland.

3. Benefits related to the ownership of capital have a slightly different geopgraphical distribution. The greatest flows went to Spanish companies, which can almost entirely be attributed to the strong presence of Spanish capital in construction companies in the V4 countries. Also Irish, German, French, Austrian and Swedish companies had a considerable share in capital-related benefits.

4. Companies from the EU15 and their subsidiaries were most granted contracts related to: construction and supply of high-tech products. These orders accountr for 88 per cent of all payments received by contractors from EU15 and 87 per cent of all profits related to the ownership of capital.

5. Case studies confirmed a considerable role of the aforementioned fields of activity

among EU15 companies and helped identify specific areas where these companies are particularly active:

a. Companies from the EU15 are very much interested in the infrastructural projects in the V4. Their presence is either direct or indirect (when the construction is peformed by their subsidiaries). Due to the large numbe of such projects, V4 are a very attractive market for Western European construction companies. On the other hand, EU15 companies have necessary knowledge and know-how, specialised equipment and qualified staff.

b. Companies from the EU15 appear to be the most competitive suppliers of goods and products that require a high level of technological advancement, high labour productivity or narrow specialisation. Projects under the Cohesion Policy with the great role of suppliers from EU15 include for example modernisation of firms in the V4 or the development of the energy sectors based on renewables.

3. Evaluation of external effects

3.1. The positive impact on innovation in the EU15

3.1.1. Support from EU funds

In each of the Visegrad countries there is at least one operational programme that explicitly supports widely understood research and development, for example in Poland, OP Innovative Economy, OP Research and Development for Innovation in the Czech Republic. At the same time, these programmes also typically fund other activities (e.g. business support institutions), while the sphere of R&D also receives funds from other programmes, such as regional ones.

Table 4 shows the indicative breakdown of funds transferred in 2009-2010 to the Visegrad countries on R&D and innovation activities of companies.[16]

The latter category also includes sums that are simply business investment spending on new technologies. Therefore, the second column excludes these expenses and shows the funding of R&D activities in a stricter sense. For comparison, the third column shows the total expenditure V4 countries on research and development according to the OECD.

This comparison, however, is imperfect as a large part of EU funds have been spent on the infrastructure of universities and cannot be taken into account as expenditure on R&D as defined by the OECD (based on the Frascati Manual, 2002). In order to better assess the importance of the Cohesion Policy in the wider science and innovation system, one needs to compare structural funds expenditure on R&D and third level education (fourth column). The result of this procedure, shown in the last column, suggests that the Cohesion Policy is the most important in Slovakia, and the least significant in the Czech Republic and probably in Hungary (given the large imperfection of data).

At the same time, it seems that in each of the V4 countries EU funds play an increasingly significant role in financing research and development, judging by the growth of importance of foreign sources of funding for R&D (Figure 51).

---

[16] Of course we took into account only funds discussed in this study, and so the Table does not include information on programmes at the European level, especially the Sixth and Seventh Framework Programmes.

Table 4. Resources spent on R&D under the Cohesion Policy in 2009-2010 in V4 (average annual expenditure in relation to GDP in 2009) with respect to total expenditure

| Country	Resources on R&D and some investment spending of companies * (1)	Spending only on R&D ** (2)	Total spending on R&D according to OECD (3)	Total spending on third-level education (2008) (4)	Significance of resources from EU (2) / (3+4)
PL	0.30 per cent	0.18 per cent	0.68 per cent	1.50 per cent	0.08
CZ	0.19 per cent	0.08 per cent	1.53 per cent	1.20 per cent	0.03
HU**	-	0.05 per cent	1.15 per cent	0.90 per cent	0.02
SK	0.29 per cent	0.23 per cent	0.48 per cent	0.90 per cent	0.17

* expenses of companies supporting innovation activities, as such are funded from the Cohesion Policy
** including capital expenditures in the science sector
*** data for Hungary are very inexact

Source: IBS elaboration based on the data of IBS, OECD and Eurostat

Figure 51. **Share of foreign resources in total expenditure on R&D (per cent of total expenditure)**
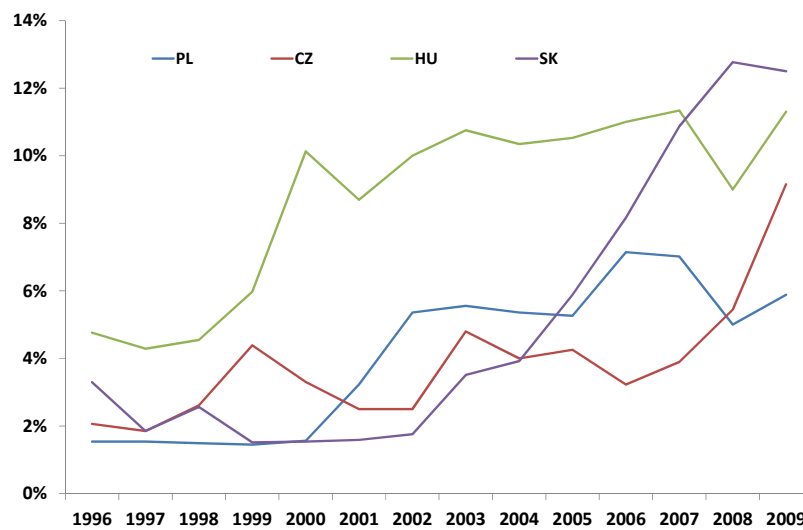
Source: OECD

In Slovakia, science mainly benefits from the funds; in the Czech Republic it is the business sector; in Poland both sectors benefit to a similar extent (there are no data for Hungary). If, however, we exclude investment expenditure of companies from the analysis, then it is the science sector that dominates in each country. This is particularly evident in Poland, where less than 5 per cent of total resources on R&D and innovation is spent on R&D activities of companies (in the Czech Republic it is 11 per cent and Slovakia 16 per cent).

Table 5. The share of education sector as the beneficiary of funds for R&D and innovation

Country	Allowing for investment spending in companies	Only spending on R&D
Poland	53.20 per cent	91.73 per cent
Czech Republic	29.76 per cent	73.70 per cent
Slovakia	62.48 per cent	79.28 per cent

Source: IBS elaboration based on the data V4. Hungary – no data.

To summarize this part of the analysis, it can be stated that funds from the Cohesion Policy play an important role in the Polish and Slovak innovation system and maybe a little less important (but noticeable) in the Czech system. Two categories of expenditure which are particularly conspicuous are the science sector (both scientific projects and spending on human capital development and investment) - and investment of firms to raise their technological level.

3.1.2. Benefits for innovation in the EU15

Investment in research and development projects carried out in the Visegrad countries thanks to the Cohesion Policy, bring at least threefold benefits to EU15 countries. First, it increases the production and acquisition of knowledge and technology by the EU15 - both in science and in the corporate sector. Second, it improves the quality of human capital involved in research and development in the Czech Republic, Poland, Hungary and Slovakia, it is important due to the migration of scientists and engineers from these countries to the EU15. Third, it can produce additional revenue thanks to imports of technology and knowledge by V4 countries.

3.1.3. Increased production and knowledge gained by the EU15

According to the assessment in the Fifth Cohesion Report (European Commission, 2010), funds received under the Cohesion Policy reinforce science sectors of the Visegrad countries and help them achieve higher levels of research. A simple bibliometric analysis suggests that this level is actually improving, at least in the Czech Republic (permanently) and in Poland (as to the trend, see Figure 52). The share of total spending on research and development in GDP has been growing in all the Visegrad countries except Slovakia (in Poland - since 2007). This indicator is commonly considered to be the general measure of technological capabilities of a country (see e.g. Archibugi and Coco, 2005).

Figure 52. Number of scientific publications in the V4 in comparison with the number of scientific publications in Western Europe
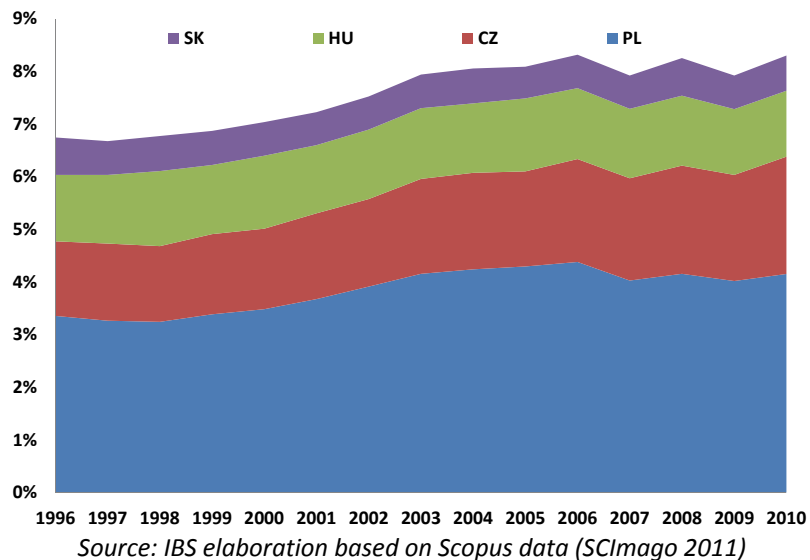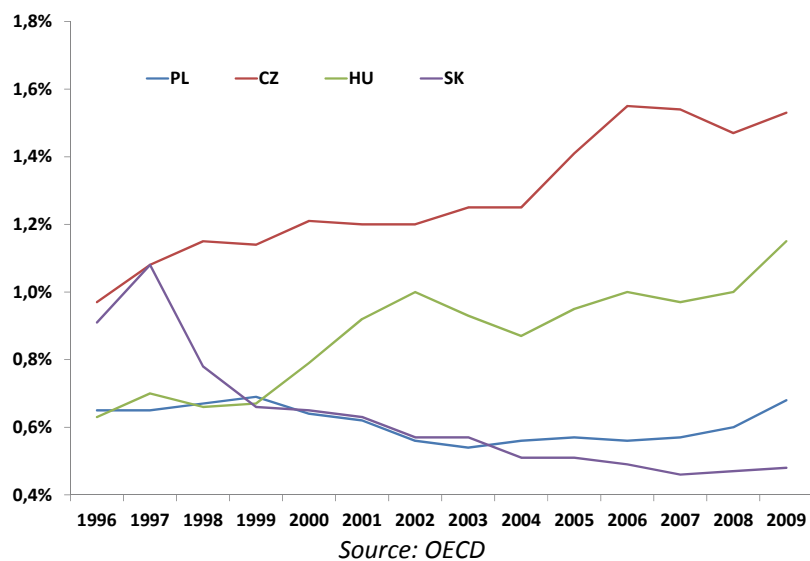
Source: IBS elaboration based on Scopus data (SCImago 2011)

Figure 53**. Total spending on R&D in V4 (per cent of GDP)**

Source: OECD

It is difficult to assess to what extent the positive trends are a result of the Cohesion Policy. Judging from the geography of changes (stable improvement of indicators in the Czech Republic, stagnation or deterioration in Slovakia) earlier national policies seem to have played a greater role. However, given the scale of support the science sectors in the V4 have received in recent years (see previous Tables), one can expect a positive impact from the resources transferred from EU15 in the coming years.
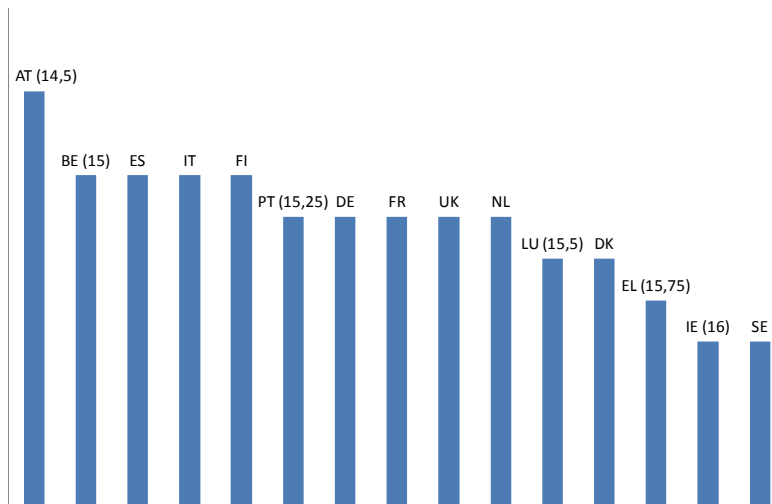
Increased quality of research in the Visegrad countries is beneficial for the science sector in the EU15. It positively affects the work of scientific consortia, bringing together the centres from

these countries and the EU15. Literature on science and science policy shows that international cooperation can improve productivity and quality of research thanks to mutual learning and sharing experiences, the use of knowledge accumulated at other centres, more efficient division of labour in research projects, reducing costs of using a large and expensive research infrastructure that is used in other areas of science, better chances of creating a research team in projects which require specialists from various fields, such as engineers, programmers and theorists (see Katz and Martin, 1997). The percentage of scientific papers written jointly by authors from different countries has been growing for decades (Engels and Rauschenberg, 2008), and bibliometrics indicates that these articles have a greater chance of publication in prestigious scientific journals, and those already published have a greater impact (measured by impact factor) than other papers (Katz and Martin, Tyfield et al., 2009).

The intensity of scientific cooperation between EU15 and Visegrad countries reflects the participation of the latter in projects financed by EU Framework Programmes which are precisely designed to promote cooperation within the European Research Area. Overall, participants from V4 countries in the 6th Framework Programme amounted to 6.14 per cent, and in the not yet concluded FP 7 - 5.45 per cent (European Commission, 2008 and 2011).

From analysis of participants of research consortia implementing projects under the 6th Framework Programme, one can determine the differences in EU15 in terms of the intensity of cooperation with V4. However, as shown in Figure 54 the differences are not large. The study is based on analysis of ranks. For each country, we took into account the number of projects in FP 6 realised in cooperation with individual EU25 countries (during the implementation of the 6th Framework Programme, Romania and Bulgaria were not yet members of the EU). Then we determined the rank of each of the partner countries, which could take a value from 1 to 24 (also included collaboration with the institutes of the country, that is, a country could be its own partner) - and calculated the average for the Visegrad countries. They biggest role in the projects was carried out by institutes from Austria, and the smallest - in those carried out by researchers from Ireland and Sweden.

Figure 54. The average position of the Visegrad countries among the partners of a given country in projects within the 6th Framework Programme (see explanation in text)

Source: IBS elaboration based on European Commission (2008)

The increased quality of scientists and research in the Visegrad countries is also beneficial for the enterprise sector in the EU15 by increasing the supply of technological knowledge. The most obvious factor is the improvement of the conditions of R&D centres located in these countries and founded by companies from EU15. It is worth noting that although small and medium-sized enterprises dominate the economy and employment structure in most developed economies, it is the R&D activities of large companies that remain one of the most important, if not the most important source of innovation in the economic system (Pavitt, 2005).

There are two main reasons why large multinational corporations decide to internationalise their research and development (Narula and Zanfei, 2005). The first one is related to the investments of these firms in manufacturing operations in other countries (i.e. the classical phenomenon of foreign direct investment). Hence R&D centres are an addition to production facilities and are designed to adapt technology developed in the central units to local conditions. Nowadays, however, a second reason is becoming increasingly important: the possibility of using local human and technological resources in R&D. It is connected with the growing pace of technological progress and fiercer competition in the field, while striving to control the costs of R&D (see Gassman and Gaso, 2004).

The success of R&D projects undertaken by companies, however, depends largely on their cooperation with the local education and third-level education sectors. The latter provides businesses with qualified personnel (graduates and researchers) who may participate in joint research projects and perform research and technical services (see Mowery, 1995 and 2005).

Therefore, the Cohesion Policy's contribution to improving the quality of research and raising the level of human capital in science and higher education in Visegrad countries indirectly improves the operation of commercial research centres. In addition, operational programmes provide many incentives for the science sector in order to establish cooperation with companies which can enhance this type of relationships in innovation systems in V4.

In Poland, the R&D centres of foreign companies exist primarily in the following industries: information technology and telecommunications, production, transportation, electronics and household appliances production. Foreign R&D centres are also operated by companies engaged in the energy and engineering sectors, and pharmaceutical and cosmetic industries. The most important European investors are Germany and France (Gorzynski, 2009). In the whole economy internal expenditure on research and development by companies with the majority foreign capital have increased since 2006, and growth was faster than in companies with a majority domestic capital (Figure 55).

Figure 55. Changes in internal expenditure on R&D in companies with the majority foreign and national capital 2006-2009
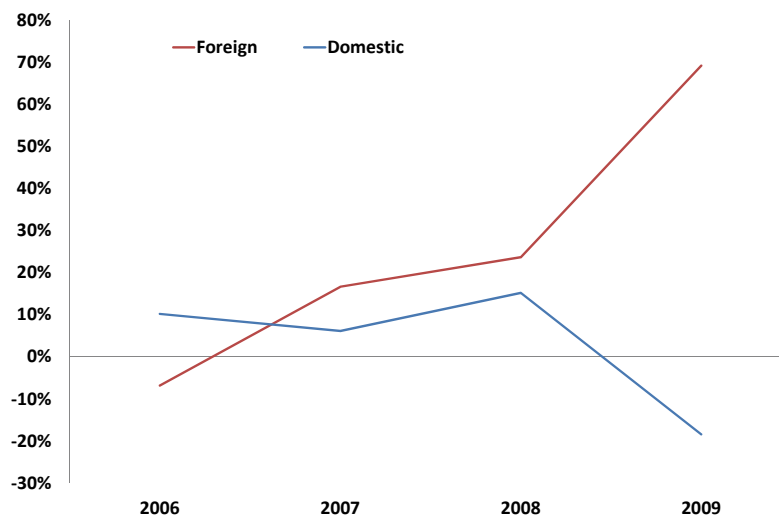
*Source: Central Statistical Office in Poland (2011)*

The results of a survey among foreign companies that have located some of their research centres in Poland show that they highly value the availability and quality of education among graduates and engineering staff in our country, but have a much lower opinion about the quality of academic staff and national R&D base. Interestingly, however, those companies that have decided to cooperate with Polish research centres are very satisfied and praise their substantive preparation and level of service (Gorzyński, 2009, pp. 23-25). Given that firms that decide to cooperate with Polish centres are still in the minority, there seems to exist a large chance for development along with improving the quality of science in Poland.

In Hungary, foreign research centres in 2006 accounted for 10-15 per cent of all industrial centres of this type but constituted 70 per cent of private sector expenditure on R&D (Havas and Nyiri, 2007). The most important investments of this type are located in the following industries: pharmaceutical, telecommunications and information technology and automotive industries. Foreign companies conducting R&D activities in Hungary are slowly developing their network of links with the local education sector, both in terms of the number and the scope of joint projects.

The growing role of the Visegrad countries in the "production" of technological knowledge for EU15 is also reflected in patent statistics. Figure 56 shows the growing share of entities from these countries in patents obtained in the European Patent Office, including those registered with other European partners. However, this share is still very small.

Figure 56. Patents obtained by the V4 countries in the European Patent Office (all patents and patents obtained jointly with a partner from the EU) as a percentage of all patents granted by the EPO
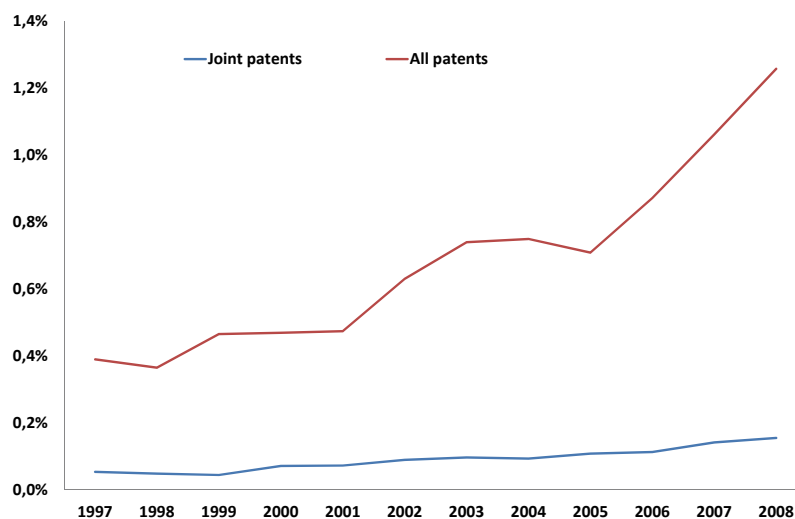
Source: Eurostat

3.1.4. Development of human capital in the R&D sector

Development of science and technology in V4 consists mainly in developing the human capital involved in research and development. An additional positive effect for EU15 is the improved level of scientists and engineers from the Visegrad countries that migrate to EU15. Mobility of researchers – or more generally, high-skilled workers - is a topic of growing importance in the study of migration (Waters, 2009; see also Box "The Cohesion Policy, human capital and migration"). Although the development of communications and methods of storing knowledge have decreased the importance of direct contacts between scientists and engineers, migration remains one of the important ways of knowledge transfer between countries (see Borras and Lundvall, 2005). Probably one of the most spectacular examples of this phenomenon is the technological boom in Israel, which followed the tremendous inflow of immigrants from the former USSR in the 1990s (Goldberg, 2011).

Although precise data on migration processes are not available, some idea of the emigration of scientists from the Visegrad countries to EU15 is given by a number of doctoral students from V4 countries in other European Member States. In 2007, Poland was 8th in this classification in Europe with almost 1500 Polish citizens at doctoral studies abroad in EU (for comparison - most of these students were German - 5300). Interestingly, Slovakian doctoral students were only slightly less numerous, while the number of doctoral students from the Czech Republic and Hungary was around 500 (Study on mobility 2010).

Box 8. The Cohesion Policy, human capital and migration

The Cohesion Policy puts a great emphasis on human capital development of the cohesion countries, and one of the less obvious effects is improved education and skills of migrants from these countries to the richer regions of the European Union. The thesis of the desirable character of immigration of skilled workers is confirmed both by economic theory and empirical research. It is also reflected in the migration policy of some English-speaking countries.

The endogenous growth theory suggests that if immigration induces an increase in the level of human capital, it also increases the production of knowledge in the economy, and thereby GDP per capita (see Howitt 2006). According to this logic, a number of countries have introduced programs that are designed to attract immigrants with desirable skills (including the United Kingdom, Canada, Australia and New Zealand, see Waters 2009). However, the contemporary situation of the European Union may be better described by microeconomic theoretical framework proposed by Peri and Sparber (2011). They indicate immigration results in the labour market specialisation in accordance with the principle of comparative advantage: immigrants take over those tasks that require more technical knowledge, while "natives" take jobs that require better communication skills. If so, both groups of workers are not substitutive but complementary. It is confirmed by empirical analysis of changes in the U.S. labour market between 1990 and 2002-2007. Similar conclusions can be found in another study by Peri, in which he examines the impact of immigration on total factor productivity (TFP) of the American states: the effect is positive (Peri, 2011).

The United Kingdom is a country that adopt the greatest number of doctoral students in the EU, which suggests that this country is also the most attractive job market for researchers. At the same time data on scientific cooperation (see Figure 54) and experience of individual scientists suggest that scientists from Visegrad countries may be interested in the Austrian and German markets. Therefore, it is these countries that will first benefit from the improving quality of human capital in the science sector in V4.

