Does economic convergence with the European Union mean more FDI flows to an economy? Analysis on 5 Central and Eastern Europe countries

Alexe, Ileana and Tatomir, Cristina F.

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Does economic convergence with the European Union mean more FDI flows to an economy? Analysis on 5 Central and Eastern Europe countries

Ileana ALEXE[a] and Cristina TATOMIR[b]

Ph.D. candidates, Bucharest Academy of Economic Studies, Piaţa Romană no.6, sector 1, Bucharest, Romania

Abstract

In this paper we analyze the relationship between economic convergence with the European Union (EU) and foreign direct investment flows to 5 EU countries (Bulgaria, Czech Republic, Poland, Romania and Hungary) in the period 2001 – 2010, in order to determine if the process of economic convergence with the EU level influences FDI inflows in these economies. We use an economic convergence index, made up of real and structural convergence indexes, to assess the level of economic convergence. The study does not provide us with a clear response to our question. We report a tight relationship between convergence index and FDI inflows in Bulgaria, but quite divergent evolutions of the two variables in the case of Hungary.

Keywords: convergence index, foreign direct investments, European Union

JEL classification: F15, F23, F43, C43

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[a] E-mail address: ileana.alexe@yahoo.com, mobile phone: +40 743 295 251
[b] E-mail address: cris_tatomir@yahoo.com, mobile phone: +40 723 178 178

1. Introduction

The issue of poor countries or regions that have higher growing rates than rich countries has received a lot of attention in the literature on economic growth and development. The issue is even more interesting when we take a look on the European integration process. Starting with 2004, the European Union (EU) declared open entry to poor countries, ex – communist countries in general, into a selective rich club.

On the one hand, it is quite clear that the EU enlargements of 2004 and 2007 lead to the creation of major disparities in the economic development levels of EU countries and also regions.

On the other hand, the existence of disparities created an interesting map for investments in those countries not yet sufficiently developed, but with important growth potential and open economies.

The question of bridging the gaps between EU member states has a twofold implication for developing economies: it eliminates the advantage of cheap destination for foreign direct investments, but it creates the advantage of stable, developed economies where the drivers of FDI change in favor of technology, skills, abilities.

This twofold implication raises the question of the FDI evolution during the economic convergence process. In this paper, we study the relationship between economic convergence and the FDI during the last decade, covering the period between 2000 and 2010, with a view to determining the influence of the convergence process on FDI flows. This means that we analyze comparatively the two evolutions, of convergence and foreign direct investments, in the five selected economies that we included in our study: Bulgaria, Czech Republic, Poland, Romania and Hungary. We chose these countries because there is an important regional competition between them in attracting foreign investments and because they are not yet part of the Euro zone, even though they are EU member states. The notion of convergence that we use in this study refers to real convergence, more exactly income convergence, and to structural convergence, more exactly convergence at the level of economies' structure.

The chosen period of analysis offers us the opportunity to grasp into the effects of the recent economic crisis on FDI and on economic convergence.

The rest of the paper is organized as follows. In section 2 we review the related literature on convergence and FDI. In section 3 we detail the research methodology used in this study. Section 4 presents the data used in the analysis, the sources of the data and some preliminary remarks of the final results. Section 5 presents the results of this research and makes some comments on the results and section 6 concludes.

2. Related literature

Coevering (2003) describes real convergence as the process which includes two important aspects: the tendency to equalize the incomes and the levels of development, that is convergence of income or growth, and the tendency to attain a certain degree of similarity of business cycles, that is structural (or cyclical) convergence. In this paper, we define real convergence as the convergence of income, growth and productivity, and structural convergence as the convergence of economic structures and business cycles.

Regarding the notion of real convergence and its theoretical foundations, there has been a large debate in the literature. Galor (1996) stated three major hypotheses about convergence: the hypothesis of absolute convergence (unconditional), the hypothesis of conditional convergence and the hypothesis of convergence clubs. Absolute convergence means the long term convergence of income per inhabitant between countries, irrespective of their initial conditions. Conditional convergence refers to the convergence of income per inhabitant in case of countries with identical fundamental structures, irrespective of their initial conditions. The third hypothesis, that of convergence clubs, refers to the convergence of income per inhabitant in case of countries with identical fundamental structures, if they have the same initial conditions. In the literature, two main quantitative definitions of convergence have mostly been used: β convergence and σ convergence. The first one implies higher growth rates for poor countries (regions) than for rich countries (regions) and it is tested through the regression of Gross Domestic Product (GDP) per inhabitant growth on its initial level. The second one refers to the reduction of the GDP per inhabitant dispersion within a group of countries (regions).

In the field of economic convergence research, Deutsche Bank researchers created at the beginning of the years 2000s a comprehensive convergence index which comprises 16 variables

grouped in 5 categories: real economy, dynamics of GDP growth and productivity, institutions and economic policy, foreign sector and monetary and fiscal policy.

Miron, Dima and Păun (2009) studied nominal and real convergence within the European Union, through cluster methods. In order to analyze the real convergence, several indicators were used: GDP growth rate, GDP per inhabitant, share of exports in GDP, intensity of foreign direct investments, capitalization of stock market, unemployment rate, labor cost, R&D private expenditure.