3.1.5. Exports of technology to Visegrad countries

The increasing level of education and human capital in V4 is accompanied by an increase in 'absorptive capacity' of their companies, defined as "a firm's ability to recognise the value of new information, assimilate it, and apply it to commercial ends" (Cohen and Levinthal, 1990). Literature on the subject emphasises that the absorptive capacity of firms and countries

depend on the level of technological expertise and experience in conducting research and development (Criscuolo and Narula, 2008), as well as the level of human capital (Keller, 1996).

An increase in the absorptive capacity of the Visegrad countries results in increased imports of technology, which is important because most of these imports already come from European Union countries. EU participation in the purchase of technology by Polish enterprises in the manufacturing sector is 18-39 per cent (Figure 57), but if we consider the Union's share in imported technologies, it is 50 to even 75 per cent.

Figure 57. Transfer of new industrial technologies in Poland enterprises in 2009, by the country of purchase (share in the number of declared purchases of technology)
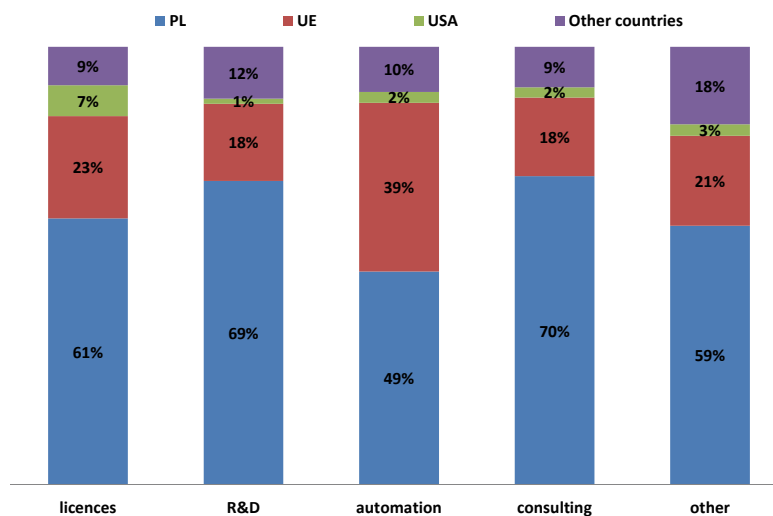
Source: CSO (2010)

The position of European exporters is strongest in the category "means of automation", including devices that control and monitor technological processes. This indicates the primary significance of retailers from the EU in the spending of Polish industrial companies on machinery and equipment as part of their investment in innovation. Share of imports in these expenses is just over 50, and in the case of companies with majority foreign capital - 60 per cent (see CSO 2010, p. 479).

3.1.6. Summary

Funds received under the Cohesion Policy are a major assistance to the national innovation systems of the Visegrad countries - particularly Poland and Slovakia. All indications are that these measures are responsible for an increase in foreign participation in the financing of research and development in V4. Money from the Cohesion Policy supply the science sector (30-60 per cent of funds, depending on the country), allowing it to develop infrastructure, additional research and improvement of human capital. Funds directed to the corporate sector

are used rather to invest in new technologies rather than to conduct R&D in the strict sense of the word.

Although the current level of science and technology in the Visegrad countries is historically determined, the Cohesion Policy will affect the growth in technological indices in V4. This process will have important consequences which will be generally beneficial for the EU15 innovation systems. Three types of positive effects have been identified.

The first is the rapid development of knowledge and technology, which, although created in V4, will be available for the science sector in EU15 (through scientific collaboration) and the corporate sector (through the operation of commercial R&D centres belonging to companies in EU15 and located in V4, and through the import of technology by V4). The second, human capital will improve in the Visegrad countries, and some of the highly skilled scientists and engineers will migrate to the R&D sector in EU15. The third, an increased technological absorptive capacity of companies in Poland, the Czech Republic, Hungary and Slovakia will result in the further development of the business market for technology exports from EU15.

The analysis indicates that the presence of the Cohesion Policy programmes aimed at the development of R&D infrastructure and support of R&D sector in V4 is not only the realisation of the ideas formulated in the Europe 2020 strategy (European Commission 2010), but also in the interest of richer countries of the European Union. Although these benefits are mostly indirect, they should be noticeable at the level of individual fields of science and sectors of the economy particularly involved in cooperation with entities from V4.

3.2. Impact on the natural environment in EU15

3.2.1. Financing environmental protection in V4 under the Cohesion Policy

The growing scale of challenges in the area of environmental protection, and improving the environmental awareness of citizens, are becoming increasingly reflected in the activities of the EU and individual Member States. One of the strategic directions adopted by the EU in this respect consisted of reducing the costs of environmental and climate policies through the implementation of saving mechanisms and integration of environmental standards within individual sectoral policies. As a result, the rise in the significance of environmental policy is not fully reflected in the budget spending. It is, however, worthwhile to cite Eurostat estimates according to which public sector spending on environmental protection in V4 averaged between 0.4 - 0.5 per cent of GDP, while in the EU15 it was about 0.7 per centof GDP (2006), and in the EU25 between 0.2 and 0.6 per cent of GDP.[17] These differences clearly indicate a directly proportional dependence of environmental protection expenditures on the gross output.

The high share of investment in relation to current expenditure in the Visegrad countries, and the relatively high ratio of public spending in general expenditure, seem to confirm the importance of the Cohesion Policy for environmental protection. It results not only from the principle of conditionality, but also from the obligation to initiate spending on the part of the beneficiaries of the Cohesion Policy.

Figure 58. State expenditures on environmental protection in relation to GDP in per cent
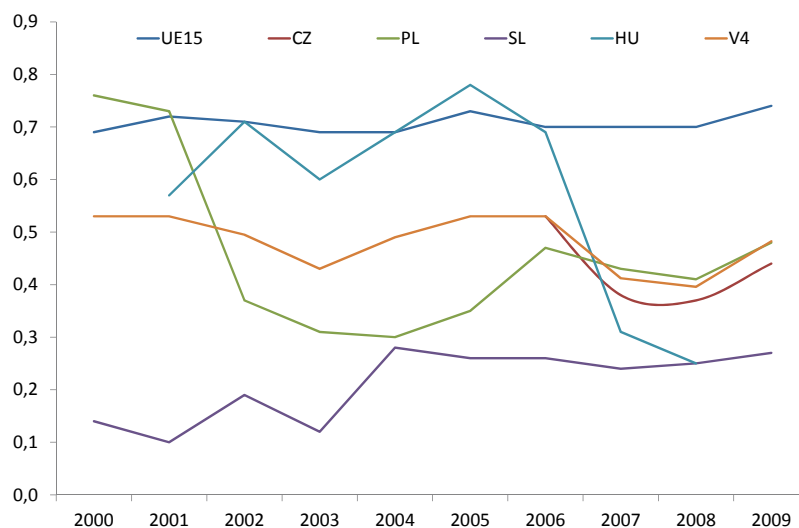
Source: Eurostat

In a broader time horizon significant fluctuations can be seen in public spending on environmental protection in the Visegrad countries compared to EU15. They are associated,

---

[17] Investment of the public sector and current expenditure

inter alia, with the size of a sample, but also with changes in the systems of environmental services (sometimes performed by the state, and sometimes by a specially created private or semi-private sector). The data also reflect the fact that the level of expenditure in the initial period of the financial perspective is scheduled in ascending order. Finally, declines in spending on environmental protection are characteristic for the beginning and end of the financial perspective, prompting some countries to allocate more funds to ensure continuity between financial perspectives.

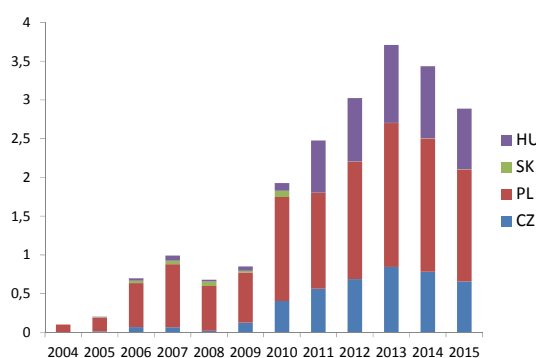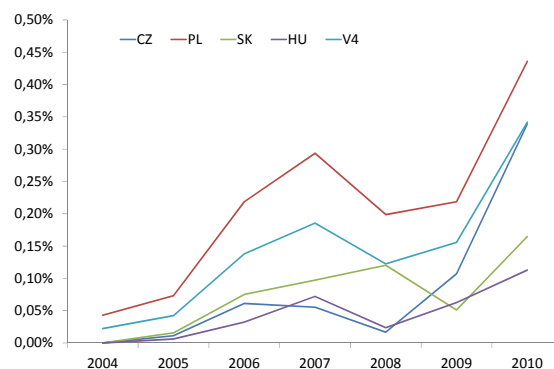Figure 59. EU spending on environmental protection under the Cohesion Policy (EUR billion)

Figure 60. EU spending on environmental protection under the Cohesion Policy in relation to GDP)

Source: IBS, Eurostat

Funds for environmental protection in the current financial perspective of the Cohesion Policy are accumulated in specially dedicated programmes. In Poland, it is primarily a programme "Infrastructure and Environment", and in Hungary "Environment and Energy", in the Czech Republic and Slovakia "Environment" programmes, supplemented by regional programmes in the Czech Republic, Poland and Hungary, and in Slovakia by the programme "Competitiveness and economic growth". Additional support of environmental investments, in addition to the Cohesion Policy, are the funds of the LIFE and LIFE + programmes.

Since 2004 environmental protection in V4 under the Cohesion Policy was given about EUR 5.39 billion, which generated a total of additional EUR 1.9 billion in domestic spending in the Czech Republic, Poland, Slovakia and Hungary. Since the beginning the spending was meant mainly to improve wastewater and waste management and reduction of dust and gas emissions. Other supported projects included those raising awareness and support for research institutes active in the field of ecology.

This division of funds is in line with the general trend in the EU, in which the sector of specialised environmental services is 60 per cent dominated by waste management firms, followed by (30 per cent) companies dealing with waste treatment. So far, both in the EU and

V4, much smaller funds are spent on the protection of biodiversity, soil, groundwater, surface water, and noise protection.[18]

3.2.2. Environmental policy of the Visegrad countries compared to EU15

In the countries of Central and Eastern Europe, the planned and systematic process of environmental protection began more than twenty year later than in EEC countries. For the countries of the Visegrad Group, it started symbolically on the date of signing the Accession Agreement by Poland, Hungary and Czechoslovakia (after the division into the Czech Republic and Slovakia, signed again by both countries). Consequently, in 1994-1995, when the Agreement came into force, all four countries began intensive adaptation of their legislation to the standards of the European Communities, including the law on environmental protection.

At the same time, the Visegrad countries began to use the pre-accession instruments, primarily ISPA, and also PHARE, SAPARD (in agriculture), and LSIF (in transport), funding the most urgent modernisation expenditures, including those related to environmental protection (Fidler and Janik, 2003, and Speck et al. 2001).

Before 1990 the use of natural resources in V4 led to serious environmental problems. Lack of investment in environmental protection was accompanied by limited actions and regulations concerning prevention. Slow economic growth, however, had a positive side effect, for example in the form of a small increase in the production of waste or air pollution (per capita). Therefore, although the environment in the V4 countries at the moment of accession to the EU was in many respects better preserved than in developed countries of Western Europe, their economies were characterised by significantly higher energy intensity and the non-systematic and inadequate approach to environmental issues.

3.2.3. State of the environment in V4 vs. EU support

The state of the environment in the Visegrad countries is not uniform, for example due to differences in the area, terrain and level of economic development. However, it is characterised by many common problems and challenges arising from similar historical-structural conditions.

---

[18] However, the upcoming negotiations on the Seventh Framework Programme will certainly be an occasion to include these areas into the new priorities. As this Programme will be created a year before the final confirmation of the 2014-2020 perspective, this should contribute to the a more sensible planning of expenditure on environmental protection in EU. Apart from the issues such as the protection of biodiversity, flood prevention and ecosystemic services, it is also expected to include new priorities signalled in the 2020 Strategy, first of all the effective utilisation of resources. All this issues are of great importance for Visegrad countries, especially prioritisation and enhancing the mechanisms of implementation.

Area of the Visegrad Group is approximately 12 per cent of the EU with a population at approximately 13 per cent of all EU citizens, and with per capita incomes at 69 per cent of EU average.

Clean water in the Visegrad countries has been recognised as a key environmental problem. There is an increasing but still low percentage of the population using sewage treatment plants, amounting to 66 per cent.[19]

For comparison, in countries such as Ireland, France and Finland, it was more than 80 per cent in 2005, while in Germany, the Netherlands and Luxembourg it is over 95 per cent.

Figure 61. Population using sewage treatment plants (per cent)
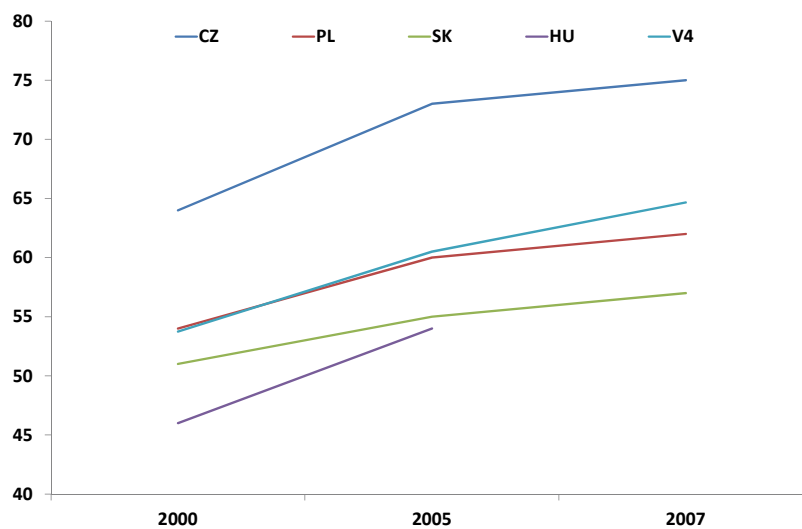
Source: Eurostat, CSO.

At the same time, analysis of data on the Czech Republic and Poland (and available data on Hungary) indicates a marked improvement in wastewater treatment. It is visible in almost complete elimination of mechanical treatment, a slow reduction in the number of biological wastewater treatment plants and a sharp increase of the most modern chemical treatment.

The water management of the Visegrad countries also includes the important issue of surface water contamination, and in the Czech and Poland, limited reserves of drinking water.

Visegrad countries to a significant extent are also responsible for the pollution of major rivers, the Danube, Elbe, Vistula and Odra, flowing to the Baltic Sea, Black Sea, and also (to a lesser extent) the North Sea. The first two basins are faced with a serious (almost unremovable) biogenic pollution and its effects, especially the process of eutrophication. Moreover, the most pressing challenges include restoring ecosystem balance by rationalising industrial pollution (heavy metals, petroleum products, NO_x) affecting both air and water. These activities are

---

[19] In Poland and Slovakia it is only 60 per cent (2007), in Hungary about 65 per cent (2006) and in the Czech Republic 80 per cent (2007).

coordinated by two organisations: HELCOM[20] and the Black Sea Commission[21], and their efforts are supported by three regional initiatives supported by the European Union - the Black Sea Synergy, Strategy for the Baltic Sea and the Danube Strategy.

<div style="border:1px solid #000; padding:10px;">

Box 9.Environmental resources in the V4

Biodiversity is one of the greatest values of the natural environment in Visegrad countries. The relatively low fragmentation of land, associated with poorly developed transport infrastructure, has allowed the preservation of extensive and valuable ecosystems at a European scale. At the same time Visegrad countries are characterised by an extensive network of protected areas with a long tradition. Implementation of Natura 2000 during the economic development of the Visegrad countries helped significantly reduce the pressure (mainly from the private sector) on the reduction of protected areas. Many of them are located in border areas, which creates an additional platform for cross-border cooperation. At the same time protecting these areas requires addressing a number of problems.

One of them is afforestation in the area of the Western Carpathians and the Sudeten on the border between Poland and the Czech Republic and Slovakia. These actions (already initiated) are designed to restore the original trees from the period before artificial afforestation which resulted in the violation of the ecological balance of these areas and introduced monocultures on poorly resistant species.

</div>

Waste management is another important issue. Although according to data from 2009, the rate of waste production per capita in Poland amounted to 316 kg and the Czech Republic, Slovakia, 339 kg and 430 kg in Hungary, compared to EU average of 514 kg[22], this is the already mentioned effect characteristic for underdeveloped economies. The actual source of the environmental burden is ineffective management of waste, which predominantly goes to landfill, and is very rarely utilised as bio-waste.[23] Furthermore, only a small percentage of waste is recycled or used for energy production. According to Eurostat, in the Visegrad countries the amount of municipal waste *per capita* sent to landfill is between 208 and 320 kg whereas the estimated EU15 average is 165 kg *per capita.*

One of the major problems of the Visegrad group economies is an outdated industrial, transport and energy infrastructure.[24]

As a consequence, these countries emit an average of approximately 10 tonnes of greenhouse gases [25] per capita, which does not differ from the average in the EU15, but when coupled with

---

[20] http://www.helcom.fi/
[21] http://www.blacksea-commission.org/main.asp
[22] Based on Eurostat data.
[23] *Key challenges in waste management in UE-11, E&Y, Warszawa 2011. (in Polish)*
[24] Recognition of these objective obstacles was reflected in the blueprint of the European Union Emission Trading Scheme.

a significantly lower rate of GDP shows a very high emission rate of these countries (Nodzyński, 2009).

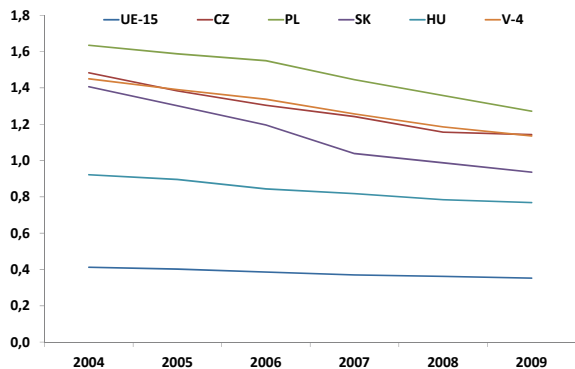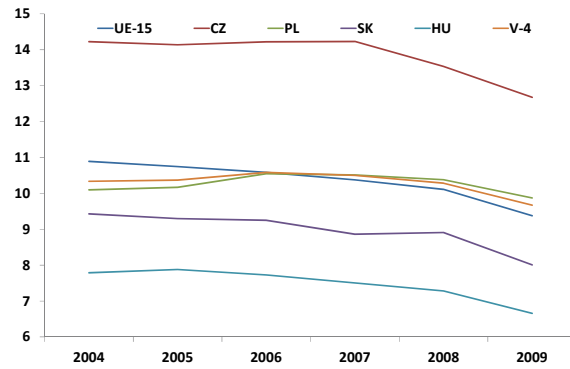| Figure 62. GHG emissions (tonnes) in relation to GDP (Euro).	Figure 63. GHG emissions (tonnes) per capita 2004-2008

Source: Eurostat

It should be noted that, given the economic growth forecasts for the region, maintaining the current policy will result in a significant increase of the **emission rate**, above the EU average.[26] The V4 states have already developed strategies to shift from the old model based largely on fossil fuels to low carbon model, so as to ensure the realisation of the objectives of CO_2 emission reduction.

According to World Bank calculations, the realisation of the objectives of the climate and energy package in its current form will be a burden on the economies at 0.5 per cent GDP (Slovakia) to as much as 1.7 per cent GDP (Poland) per year. Because the vast majority of greenhouse gas and dust is emitted by private enterprises, it is not possible to support them with public funds, hence a relatively small share of the Cohesion Policy funds has been designed to solve this problem. Possible solutions include support for individual households using coal for heating due to socio-economic reasons, which at the local level is particularly detrimental during periods of low atmospheric pressure, and globally also contributes to increasing greenhouse gas emissions.

---

[25] For comparison - CO_2 emission in Mt: Czech Republic – 116.83, Poland – 298.69, Slovakia – 36.23, Hungary – 53.01 (based on data from 2008 collected by MAE. UE emits about 3849.53 mln tonnes of CO_2. See *CO_2 Emissions from Fuel Combustion. Highlights*. 2011.

[26] Similar to other areas, also here there are distinct differences resulting for example from their different structures of energy production or GDP structure. For example, the Czech Republic have the highest GDP per capita among UE-12, and Poland has the highest share of coal in the production of electricity.

3.2.4. Benefits of the implementation of projects under the Cohesion Policy

Although research on the economic aspect of the ties between the environment and economy is a relatively new area of interest to scientists, first models in this field have already been developed. For example, according to recent European Environment Agency estimates, the air pollution emissions of industrial origin in 2009 cost the average EU citizen between EUR 200 and 330 (Weber, 2011).

The highest external costs caused by pollution include increased spending on health care related to diagnosis and treatment of diseases, especially respiratory diseases, cancer, asthma, allergies and damage to foetuses. Pollution also reduces income from tourism and contributes to the deterioration of the landscape in each region. Costs of corrosion and destruction of buildings and transport infrastructure are also significant. Emissions of greenhouse gases, and also emissions of other pollutants that contribute to environmental degradation, significantly increase risks of flood and decrease agricultural crops.

Well-prepared investment in the environment not only contributes to reductions in these negative phenomena, but also creates jobs and a market for the most competitive businesses. Development of entrepreneurship in the field of environmental protection contributes to the creation of innovative solutions.

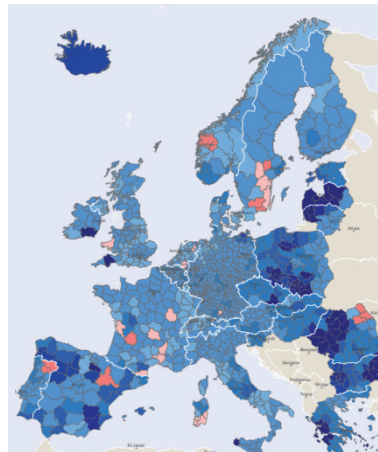## 3.3. The benefits of transport infrastructure development

3.3.1. The development of transport infrastructure in the Visegrad countries through implementation of the Cohesion Policy

The lack of efficient transport networks was one of the main barriers to development of Visegrad countries at the threshold of EU membership. The first dozen years of political transformation allowed them to close the gap separating them from the more developed Western European countries, but the internal financial constraints largely inhibited the realisation of large, complex infrastructure projects. Consequently, the transport accessibility of regions in Poland and Slovakia at the beginning of the 2000s was one of the worst in Europe, while the Czech Republic and the western part of Hungary had a relatively better situation. Insufficient performance of the transport network in Visegrad countries was also an important constraint for EU15 economies, particularly those more open to economic exchange with the eastern part of the continent.