In terms of real convergence, Onen (2008) analyses, through bivariate regressions, the relationship between economic growth and net FDI. The economic growth is measured as GDP per capita growth. He concludes that economic growth has a negative impact on net foreign investments in China and Turkey, two developing economies, and in the US. For UK and the countries in the euro area, it seems that economic growth rather influences FDI outflows than FDI inflows, so there is a positive relation between GDP per capita growth and net foreign direct investments. The dynamic panel regression concludes though that economic growth in host economies makes the country more attractive for foreign direct investors.

Diaz Vazquez (2004) makes a very interesting analysis of foreign direct investments and regional convergence and concludes that the allocation of FDI among more and less developed countries could in fact hinder the economic convergence of less developed economies. FDI concentration in the richest countries implies that they benefit the most from the tangible and intangible assets offered by the transnational corporations, as main catalysts of FDI. In the case of developing countries, it seems that the developing countries are not receiving the technological and productive capacity that developing countries receive.

The role of FDI in income convergence is investigated by Choi (2004) who gets to the conclusion that income level and growth gaps between source and host countries turn out to decrease as bilateral FDI increases. He also concludes that a common language and geographical closeness have an important role to play in income level and growth convergence.

In terms of structural convergence, a common element of the EU member states analysed in this paper is that these countries are open, relatively small economies, strongly influenced by the succession of business cycles phases of their most important trade partner, the European Union.

Trade integration with the EU has a major impact on the degree of correlation of macroeconomic shocks and of business cycle syncronization with the EU.

The mark of these effects is still under theoretical controversy. According to the European Commission (1990), a strong trade integration diminishes the incidence of assymetric shocks, generating more syncronised business cycles. The common argument for supporting the idea that trade integration engages an increase in the degree of correlation between two economies consists of the fact that a change in the income of one country drives to changes in the same direction in the demand for the goods produced by the partner country. Among studies that support this result we highlight Frankel and Rose (1998). According to them, adopting a common currency leads to more trade and a better correlation of business cycles between members of the common currency area.

On the other hand, Krugman (1991) came to the conclusion that deep trade integration leads to a higher degree of specialization and, consequently, to a higher risk of asymmetric shocks occurence.

Regarding the literature on business cycles (which relates to structural convergence) and FDI, a recent research paper of Wang and Wong (2007) investigates the effects of business cycles over the FDI outflows from one country using a sample of 45 countries, over the period 1970 – 2001. Considering economic growth as an indicator of business cycle, they find that the volatility of the economic growth has a negative impact on the FDI outflows. The study also concludes that a volatile economic growth during recession periods has a greater negative impact on FDI than a volatile economic growth during boom periods.

Jansen and Stockman (2004) conclude in their analysis on 12 countries during 1982 – 2001, that foreign direct investments represent an important channel with longer lasting effects on the economies than the trade channel. Concerning the correlations with the business cycles (or structural convergence of the economies), the empirical evidence in favor of FDI explaining cross – country business cycle patterns flourished after 1995, as a consequence of higher levels of FDI.

It seems that foreign direct investments explain better the pattern of international business cycles linkages than foreign trade relations. In addition, a greater economic interdependence through

FDI implies more synchronized business cycles. The downside is that FDI has also become an important channel for shocks transmission.

Onen (2008) finds that there is a negative relationship between business cycles and net foreign direct investments. He concludes that the decision of investors is not affected by the business cycles in emerging economies, because of other factors, more attractive, such as low costs of production and a growing market. In particular, in the UK and the Euro area, business cycles increase uncertainty in the domestic markets which are considered more risky than the investments abroad. Consequently, there will be recorded an increase in the FDI outflows.

Another study conducted by Barrios, Barry and Strobl (2002) explores the relation between convergence of industrial structure and income convergence in four cohesion countries: Greece, Spain, Portugal and Ireland. They show that industrial structure convergence is associated with convergence in terms of income per head. More exactly, the more similar EU countries are to each other in terms of income per head the more similar they will be in terms of employment distribution across countries. Furthermore, inward FDI to EU periphery lead to an increase in the similarity of industrial structure of these countries to that of the EU core.

Through the current study we take the research further, taking into account that empirical research on the relationship between FDI and convergence has been limited by now. We investigate in this paper the relationship between FDI and economic convergence, in terms of both real and structural convergence, in five countries from Central and Eastern Europe, which are now also members of the European Union. In particular, we are interested to determine if the process of economic convergence with the EU level leads to more inflows of FDI in these economies. We also assess the changes brought by the recent economic crisis.

3. Research methodology

This paper uses a quantitative analysis based on a convergence index creation, but also an exploratory data analysis in order to determine how economic convergence with the EU level influences FDI inflows. The convergence index is computed by comparison with the EU average.

In the case of the quantitative analysis, our approach was founded on the research methodology used by the Group of Applied Economics (GEA) in the handbook for assessing the regional competitiveness of Romania, which was published in 2007. They create a hard matrix through the aggregation of three categories of indicators: economic indicators, social indicators and technological indicators. The final competitiveness index is obtained as a weighted average of the three indicators, the shares being established according to the results of a focus group of GEA experts.

The convergence index developed here is made up of two equal parts: real convergence index and structural convergence index. The equal shares given to each index lie in the equal importance granted to real and structural convergence, in order to create a comprehensive indicator, which would be compared to the level of FDI inflows from the EU, as share of GDP.