Map 6. Between-sector transportation accessibility
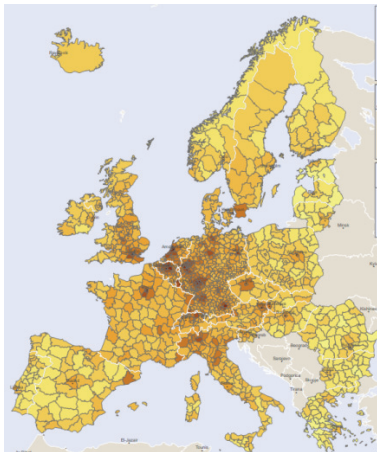
Map 7. Relative changes in between-sector transport accessibility 2001-2006

Source: IBS elaboration based on ESPON data.

The development of the transport network in the Visegrad countries was enhanced by funds transferred to these countries through a variety of instruments under the Cohesion Policy. Both in the financial perspective 2004-2006, as well as in the current programming period, the expansion of transport infrastructure was granted the largest funds in each of the four of these countries. In absolute terms, the investment with the highest values have been (or will be) allocated in Poland, whereas Slovakia has been the greatest relative beneficiary.

In all new Member States, including the countries of the Visegrad Group, the investment in transport infrastructure financed by the Cohesion Fund and European Regional Development Fund accounted for about 15-20 per cent of total expenditure for this purpose in the 2004-2006 programming period. Hence, the intervention funded by the Union was much lower than the national effort in individual countries. However, the latter were primarily current investments and replacements, and to a lesser extent concerned large projects that actually increase the accessibility of transport in Eastern Europe.

Figure 64. The share of expenditure on transport infrastructure in the total allocation measures under the Cohesion Policy in the Visegrad countries
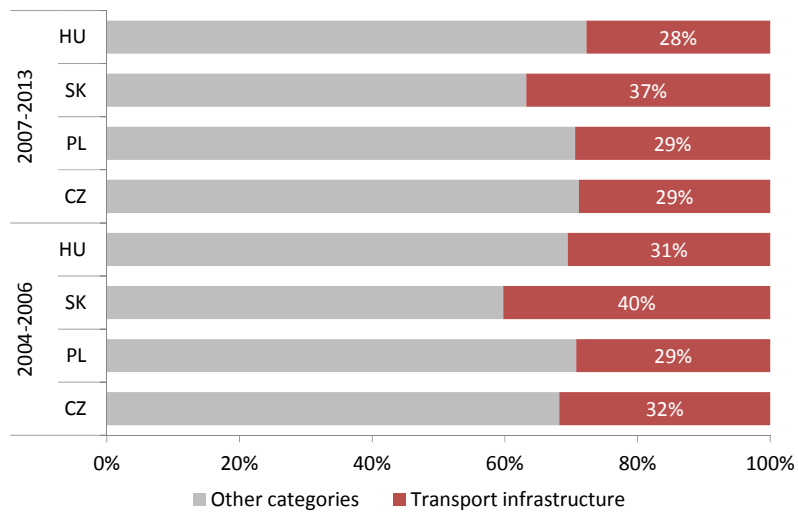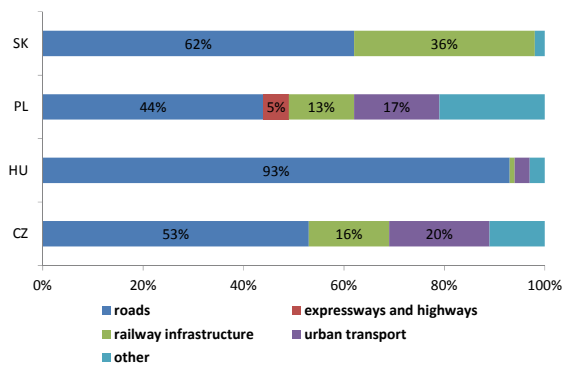

Source: IBS elaboration

Figure 65. Structure of spending on transport infrastructure 2000-2006
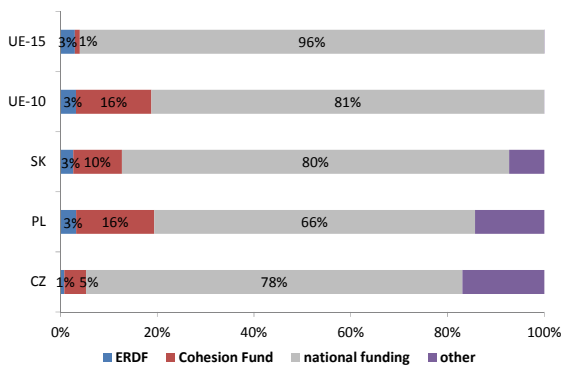
Source: IBS elaboration

Figure 66. Structure of spending on transport infrastructure in 2000-2006 under ERDF

Source: IBS elaboration

Benefits obtained by the EU15 thanks to the development of transport infrastructure in the V4 may be identified in three main areas: improved accessibility (resulting in the improved traffic and increased accessibility of areas attractive for investment, e.g. for the logistics industry), lower accident rates, and the improved and more environment-friendly structure of transportation of people and goods.

3.3.2. Effect on transport accessibility

The effects of the new transport networks in V4 include increased transport accessibility in those areas, and hence shorter time, lower cost and increased travel comfort between EU15 and V4. From the point of view of EU15, it is most important to develop cross-border sections of the network connecting Germany, Austria, Italy (through Slovenia), Greece (through Serbia, Romania and Bulgaria), and the remaining EU15 countries (through German, Austrian and Italian networks) with the most important agglomerations in Poland, the Czech Republic, Slovakia and Hungary, as well as the Baltic States, Russia, etc. Therefore below we focus on the development of expressways and highways, realised to a large extent thank to the support of structural funds.

Box 10. Trans-European Transport Network TEN-T

The development of transport networks in the European Union is closely connected with the Trans-European Transport Network (TEN-T). The idea of this network was launched in the 1990s, but for many years this network was rather based on priority projects. In October 2011 the European Commision passed a motion concerning the transformation of the incohesive road structure, railways, airports and channels in Europe into the Trans-European Transport Network. The development of the new network is to remove bottlenecks, modernise infrastructure and enhance cross-border transportation of people and goods across the EU. The new network will be supplemented by a complex net of roads – added to the basic network – at regional and national levels.

Hungary

Motorways in Hungary have the arrangement of a spoked wheel with the centre in Budapest. The oldest Hungarian highway is the M1 motorway connecting Budapest with the Austrian border, and was started in 1964 and finished in 1996. In 2004, when Hungary joined the European Union, it had the following sections of highways: M7 between Budapest and Lake Balaton, M5 between Budapest and Kecskemét, and M3 in the direction of Miskolc (the final section was built in 2004). In 2005, an important section of the M5 motorway in the direction of Szeged was added, the construction of the M7 along Lake Balaton was continued, and also a small section of Budapest's eastern bypass was completed. In 2006, construction of the M5 between Szeged and the border with Serbia was completed (thereby linking Budapest with Serbia via an expressway). Further sections of the M7 and M3 were also built (up to Debrecen), and the first section of the M6 motorway was built (from Budapest towards Croatia). In 2007, part of the M3 towards Nyíregyháza was the longest highway section under construction. 2008 was a key year for the capital of Hungary. The eastern portion of the ring road of Budapest was opened. The entire length of the M7 motorway to the border with Croatia was also finished, linking the existing sections of from Budapest to Lake Balaton and areas close to the border. In 2010, the Budapest southern bypass in 2x3 standard was opened. A very long stretch of M6 linking the city of Pecs (European Capital of Culture in 2010) with Budapest, and M31 connector from the M0 Budapest to Gödöllő M3 and M43 motorway section from Szeged in the direction to the border with Romania were also completed. The M70 connector to the border with Slovenia and M15 connector in the direction of Bratislava (Slovakia) are standard single-lane motorways.

Table 6. Lengths of the network of expressways and highways in the Visegrad countries

	2000	2005	2009
Czech Republic	499 km	564 km	729 km
Hungary	448 km	636 km	1273 km
Poland	358 km	552 km	849 km
Slovakia	295 km	327 km	391 km

Source: IBS elaboration based on Eurostat data

Czech Republic

Roads in the Czech Republic and Slovakia are divided into highways (Dálnice) and expressways (Rychlostní silnice). In the Czech Republic there are six highways (D1, D2, D3, D5, D8 and D11) and several expressways. The most important highway in the Czech Republic is the D1 motorway connecting Prague with Brno and Ostrava. The section to Brno was completed in 1980. In the early 1990s a 19 km section between Brno and Vyškov was also completed. In 2004, when the Czech Republic joined the European Union, there was also a 61 km D2 highway linking Brno with the border with Slovakia towards Bratislava, and the D5 highway connecting Prague and Pilsen and the border with Germany (the last part of the highway was completed in 2006). In addition, sections of the highway D8 between Prague and Lovosice and Prague-Pardubice section of D11 were ready. In 2004-2010 missing parts of the highway D1 were completed: in 2005 the highway was extended by about 18 km in a northeasterly direction, and then work continued all the way to the border with Poland. A 17 km border stretch from Ostrava to Bohumín was completed in 2007, and the last section between Bohumín and Gorzyczki is being completed. Works on the D3 have not begun yet, except that in 2009 a 17 km stretch was open halfway between Prague and České Budějovice. In 2006 the last part of the Czech Highway D5 was opened, important for the traffic flows between Germany and the Czech Republic. On the D8 motorway, also very significant for the Czech-German relations, a 14 km stretch between Usti nad Labem and the German border was opened in 2006. Moreover, after 2004 the D11 highway was extended between Poděbrady and Libšany so that today the highway almost reachesHradec Králové. In the context of connections with the countries of the EU15, we should mention plans to extend the expressway R52 connecting Brno to Vienna on the section between Pohorelice and Mikulov - the border with Austria (15 km). The completion of the expressway is planned around 2015.

Slovakia

Slovakia has the shortest border with the EU15 among the V4 countries (only about 100 km with Austria). In January 2011, Slovakia had 415.7 km of highways (D1, D2, D3, D4) and 189.5 km of expressways (R1, R2, R3, R4, R6). The most important highway in Slovakia is the D1 that connects Bratislava with Trnava, Žilina, Poprad, Prešov and Košice. So far Slovakia has completed the sections between Bratislava and Žilina and tens of kilometres in the central part. Since 2006, a dozen to a few dozen kilometres have been completed annually. The whole route of the D1 highway Bratislava - Žilina - Košice is to be completed by 2017. Slovakian priorities also include a D3 motorway linking Žilina with the Slovakian-Polish border and the

construction of the expressway R5 Svrčinovec – to the Slovak-Czech border. In the case of D3 and R5, construction of most of the missing sections is expected to start by 2014.

Poland

The accession of Poland has resulted in an unprecedented leap in the field of road infrastructure. In the financial perspective 2004-2006, the most important section in terms of relations with Germany and Western Europe was a section of the A4 between Zgorzelec and Krzyżowa. In the next period 2007-2013 a rapid acceleration in the construction of the road network in Poland was seen. At the end of 2011, the length of roads (motorways and expressways) in operation exceeded 1,700 km, and another 1,300 were under construction. With the completion of the A4 in 2012, the citizens of EU15 will for the first time be able to travel via highway to the border with Ukraine. Completion of the missing sections of the A2, between the border in Świecko and Nowy Tomyśl in late 2011, and the segment between Łódź (Stryków) and Warsaw (Konotopa) by mid-2012, will create a highway between Berlin and Warsaw. Completion of the northern section of the A1 between Stryków and Toruń in 2012 will create a motorway connection between Germany and the Tri-City on the northern Polish coast (although not in a straight line). Construction of expressways S3, S5 and S8, and the southern section of the A1 will make central Poland more accessible for EU15.

Summary

The development of motorways and expressways in the Visegrad countries, particularly latitudinal links, greatly facilitate transit through these countries, as well as increase the availability of markets in Poland, the Czech Republic, Slovakia and Hungary for companies from EU15. Since 2004, we may observe an increasing efficiency of transport and logistics companies as a result of the creation of modern logistics centres, particularly near major transport nodes on the network. In the countries of the Visegrad Group the core network TEN-T has the following network nodes: Warsaw, Gdańsk, Katowice, Kraków, Łódź, Poznań, Szczecin and Wrocław (Poland), Prague and Ostrava (Czech Republic), Bratislava (Slovakia) Budapest (for Hungary).

According to a report by Cushman & Wakefield (2010), Poland remains the largest warehouse market in Central Europe. Warehouse space in Poland amounts to 6.7 million square metres, and in Central Europe 14.4 million square metres. Demand for warehouse space has been generated by manufacturing companies, particularly the automotive sector, which after the accession of the Visegrad countries has very strongly developed in all four countries. For example Hungary has seen investment from Suzuki, Mercedes and Audi, the Czech Republic - Skoda, Toyota and Hyundai, Slovakia - Volkswagen, Kia and PSA, and Poland - Fiat, Opel and Volkswagen. For the automotive sector, which operates according to the principles of just-in time delivery, a high quality transport infrastructure is most crucial.

The general dynamisation of the Visegrad Group countries and the intensification of contacts between EU15 and Poland, Czech Republic, Slovakia and Hungary, have increased traffic flows. Despite the recent economic crisis, with serious consequences for the transport sector in Western European countries, the intensity of heavy traffic at five major road crossings on the

Poland-German border has increased in 2005-2010 by about 40 per cent. This high growth is mainly a consequence of dynamic trade between Poland and Germany, and other Western European countries after 2004.

Table 7. Changes in total vehicle traffic and in
truck traffic on the German-Polish border 2005-2010

	2005		2010		change 2005-2010 (per cent)	
	total	trucks [27]	total	trucks	total	trucks
Lubieszyn	7 799	366	8 045	721	3	97
Kołbaskowo	7 567	1 422	7 251	1 527	-4	7
Świecko	15 083	6 126	18 479	8 896	23	45
Olszyna	7 454	2 378	70 86	2 679	-5	13
Jędrzychowice/Zgorzelec	10 426	2 294	12 928	3 839	24	67
total [28]	**48 329**	**12 586**	**53 789**	**17 662**	**11**	**40**

Source: General Traffic Measurement 2005, 2010

3.3.3. Reduction in accident rates

The aforementioned economic effects of transport infrastructure development in the Visegrad Group should be regarded as a major channel of influence on the EU15. But this is not the only way the implementation of the Cohesion Policy in the new Member States benefits EU15. Citizens of EU15 countries are also the beneficiaries of improved safety on the newly created and upgraded roads - as they increasingly often visit the countries of Eastern Europe.

Figure 67. Deaths in automobile accidents and number of cars per citizen
in the countries of the Visegrad Group 2005, 2007 i 2009

---
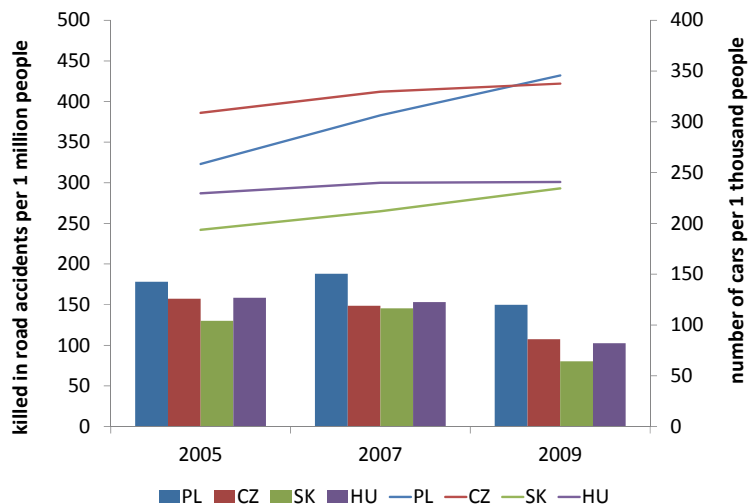
[27] without light commercial vehicles
[28] five largest road crossings on the Polish-German border

Gradual improvement in road network safety in Visegrad countries can, at least to some extent, be attributed to the effects of investments supported from EU structural funds. This is a big success considering the dynamically growing motorisation rate (a particularly high increase in the number of vehicles was observed in Poland, while in 2010 the number of fatalities fell below 4,000 thousand people).

3.3.4. Impact on the environment

Support for the modernisation and expansion of the transport infrastructure in the Visegrad Group should be regarded as potentially beneficial from the standpoint of EU15 because the prevailing methods of transporting people and goods in Eastern Europe also exert a relatively strong pressure on the environment. Any shift in the structure of transport, for example, towards rail transport can bring noticeable ecological effects at a level of the whole continent.

Figure 68. Shipping in rail transport in Visegrad countries - millions of passenger-kilometres (2005=100)
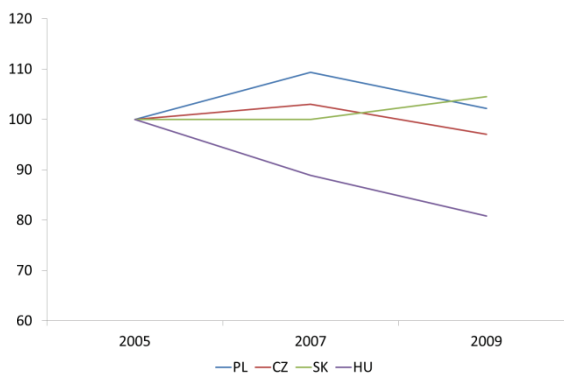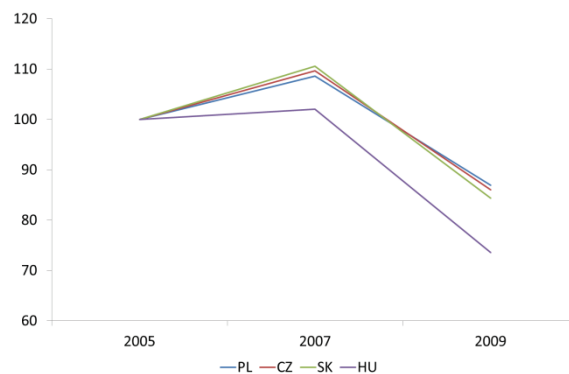
Figure 69. **Shipping in rail transport in Visegrad countries - millions of tonne-kilometres (2005=100)**

Source: IBS elaboration based on Eurostat data

The available data suggest, however, that the volume of railway transport (measured in passenger-kilometres and tonne-km) was constant 2005-2009 or showed a downward trend. But this is not sufficient proof for the lack of effectiveness of the Cohesion Policy in this regard: both in the previous and the current financial perspective (especially in Poland) greater emphasis had been placed on the expansion of road infrastructure than rail networks.[29] Initial assumptions on the Cohesion Policy after 2014 provide for more favourable treatment of rail transport, which will ultimately contribute to environmental effects – previously treated only as potential.

3.3.5. Summary

Development of transport infrastructure in the Visegrad countries under the Cohesion Policy resulted in tangible benefits for EU15 countries. In addition to the direct and macroeconomic channels of influence described in the main part of this Report (which generates significant revenue of EU15 companies, especially in transport investment), we must not ignore the

---

[29] The decrease in transport volume in 2009 was also due to cyclical factors.

overall increase in capacity of European transport networks and greater safety on the roads in Poland, Czech Republic, Slovakia and Hungary. It should also be noted that the material effects of the investments will be multiplied in the coming years - in the current financial perspective, long sections belonging to the TEN-T will be completed, so Western European countries will be able to use them in economic exchange with the eastern part of the continent.

Conclusion

In this Report, we presented an overview of the benefits of EU15 countries resulting from the implementation of the Cohesion Policy in the Visegrad countries (V4), i.e. the Czech Republic, Slovakia, Hungary and Poland. The analysis includes both the previous (2004-2006) and current financial perspectives (2007-2013, with spending up to 2015), taking into account forecasts for the period until 2015.

This defined research area is important as the Cohesion Policy is largely funded by EU15 countries (almost all of which are net contributors - and the largest and richest of them contribute to the EU budget much more than they receive), while the state of the Visegrad Group are the main beneficiaries among the new Member States. Throughout the 2004-2015 period under review, total contributions of EU15 countries to the EU for the Cohesion Policy budget will have amounted to around EUR 413 billion (here and throughout the summary, like in the report, we used fixed prices of 2005), with approximately EUR 140 billion directed for the Cohesion Policy in the V4. The greatest sum, about EUR 77 billion, 8.5 billion – went to Slovakia. After considering the contributions of the V4 countries (in those parts which can be attributed to the Cohesion Policy), these countries will have been the net beneficiaries of the Cohesion Policy to the value of EUR 117 billion.

The Cohesion Policy is intended to provide the economic, social and territorial cohesion of the continent, and is based on the assumption that the entire Europe benefits from the reduction of development gaps across Europe. In this Report we show the validity of this assumption, analysing the most important channels through which development of the Visegrad Group countries results in the improvement of the situation across the EU.

Our analysis indicates that the impetus for development of V4 countries induced by the Cohesion Policy results in a significant increase in the output, and thus increased consumer, investment and intermediate demand – largely satisfied by imports from EU15. Additionally, in this study, we analyse the external benefits of the Cohesion Policy, i.e. those more difficult to express in monetary terms, but very important for the whole Union, due to increased innovation, greater emphasis on environmental protection and development of the European transport system in V4.

To evaluate total benefits (i.e. additional exports) we used a multi-stage procedure, using the following tools:

- Microeconomic analysis(CAWI)
- Economic modelling (EUImpactMOD V4)
- Macroeconomic analysis (multi-stage methodology for estimating additional exports of the EU15)

Using these methods, we found that thanks to EUR 140 billion (in fixed prices of 2005) for the implementation of the Cohesion Policy in V4, the additional imports of these countries from the EU15 will have reached EUR 75 billion for the entire period 2004-2015. If you take into

account that the EU15 countries will have spent about EUR 130 billion gross and about EUR 117 billion net on the Cohesion Policy in V4 (i.e. after allowing for the payments they receive under the Cohesion Policy - here we discuss only the net contributors, so we omit Greece, Portugal and Spain), it can be said that each net euro invested under the Cohesion Policy by EU15 comes back in the form of additional exports of 61 cents (57 cents if we do not include payments received by EU15 countries under the Cohesion Policy).

At the same time these benefits vary greatly depending on country and are greatest for Germany - both in absolute (EUR 30.7 billion) and relative terms (each euro spent on the Cohesion Policy is balanced by 1.25 euro net and 1.14 euro gross in additional exports). Net benefits of more than 1 euro are also recorded in Ireland and Luxembourg, but in their case it is primarily a low base effect (i.e. a small contribution to the Cohesion Policy), with relatively high additional exports. Obviously, the distinction between gross and net results depends much on how the EU15 country participates in the allocation of resources - for example in the case of Austria, the net effect (37 cent) is much lower than the gross effect (57 cent), which comes from the fact that Austria contributes significantly to the Cohesion Policy compared to received payments.

Figure 70. Summary of the benefits of additional exports (additional exports and contributions in EUR billion in 2005 - left axis; the share of additional exports in contributions (per cent) - right axis)

Source: IBS elaboration
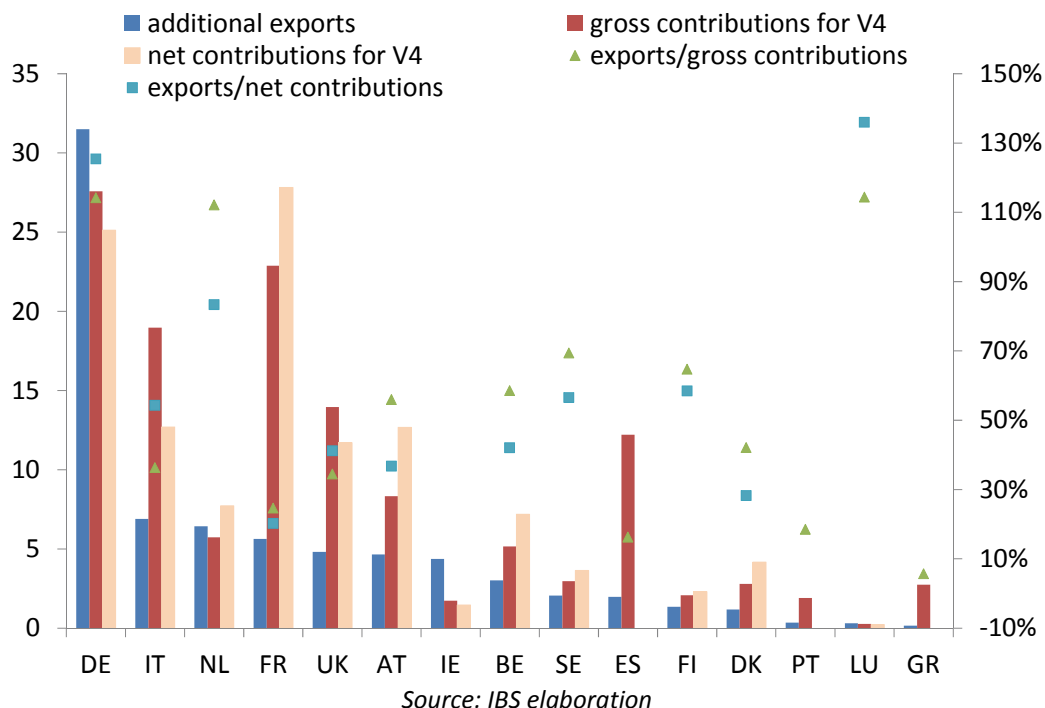
The effects of the Cohesion Policy are also unevenly distributed among the V4 countries. Due to differences in the size of economies and spending on the Cohesion Policy, the greatest additional exports go mainly to Poland (EUR 42.6 billion), followed by the Czech Republic (EUR

14.8 billion), Hungary (EUR 12.4 billion) and Slovakia (EUR 4.8 billion). The overall additional exports are closely related to the size of the expenditure from EU funds in the target country, but for Poland the effects are somewhat weaker, which is related to the greater openness and integration into the international market of the remaining V4 countries.

It should be noted that because the majority of expenditure in the examined period is yet to be spent, also in the case of additional exports, most of the estimated volume concerns the upcoming years, with maximum exports in 2012-2014.

Thanks to modelling and the analysis of import intensity in the examined economies, in the further part of the analysis we distinguished direct effects (using the results of questionnaire research among entities implementing projects financed by the EU), i.e. resulting from direct involvement of companies from EU15 in the implementation of projects (the direct effect of transaction) and companies from the V4 that belong to EU15 companies (the direct effect of capital). We estimated the total direct effect to be EUR 8.6 billion. Direct effects are characterised by a strong sectoral concentration. In the case of benefits related to contracts, 44 per cent of expenditure each go to construction and products of high and medium high technology. In the case of the capital channel, spending on construction accounted for as much as 84 per cent. As regards products supplied by EU15 companies, 62 per cent was other transport equipment (i.e. equipment primarily related to the implementation of large infrastructure projects), and a further 26 per cent for other machinery and equipment. In the case of total additional exports, sectoral concentration is less pronounced, but also in this case we estimate that the products of high and medium technology will have the highest share, reaching 37 per cent.

In the area of external effects, our analysis focused on innovation and R&D, environmental protection and transport systems. In these areas, the beneficial effects will be important for the whole Union, and should not be considered only in the context of the EU15. In all the categories analysed, the availability of European funding is crucial for the implementation of national policies, and in some cases European funds (combined with national funding) are almost the only source of funding for public intervention.

With regard to funds for R&D and support of innovation, it should be noted this assistance under the Cohesion Policy not only means the realisation of ideas formulated in Europe 2020, but also those in the interest of the richer EU countries. Although these benefits are mostly indirect, we have identified three main channels of influence: (1) the rapid development of knowledge and technology generated in V4 will improve knowledge and innovation across the EU through scientific and commercial R&D centres; (2) the improvement in human capital will also result in stronger R&D in the EU15, due to the migration of scientists and engineers; (3) the increased technological absorptive capacity of companies in Poland, the Czech Republic, Hungary and Slovakia will result in further development of the business market for technology exports from the EU15.

In the area of environment, it is most essential to reduce emissions and air pollution (which degrade the environment not only in the V4 but across the EU, as well as globally), and the preservation of unique natural resources. For the implementation of the environmental policy in the V4, it is not only important to directly finance projects in this area, but also general standards and requirements imposed by the EU in this area – also within projects financed from EU funds.

Expansion of transport infrastructure in the Visegrad countries under the Cohesion Policy also brings tangible benefits for other countries by increasing the capacity of European transport networks and greater safety on the roads of the V4 countries. The projects financed from the current financial perspective will provide long stretches of roads belonging to the TEN-T, used by the countries of Western Europe in economic exchange with the eastern part of the continent.

In summary, the overall impact is significant in comparison to resources allocated to the V4 under the Cohesion Policy. At the same time, in relation to total exports to the V4, it varies depending on the year and country, reaching a maximum of about 6 per cent of total exports. The influence on other macro aggregates (other than exports) is small, which results mainly from the fact that resources spent on the Cohesion Policy by EU15 are insignificant in comparison with the sizes of their developed and highly productive economies. These other effects seem much higher in comparison with the output of V4 countries. In addition, it should be borne in mind that although in this analysis we focused on additional exports resulting from the development of the V4 countries thanks the Cohesion Policy, the exports are financed directly or indirectly from public funds of net contributors. Thus, although the funds spent on the Cohesion Policy return to net contributors, their costs are completely real, and an additional 61 cents of exports is not a full equivalent of one contributed euro. On the other hand, that the V4 countries increase their imports due to the received funding is a natural consequence of such a model of development. It should be emphasised that the primary effect, important for the whole European Union, is that the Cohesion Policy contributes not only to the development of beneficiary countries, but increases economic and social integration across the Union and generates external effects that are beneficial to all Member States. Therefore, although the main purpose of this report was to show what the directions and intensity of export flows induced by the Cohesion Policy are, these exports are only one of many - and by no means the most important - arguments for the Cohesion Policy.

Table 8. Summary of benefits to EU15 countries resulting from implemetation of the Cohesion Policy in the V4

Category	Czech Republic	Poland	Slovakia	Hungary	V4 total
Spending on the Cohesion Policy	24.85	83.3	9.13	22.83	140.11
EU15 spending on the Cohesion Policy in the V4	23.06	77.33	8.48	21.19	130.06
Net contributions of the EU15 for the Cohesion Policy in the V4 (net contributors)	20.26	71.07	7.11	19.3	117.74
Total benefits of EU15	14.77	42.62	4.87	12.43	74.69
EU15 net contributors	14.29	41.27	4.71	11.92	72.19
Structure of total benefits; by EU15 country					
AT	8.45%	2.96%	10.83%	13.08%	6.24%
BE	5.02%	3.83%	3.03%	4.05%	4.05%
DK	1.04%	1.72%	1.62%	1.71%	1.58%
FI	0.97%	2.24%	1.13%	1.56%	1.80%
FR	7.33%	7.36%	9.56%	7.60%	7.54%
DE	51.91%	38.20%	44.58%	43.30%	42.17%
GR	0.18%	0.19%	0.56%	0.17%	0.21%
IE	1.75%	9.19%	1.14%	1.06%	5.84%
IT	8.21%	9.26%	12.57%	9.01%	9.23%
LU	0.41%	0.40%	0.68%	0.36%	0.41%
NL	5.23%	10.70%	3.88%	7.30%	8.61%
PT	0.46%	0.51%	0.41%	0.38%	0.47%
ES	2.59%	2.60%	2.44%	3.00%	2.66%
SE	2.10%	3.13%	2.05%	2.54%	2.76%
UK	4.33%	7.74%	5.58%	4.86%	6.45%
Indirect benefits	13.14	37.22	4.46	11.67	66.49
Direct benefits	1.63	5.4	0.41	0.76	8.20
contracts	1.44	4.97	0.35	0.63	7.39
ownership of capital	0.19	0.43	0.06	0.13	0.81
Total benefits as a percentage of EU15 spending on the Cohesion Policy in individual countries and the entire V4	64.05%	55.11%	57.43%	58.66%	57.43%
Total net benefits as a percentage of spending on the Cohesion Policy in individual countries and the entire V4	70.53%	58.07%	66.24%	61.76%	61.31%

Note: Absolute values are expressed in EUR billion in fixed prices of 2005.
Source: IBS elaboration.

Bibliography

Archibugi D., Coco A., 2005, Measuring technological capabilities at the country level: A survey and a menu for choice, Research Policy, 34, s. 175-194.

Badinger H., Breuss F., 2008, Trade and productivity: an industry perspective, Empirica, Vol. 35(2), 2008

Biuro Publikacji Unii Europejskiej,2010, Environmental statistics and accounts in Europe, Luksemburg

Bukowski M., Kowal P., Lewandowski P., 2011, Modelowa analiza rynków pracy o różnej strukturze instytucjonalnej, Instytut Badań Strukturalnych

Cohen W., Levinthal D., 1990, Absorptive Capacity: A new perspective on learning and innovation. Administrative Science Quarterly, 35: s. 128-152

Criscuoloa P., Narula R., 2008, A novel approach to national technological accumulation and absorptive capacity: aggregating Cohen and Levinthal, The European Journal of Development Research, Vol. 20, No. 1, s. 56–73

Cuaresma J.C., Wörz J., 2005, On Export Composition and Growth, Review of World Economics, vol. 141(1)

Cushman&Wakefield, 2010, Marketbeat: Raport o rynku nieruchomości w Polsce

Engels A., Ruschenberg T., 2008, The uneven spread of global science: patterns of international collaboration in global environmental change research, Science and Public Policy, 35(5), s. 347-360

Felbermayr, G., Prat, J., Schmerer, H-J., 2011, Trade and unemployment: What do the data say?, European Economic Review, Elsevier, vol. 55(6)

Fiedler J., Janiak P., 2003, Environmental Financing in Central and Eastern Europe 1996-2001, The Regional Environmental Center, Szentendre

Frankel J.A., Romer D., 1999, Does Trade Cause Growth? The American Economic Review, Vol. 89, No. 3

Fricker A. et al., 2005, An Experimental Comparison of Web and Telephone Surveys, Public Opinion Quarterly 69(3), 370-392

Galimberti J. K., 2009, Conditioned Export-Led Growth Hypothesis: A Panel Threshold Regressions Approach, MPRA Paper 13417

Gassmann O., Gaso B., 2004, Insourcing Creativity with Listening Posts in Decentralized Firms, Creativity and Innovation Management, 13(1)

Giles J. A., Williams C. L., 2000, Export-Led Growth: A Survey of the Empirical Literature and Some Non-Causality Results, Part I., Journal of International Trade and Economic Development, vol. 9, no.3

Goldberg, Itzhaak, 2011, Igniting Innovation: The Role of Government in Innovation in Emerging Europe and Central Asia, prezentacja wygłoszona na seminarium CASE

Górzyński M., 2009, Zagraniczne ośrodki naukowo-badawcze zlokalizowane w Polsce – analiza potencjału i oddziaływania, CASE, Warszawa

Greenaway D., Morgan W., Wright P., 1999, Exports, export composition and growth, Journal of International Trade & Economic Development, vol. 8(1)

Growiec J. i Zawistowski J. [red.], 2009, Ocena korzyści uzyskiwanych przez Państwa UE15 w wyniku realizacji polityki spójności w Polsce, Raport Końcowy, Instytut Badań Strukturalnych dla Ministerstwa Rozwoju Regionalnego, Warszawa

GUS, 2010, Działalność innowacyjna przedsiębiorstw 2006-2009

GUS, 2011, Nauka i Technika w Polsce w 2009 roku

Havas A., Nyiri L. [red.], 2007, National System of Innovation in Hungary, Background Report for the OECD country review 2007/2008

Howitt P., 2008, Endogenous growth theory, [w:] Durlauf S.N., Blume L. E. [red.], The New Palgrave Dictionary of Economics, Palgrave Macmillan

International Energy Agency, IEA Publications, 2011, CO2 Emissions from Fuel Combustion. Highlights, Paris

Katz J.S., Martin B.R., 1997, What is research collaboration?, Research Policy, 26, s. 1-18

Keller W., 1996, Absorptive Capacity: On the Creation and Acquisition of Technology in Development, Journal of Development Economics

Komicja Europejska, 2010, KOMUNIKAT KOMISJI „EUROPA 2020. Strategia na rzecz inteligentnego i zrównoważonego rozwoju sprzyjającego włączeniu społecznemu", KOM(2010) 2020 wersja ostateczna

Komisja Europejska, 2008, FP6 Final Review: Subscription, Implementation, Participation

Komisja Europejska, 2010, Ex-post Evaluation of Cohesion Programmes 2000-2006 Co-Financed by the ERDF. Work Package 5A: Transport

Komisja Europejska, 2010, Investing in Europe's future. Fifth report on economic, social and territorial cohesion

Komisja Europejska, 2011, Eurostat, PocektBook: Key Figures on Europe

Komisja Europejska, 2011, Fourth FP7 Monitoring Report: Monitoring Report

Komisja Europejska, Raphaël Goulet [red.], 2008, Polityka spójności UE 1988-2008: Inwestowanie w przyszłość Europy, Inforegio Panorama Nr 26, DG ds. Polityki Regionalnej

Lundvall B-A., Borras S., 2005, Science, Technology, and Innovation Policy, [w:] Fagerberg J., D. C. Mowery, R. C. Nelson [red.], The Oxford Handbook on Innovation, s. 599-631, Oxford University Press

Mo P. H., 2010, Trade Intensity, Net Export, and Economic Growth, Review of Development Economics, Vol.14, Issue 3

Mowery D.C, 1995, The Practice of Technology Policy, [w:] Stoneman P. [red.], Handbook of Innovation and Technological Change, Blackwell, s. 513-557

Mowery D.C, Sampat B. N., 2005, Universities in National Innovation Systems, [w:] Fagerberg J., Mowery D. C., Nelson R. C. [red.], The Oxford Handbook on Innovation, Oxford University Press, s. 209-239

Narula R., Zanfei A.,2005, Globalization of Innovation, [w:] Fagerberg J., Mowery D. C., Nelson R. C. [red.], The Oxford Handbook on Innovation, Oxford University Press, s. 318-345

Nodzyński R., 2009, Energochłonność i elektrochłonność gospodarki oraz emisyjność CO2 w 27 państwach członkowskich UE na tle poziomu ekonomicznego tych państw oraz wymagań ograniczenia wzrostu zużycia energii i emisji CO2,Energetyka

OECD, 2007, Growing unequal, OECD: Paryż

Pavitt K., 2005, Innovation Process, [w:] Fagerberg J., Mowery D. C., Nelson R. C. [red.], The Oxford Handbook on Innovation, Oxford University Press, s. 86-114

Peri G., 2011, The Effect of Immigration on Productivity: Evidence from US States, Review of Economics and Statistics [w druku]

OECD, 2002, Podręcznik Frascati Pomiar działalności naukowo-badawczej: Proponowane procedury standardowe dla badań statystycznych w zakresie działalności badawczo-rozwojowej

Peri G., Sparber C., 2011, Highly Educated Immigrants and Native Occupational Choice, Industrial Relations, Vol. 50 No 3., s.385-411

SCImago, 2011, SJR — SCImago Journal & Country Rank

Skrok Ł., 2010, Ocena korzyści uzyskiwanych przez Państwa UE15 w wyniku realizacji polityki spójności w Polsce, Aktualizacja, Instytut Badań Strukturalnych dla Ministerstwa Rozwoju Regionalnego, Warszawa

Speck S., McNicholas J., Markovic M. [red.], 2001, Environmental Funds in Candidate Countries, The Regional Environmental Center, Szentendreation

Tyfield D., Zhu Y., Cao J., 2009, The importance of the 'international collaboration dividend': the case of China, Science and Public Policy, 36(9), s. 723-735

Waters J. L., 2009, 'Immigration', in R. Kitchen and N. Thrift (eds.) International Encyclopedia of Human Geography, Vol. 5 Oxford: Elsevier, s. 297 – 307

Weber J-L., 2011, An experimental framework for ecosystem capital accounting in Europe, Technical Report EEA, Nr 13

Zawistowski J. [red.], 2010, Ocena wpływu polityki spójności na wzrost konkurencyjności i innowacyjności polskich przedsiębiorstw i gospodarki, Instytut Badań Strukturalnych

List of figures

List of maps

List of tables

Annex 1: Methodology of the research

In this subsection we present the methodology of the study. We start with a presentation of assumptions necessary for the proposed method. Then we give a detailed description of the microeconomic and macroeconomic survey. Finally, we show response rates for the CAWI survey.

In the beginning we present our assumptions. The next part of the Annex describes the microeconomic study, the CAWI survey and the methods of primary data analysis. Then we describe the EUImpactMOD V4 macroeconomic model applied in this study to estimate the effect of the implementation of the Cohesion Policy on the V4 economies. At the end, we provide the details of the multi-stage macroeconomic survey.

Assumptions

The analyses in this study, both in micro- and macroeconomic aspects, required the adoption of a number of assumptions. In many cases this was a sine qua non condition for the realisation of the research in the proposed form. In other cases – methodological assumptions allowed us to simplify the research considerably .

A. n+2 principle. We assume that funds directed under the Cohesion Policy to V4 countries will have been spent by 2015 at the latest.

B. The principle of equal distribution of payments for contractors. In situations where the remuneration had to be split among the tasks performed by the contractor (when the contractor performed more than one task) or between individual members of the consortium (in a situation where the contractor was a consortium of companies engaged in similar tasks), we assumed equal division of wages.

C. Full absorption of EU funds. We assumed that in the current EU perspective, all funds will be allocated in full to all operational programs. In other words, 100 per cent of the budgets of individual programmes and priority axes will have been spent in 2007-2015.

D. With regard to the future, we adopted the general principle of continuation - we assumed that the future will be similar to the present and the past, as an extension of current trends or the current situation (when the data does not show any specific trends in recent years).

E. Proportionality of the impact of structural funds on V4 economies. It is assumed that the impact of funding on the gross domestic product in each

sector will be proportional to the share of the industry in the sum of expenditures of projects financed from EU funds (see the description of the step 1 of the macroeconomic survey included in this methodological Annex). The sectoral breakdown of European funds in each country was based on CAWI results - a description of this procedure is presented in the relevant chapter of the Annex.

F. Input-output tables are created and published at different intervals, and usually with a long delay. At the moment, the latest available version of the tables for all V4 countries is from 2005. This is why most calculations had to be made with the use of input-output tables from 2005. This implies that import intensity, import structure tables, and production structure tables (the Leontief matrix) used in the study refer to the year 2005. Consequently, all the relationships between production and imports are adopted at the level observed in 2005. Adequacy and precision of test results is therefore based on the assumption of invariance of these relationships over time.

G. Stability of the detailed structure of V4 imports. Statistical data on the structure of foreign trade by industry and partner countries (OED and Eurostat) concern the years 2004-2009. For this reason, for 2010-2015 we assumed that the structure of suppliers of goods and services within each sector for each V4 country will be identical with the structure of 2009.

Methodology of the microeconomic survey

The microeconomic survey was based on the CAWI conducted on the full sample of beneficiaries of the current EU financial perspective in the V4 countries. These results in the sample (described in detail in one of the subsections) are then generalised to the full population of beneficiaries. The CAWI results were then used in two areas of research: estimation of direct benefits (related to obtained contracts and ownership of capital) and the calculation of the sectoral structure of the impact of EU funds on the economy.

Figure 1. Logic behind the microeconomic study
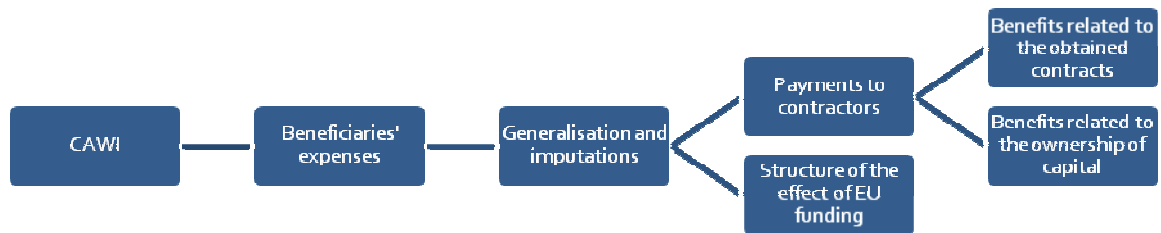
CAWI survey

In order to identify the direct effects of the Cohesion Policy in V4 countries on the EU15, it is necessary to estimate the value of contracts during the implementation of EU projects in the V4 obtained by companies from the EU15.

Such information may not always be publicly available. Although in the case of projects implemented by public institutions, information about projects is usually made public (in the published tender documents or public information bulletins). In the case of projects implemented by private or non-profit organisations, such information is often not published. Moreover, even if all the information about the implementation of all EU projects was available, it would impossible to collect them individually due to the number of projects, more than 150 thousand in the V4. [30] The dispersion of information would also necessitate creating large databases "from scratch".

Due to the large number of realised projects, and hence the large sample size, we decided to obtain information on the realisation of projects using a Computer Assisted Web Interview (CAWI). The choice of a web interview was made due to the sample size and its characteristics. In particular, the difficulty with reaching beneficiaries of EU funds in the four countries with four different languages created a significant barrier for using standard survey methods (see Box 11).

For the purpose of this research, the web interview was constructed in four languages: Polish, Czech, Slovak and Hungarian. Moreover, we used two types of web forms:

- Web questionnaire designed and managed using the 2ask.net platform
- Excel form, designed by IBS

The form sent to individual beneficiaries was made according to the size (total value) of the project. The beneficiaries of 'large' projects (mostly infrastructural ones, e.g.

---

[30] *The total number of all projects realised under the financial perspective 2007-2013.*

road and railway projects)[31] were sent Excel forms that made it possible to provide all significant contractors in a given project (up to thirty). The remaining beneficiaries were sent web questionnaires that could include only the three largest contractors.

Box 11. Advantages of CAWI over other surveys

The Computer Assisted Web Interview is an efficient tool for obtaining information, first of all in the case when the population of respondents is relatively large (Fricker, 2005). In a study on beneficiaries of EU funding, the examined population is relatively large and also highly dispersed, as the survey focuses on four Visegrad Group countries. Obtaining information on the project contractors using other methods would have required much greater resources, both in term of money and time. However, it is not clear if we would have obtained greater effectiveness using other methods of data collection.