As regards the real convergence index, it comprises three indicators: labor productivity per person employed, GDP per capita at purchasing power parity (PPP) and economic growth, as percentage of the EU average.

Labor productivity per person employed, gives an overall impression of the productivity of national economies, in relation to the European Union average. It is expressed as the GDP per person employed, at PPP. By expressing the figures at PPP, the differences in price levels between countries are eliminated, allowing meaningful comparisons between countries' GDP per capita. If the index of a country is lower than 100, this country's level of GDP per person employed is lower than the EU average and vice versa.

GDP per capita at PPP is expressed in relation to the European Union average set to equal 100. If the index of a country is higher than 100, the country's level of GDP per head is higher than the EU average. If the index of a country is lower than 100, the country's level of GDP per head is lower than the EU average.

The economic growth is expressed through real GDP growth rate (growth rate of GDP volume). This indicator represents the percentage change on previous year. GDP is one of the most important variables indicating the economic activity expansion.

Each of these indicators is computed as numbers between 0 and 100, expressing the distance against the EU average. More exactly, 0 means no convergence with the European average,

while 100 means full convergence with the European average. In the case of economic growth, we computed the economic growth index of each country in the economic growth index of the EU average to determine the economic growth of each country in the average economic growth at the EU level.

The real convergence index is obtained by weighted average of these three indicators. The highest share, of 50%, is given to the labor productivity per person employed, in accordance with the highest share employed by GEA in computing the economic indicator. GDP per capita and economic growth receive equal shares of 25% each, similar to the GEA study and according to the fact that GDP per capita is an indicator of productivity and economic growth also expresses the growth potential of a country. They are both equally important.

As regards the structural convergence index, it also comprises three indicators: economic openness degree, trade intensity and sectoral convergence index. The economic openness degree is computed by using a classic formula, as ratio between the exports and imports of a country and its GDP and the trade intensity by the formula used in Eickmeier and Breitung (2006), as ratio between intra – EU exports and imports of a country and the GDP of the country multiplied by EU's GDP:

Economic Openness Degree (EOD) is computed as follows:

$$\boldsymbol{EOD_i = \frac{X_i + M_i}{Y_i}}$$

where: Xi (Mi) represents the exports (imports) of the country i

Yi represents the GDP of the country i

Trade Intensity (TI) is computed as follows:

$$\boldsymbol{TI_{i,EU} = \frac{X_{i,EU} + M_{i.EU}}{Y_i * Y_{EU}}}$$

where: X(i, EU) represents the exports of the country i in EU exports

M(i, EU) represents the imports of the country i from EU

Yi represents the GDP of the country i

Y_{EU} represents the GDP of EU

The third indicator, sectoral convergence index, uses the index of structural divergence (ISD) proposed by Krugman in 1991 and previously used in numerous other studies (Clark and van Wincoop, 2001; Imbs, 2004; Traistaru, 2005 etc.) for computing the sectoral convergence index. The indicator construction mode shows that a country is more similar to the EU in terms of economic structure as its value is close to 100.

Sectoral Convergence Index (SCI) is computed as follows:

$$\boldsymbol{SCI = 100 - ISD}$$

$$\boldsymbol{ISD_{i,EU} = \sum_{k=1}^{K} abs\,(S_{k,i} - S_{k,EU})}$$

where: $ISD_{i,EU}$ – index of structural divergence measures the homogeneity degree of the economic structure between country i and EU

K – represents the number of sectors taken into account

$S_{k,i}$ – represents the share of the gross value added of the *k* sector in the total gross value added of country *i*

$S_{k,EU}$ – represents the share of the gross value added of the *k* sector in the total gross value added of EU

The structural convergence index is obtained by weighted average of these three indicators. The highest share, of 70%, is given to the sectoral convergence index, in accordance with its highest relevance for the structural convergence of a country. The economic openness degree receives a share of 10%, having the less significance in explaining the structural convergence, according to Marinas (2006). The rest of 20% is given to the trade intensity indicator.

In the case of the exploratory analysis, we compare the evolution of the economic convergence index to the evolution of FDI inflows in the reporting economy, for the period 2001 – 2010, in order to see if there exists a clear influence of the degree of economic convergence on the amounts of foreign direct investments received by these 5 Central and Eastern Europe countries. The direct investment flows in the 5 reporting countries are expressed as percentage of GDP to remove the effect of differences in the size of the economies of the reporting countries.

4. Data analysis

The data used in this study are from Eurostat database and cover the period of time between 2001 and 2010.

The final convergence index is presented below, in detail, for each year, and for each country.

Table no. 1 – **Convergence index for Bulgaria**

Year	**Bulgaria**		
	Real convergence index	Structural convergence index	**Convergence index**
2001	49.0	70.2	**59.6**
2002	50.9	68.4	**59.7**
2003	52.0	66.7	**59.4**
2004	52.3	68.0	**60.1**
2005	53.3	70.7	**62.0**
2006	53.3	69.3	**61.3**
2007	54.8	74.9	**64.8**
2008	57.4	74.2	**65.8**
2009	55.7	67.8	**61.8**
2010	56.4	71.0	**63.7**
Shares	**0.5**	**0.5**	

Source: Authors' work

As regards Bulgaria, we can see that its convergence index has been on a growing path between 2003 and 2008, but this path was reversed because of the crisis in 2009. Both real and structural convergence index reported decreasing values in 2009. However, in 2010 Bulgaria reports a growing convergence index, mostly supported by a high structural convergence index level with the European Union. In the case of real convergence, during the analyzed period, it barely reaches values close to 58% as compared to the European average. Moreover, the structural convergence index is permanently above the real convergence index, meaning that business

cycles in Bulgaria are more synchronized with the EU business cycles, as compared to the level of real convergence with the EU average.