Using an analysis of project documentation would have required a considerable drop in the number of respondents due to the sheer task of reviewing the documentation from such a great number of projects. Furthermore, significant regulatory differences concerning drafting reports among V4 countries and individual programmes in one country would have created significant difficulties with the comparability of data. A large population of EU funding beneficiaries would also make it difficult to conduct other forms of survey, e.g. telephone interview or in-depth interviews, as this would require personal involvement of interviewers. It should be borne in mind that the survey was conducted across four countries with different official languages, which would also hamper the effectiveness of a survey. Therefore the web interview seemed to be an appropriate tool for this specific research.

Main assumptions of CAWI

The main goals of CAWI were the following:

1. Obtaining information on the value of contracts obtained by companies during the execution of projects;
2. Determination of the geographical structure of the firms' origin (e.g. which country the company is from);
3. Identification of capital links between the contractors and their parent companies.
4. Determination of the sectoral structure of financial assistance under the Cohesion Policy (i.e. to which sector a given company belongs to).

---

[31] *'Large projects' were selected individually for each V4 country. In Poland, these were projects with the total value greater than PLN 200 million (roughly EUR50 million). For Hungary and Slovakia, the 'large projects' were selected using the criterion of at least 20 per cent allocation in the total EU funding, and minimum value of EUR 50 million.*

As already mentioned, CAWI is a tool which we used to identify direct financial flows to the EU15 resulting from the projects realised in the V4. To obtain this information we asked the beneficiaries to provide the values of the five largest contracts granted to external companies, and then we proceeded with detailed questions on the characteristics of a given contractor. In particular, we asked about the country of origin, and if it was the homeland of the beneficiary of the project, we asked about the ownership of capital in that company. Moreover, the questionnaire included a series of questions on the sector in which the contractor operated, asking about the tasks performed by the contractor. The responses were constructed in such a way so that they could be assigned to NACE 1.1 codes of sectoral classification.[32] [33]

The methodology of the survey used a series of questions from general to more detailed. It means that in the first question on the character of the task performed by the contractor, it was possible to choose four responses (supply of materials, rendering services (except for printing services), construction, waste management. In the next questions, depending on the selected category, we asked about more details concerning the task. The obtained list of tasks and corresponding NACE codes is presented in Table 1.

Table 1 NACE AND CAWI SECTORAL CLASSIFICATIONS

NACE	Name of the category/sub-category in the sectoral structure
1	Supply of products
D	Supply of manufacturing sector products
15,16	Food products, beverages and tobacco
17-19	Textiles and textile products
20	Wood and wood products (except furniture)

---

[32] *The choice of the NACE 1.1 classification (and not the 2.0 version) was related to the need of maintaining cohesion among all the sources of data used in this study. In particular, standard input-output tables (Eurostat) are still constructed using the NACE division into 59 sectors. At the same time, at the adopted level of detail, there exists no methodologicallycorrect way of converting the individual sectoral data between the two types of classification.*

[33] *In the national languages of V4 countries, the NACE is referred to as: PKD - Polska Klasyfikacja Działalności (Poland), TEÁOR - Gazdasági Tevékenységek Egységes Ágazati Osztályozási Rendszere (Hungary), OKEČ - Odvetvová klasifikácia ekonomických činností (Slovakia) and OKEČ - Odvětvová Klasifikace Ekonomických Činností (Czech Republic).*

21,22	Pulp, paper and paper products
24	Chemicals, chemical products and man-made fibres
23,25	Products of petrochemical industries, nuclear fuel, rubber and plastic products (division into two categories according to NACE)
26-28	Products of mill industries (division into categories according to NACE)
29-35	Products of machine industries (broken down into the following categories):
30-33	Electrical and optical equipment (categories according to NACE)
34,35	Transport equipment (categories according to NACE)
29	Machinery and equipment not elsewhere classified
36,37	Manufacturing not elsewhere classified
E	Electricity, gas and water supply
A,B,C	Supply of other materials
1,2,5	Agriculture, hunting, forestry and fishing
10-14	Supply of mining and quarrying products
F	Construction
45	Construction
3	Services
50-52	Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods
55	Hotels and restaurants
60-63	Transport (in NACE categories)
64	Post and telecommunications
65-67	Financial intermediation (in NACE categories)
70	Real estate activities
71	Renting of machinery, equipment, personal and household goods

72	Computer and related services
73	Research and development
74	Other business activities
80	Education
85	Health and social work
90	Sewage and refuse disposal, sanitation and similar activities
0	Other community, social and personal service activities

Sample size and response rates

Table 2. Response rates broken down by country and operational programme

Country	Programme	Number of questionnaires sent	Number of questionnaires received	Sample response (% of value of projects)
Czech Republic	Human Resources and Employment OP	2956	707	3.29 %
Poland	Infrastructure and environment OP	607	154	41.16 %
	Innovative Economy OP	6332	819	10.24 %
	Human Capital OP	14598	4496	8.59 %
	Technical Assistance	0	0	0.00 %
	Regional Operational Programme of Mazovia	234	100	9.29 %
	Podlaski Regional Operational Programme	781	219	39.94 %
	Development of Eastern Poland Operational Programme	115	56	17.71 %
	Wielkopolska Regional Operational Programme	1032	276	21.08 %
Slovakia	OP Bratislava Region	167	30	6.91 %
	OP Competitiveness and Economic Growth	702	94	7.50 %
	OP Education	485	123	2.26 %
	OP Employment and Social Inclusion	1114	157	45.60 %
	OP Environment	375	78	82.92 %
	OP Health	60	12	9.16 %
	OP Informatisation of Society	26	3	5.20 %
	OP Research and Development	132	30	0.84 %
	OP Technical Assistance	13	5	0.00 %
	OP Transport	16	4	0.01 %
	Regional OP	945	159	5.31 %
Hungary	AROP	384	82	3.68 %
	DAOP	881	241	16.20 %
	DDOP	526	152	14.56 %
	EAOP	908	174	8.96 %
	EKOP	40	6	1.36 %
	EMOP	1133	210	14.51 %
	GOP	10957	1288	12.35 %
	KDOP	581	117	13.28 %
	KEOP	1844	472	3.05 %
	KMOP	3906	594	16.71 %
	KOZOP	149	24	1.65 %
	NYDOP	583	129	15.12 %
	TAMOP	4709	1659	5.47 %
	TIOP	1577	551	16.74 %

	VOP		72	6	0.21 %

Notes: Red colours denote programmes where imputation procedures were used. The number of sent (and received) questionnaires does not reflect the number of projects realised in the V4 – when the beneficiary realised 3 or more projects under the same Measure, they were sent one questionnaire for all projects.

Source: IBS elaboration.

Analytical weights

The total value of finances covered by projects in CAWI data is 67 per cent of the total value of EU funds granted to V4 countries in the current financial perspective. In order to draw valid conclusions on the size of direct benefits to the EU15, one needs to generalise the obtained sample into the full population. Due to the different response rates in individual programmes (from 0 per cent in case of OP Technical Assistance to 93 per cent in Slovak OP Environment) and large differences in the response rates within individual programmes, we decided to assign an analytical weight to each observation, established at the level of priority axes of the operational programmes in the V4.

Moreover, in order to isolate the effects of the European funds in V4, we decided to take into account only this part of projects' budgets which were financed by European funds. That is why we calculated the share of EU funding for each priority axis, based on the budget reports of operational programmes.

Finally, the analytical weights are given in the following formula:

$$\delta_{pa}^{(i)} = \frac{A_{pa}^{(i)}}{\sum_{n=1}^{N(pa)} E_{pa,n}^{(i)}} u_{pa}^{(i)}$$

$$A_{pa}^{(i)}$$

Where $A_{pa}^{(i)}$ denotes the total budget of the given priority axis (*pa*) in a country *i*, $E_{pa,n}^{(i)}$ denotes the budget of the nth project, and $u_{pa}^{(i)}$ - the share of EU funds in financing the given priority axis. The weights adopted for individual programmes and priority axes are presented in the Table below.

Table 3. Analytical weights for individual priority axes and operational programmes in V4

Country	Programme	Priority	Participation of the EU	Weight	Country	Programme	Priority	Participation of the EU	Weight
Czech Republic	OP HRE	4	85 %	3.23	Poland	POKL	1	85 %	8.66
Poland	POIŚ	1	85 %	3.28	Poland	POKL	2	85 %	8.30
Poland	POIŚ	2	85 %	3.28	Poland	POKL	3	85 %	17.14
Poland	POIŚ	3	85 %	3.28	Poland	POKL	4	85 %	10.34
Poland	POIŚ	4	75 %	3.28	Poland	POKL	5	85 %	5.16
Poland	POIŚ	6	85 %	1.10	Poland	POKL	6	85 %	16.80
Poland	POIŚ	7	70 %	30.49	Poland	POKL	7	85 %	6.30
Poland	POIŚ	8	85 %	2.24	Poland	POKL	8	85 %	38.55
Poland	POIŚ	9	70 %	49.59	Poland	POKL	9	85 %	24.48
Poland	POIŚ	10	85 %	49.59	Poland	RPO WM	1	85 %	10.65
Poland	POIŚ	11	85 %	1.88	Poland	RPO WM	2	85 %	10.65
Poland	POIŚ	12	85 %	2.54	Poland	RPO WM	3	85 %	10.65
Poland	POIŚ	13	85 %	6.02	Poland	RPO WM	4	85 %	19.76
Poland	POIG	1	85 %	8.97	Poland	RPO WM	5	85 %	16.98
Poland	POIG	2	85 %	5.74	Poland	RPO WM	6	85 %	9.83
Poland	POIG	3	85 %	11.15	Poland	RPO WM	7	85 %	5.60
Poland	POIG	4	85 %	11.15	Poland	RPO WP	1	100 %	4.45
Poland	POIG	5	85 %	24.69	Poland	RPO WP	2	100 %	1.87
Poland	POIG	6	85 %	8.56	Poland	RPO WP	3	100 %	1.87
Poland	POIG	7	85 %	9.99	Poland	RPO WP	4	85 %	1.87
Poland	POIG	8	85 %	9.99	Poland	RPO WP	5	100 %	4.14
Poland	WRPO	1	84 %	9.85	Poland	RPO WP	6	87 %	3.06
Poland	WRPO	2	66 %	3.59	Poland	PO RPW	1	85 %	3.06
Poland	WRPO	3	80 %	5.11	Poland	PO RPW	3	85 %	10.06
Poland	WRPO	4	72 %	13.50	Poland	PO RPW	4	85 %	6.65
Poland	WRPO	5	80 %	3.87					
Poland	WRPO	6	70 %	3.53					
Slovakia	OP BR	1	85 %	14.48	Slovakia	OP ESI	1	36 %	2.06
Slovakia	OP BR	2	85 %	14.48	Slovakia	OP ESI	2	85 %	2.06
Slovakia	OP BR	3	85 %	14.48	Slovakia	OP ESI	3	85 %	2.06
Slovakia	OP CEG	1	85 %	12.50	Slovakia	OP ESI	4	85 %	2.06
Slovakia	OP CEG	2	85 %	13.28	Slovakia	OP Env	1	85 %	1.98
Slovakia	OP CEG	3	85 %	29.38	Slovakia	OP Env	2	85 %	6.62
Slovakia	OP CEG	4	85 %	4.32	Slovakia	OP Env	3	85 %	0.70
Slovakia	OPEd	1	85 %	35.37	Slovakia	OP Env	4	85 %	0.27
Slovakia	OPEd	2	85 %	88.16	Slovakia	OP Env	5	85 %	4.95
Slovakia	OPEd	3	85 %	60.10	Slovakia	ROP	1	85 %	18.25
Slovakia	OPEd	4	85 %	19.93	Slovakia	ROP	2	85 %	18.25
Slovakia	OPH	1	85 %	9.02	Slovakia	ROP	3	85 %	18.25
Slovakia	OPH	2	85 %	32.88	Slovakia	ROP	4	85 %	18.25

					Slovakia	ROP	5	85 %	18.25
Hungary	AROP	1	85 %	22.68	Hungary	KDOP	1	85 %	6.64
Hungary	AROP	2	85 %	54.72	Hungary	KDOP	2	85 %	9.83
Hungary	AROP	3	85 %	29.85	Hungary	KDOP	3	85 %	9.15
Hungary	DAOP	1	85 %	8.65	Hungary	KDOP	4	85 %	7.54
Hungary	DAOP	2	85 %	5.14	Hungary	KDOP	5	85 %	4.52
Hungary	DAOP	3	85 %	7.15	Hungary	KEOP	2	85 %	37.14
Hungary	DAOP	4	85 %	3.27	Hungary	KEOP	3	85 %	37.14
Hungary	DAOP	5	85 %	10.85	Hungary	KEOP	4	85 %	12.50
Hungary	DDOP	1	85 %	7.78	Hungary	KEOP	5	85 %	4.92
Hungary	DDOP	2	85 %	10.62	Hungary	KEOP	6	85 %	13.65
Hungary	DDOP	3	85 %	3.28	Hungary	KMOP	1	85 %	7.11
Hungary	DDOP	4	85 %	15.75	Hungary	KMOP	2	85 %	8.91
Hungary	DDOP	5	85 %	7.02	Hungary	KMOP	3	85 %	5.34
Hungary	EAOP	1	85 %	5.71	Hungary	KMOP	4	85 %	3.97
Hungary	EAOP	2	85 %	9.92	Hungary	KMOP	5	85 %	5.22
Hungary	EAOP	3	85 %	30.90	Hungary	NYDOP	1	85 %	6.33
Hungary	EAOP	4	85 %	8.92	Hungary	NYDOP	2	85 %	10.56
Hungary	EAOP	5	85 %	14.99	Hungary	NYDOP	3	85 %	7.12
Hungary	EKOP	1	85 %	36.58	Hungary	NYDOP	4	85 %	7.44
Hungary	EMOP	1	85 %	5.18	Hungary	NYDOP	5	85 %	3.60
Hungary	EMOP	2	85 %	21.61	Hungary	TAMOP	2	85 %	8.70
Hungary	EMOP	3	85 %	8.35	Hungary	TAMOP	3	85 %	17.18
Hungary	EMOP	4	85 %	6.94	Hungary	TAMOP	4	85 %	6.63
Hungary	EMOP	5	85 %	2.46	Hungary	TAMOP	5	85 %	19.94
Hungary	GOP	1	85 %	10.83	Hungary	TAMOP	6	85 %	79.71
Hungary	GOP	2	85 %	3.47	Hungary	TIOP	1	85 %	3.35
Hungary	GOP	3	85 %	28.68	Hungary	TIOP	2	85 %	8.24
					Hungary	TIOP	3	85 %	6.96

Source: IBS elaboration.

Data imputation

Conducting a survey is associated with the risk of an insufficient response rate. Obviously, in order to reduce this risk we made a number of standard steps such as attaching a letter of recommendation informing about the goals and motivations of this study, and prompting the potential respondents several times. Nonetheless, certain circumstances of this particular study increased the aforementioned risk. These were

- according to our experience, the beneficiaries of the projects had participated in various evaluation studies, and with the growing number of

questionnaires, their readiness to participate in further surveys significantly decreases.

- moreover, the inclusion of the Czech Republic, Slovakia and Hungary meant that the respondents took part in a survey conducted by a foreign entity (IBS) which could have significantly decreased their willingness to participate in it.

This is why the level of sample response in the remaining V4 countries was inadequate. In the Czech Republic we did not obtain a distinct majority of necessary data on beneficiaries. Hence before our analyses of direct benefits could be conducted, we had to perform an imputation of the lacking data. We used two methods of imputation: one using the results of our previous study, realised by IBS for the previous financial perspective in Poland; and one using the results of the microeconomic survey for Poland. The list of programmes and priorities, along with the applied imputation method, is given in the Table below.

Regardless of the method of imputation, the operational aspect remains the same. The remuneration of contractors (from the EU15) is given by:

$$W_s^{(i)(u)} = \sum_{k=1}^{K} \left(E_k^{(i)} u_k^{(i)} W_k^{(i)} \omega_{k,s}^{(i)(u)} \right)$$

Where $E_k^{(i)}$ denotes the total value of projects of type k (see the Table above) in a given country, $u_k^{(i)}$ is the share of EU funding, $W_k^{(i)}$ is the share of remuneration to all contractors in projects of a given type, and $\omega_{k,s}^{(i)(u)}$ is the share of contractors from a country i, performing tasks for the sector s. Contractors with headquarters in V4 countries but with majority capital from the EU15 were subject to similar calculations.

Table 4. Presentation of the performed imputations of microeconomic data.

Country	Programmes (priority axes)	Method of imputation
Czech Republic	**Transport infrastructure** (OP Transport, regional programmes)	**Previous perspective** (FS & SPOT)
	Environment and energy (OP Environment)	**Current perspective** (POIŚ)

	R&D, support for business (OP Enterprise and Innovation, OP Research and Development, regional programmes)	**Current perspective** (POIG)
	Human capital (OP Human Resources and Employment, OP Education for Competitiveness, regional programmes)	**Current perspective** (POKL)
	Technical assistance (OP Technical Assistance, technical assistance of regional programmes)	**Previous perspective** (PT)
Poland	**13 remaining** regional programmes	**Current perspective** (3 regional programmes: Mazowiecki, Podlaski, and Wielkopolski)
		Previous perspective (PT)
	OP Technical assistance and technical assistance under other OPs	
Slovakia	**Transport infrastructure** (OP Transport)	**Previous perspective** (FS & SPOT)
	Infrastructure and ICT development (OP Informatisation of Society)	**Current perspective** (POIG)
	Support for business and R&D (OP Research and Development)	**Current perspective** (POIG)
	Technical Assistance (OP Technical Assistance and technical assistance of operational programmes)	**Previous perspective** (PT)
Hungary	**Transport infrastructure** (KOZOP)	**Previous perspective** (FS & SPOT)
	Environment and energy (KEOP 1)	**Current perspective** (POIŚ)
	Human capital (EKOP, TAMOP: 1, 7, 8)	**Current perspective** (POKL)

	Technical assistance (VOP, technical assistance of operational programmes)	Previous perspective (PT)

Source: IBS elaboration.

Estimating the structure of the impact on the economy.

One of the main goals of the microeconomic survey was to establish the sectoral structure of the impact of structural funds (necessary for the estimation of total benefits obtained by the EU15 due to implementation of the Cohesion Policy in the V4). The structure of the CAWI (both the Excel form and the website questionnaire) allows a detailed division of spending of EU projects into 10 economic categories (see the Table below) corresponding to economic sectors. Estimations of the structure of the impact of the EU funds requires the inclusion of the sectoral structure of expenditure on contractors and suppliers, the structure of consumption expenditure within the project, the structure of value added (direct effect of public funds spent as assistance to enterprise and entrepreneurs) and the structure of other expenditures (telecommunications, water, gas, electricity and others).

For the part of expenditures under the examined projects, it was possible to assign financial flows to specific sectors. For example, expenditure on telecommunication services was assigned to section 64 (post and telecommunications), and administrative expenditure to section 75 (public administration). At the same time an analogous operation was not possible for a considerable part of the expenditure (expenses on own employees, financial support for individuals) – in this case it was assumed that these funds will impact the economy according to the structure of private consumption expenditures in a given country (based on the input-output table for domestic goods).

Table 5. Expenditure of the initiators of projects reported in CAWI and corresponding economic sectors.

Type of expenditure	Economic sector
Expenditure on external contractors and suppliers	Various sectors, broken down by type of activity of the project contractors
Expenditure on telecommunication services	Post and telecommunications

Expenditure on own employees	Various sectors, division by national structure of private consumption
Administrative expenditure	Public administration and defense, compulsory social security and health insurance
Expenses associated with the transmission of water, energy and gas	Production and supply of electricity, gas, water
Expenditure on delegations, domestic training	Education
Expenditure on delegations, overseas training trips	Nowhere
Expenditure on the purchase of land and real estate	Real estate
Financial assistance to businesses and entrepreneurs	Different sectors, division by national structure of value added
Financial assistance for individuals without their own companies	Various sectors, division by national structure of consumer spending
Other	Various sectors, division by national structure of consumer spending

Finally, the share of the sectors *s* in expenditures under the Cohesion Policy is given by the formula:

$$E_s^{(i)} = E_{(w,s)}^{(i)} + (\llbracket va \rrbracket_s(s, 2005)^{(i)}) / (\sum_{(s=1)}^{59} \llbracket va \rrbracket_s(s, 2005)^{(i)}) \, E_{sup}^{(i)}$$

Where $E_{w,s}^{(i)}$ is the remuneration for contractors in the sector *s*, $E_{sup}^{(i)}$ the expenditure classified as support for enterprises, $E_c^{(i)}$ is the sum of expenditures classified as private

consumption, while Y_s is the remaining part of the expenditure attributable to that sector (see Table 12).

Estimating benefits related to the ownership of capital

The starting point for estimating direct benefits derived by the EU15 through the capital channel were the salaries of contractors established in the V4 that realised projects financed with EU funds, and with a majority share of foreign capital. In our study a contractor with a majority foreign capital means both subsidiaries of companies established abroad and a native company with a majority foreign owner.

For the purposes of this study, we assumed that benefits related to the ownership of capital can be equated with additional dividends and other incomes related to the ownership of capital received by entities in the EU15. Thus, we assumed that a certain percentage of the wages of foreign contractors increased their profits, which were subsequently transferred abroad. This percentage is estimated on Eurostat data on the finances of companies with foreign capital. It is equal to the quotient of; (1) $sur_s^{(V4)(u)}$ the gross operating surplus obtained by companies with foreign capital (from the country u in the EU15) operating in the sector s, minus the average VAT rate in the V4 country's economy, and $earn_s^{(V4)(u)}$

(2) . their revenues.

$$\Delta im\_cap_s^{(i)(u)} = \sum_{n=1}^{N} W_{n,s}^{(i)(u)} \frac{sur_s^{(V4)(u)}}{earn_s^{(V4)(u)}} (1 - \tau_{VAT})$$

Brief description of the EUImpactMOD model

The EUImpactMOD V4 model is a modern structural macroeconomic model belonging to the group of *Dynamic Stochastic General Equilibrium* models (DSGE). It has both the general properties of DSGE models (see Box 12) and specific properties that are important for this study. In particular this means that EUImpactMOD V4:

- takes into account the presence of the European Union and its support in the form of structural funds,

- is multi-sectoral, so one can examine the impact of EU funds in different sectors of the economy,
- has a government whose policies (including decisions about the allocation of European funds) affect the state of the economy,
- funds from the European Union are divided into three categories: transfers, investment, and human resource development, making it possible to separately study their individual impacts on the economy.

The EUImpactMOD V4 is a model of an open economy whose main elements include the home country and the abroad (i.e. other EU Member States). Foreign countries are symmetric in relation to the home country, i.e. they are modelled as one entity, using the same mathematical structures, with the same types of entities, sectors and markets as in the base country. Differences between the domestic and foreign economies result from different parametrisation of the two areas, so that the fundamental economic variables such as the size of individual sectors, the size of investment, consumption, etc. have values that are close to real ones.

Box 12 General characteristics of DSGE models
In DSGE models, the decisions taken by economic agents (households, firms) concern many periods. Events from the past and expectations for the future play an important role. Moreover, the actions of individuals are significantly affected by the uncertainty and random nature of many phenomena they have to deal with. These models are formulated in general equilibrium, which means that economic actors in their decisions also take into account their expectations about the reactions of others, and that demand equals supply on all markets.   In comparison of other classes of macroeconomic models (e.g. econometric models, multi-equation models), the DSGE methodology has significant advantages, for example: it is strongly rooted in widely recognized knowledge the functioning of the economy, allows for the expectations of economic actors, and is relatively resistant to the typical shortcomings and deficiencies of statistical data.