Table no. 2 – **Convergence index for Czech Republic**

Year	**Czech Republic**		
	Real convergence index	Structural convergence index	**Convergence index**
2001	74.6	77.9	**76.2**
2002	74.2	74.3	**74.2**
2003	77.3	76.0	**76.6**
2004	78.7	79.6	**79.2**
2005	79.6	78.3	**78.9**
2006	80.1	78.1	**79.1**
2007	81.8	79.3	**80.5**
2008	82.2	77.6	**79.9**
2009	82.1	73.0	**77.5**
2010	81.1	77.4	**79.2**
Shares	**0.5**	**0.5**	

Source: Authors' work

In the case of the Czech Republic, the situation is quite different from that of Bulgaria. It is true that this country benefited from an earlier accession to the European Union, but we can see that even in 2001 there are striking differences in the convergence index, in particular due to the higher real convergence index as compared to Bulgaria. In fact, during the analyzed period, the real convergence index is, generally speaking, higher than the structural convergence index. On the whole, 2009 marks a downward trend in the evolution of the indexes. However, the convergence index of the Czech Republic approaches 80 points out of 100, which is a high level of convergence with the European Union average.

Table no. 3 – **Convergence index for Hungary**

Year	**Hungary**		
	Real convergence index	Structural convergence index	**Convergence index**
2001	71.2	91.1	**81.1**
2002	73.7	92.9	**83.3**
2003	74.4	91.9	**83.2**
2004	75.2	96.1	**85.7**
2005	75.0	99.8	**87.4**
2006	74.8	105.9	**90.4**
2007	74.0	110.5	**92.2**
2008	77.3	112.9	**95.1**
2009	77.1	101.2	**89.1**
2010	76.4	107.0	**91.7**
Shares	**0.5**	**0.5**	

Source: Authors' work

Hungary reports the highest level of convergence index of all 5 countries included in the analysis. It is above 90, which is very close to the European average. Over the whole period the structural convergence index recorded very high levels, exceeding the EU average since 2006. It is true that the effect of the crisis started being noticeable from 2009, but the convergence index remains above 90 in 2010.

Table no. 4 – **Convergence index for Poland**

Year	**Poland**		
	Real convergence index	Structural convergence index	**Convergence index**
2001	52.9	66.1	**59.5**
2002	54.7	66.7	**60.7**

2003	55.8	67.6	**61.7**
2004	56.8	66.6	**61.7**
2005	56.5	66.5	**61.5**
2006	56.3	67.2	**61.7**
2007	57.1	67.7	**62.4**
2008	57.3	68.2	**62.7**
2009	59.2	63.2	**61.2**
2010	59.1	63.9	**61.5**
Shares	**0.5**	**0.5**	

Source: Authors' work

Poland reports a higher level of structural convergence during the analyzed period, as compared to the real convergence index, but also to the final convergence index. Surprisingly, in 2009 its real convergence recorded an increase. This is due, partly, to the fast growing economic rate in comparison to the EU average. The structural convergence index is always higher than the real convergence index. The convergence index records values between 59 and 63.

Table no. 5 – **Convergence index for Romania**

Year	**Romania**		
	Real convergence index	Structural convergence index	**Convergence index**
2001	45.9	45.9	**45.9**
2002	47.7	47.4	**47.5**
2003	49.2	47.9	**48.6**
2004	52.5	46.5	**49.5**
2005	52.3	49.7	**51.0**
2006	55.6	49.7	**52.7**
2007	57.8	51.6	**54.7**

2008	62.9	51.6	**57.3**
2009	59.8	47.5	**53.6**
2010	59.0	48.5	**53.7**
Shares	**0.5**	**0.5**	

Source: Authors' work

Interestingly, Romania reports the same level of real and structural convergence in 2001. Over the period, we can see that it is real convergence which drives the higher levels of final convergence index during time. The effect of the recent economic crisis is noticeable in 2009 when both real and structural convergence recorded lower levels. However, the downward path continues in the case of real convergence. Between 2001 and 2008, we can see a marked tendency towards convergence with the EU average, which was interrupted in 2009. At the moment, Romania's convergence with the EU barely approaches the 54 threshold. In 2008, this level was above 57, being the best convergence level ever attained by Romania, since 2001 up to present time.

To put it comparatively, Hungary ranks first in terms of high convergence level, followed by the Czech Republic, and Romania ranks last in terms of the lowest convergence level with the European average. Hungary and the Czech Republic seem to be the most similar to the old members. Hungary reported a very strong increase in the share of technology-driven industries in total exports, which is reflected in the high convergence index level in this study.