Importantly, the model includes a detailed representation of the relationship between the Visegrad Group countries and the EU that is critical from the viewpoint of this study, i.e. financial support through Structural Funds. This support was taken into account in a direct way and consistent with their actual activity (i.e. money transfers operate in exactly the same way; investment of the state and local governments increases the size of public investment, etc.).

The EUImpactMod V4 is also a multi-sectoral model, taking into account 11 distinctive sectors of the economy:

- The agricultural sector, including agriculture, forestry, hunting, fishing
- Industrial sectors: light industry, heavy industry, energy, construction, mining and quarrying;

- 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 funds coming from taxes (PIT, CIT and VAT) and additional sources (profit earned by the central bank) and spending them on various targets. In particular, the state allocates funds to:

- Public consumption (including, for example, training, education and research and development);
- Investments in different types of infrastructure - both in 'hard' infrastructure, i.e. transport, telecommunications and environmental infrastructure, as well as social infrastructure such as health care;
- Subsidies for companies from different sectors.

The government may also borrow by issuing bonds purchased by domestic and foreign entities - it is therefore possible to operate with a budget deficit.

In the public sector balance sheet, the EU institutions take a special place. On one hand the EUImpactMOD V4 model reflects the settlement system of the Member States through contributions, while on the other, it reflects the deliberate nature of the spending of European funds. All the above-mentioned categories of expenditure may be financed with the assistance of European funds. Detailed relationships of financial flows are shown in Figure 2.

The EUImpactMod V4 model was created separately for each state in the Visegrad Group, where the foreign sector represents all the EU Member States except the home country. Hence all the models have the same mathematical structure; differences in models result only from the different parametrisation of the base country.

The parameters of each model can be divided into three groups:

- Parameters describing the macroeconomic variables in the steady state, such as the share of individual sectors in the economy, taxes, etc.

- Parameters determining the elasticity of substitution (e.g. in the functions of the firms' production) and relative standard deviations between the individual variables.

- Parameters determining exogenous shocks, in particular the standard deviations of shocks and their autocorrelations.

The values of necessary parameters for each country were calibrated (e.g. adjusted, calculated directly on the basis of statistical data) with the use of the latest available

macroeconomic data concerning the countries of the Visegrad Group and European Union.

Figure 2. Diagram of the EUImpactMOD V4 model
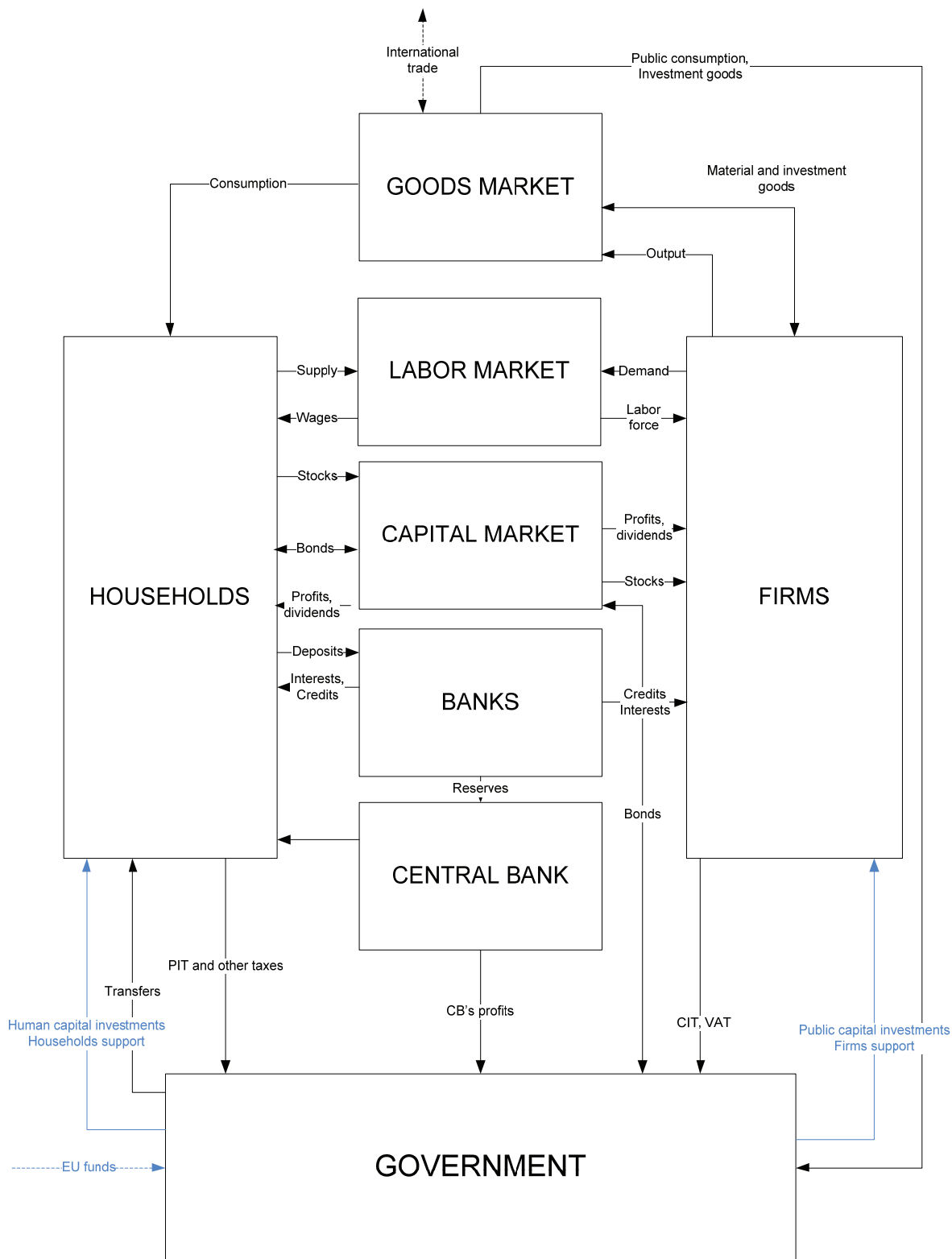
Source: IBS elaboration

The calibration procedure used the following input data:

- a wide range of macroeconomic data, e.g. GDP, gross value added, consumption, revenue and expenditure of the national and local government budgets, information on the labour market. For the description of between-sector relationships we used the latest available input-output table (Eurostat)

- Results of economic studies on e.g. consumer behaviour, size of foreign trade and activity of enterprises.

- Data on the allocation of European funds and sizes of support from European funds.

As a result, thanks to the application of the EUImpactMod V4 we estimated the impact of EU funds on the V4 economies, defined as the per cent deviation from GDP level, export/import of a given economy, in a situation without EU funds.

Methodology of the macroeconomic study

The eight-stage macroeconomic analysis described below was the most important instrument for meeting the objectives of this research. It was based on the combination of micro- and macro-economic perspectives. The basis formed the results of the microeconomic survey of the beneficiaries of the Cohesion Policy in individual V4 countries. Thanks to extrapolation of the results obtained in the sample to the entire population of the initiators of projects in the current perspective, we were able to draw general conclusions on the structure of intervention in both financial perspectives in each of the examined countries.

The macroeconomic study was conducted in eight stages:

1. Estimation of the GDP growth induced by the inflow of structural funds broken down by sectors in the V4

2. Estimation of the additional investment and consumption imports, in a breakdown by sectors producing the imported products

3. Estimation of the gross output growth in a breakdown by sectors in V4 economies.

4. Estimation of the additional imports of intermediate products in a breakdown by individual sections of V4 economies.

5. Estimation of the additional imports of intermediate products of the V4 in a breakdown by individual sectors of the EU15 economies.

6. Disaggregation of the additional imports of V4 countries resulting from the implemented Cohesion Policy in a breakdown by individual EU15 countries

Correction of the additional imports of V4 countries due to the occurrence of secondary consequences of the increased imports

7. Comparison of the obtained results to the actual structure of foreign trade with the EU15

8. Estimation of the impact of the implementation of the Cohesion Policy in V4 on the GDP and employment in EU15.

Box 2. Glossary of terms with the input-output table

term	definition
gross sector output	Total value of goods or services produced by a given sector in a given year, regardless of its further destination. Gross output is divided into intermediate consumption (consumption of materials necessary for production in individual sections) and final consumption, i.e. consumption, investment and exports.
final sector output	Gross sector output minus intermediate consumption. The final output is divided into consumption, investment in fixed capital, changes in inventories, and exports. In national accounts, the accumulated final output of all sections of the economy (including the final imported goods) is the same as the country's GDP (the sum of the value added of all domestic products produced in a given year) plus total imports.
imports of intermediate goods	Imports of goods and services to be used (utilised) in the production process in individual sections of the national economy
consumer imports	Imports of goods and services for consumption (including the government)

investment imports	Imports of goods and services used in fixed capital investment.
section import intensity	The percentage of intermediate imports in the gross output of a given section
value added of the section	Total profits and compensation of employees of all companies in the section. using the balance equation, the total output in a section requires incurring costs equal to total intermediate costs (taking into account the cost of imported goods and services), consumption of fixed assets and wages. The remainder of the gross output is the profit of companies.

Source: IBS elaboration

Stage 1. Estimating GDP growth induced by the inflow of structural funds in a breakdown by sectors in the V4

data used	• estimated impact of the Cohesion Policy on the Visegrad Group countries in 2004-2009, together with the forecast for 2010-2015 (EUImpactMOD) • historical data (national accounts in V4 countries) • forecast of macroeconomic accounts of V4 countries (to 2015) • CAWI survey results
method	Estimated impact of structural funds in V4 countries, obtained using the EUImpactMOD model (calibrated to each of the four economies), was quantified as the percentage deviation from the level of output that would have been earned in a given year without those funds. In order to obtain the absolute size of this effect, it was necessary to multiply this deviation by the value found in national statistics. $$\Delta PKB_t^{(i)} = PKB_t^{(i)} \varepsilon_{PKB,t}^{(i)}$$ The obtained absolute value of the impact of structural funds on V4 economies (broken down by year) was multiplied by the vector of the sectoral structure of the allocation of EU funds, obtained using CAWI. This gave an estimated absolute impact of the Cohesion Policy on the

	output in each of the four Visegrad countries (*i*), in each year from 2004 to 2015 (*i*) and in each of 59 sections (*s*): $$\Delta PKB_{s,t}^{(i)} = \frac{E_s^{(i)}}{E^{(i)}} \Delta PKB_t^{(i)}$$
results	The table presenting the impact of structural funds on the gross output of individual sectors of the V4 economies in 2004-2009 and the forecast for years 2010-2015.

Stage 2. Estimating additional investment and consumption imports, in a breakdown by sectors where the imported goods came from.

data used	• outputs of Stage 1 • import intensity of individual sectors of the V4, estimated using the supply and use tables. • investment and consumption imports intensity, estimated using the import and supply tables.
method	Import intensity coefficients (for each of 59 sections of V4 economies) were calculated as the ratio of the value of imported final goods (the value of which, in a breakdown into imports from EU15 and the remaining economies, is given in the table of imported goods and services) and the total level of domestic value added of each section (included in the input-output table). However, since the impact of the funds in Stage 1 is calculated as the impact on GDP in individual sectors/sections, additional final output (i.e. gross output growth (or value added growth), plus the increase in imports) is estimated (for each section and each year of the study) as the sum of GDP growth and the product of GDP growth and the above-mentioned import intensity. $$\Delta Y_{s,t}^{(i)} = \Delta PKB_{s,t}^{(i)} \left(1 + \frac{im_{s,2005}^{(i)}}{y_{s,2005}^{(i)}} \right)$$ The obtained vectors of absolute impact of the implementation of the Cohesion Policy in the V4 countries on final outputs of individual sections were multiplied by the intensity of consumption and investment imports of the V4 economies, calculated as the ratio of consumer and investment imports of individual sections (available in the input output table of

<table>
<tr>
<td></td>
<td>imported goods) and the final output of these sectors (available in the general input-output table). The obtained estimates of additional investment and consumption imports will be presented in a breakdown by the section where the imported products originated from, i.e. the corresponding sections of exporting economies.

$$\Delta im_{ik\,s,t}^{(i)} = \Delta Y_{s,t}^{(i)} \frac{im_{i\,s,2005}^{(t)} + im_{c\,s,2005}^{(t)}}{y_{s,2005}^{(i)}}$$</td>
</tr>
<tr>
<td>**results**</td>
<td>As a result, in this stage we obtained a table of additional investment-consumption imports, broken down by the sections of exporting economies.</td>
</tr>
</table>

Stage 3. Estimating the gross output growth in a breakdown by sectors of V4 economies

<table>
<tr>
<td>**data used**</td>
<td>
- the results of Stage 1 (table of the additional final domestic output of individual sections)
- input-output tables for individual V4 economies
</td>
</tr>
<tr>
<td>**method**</td>
<td>According to the Leontief method, growth of gross output in individual sections of V4 economies (i.e. the final output of individual sections plus intermediate consumption) is determined using the input-output table. To this end, we used the following formula (for each V4 country):

$$\Delta X_t^{(i)} = \left(I - A^{(i)}\right)^{-1} \Delta Y_t^{(i)}$$

where $A^{(i)}$ is a matrix of the cost of the economy (i.e. each element of the matrix A, calculated directly from the input-output table, $a_{ij}=x_{ij}/X_j$, is a share of materials from the i section in the total output of the j section), I is an identity matrix, $\Delta Y_t^{(i)}$ is a vector of the growth of the domestic final output in the country i in the year t, and $\Delta X_t^{(i)}$ is a corresponding growth of the final output.</td>
</tr>
<tr>
<td>**results**</td>
<td>As a result, thanks to the Leontief method, we obtained a table of final output growth, in a breakdown by individual section of the V4 economies and by year.</td>
</tr>
</table>

Stage 4. Estimating the additional intermediate imports in a breakdown by individual sections of the V4 economies

<table>
<tr>
<td>**data used**</td>
<td>
- results of Stage 3
- intensity of imports of intermediate goods, calculated using the
</td>
</tr>
</table>

	supply and use tables.
method	The intermediate import intensity of individual sections was calculated using the input - output table of imported goods, and the input - output table of domestic goods. It is calculated through the division of imports used in the production in a given section by their (domestic) final output. The obtained coefficients were multiplied by the forecasted final output growth in each section resulting from the implementation of the Cohesion Policy in individual V4 countries. This algorithm was repeated individually for each year in the period 2004-2010, and also for each year of the forecast period (2011-2015). $$\Delta im_{prod}{}^{(i)}_{s,t} = \Delta X^{(i)}_{s,t} \frac{im_{prod}{}^{(i)}_{s,2005}}{X^{(i)}_{s,2005}}$$
results	As a result, we obtained a table of intermediate import growth in individual sections of V4 economies, in a breakdown by year (2004-2015).

Stage 5. Estimating the additional intermediate imports of V4 countries in a breakdown by individual sections of the EU15 economies

data used	• results of Stage 4 • tables of the sectoral structure of imports for individual V4 economies
method	The results of Stage 5 comprehensively describe the structure of additional imports of intermediate products in a breakdown by sections of the importing economies. However, since one of the significant goals of this study is the assessment of the extent individual EU15 countries benefit from the implementation of the Cohesion Policy in V4 countries, it is necessary to express the additional intermediate imports in the categories of exporting economies, and then extract the share of individual EU15 countries. To this end, for each V4 country, we calculated a table of the sectoral structure of imports. The table of the sectoral structure of imports, $B^{(i)}$, was estimated based on the input - output table of imported goods. This matrix comprehensively describes the sectoral structure of imports in each sector of V4 economies: each element b_{ij}/b_j denotes the share of imports

	of products from the *i* section in the total imports of the *j* section.

Then, for each year and each V4 country, the matrix of import structure is multiplied by the vector of intermediate imports of sections of V4 economies (obtained in stage 4):

$$\Delta im_{p\,t}^{(i)} = B^{(i)} \Delta im_{prod\,t}^{(i)}$$

Then, we calculated the share of EU15 in the additional imports. Here, we used the sectoral coefficients of the share of EU countries in the imports of V4 countries, based on the input-output tables of imported goods.

$$\Delta im_{p\,s,t}^{(i)} = \frac{im_{UE15,s,2005}^{(i)}}{im_{s,2005}^{(i)}} \Delta im_{p\,s,t}^{(i)}$$ |
| **results** | As a result, we obtained a table of additional intermediate imports resulting from the implementation of the Cohesion Policy in the V4, in a breakdown by sections of exporting economies and years in the periods 2004-2010 and 2011-2015 (forecast). |

Stage 6. Disaggregation of additional imports of V4 countries induced by the EU Cohesion Policy, into individual EU-15 countries

data used	• results of stages 2 5

• import structure tables of economies in Visegrad Group countries, broken down by EU-15 countries |
| **method** | The main task of this stage was to disaggregate previously estimated additional consumption and investment imports and intermediate imports (production) into EU15 countries, within each section of each of the V4 economies.

$$\Delta Im_{p\,s,t}^{(i)(u)} = \frac{Im_{s,t}^{(i)(u)}}{Im_{s,t}^{(i)}} \Delta Im_{p\,s,t}^{(i)}$$

$$\Delta Im_{ik\,s,t}^{(i)(u)} = \frac{Im_{s,t}^{(i)(u)}}{Im_{s,t}^{(i)}} \Delta Im_{ik\,s,t}^{(i)}$$ |

	As a result we obtained an estimate of additional exports of the EU15 to the V4, induced by the Cohesion Policy in the V4, broken down by: years, sectors of exporting countries, EU15 countries, V4 countries and destination of goods and services (intermediate imports and consumption and investment imports). This data structure allows aggregation into many interesting cross-sections. $$\Delta Im_{s,t}^{(i)(u)} = \Delta Im_{p_{s,t}}^{(i)(u)} + \Delta Im_{ik_{s,t}}^{(i)(u)}$$ The disaggregation has been prepared based on OECD data (trade by sector) and Eurostat (international trade in services). For the period 2010-2015 we used an averaged structure for 2004-2009. Due to the absence of significant changes in 2004-2008, this approximation should be regarded as relevant.
results	Estimates of the total additional imports produced by adding the consumption and investment imports and intermediate imports.

Stage 6a. Adjusting the additional imports to the V4 related with the secondary consequences of the import growth.

data used	- results of stage 6 - results of the macroeconomic modelling - forecast of the imports of V4 countries
method	Comparison of results obtained in Section 6 and the results of macro-economic modelling (the impact of the Cohesion Policy on the total imports of the V4) reveals that the methodology used here slightly (by about 10 per cent) overestimates the benefits achieved by EU15 countries. This is mainly due to the static nature of the calculations - the effect on imports is calculated separately for each year, without taking into account the fact that changes in imports in a given year have some impact on the country's foreign trade in subsequent years. The increase in imports in V4 countries produce a decrease in the current account balance, so that there is a need for adjustment, either in the current account or capital account. In each of these two cases one can expect a decrease in imports. In order to correct our estimates, we used results of macroeconomic

| | modelling. For each V4 country and for each year from 2004 to 2015 the EUImpactMOD model provides estimated impact of the Cohesion Policy on imports. These estimates, multiplied by the value of imports and the share of the EU15 in imports provide independent estimates of the total value of additional exports from the EU15 to the V4.

$$\Delta IM^{(i)(UE15)} = IM_t^{(i)(UE15)} \varepsilon_{IM,t}^{(i)}$$

As a result, we obtain the following:

$$\Delta Im_{s,t}^{(i)(u)} = \Delta Im_{s,t}^{(i)(u)} \frac{\Delta IM^{(i)(UE15)}}{\sum_{t=2004}^{2015} \sum_{s=1}^{59} \sum_{u=1}^{15} \Delta Im_{s,t}^{(i)(u)}}$$ |
|---|---|
| **results** | Final estimates of the total additional imports of the V4 from the EU15, in a breakdown by EU15 and V4 countries, years and sectors. |

Stage 7. Referring the results obtained to the previous structure of foreign trade in the EU15.

data used	• results of Stage 6a • data on changes in V4 imports from individual EU15 countries, by sectors (2004-2009) • data on contributions of individual EU15 countries to the EU budget in 2004-2010, including the forecast for 2011-2015.
method	In this stage we analysed the relative importance of imports induced by the implementation of the Cohesion Policy in the Visegrad countries. The resulting estimates were related to the actual and projected volume of trade between the EU15 and V4 countries, as well as the expenditure on the Cohesion Policy incurred by EU15 countries.
results	Additional exports of the EU15 to the Visegrad Group countries, induced by the EU cohesion policy, will be referenced to the size of funds from before 2004 which EU members spend on financing the EU budget.

Stage 8. Estimating the effect of the implementation of the Cohesion Policy in V4 on the GDP and employment in EU15

data used	• results of Stages 6a and 7 • macroeconomic data and forecasts (GDP, foreign trade) • conclusions from the analysis of empirical economic literature

method	Based on a comprehensive analysis of accumulated economic literature (in particular the flexibility of employment and GDP relative to exports of goods and services) we will specify the scale of the impact of the Cohesion Policy in the Visegrad countries on basic macroeconomic indicators in the EU15.
results	Estimates of the impact of implementation of the Cohesion policy in the Visegrad countries on GDP and employment in the EU15 total, and on an annual basis for sub-periods 2004-2009 and 2009-2015 (forecast).

Macroeconomic forecasts

For the purpose of this study, we conducted forecasts in order to determine the most probable values of certain macroeconomic aggregates for 2011-2015, such as GDP, foreign trade and expenditure incurred under the Cohesion Policy in individual V4 countries.

In order to obtain future projected values of GDP and foreign trade for the EU15 and V4 countries, we used available data in the Eurostat database for the years 2011-2012, and macroeconomic forecasts prepared by the IMF for the years 2013-2015 (formulated as real growth rates for the respective values) .

In the forecast of the implementation of the Cohesion Policy in the analysed countries in the following years (until 2015), different assumptions were made with relation to the forecast of spending and contributions

The contributions of individual countries to the EU budget in future years have been determined based on previously observed e ratio of contributions to the total GDP of the country. In particular, in the determination of the future value of contributions to the EU budget (for the years 2011-2015) we assumed a constant ratio of the value of contributions to GDP. As a result, we used the previously obtained forecast of GDP for each country and a constant coefficient determining the ratio of contributions to GDP.

On the other hand, in the forecasts of expenditure from the Cohesion Policy in the EU27 countries for 2011-2015, we assumed that this expenditure in each country will change with the rate observed in the years 2004-2010.