In the case of Romania, there are huge gaps between the Romanian economy and the EU average. Structural divergence is the main reason for the low level of convergence with the European average. Some possible explanations for the structural differences between the Romanian and the EU may be the low development level of financial markets, responsible for a different allocation of resources, or the high share that agriculture still has in the Romanian economy, as a consequence of the communist period.

In terms of foreign direct investments inflows from the EU, expressed as share of GDP of each country, the situation in presented in the table below:

Table no. 6 – **Direct investment flows in the reporting economies, as % of GDP**

Country	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Bulgaria	5	3.8	10.1	13.4	13.6	23.5	29.4	18.9	9.4	4.5
Czech Republic	9.1	11.3	2.3	4.5	9.4	3.8	6	3	1.4	3.5
Hungary	7.4	4.5	2.5	4.4	7	6.5	2.9	4.8	1.6	1.2
Poland	3	2.1	2.2	5.1	3.4	5.7	5.5	2.8	3.2	2.1
Romania	2.9	2.5	3.7	8.5	6.5	9.2	5.8	6.8	3	2.2

Source: Eurostat database

As we can see from the above table, in 2001 the Czech Republic had the highest level of FDI inflows from the EU, as share of GDP. In 2010, Czech Republic ranks second, after Bulgaria. As a matter of fact, Bulgaria is the only one, among the 5 countries included in the study, which recorded double – digit inflows of FDI, as share of its GDP, over the period 2001 – 2010.

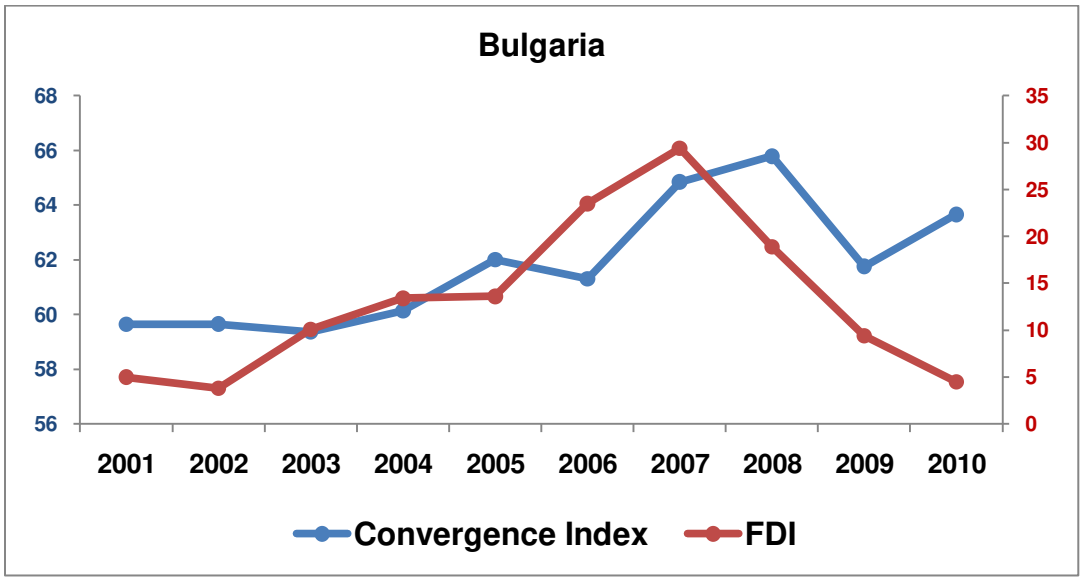
5. Results and discussion

In order to determine if the process of economic convergence with the EU level leads to more inflows of FDI in the analyzed economies, we make a comparative, graphical analysis between the convergence index previously computed and the EU inflows of FDI in these countries.

We discuss the results separately, for each country, and then we make a comparative analysis between countries.

In the case of Bulgaria, it is noticeable a tight relationship between the inflows of FDI and the convergence index evolution during 2001 – 2010. An interesting fact is that while FDI inflows embarked on a downward path from early 2007, the convergence index reflected the change starting with 2008. So, we can see there is a one year lag in this case. However, even though the convergence index is back on an upward trend since 2009, it seems that foreign direct investments continue to decrease, as share of GDP.

Figure no. 1 – **Convergence index and FDI inflows in Bulgaria**

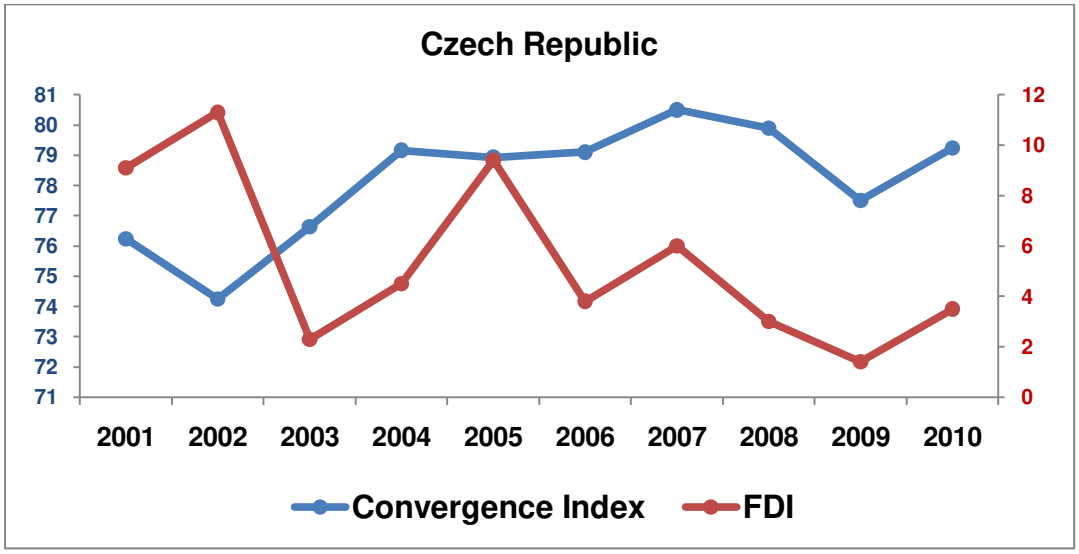


Source: Authors' work

Regarding the Czech Republic, which ranks second in terms of convergence index in this study, the comparative analysis below shows us that FDI started following the convergence index path since 2006, their evolution being almost parallel until 2010. The downward trend in the convergence index evolution that started in 2007 is closely followed by the FDI inflows.

Furthermore, in 2010 both these indicators came back on an increasing path.

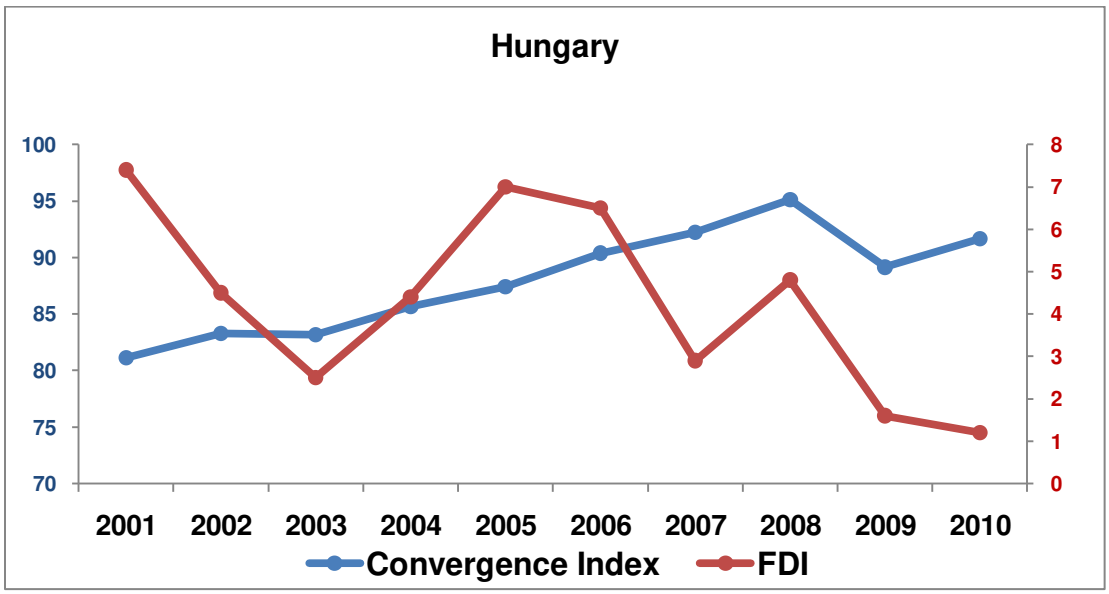
Figure no. 2 – **Convergence index and FDI inflows in Czech Republic**



Source: Authors' work

Hungary presents a quite linear progression in terms of convergence index until 2008, when the process is reversed. However, the foreign direct investments received do not follow the same progression type, even though we can notice a synchronized evolution during between 2007 and 2009. In 2010, the convergence index increased again, but the FDI inflows did not record the same evolution.

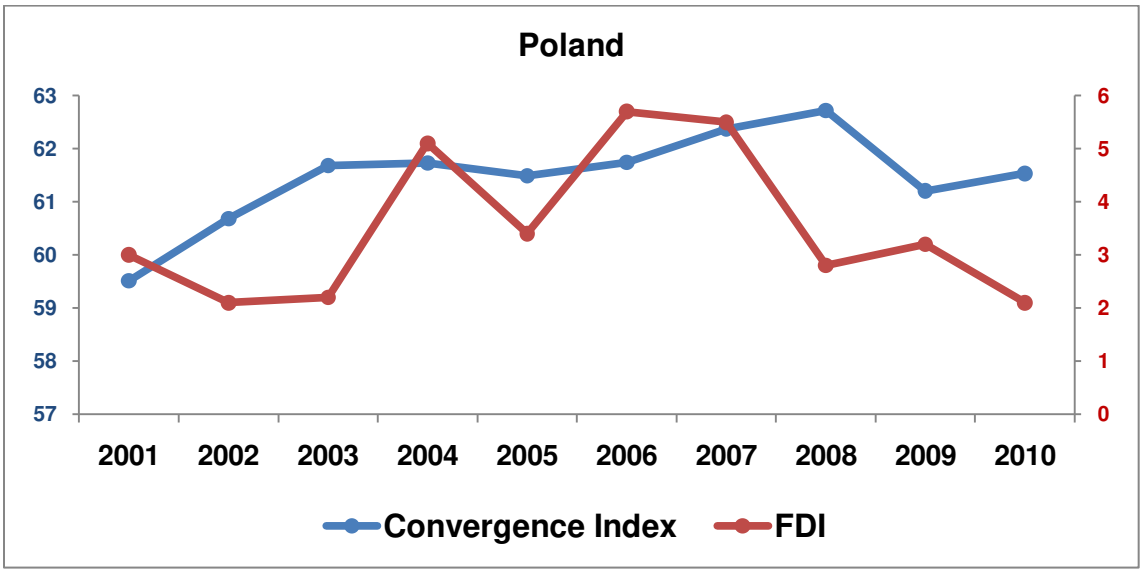
Figure no. 3 – **Convergence index and FDI inflows in Hungary**