In order to determine the detailed projections of spending under the Cohesion Policy in the V4 countries we also assumed that by 2015 these countries will have fully used

the allocation. In addition, for each country we assigned a value of expenditure under the priority axis to the following categories:

- Active labour market policies
- Research and development
- Education and training
- Energy
- ICT infrastructure
- Social Infrastructure
- Protecting the environment
- Technical Support
- Other investments in infrastructure
- Other interventions
- Agriculture and Related
- Transportation
- Support for business

The detailed forecast of spending of EU funds was based on the data of the Ministry of Regional Development on EU funds spent in Poland. In order to forecast expenditure for the other V4 countries, we assumed that the structure of expenditure by type (category) will change in the same manner as in Poland.

$$E_{k,t}^{(i)} = \left(A_k^{(i)} - \sum_{\tau=2007}^{2010} E_{k,\tau}^{(i)}\right) \frac{E_{k,t}^{(PL)}}{\left(A_k^{(PL)} - \sum_{\tau=2007}^{2010} E_{k,\tau}^{(PL)}\right)}$$

Additionally, in accordance with the observed distribution of spending in the previous financial perspective, we assumed that the value of the expenditure will reach a maximum in 2013. In some cases, this assumption was replaced in favour of the expected maximum expenditure in 2011. Adoption of 2011 is justified for those categories in which the level of implementation exceeds 50 per cent.

Annex 2: Case studies

Poland: The development of the TEN-T network

Context of realisation

The state of road infrastructure in Poland negatively affects the economic development in manufacturing, trade and services and the mobility of the population. Moreover, poor transport availability decreases the competitiveness of the country, which is additionally a significant barrier for the development of trade.

Road infrastructure in Poland is incohesive, and the state of the existing roads is inadequate. Moreover, a large part of traffic travels through urban and built-up areas, which reduces the capacity of travel routes and negatively influences the safety of the inhabitants.

However, the value of investment in road infrastructure in Poland has systematically increased. According to the data of the General Directorate of National Roads, over the previous 15 years real expenditure on road investment has increased 20 times (from 1 billion in 1995 to 19.92 billion in 2010)

Transport projects are mostly large. Among the 100 largest projects, 16 were realised in Measure 6.1. Their characteristic feature is the long time of realisation and the large number of involved contractors (including foreign). Due to a long preparation stage, the peak of payments within these projects is forecast for the second half of the current financial perspective.

Information on Measure 6.1

Country	Poland
Perspective	2007-2013
Programme	Infrastructure and Environment
Priority	6. TEN-T road and air transport network
Measure	6.1 Development of the TEN-T road network
Objective	Improved transport capacity, shorter time of transit traffic and between major cities, improved safety and better capacity of transport through cities in the TEN-T network
Total allocation	EUR 8 929.15 million
Support of UE	EUR 7 589.78 million

Transferred funds (as for 31 December 2010)	PLN 8 094.16 million

This Measure includes projects like the construction of highways and expressways that are part of the European TEN-T network. The goal of these projects is the improvement of links between regions and the transport availability of the country. The measure also includes the improvement and construction of sections of national roads in cities and the construction of bypasses around cities. The realisation of these projects will increase traffic capacity and reduce the intensity of traffic in built-up areas.

It is assumed that thanks to the realisation of Measure 6.1, by 2015 Poland will have built 636 km of highways and 1,578 km of expressways within the TEN-T network.

An example of a project under Measure 6.1

Project's name	Construction of the A4 highway from Kraków to Tarnów	
Beneficiary	General Directorate of National Roads	
Time of realisation	2007-2013	
Value of the project	PLN 2,640 million	
Support of UE	PLN 1,981 million	75 per cent of the project value

The objective of the project is the construction of a section of the A4 highway between Kraków and Tarnów. The investment additionally includes the construction of four nodes, the reconstruction and construction of roads in adjacent areas, the construction of facilities for travellers, and the construction of 66 structures such as viaducts, flyovers and bridges along and over the highway.

The project has so far involved 12 contractors associated with 4 consortiums. Their remuneration has constituted about 80 per cent of the expenditure under the project so far.

Out of 12 companies realising the project, four had their headquarters outside Poland. Three had headquarters in the European Union - Czech Republic, Spain and Slovakia, and the fourth in Macedonia.

Based solely on the headquarters of the company, one cannot unambiguously determine the country of origin, which is why it is necessary to determine the origin of the majority capital in the firm. Taking into account the headquarters and the origin of capital, expenditure on contractors from abroad was 70 per cent of expenditure for all contractors (53 per cent of the project value), and the share of remuneration for firms from the EU15 was estimated at 42 per cent (26 per cent of the total value of the project).

It is worth noting that the project has involved two types of firms. The first group consisted of companies that were actually rendering construction services, and the second included companies providing designs, engineering and supervision services, and rental of tools and machinery.

The construction companies included STRABAG Sp. z o.o. and Heilit + Woerner Sp. z o.o., both belonging to the STRABAG group. The third company is Dragados from Spain.

Engineering consultancy was provided by Egis Poland Sp. z o.o., operating in the Polish market since 1998. The next contractor rendering such services was the Dutch company DHV Poland Sp. z o.o. belonging to the DHV group.

Evaluation

The implementation of the projects under Measure 6.1 Development of the TEN-T road network has increased the demand for services in construction, engineering and design. Beneficiaries outsource these tasks to companies from Poland and abroad, including EU15 countries.

Under this Measure, the TEN-T network will be extended in Poland, which will positively influence the quality of road links. It is worth emphasising that citizens and also firms from other countries (including the EU15) will substantially benefit from the improved quality of roads in Poland. Better road links will shorten the time of transit and improve its effectiveness, also thanks to the increased safety on roads.

Czech Republic: Construction and modernisation of TEN-T roads and highways

Context of realisation

Despite the fact that the Czech Republic is a relatively small country, its significance in the international transport is quite considerable due to its location in the Central part of Europe, just like the other V4 countries. The transport infrastructure in the Czech Republic is at a moderate level when compared with other EU countries. On one hand, the density of the railway network is higher than the EU average. On the other hand, the number of highways and expressways is lower – the density of highways is half the EU average.

The lower accessibility of highways and expressways is one of the main problems of road transport in the Czech Republic. Moreover, the construction of many expressways and highways is not completed, which contributes to the relatively high number of fatal road accidents compared to the EU average (respectively 135.5 and 109 deaths per 1 million citizens). The improvement of road transport, including the extension of road and highway networks, is especially significant for the transport infrastructure in the Czech Republic.

Information about Measure 2.1

Country	Czech Republic
Perspective	2007-2013
Programme	Transport
Priority	2. TEN-T road and air transport network
Measure	2.1. Construction and modernisation of the TENT-T motorway and road network
Objective	Connecting regions with high quality roads and motorways, providing sufficient road capacity, improving road safety, traffic information and thus improving traffic management.
Total allocation	EUR 1 794.88 million
Funding from the EU	EUR 1 525.65 million
Transferred funds (31 December 2010)	EUR 1 907.36 million

The Transport OP, supporting the construction and improvement of transport networks, is the largest programme under the current financial perspective in the Czech Republic, with a total allocation of EUR 5.774 billion.

Similarly to the aforementioned Measure 6.1. under the Infrastructure and Environment OP in Poland, the general objective of Measure 2.1 in the Transport OP is development of the TEN-T network. The expected results of this Measure include improved transport accessibility of the Czech Republic, and improved road links between individual regions. This Measure is thus oriented at building highways, expressways and a bypass around Prague.

An example of a project under the Measure: The construction of the Prague ring road

Name of the project	The construction of the Prague ring road – construction number 512 in the section highway D1 - Vestec
Beneficiary	Road and Motorway Directorate in the Czech Republic
Duration of the project	2007-2013
Value of the project	EUR 173.87 million

Name of the project	The construction of the Prague ring road – construction no. 513 in the section Vestec - Lahovice
Beneficiary	Road and Motorway Directorate in the Czech Republic
Duration of the project	2007-2013
Value of the project	EUR 188.87 million

The construction of the Prague ring road was financed under two projects of the Transport Operational Programme. The total value of investments, different in the section of the ring road, is more than EUR 362 million. The total length of the constructed sections is 17087 metres (respectively 8750 and 8337 metres for sections 512 and 513). The construction of section 512 will include 21 bridges and 3 crossroads, and section 513 will include 26 bridges and a 70 metre-long tunnel.

The construction of the Prague ring road in these two sections involves seven contractors, associated in two consortiums, one per project. Only one firm out of seven has Czech and Slovakian capital (Metrostav); the rest of the contactors belong to

the Austrian firms (STRABAG, TEERAG – ASDAG, Alpine Mayreder Bau GmbH) and Swedish SKANSKA, the contractor of both projects under the Prague ring road construction.

A detailed list of contractors in the projects of Prague ring road construction, along with the description of the capital links of their shareholders, is presented in Table 22.

Table 6. Contractors of Prague ring road construction projects under the Measure 2.1. of the Transport Operational Programme

Section	Contractors	Description
512	Dálniční stavby Praha (S.A.)	One hundred per cent of shares owned by German design company Heilit + Woerner Bau GmbH, which belongs to the Austrian construction group STRABAG
	Skanska DS. (S.A.)	Company belonging to the company SKANSKA established in Sweden
	Metrostav (S.A.)	The main shareholders are the DDM Group (51.32), DOAS SK (23.18 per cent), DOAS CZ (17 per cent). DDM Group is a consortium of companies from the Czech Republic and Slovakia, among others: DOAS, Dapastav.
	PSVS (S.A.)	One hundred per cent stake of an Austrian construction company TEERAG - ASDAG
513	Skanska DS. (S.A.)	Company belonging to SKANSKA established in Sweden
	Skanska BS. (S.A.)	Company belonging to SKANSKA established in Sweden
	Alpine Mayreder Bau GmbH	Company belonging to the group Alpine Holding, based in Austria

Source: IBS elaboration based on EU transport projects in the Czech Republic, available at the official website of the Road and Motorway Directorate of the Czech Republic http://www.rsd.cz

Evaluation

The implementation of the aforementioned projects involved six contractors from the EU15. It is worth noting that some of them also participated in the implementation of the corresponding Measure in Poland, e.g. STRABAG group companies.

A large share of foreign companies may be associated with the specificity of the

construction market. Due to the high investment costs, small firms cannot effectively compete in this market. That is why we see so many consortiums and groups involved in the transport projects.

Implementation of Measure 2.1 in the Czech Republic, as well as Measure 6.1 in Poland, increases the demand for construction, design and engineering services provided by the companies of the EU15. It also increases the demand for building materials, raw materials and machinery supplied from the EU15.

Construction of the TEN-T aims to improve and increase the efficiency of communication links in the European Union to allow faster transport and improved travel safety. This means that the development of TEN-T network will benefit all Member States and their citizens.

It is worth noting that a foreign firm realising a large project, not just transportation-related, may gain prestige and reputation in the market. The brand will be highly recognisable and well perceived, which can be later reflected in the increased demand for its services and goods.

Poland: Centres with high research potential

Context of implementation

The state is not always able to fully use the potential of its qualified research specialists. This is due to a lack of access to sophisticated research tools that allow greater specialisation within the research unit, high quality research and international cooperation in research projects. In the EU15, the largest share of expenditure on R&D in GDP for 2009 was recorded in Finland and Sweden - it amounted to 3.92 per cent and 3.62 per cent, respectively, while in the whole Union the average was 2.1 per cent. Polish expenditure on research and development was just 0.68 per cent of GDP – less than half the share in the Czech Republic (1.53 per cent of GDP). The largest R&D expenditures in the European Union can be observed in Germany, France and Italy - with 20.83, 15.4 and 13.81 per cent of all expenditure on research and development in the European Union. The share of Poland is 1.38 per cent.

Total expenditure on the higher education sector within the expenditure on research and development in Poland was 0.25 per cent - only 0.03 percentage points less than in the Czech Republic, which is the Visegrad Group leader in this respect. For comparison, the average size of expenditure for all EU countries is 0.44 per cent

Information on Measure 2.1

Country	Poland
Perspective	2007-2013
Programme	Innovative Economy
Priority	2. R&D infrastructure
Measure	2.1 Development of research centres with high potential
Objective	Development of the infrastructure of research units in centres with high research potential to allow them to conduct high quality research.
Total allocation	EUR 691.42 million
Funding from the UE	EUR 587.710 million

Projects under this Measure

Projects under this Measure include support for construction projects, purchase of buildings and investments and the purchase or construction of research equipment. This action is directed, among others, to research units and universities. The beneficiaries of this measure include specialised research laboratories, universities, Centres of Advanced Technologies and Centres of Excellence based on scientific networks, other research consortia, scientific and industrial consortia, National Centre for Research and Development.

In this study, 5.77 per cent of all examined projects under Measure 2.1 had a share of foreign capital from EU15 countries - France, Sweden and Germany, whose combined share in total remunerations amounted to 20.64 per cent, while the share of total expenditure allocated for the project amounted to 27.91 per cent. This capital was intended, among others, for the provision of construction services, where it amounted to 31.82 per cent of total expenditure allocated to this sector.

42.5 per cent of contractors had their headquarters outside Poland, of which 76.47 per cent were in the EU15. Among foreign contractors the highest share of funds was transferred to contractors from Germany (59 per cent). 19 per cent of payments to EU15 companies was spent on construction services and 12 per cent on the purchase of equipment and machinery.

Evaluation

In the context of Measure 2.1, investments in the material base of science are a major catalyst of specialisation of a research unit. They also enable the performance of a larger number of high-quality projects, often created through international cooperation and consolidation of research teams. Moreover, Measure 2.1 is also an immense investment in human capital by providing training of staff for the science and education sector of the economy. The Measure also enhances a more innovative economy by also finding internationally competitive, efficient and current technological solutions for businesses.

Measure 2.1 includes actions aimed at the creation of a European Research Area (ERA). Increasing international cooperation and innovative solutions developed in individual countries, yet internationally accessible, should facilitate the development of the entire EU. This is especially related to fields such as bioengineering, biological progress in agriculture and environmental protection, which are extremely important in the context of sustainable development, not only in Poland but throughout the EU (e.g. the ECOTECH-COMPLEX project - *Man, Environment , Production* carried out by the University of Maria Curie-Sklodowska University in Lublin). EU countries may use the know-how based on the experience of Polish scientists and their solutions.

For example, in the Project of the Centre for Advanced Materials and Technology, managed by the Technical University of Warsaw, we may observe tangible benefits for the EU15 in terms of investment. The research strategy creates a demand for so-called spin-offs which produce new equipment and materials - these are entities that are particularly attractive for foreign capital investments of the EU15.

Hungary: Renewable energy

Context of implementation

Activities aimed at the use of renewable energy sources are increasingly important in the European Union's energy policy. Increased production of green energy carries many benefits. Not only does it allow a reduction in environmental pollution but also helps to reduce energy imports, and thus increases the energy security of the country.

Figure 1. Share of energy from renewable resources in total energy consumption.
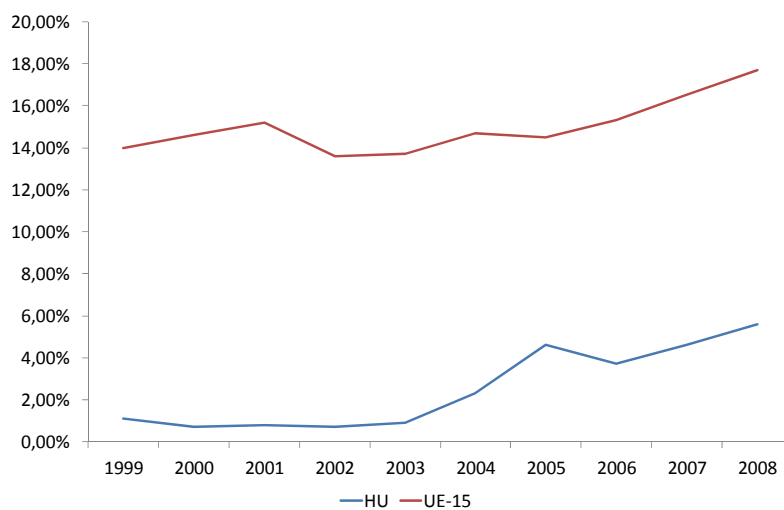
Source: Eurostat

Despite a more than seven-fold increase in the share of renewable energy in 2000-2008, Hungary is still lagging behind when compared to the EU15. In 2008, the share of energy from renewable sources accounted for 5.6 per cent energy consumption in Hungary, i.e. about one-third of the EU15 average.

Information on Measure 4.1

Country	Hungary
Perspective	2007-2013
Programme	Environment and Energy
Priority	4. Increasing the use of energy from renewable sources
Measure	4.1 Supporting the production of heat and/or energy from renewable sources

Objective	Increased use of energy from renewable sources, contributing to the increased energy security of the country, reduced energy imports, and meeting the objectives of the environmental and climate protection policy

Projects under the Measure

The Measure supports projects aimed at increasing production and the use of wind, geothermal, solar and biomass energies.

Projects under Measure 4.1 involved contractors from two EU15 countries, Germany and Italy. Orders for contractors from the EU15 concerned the supply of machinery and equipment. 67 per cent of those contracts went to companies based in Germany and 33 per cent to companies from Italy. The share of payments for contractors from the EU15 in total expenditure on contractors was 24 per cent.

Box 3 Renewable energy in Hungary.
Many of the Hungarian plants using charcoal have been transformed and now use firewood classified as a renewable energy source. Accordingly, the share of renewable energy has increased in Hungary. There are currently five plants using this energy source: Pécs, Ajka, Kazincbarcika, Tiszapalkonya and Mátra.

Evaluation

The increase in production of energy from renewable sources requires the development of costly infrastructure with elements that are complementary to one other. For example, the construction of a biogas plant may cost several million euro. To a large extent, technology and equipment are purchased from foreign companies. The increase in demand for equipment from the EU15 translates into growth of exports of these countries. Importantly, many of the companies that supply the equipment also provide maintenance services. This means that their benefits do not end at the sale, but may last the lifetime of the equipment. In conclusion, an increase in investment in energy production from renewable sources increases the demand for equipment from abroad, including the EU15. In addition, it may later increase imports of services related to the maintenance of these devices.

Investment in renewable energies may reduce environmental pollution, not only in Hungary but also in neighbouring countries. This allows major benefits to the environment, for example in Austria.

Poland - Renewable energy sources

Context of implementation

The Table below shows the discrepancy between the share of renewable energy in total final energy consumption in Poland, 7.9 per cent in 2009, and the average for the EU15, which amounts to 13.71 per cent.

Figure 2. Share of renewable energy in the final energy consumption
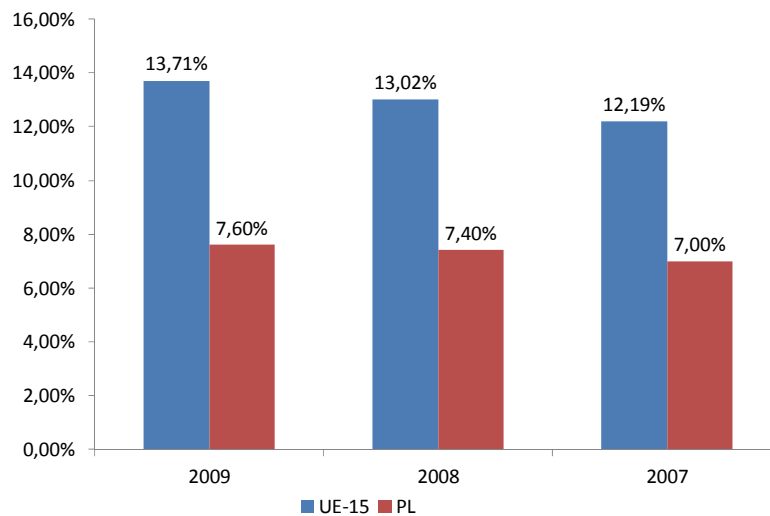
Source: Eurostat

In the case of electricity generation, based on comparing renewable energy sources in total electricity consumption, the disparity is even greater, since the average for the EU15 is more than 4 times greater than the 4.2 per cent in Poland. The average share of renewable energy sources in total electricity consumption for the Visegrad Group is significantly higher thanks to Slovakia, where this ratio was close to the EU average, amounting to 15.5 per cent.[34]

---

[34] *Source: Eurostat*

Figure 3. Share of electricity produced from renewables vs. total electricity consumption
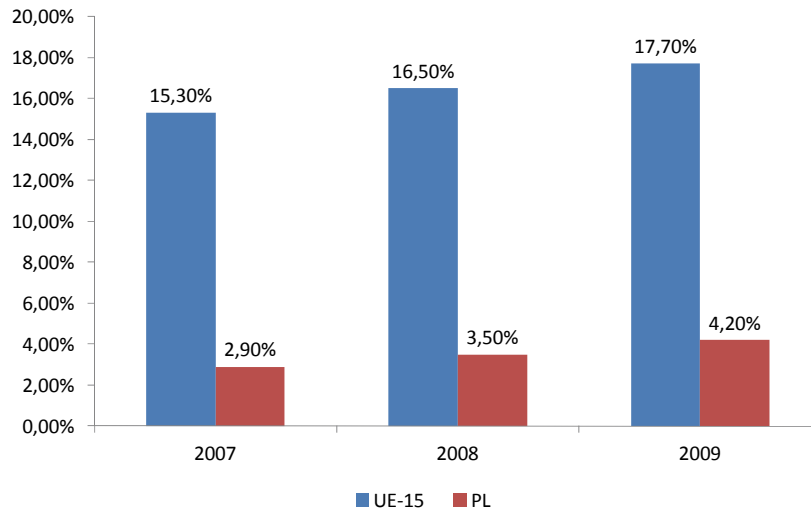
Source: Eurostat

Information about Measure 3.7

Country	Poland
Perspective	2007-2013
Programme	Wielkopolska Regional Operational Programme
Priority	3. Natural environment
Measure	3.7 Increased the use of renewable energy resources
Objective	Increasing the share of renewable energy in national energy balance
Total allocation	EUR 22.375 million
Funding from the UE	EUR 10.010 million

Projects under the Measure

Projects under this Measure involve the construction of infrastructure for the production and distribution of renewable energy, as well as projects enhancing complementarity of renewable energy with conventional energy sources e.g. in power industry. The Measure concerns the following renewable energy sources: wind, water, solar, geothermal energy, biogas, biomass and biofuels.

The study showed that in f 66.67 per cent of projects under Measure 3.7 of the WROP, Germany was the country of origin for the company realising the project. Other projects were carried out by Polish companies, the expenditure of which was spent on construction, amounting to 29.36 per cent of expenditure on this sector in general.

Companies with headquarters in Germany were suppliers of construction services,

electrical equipment and machinery and equipment. Two thirds of total expenditure were spent on contractors with Polish headquarters. An inverse relationship was observed for the size of remunerations, which perfectly shows capital flows. Remuneration for contractors from Germany amounted to 91.54 per cent of total value of remunerations. Importantly, contractors with Polish headquarters to 3.25 per cent of expenditure on the project realisation, while for the German companies it was as high as 75.5 per cent.

Evaluation

Implementation of projects under WROP Measure 3.7 *Increasing the use of renewable energy resources* fits perfectly into the strategy for sustainable development, creating an effective environmentally friendly energy infrastructure. The creation of this infrastructure is accompanied by a rise in demand for companies that specialise in servicing, monitoring and maintenance of specialised machinery and equipment related to the use of renewable energy resources. This is a great opportunity for the diversification of non-agricultural activities and jobs for the unemployed. At the same time, an increased use of unconventional energy sources enhances the competitiveness of enterprises which have implemented the principle of optimal management of resources and energy in their business strategies, making them more socially responsible.