Source: Authors' work

Poland reports quite divergent evolutions of FDI inflows and convergence index. Generally speaking, when convergence index increases, FDI inflows decrease. Surprisingly, in 2009 foreign direct investments went up. Poland represents a particular case among the countries analyzed so far. It is also well known the fact that Poland is the unique European economy which was not in crisis.

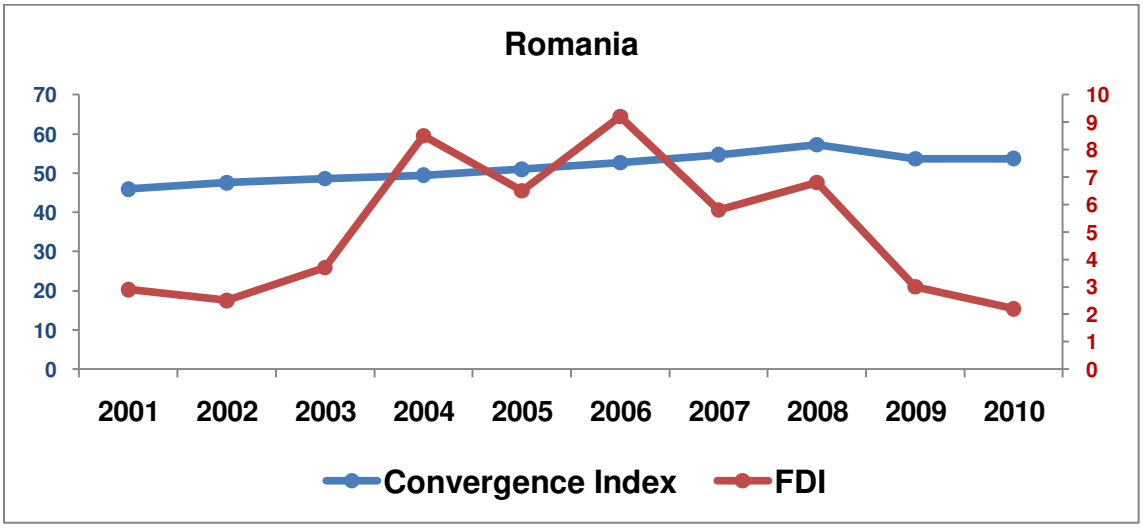
Figure no. 4 – **Convergence index and FDI inflows in Poland**



Source: Authors' work

Romania, which ranks last in terms of lowest convergence index level, reports a steady progress in the convergence process, but very fluctuating levels of FDI inflows during 2001 – 2010. The FDI levels rose between 2002 and 2004, but afterwards they fluctuate a lot. However, we can notice that in 2009 both the FDI and the convergence index recorded decreasing values. The convergence index started increasing slowly in 2010, but the FDI inflows remained on a downward path.

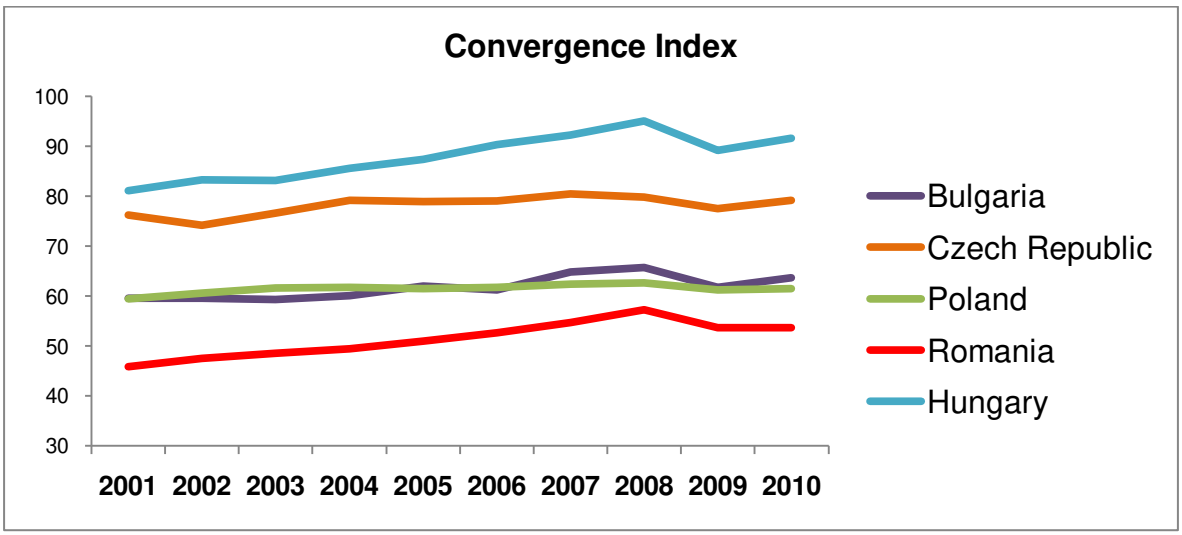
Figure no. 5 – **Convergence index and FDI inflows in Romania**