Hungary: Modernisation of enterprises

Context of implementation

Investment in innovation is an important element of growth in productivity and business efficiency, and thus improves competitiveness.

Figure 4. Share of expenditure on innovation in GDP in 2008
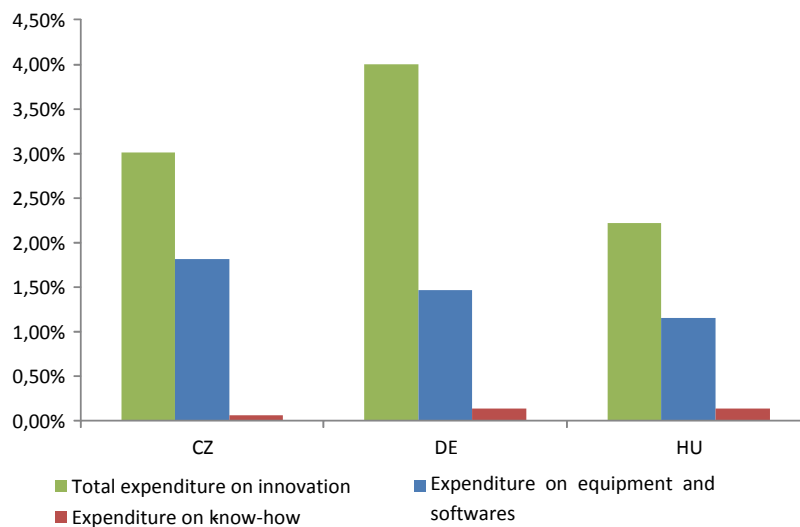
Source: Own elaboration based on Eurostat data

The share of expenditure on innovation in GDP is almost twice lower in Hungary than in Germany. It is worth noting that even in comparison to the Czech Republic, investment in technology in Hungary is not very impressive.

Information about Measure 2.1

Country	Hungary
Perspective	2007-2013
Programme	Economic development
Priority	2. Support to enterprises
Measure	2.1 Technological modernisation of enterprises
Objective	Support for the development and modernisation of technology in enterprises.

Projects under this Measure

This measure supports investments aimed at improving the innovation of technology (the purchase of licenses, patents and new technologies), as well as increasing internationalisation of investments. In addition, funding is provided for investment increasing employment in less developed regions.

Companies from the EU15 received 15 per cent of all remuneration for contractors (6 per cent went to German companies).

Companies from Western Europe, primarily delivered machinery and equipment (22 per cent of total expenditure on these purchases). This equipment was imported from Austria, Belgium, Finland, France, Greece, Spain, the Netherlands, Germany, Portugal, Sweden and Italy.

Evaluation

Improving technology in enterprises requires both the acquisition of licenses, patents, as well as purchase of new equipment and machinery. These devices are largely imported from abroad, including the EU15. This implies an increase in imports. Machinery and equipment used in businesses require a systematic review, which may increase the demand for services provided by firms from the EU15. Furthermore, many of the machines require the updating of licenses.

Higher innovativeness of Hungarian companies will allow them to manufacture more advanced and higher-quality goods. Thanks to the free movement of goods and services in the European Union, these innovations may also benefit consumers from outside Hungary. By increasing the supply of goods one can expect more competitive prices and a greater emphasis on meeting the expectations and needs of consumers. Improvement of innovation in Hungary may also create or increase demand for new, more specialised services provided by foreign companies, including those from the EU15.

In summary, by supporting and improving innovation in Hungary, one can expect not only the immediate gains associated with the purchase of machinery, but also long-term benefits of the acquisition of such equipment and the development of enterprises.

Poland – New investments of high innovative potential

Context of implementation

The business sector in Poland is characterised by low levels of innovation. Polish companies rarely invest in R&D or engage in introducing new products and services. The vast majority of capital expenditure incurred by Polish companies is spent on the purchase of fixed assets (82 per cent of total expenditure). Low levels of innovation result for example from an unfavourable financial structure of innovative activities. Most of the funds spent on this activity are business' own resources (see Zawistowski, 2010).

Information on Measure 4.4

Country	Poland
Perspective	2007-2013
Programme	Innovative Economy
Priority	4. Investments in innovative undertakings
Measure	4.4 New investments of high innovative potential
Objective	Support for manufacturing and service companies involved in new undertakings and relevant consulting and training projects, including the purchase of innovative technologies.
Total allocation	EUR 1 493.70 million
Funding from the UE	EUR 1 269.65 million
Transferred funds (31/12/2010)	PLN 1 843.83 million

Projects under the Measure

The measure supports the purchase and implementation of new technological solutions in production and services, including environmentally friendly solutions. In addition, the projects are aimed at introducing new marketing and organisational solutions, enhancing efficiency and productivity.

Thanks to the implementation of Measure 4.4, 65 companies have received assistance (including 50 SMEs). Forty-two SMEs have introduced organisational and marketing

innovation, and four introduced environmental technologies. The supported companies have so far created 1,860 new jobs.

Companies from the EU15 received 31 per cent of expenditure for the remuneration for contractors. Firms in this group had their headquarters in Austria, Belgium, Denmark, Spain, Holland, Luxembourg, Germany, the United Kingdom and in Italy.

Companies from the EU15 provided construction services and industrially processed products (such as electrical equipment, metals, metal products). The highest amount was handed over to contractors from the EU15 for the purchase of machinery and equipment. This amount accounted for 20 per cent of total expenditure on the remuneration of contractors. It is worth noting that 69 per cent of all metals needed to implement projects under this Measure were provided by contractors from the EU15.

Figure 4. Share in the remuneration of contractors from the UE15
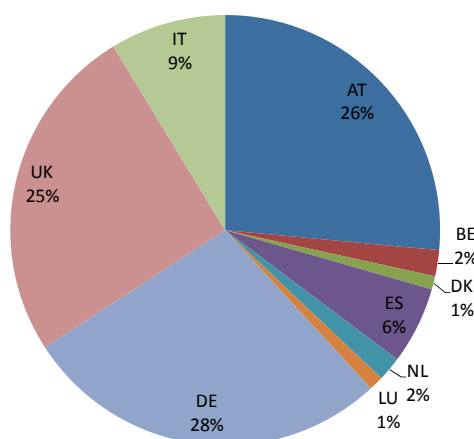
Source: IBS elaboration based on CAWI results

The greatest funds went to German contractors (28 per cent). German companies supplied electrical equipment, equipment and machinery. A slightly lower sum was transferred to enterprises from Austria (26 per cent) and the United Kingdom (25 per cent).

Evaluation

The implementation of projects under Measure 4.4 involved foreign contractors, including those from the EU15 who mainly supplied industrially processed products such as electrical equipment, metals and metal products. To a small extent, these companies were involved in the provision of construction services.

Activities aimed at raising the innovativeness of enterprises in Poland increase the demand for facilities and equipment necessary for the implementation of new technologies. Many of these devices are manufactured by companies from the EU15. This means that growth in demand for products manufactured in these countries. In other words, the increased demand for new technological solutions in Poland increases the imports of industrially processed products from the EU15.

Slovakia – Innovation and technology

Context of implementation

Similar to Hungary and Poland, Slovakian companies are also characterized by low levels of investment in new technological solutions. Analogous to Hungary, the share of expenditure on innovation is relatively low compared to Germany and the Czech Republic. Slovakia released in 2008 more than two and a half times less (in relation to GDP) on new technologies than Germany and 2 times less than the Czech Republic. As is clear from this and previous case studies, support of the development of innovation in Slovakian, Hungarian and Polish enterprises is very necessary. Measures aimed at supporting businesses may help reduce the disparities between the V4 countries and Western Europe.

Figure 5. Share of spending on innovation in GDP in 2008
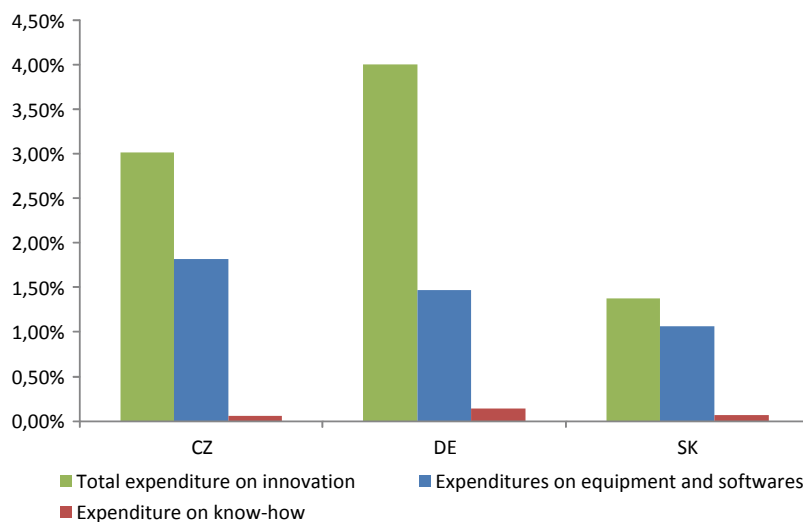
Source: IBS elaboration based on Eurostat data

Information on Measure 1.1

Country	Slovakia
Perspective	2007-2013
Programme	Competitiveness and economic growth
Priority	1. Innovation and competitiveness
Measure	1.1 Transfer of innovation and technology

Objective	Support for the transfer of innovation and technology in enterprises.
Total allocation	EUR 277.76 million
Transferred funds **(31 December 2010)**	EUR 38.75 million

The Measure supports the introduction of innovative technology and the purchase of equipment and machinery. The modernisation of technology in companies is meant to increase their effectiveness. The projects also put great emphasis on reducing the environmental impact by introducing new, more environmentally friendly technology.

As with analogous Measures in Poland and Hungary, the projects in Slovakia also involved contractors from the EU15. These were companies from Austria, Germany and Italy. Most orders were obtained by Italian companies (86 per cent of expenditure on remunerations for contractors from the EU15). About 81 per cent of remunerations for contractors was spent on the purchase of machinery and equipment. These devices were imported from Austria and Italy. German companies provided services related to the participation of beneficiaries in fairs and exhibitions in Germany.

Evaluation

Purchases of new technological solutions by V4 businesses will translate into long-term benefits to the economies of the EU15. In view of the low supply and low quality of services related to maintenance and operation of high-tech machines, western European companies involved in servicing and training in operating machinery gain a significant new market. It can be expected that the adaptation of innovations in technology will continue in the V4 for the next ten or so years. It is therefore justified to perceive the Cohesion Policy in the V4 countries as a tool for the long-term industrial policy of the EU15.

Annex 3: Detailed information on operational programmes in V4

Table 7. Operational programmes implemented in Poland in 2004-2006[35]

Programme (Polish name)	English name	Spending in EUR million (30 April 2009)
SPO Rozwój Zasobów Ludzkich (SPO RZL)	Human Resources Development	1 235.18
SPO Transport	Transport	1 065.25
SPO Wzrost Konkurencyjności Przedsiębiorstw (SPO WKP)	Competitiveness of Enterprises	1 075.30
SPO Restrukturyzacji i Modernizacji Sektora Żywnościowego i Rozwój Obszarów Wiejskich (SPO ROL)	Agriculture and Rural Development	1 014.27
SPO Rybołówstwo i Przetwórstwo Ryb (SPO RYBY)	Fisheries	157.29
Zintegrowany Program Operacyjny Rozwoju Regionalnego ZPORR	Integrated Regional Operational Programme	2 547.33
PO Pomoc Techniczna	Technical Assistance	26.51
Fundusz Spójności	Cohesion Fund	4 191.00
Total		11 312.13

Source: *Information about the use of Structural Funds and the Cohesion Fund under the NDP 2004-2006, the Ministry of Regional Development, Warsaw, May 2009 (The analysis excludes INTERREG and EQUAL due to their low financial significance).*

Table 8. Operational programmes implemented in Poland in 2007-2013

Programme (Polish name)	English name	Allocation of public funds in EUR million	EU contribution in the allocation in EUR million	Eligible expenditure in EUR million[36]
PO Infrastruktura i Środowisko (PO IŚ)	Infrastructure and Environment	35 010.0	27 913.7	3 432.5
PO Kapitał Ludzki (PO KL)	Human Capital	11 420.2	9 707.2	3 116.6
PO Innowacyjna Gospodarka (PO IG)	Innovative economy	9 711.6	8 254.9	1 885.5
PO Rozwój Polski Wschodniej	Development of	2 675.1	2 273.8	451.4

---

[35] *This and subsequent Tables omit IW EQUAL and INTERREG due their low share in total expenditure under the Cohesion Policy.*

[36] *Eligible expenditure, i.e. value of the expenditure shown in the approved applications for payment as at 31 December 2010 Expenditure in Euro converted by annual average exchange rate for 2010: 1 Euro = 3.9947 PLN*

(PO RPW)	Eastern Poland			
PO Pomoc Techniczna (PO PT)	Technical Assistance	607.9	516.7	175.1
RPO Dolnośląskie Voivodeship (RPO WD)	Regional programmes	1 399.5	1 213.1	464.6
RPO Kujawsko-Pomorskie Voivodeship (RPO K-P)		1 118.8	951.0	404.3
RPO Lubelskie Voivodeship (RPO WL)		1 359.8	1 155.9	397.9
RPO Lubuskie Voivodeship (LRPO)		516.7	439.2	314.6
RPO Łódzkie Voivodeship (RPO WŁ)		1 117.2	1 006.4	367.3
RPO Małopolskie Voivodeship (MRPO)		1 518.0	1 290.3	616.6
RPO Mazowieckie Voivodeship (RPO WM)		2 084.3	1 793.7	578.5
RPO Opolskie Voivodeship (RP WO)		502.5	427.1	292.6
RPO Podkarpackie Voivodeship (RPO WP)		1 341.1	1 136.3	474.6
RPO Województwa Podlaskiego (RPO WP)		750.2	636.2	285.3
RPO Pomorskie Voivodeship (RPO WP)		1 129.1	885.1	466.8
RPO Śląskie Voivodeship (RPO WSL)		2 016.7	1 713.0	531.6
RPO Świętokrzyskie Voivodeship (RPO WŚ)		853.9	725.8	366.4
RPO Województwa Warmińsko-Mazurskiego (RPO WiM)		1 228.5	1 036.5	353.4
RPO Województwa Wielkopolskiego na lata 2007-2013 (WRPO)		1 713.7	1 272.8	653.9
RPO Zachodniopomorskie Voivodeship (RPO WZ)		982.9	835.4	285.2
Total		**97 456.6**	**79 148.0**	**22 193.3**

Table 9. Operational programmes implemented in the Czech Republic in 2004-2013

Programme	Allocation of public funds in EUR million	EU contribution in the allocation in EUR million	Eligible expenditure in EUR million
Both perspectives	33 563	28 230	13 121
2004-2006	2 211	1 581	3 446
Cohesion Fund	1 174	998	1 174
Joint Regional Operational Programme (JROP)	599	454	661
OP Human Resources Development	422	319	336
OP Industry and Enterprise	348	261	346

OP Infrastructure	335	246	424
OP Rural Development and Multifunctional Agriculture	247	171	245
SPD2 Prague	143	71	144
SPD3 Prague	118	59	118
2007-2013	31 352	26 649	9 674
Education for Competitiveness OP	2 152	1 829	374
Human Resources and Employment Operational Programme	2 162	1 837	353
Integrated operational programme	1 862	1 582	172
OP Enterprise and Innovation	3 567	3 032	633
OP Environment	5 786	4 918	913
OP Prague - adaptability	128	108	58
OP Prague - competitiveness	276	235	114
OP Technical Assistance	290	247	44
OP Transport	6 793	5 774	4 961
RESEARCH AND DEVELOPMENT FOR INNOVATION	2 428	2 064	77
ROP Central Bohemia	658	559	176
ROP Central Moravia	774	657	315
ROP Moravia-Silesia	842	716	195
ROP North-East	772	656	341
ROP North-West	878	746	287
ROP South-East	832	707	341
ROP South-West	1 152	979	322

Source: Závěrečná zpráva o implementaci Operačního programu Rozvoj lidských zdrojů, Ministerstvo práce a sociálních věcí ČR, 2010; Průběh čerpání strukturálních fondů, stav k březnu 2010, Ministerstvo pro místní rozvoj, 2010

Table 10. Operational programmes implemented in Slovakia in 2004-2013

Programme	Allocation of public funds in EUR million	EU contribution in the allocation in EUR million	Eligible expenditure in EUR million
Both perspectives	12 790	10 509	6 556
2004-2006	1 848	1 347	4 778
Cohesion Fund	3 275	2 518	3 275
OP Agriculture and Rural Development	256	183	339
OP Basic Infrastructure	566	422	509
OP Human Resources	366	284	318
OP Industry and Services	236	151	215

SPD2 Bratislava	77	37	65
SPD3 Bratislava	347	269	56
2007-2013	10 942	9 162	1 778
OP Bratislava Region	102	87	15
OP Competitiveness and Economic Growth	908	772	162
OP Education	727	618	59
OP Employment and Social Inclusion	527	371	145
OP Environment	132	112	135
OP Health	294	250	57
OP Informatisation of Society	1 168	993	30
OP Research and Development	1 423	1 209	141
OP Technical Assistance	115	98	32
OP Transport	3 846	3 207	645

Source: Správa o implementácii a čerpaní predvstupových nástrojov, štrukturálnych fondov a Kohézneho fondu programového obdobia 2004 - 2006 a iných finančných nástrojov za obdobie od 1. 1. 2010 do 30. 6. 2010; http://www.nsrr.sk/sk/

Table 11. Operational programmes implemented in Hungary in 2004-2013

Programme	Allocation of public funds in EUR million	EU contribution in the allocation in EUR million	Eligible expenditure in EUR million
Both perspectives	31 663	27 630	7 907
2004-2006	2 720	2 007	3 413
ALAIRT	500	378	499
AVOP	423	317	414
Cohesion Fund	1 000	850	1 000
GVOP	606	435	641
HEFOP	750	563	390
KIOP	440	314	469
2007-2013	28 943	25 623	4 494
ÁROP	172	148	30
DAOP	881	768	210
DDOP	881	667	219
ÉAOP	1 147	1 005	230
EKOP	422	346	87
ÉMOP	1 063	932	216
GOP	2 936	2 487	729

KDOP	598	507	128
KEOP	4 916	4 749	149
KMOP	1 726	1 243	377
KÖZOP	7 091	6 110	877
NYDOP	546	458	136
TÁMOP	4 097	3 903	713
TIOP	2 097	1 997	259
VOP	371	303	134

Source: Monitoring data of managing authorities

Table 12. Expenditure in V4 countries under the Cohesion Policy in 2004-2010 by category – EU contribution in EUR billion

	Czech Rep.	Poland	Slovakia	Hungary	Total
Research and development	117.6	914.3	67.1	221.6	1 320.6
Energy	231.4	205.4	18.6	20.4	475.8
Infrastructure - ICT	24.5	745.7	16.1	181.9	968.2
Infrastructure - other	1 159.5	547.7	147.9	223.5	2 078.7
Social infrastructure	149.4	770.1	406.0	557.9	1 883.4
Transport infrastructure	5 435.1	8 308.7	2 032.1	1 530.4	17 306.3
Human capital – education and training	842.0	1 805.5	41.2	345.0	3 033.7
Human capital - ALMP	233.6	1 581.4	338.5	593.2	2 746.7
Technical assistance	224.6	630.7	146.3	459.9	1 461.5
Other	187.2	714.0	77.5	190.9	1 169.6
Entrepreneurship	619.6	3 126.3	123.0	783.8	4 652.7
Environment	1 194.8	4 229.9	1 503.0	649.0	7 576.6
Total	10 419.3	23 579.9	4 917.2	5 757.5	44 673.8

Tabela 13. Expenditure in V4 countries under the Cohesion Policy in 2004-2010 by category – contribution from national budgets in EUR billion

	Czech Rep.	Poland	Slovakia	Hungary	Total
Research and development	21.1	302.7	11.8	62.0	397.7
Energy	40.8	37.4	3.3	4.0	85.5
Infrastructure - ICT	4.3	219.3	2.8	51.2	277.6
Infrastructure - other	271.4	193.6	46.1	58.9	570.0
Social infrastructure	32.2	227.8	71.6	98.5	430.0
Transport infrastructure	1 366.7	2 782.9	546.5	301.1	4 997.1
Human capital – education and training	198.6	534.9	10.8	89.3	833.6
Human capital - ALMP	60.1	359.2	103.7	118.8	641.9
Technical assistance	46.9	143.7	34.0	89.2	313.7
Other	37.5	213.4	35.8	33.7	320.3
Entrepreneurship	149.1	975.8	50.8	173.0	1 348.7

Environment	242.3	1 632.4	464.2	157.7	2 496.6
Total	2 470.9	7 623.1	1 381.6	1 237.2	12 712.9

Tabela 14. Forecasted expenditure in V4 countries under the Cohesion Policy in 2004-2015 by category – EU contribution in EUR billion

	Czech Rep.	Poland	Slovakia	Hungary	Total
Research and development	2 012.3	2 723.2	976.8	1 070.8	6 783.0
Energy	680.7	2 077.7	168.8	393.1	3 320.3
Infrastructure - ICT	514.1	4 005.7	962.0	449.8	5 931.5
Social infrastructure - other	3 446.4	1 356.8	614.5	1 441.0	6 858.8
Social infrastructure	258.4	3 156.8	1 675.1	2 803.8	7 894.1
Transport infrastructure	8 529.8	28 056.4	4 832.3	7 425.9	48 844.3
Human capital – education and training	3 642.4	6 178.6	429.9	2 084.9	12 335.8
Human capital - ALMP	750.9	4 746.6	338.5	1 836.6	7 672.5
Technical assistance	1 388.2	2 467.0	382.9	2 074.8	6 312.8
Other	1 067.0	2 971.6	188.3	1 051.5	5 278.4
Entrepreneurship	2 081.7	10 361.5	509.6	2 149.1	15 101.9
Environment	4 732.7	12 001.6	1 516.7	4 779.4	23 030.3
Total	29 104.4	80 103.4	12 595.5	27 560.5	149 363.8

Tabela 15. Forecasted expenditure in V4 countries under the Cohesion Policy in 2004-2015 by category – contribution from national budgets in EUR billion

	Czech Rep.	Poland	Slovakia	Hungary	Total
Research and development	355.5	621.9	172.4	79.7	1 229.5
Energy	120.1	367.8	29.8	17.5	535.2
Infrastructure - ICT	90.7	794.5	169.8	112.2	1 167.2
Infrastructure - pozostałe	675.9	336.4	128.4	216.4	1 357.2
Infrastructure społeczna	51.7	649.0	295.6	394.6	1 390.8
Infrastructure transportowa	1 605.6	6 267.8	1 113.5	1 380.1	10 367.0
Human capital – education and training	692.8	1 306.6	79.4	147.3	2 226.1
Human capital - ALMP	151.4	917.8	189.0	175.0	1 433.1
Technical assistance	253.8	467.7	75.8	533.1	1 330.4
Other	192.5	611.7	55.4	168.7	1 028.3
Entrepreneurship	407.1	2 252.6	119.1	413.1	3 191.9
Environment	866.6	3 003.9	466.6	245.1	4 582.2
Total	5 463.8	17 597.9	2 894.7	3 882.7	29 839.0