Source: Authors' work

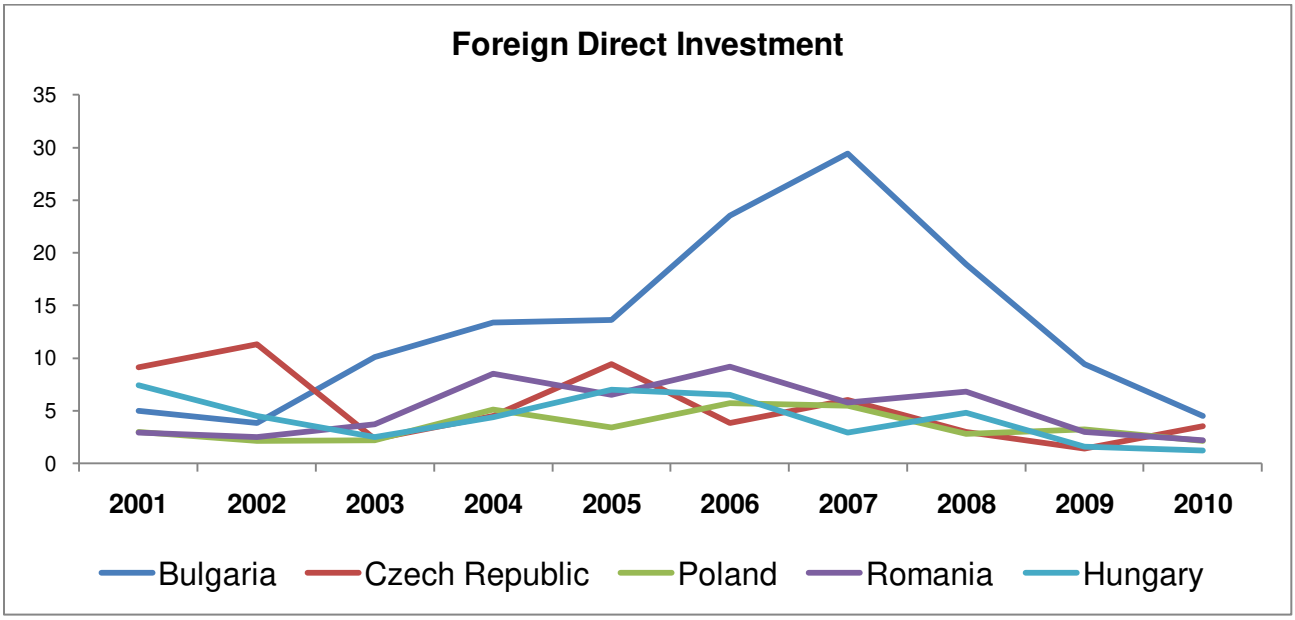
A comparative view of the convergence index and the FDI inflows in the five analyzed countries reveals that even though Hungary ranked first in terms of high convergence index, during the whole period, the highest shares of FDI inflows, as percentage of GDP, were reported by Bulgaria. However, Romania, which has the lowest level of convergence index, reported important inflows of FDI during this period.

Figure no. 6 – **Convergence index – comparative analysis**



Source: Authors' work

Figure no. 7 – **Foreign direct investment inflows – comparative analysis**



Source: Authors' work

6. Conclusions

The results do not provide us with a clear response to our question regarding the influence of the convergence process on the level of FDI attracted by a country. We can though distinguish a close relationship between convergence index and FDI in the case of Bulgaria, but at the same time, the indicators report quite divergent evolutions in case of Hungary. For the other three countries the indicators fluctuate a lot.

Even though the results are inconclusive and do not confirm exactly the influence of convergence on FDI, it is quite clear that the opposite is true. In the case of any country, FDI is important for both growth and convergence, especially because it is the main channel of technology transmission across countries. However, as we can see in this paper, even when FDI report very high levels, the rate of convergence across countries remains slow.

The research can be further improved by including more indicators in the analysis and by creating more complex real and structural convergence indexes. A particular attention should be given to FDI specific indicators, such as labor costs or R&D public and private expenditure.

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Appendices

Appendix A Real and Structural Convergence Index for Bulgaria

Year	Labor Productivity	GDP growth	GDP per capita	**Real Convergence Index**	Economic openness degree	Sectoral Convergence Index	Trade Intensity	**Structural Convergence Index**
2001	32	102.16	30	**49.0**	89.0	72.1	54.4	**70.2**
2002	34	103.46	32	**50.9**	85.0	71.1	50.9	**68.4**
2003	35	104.15	34	**52.0**	88.6	67.6	52.5	**66.7**
2004	35	104.10	35	**52.3**	96.2	681	53.6	**68.0**
2005	36	104.31	37	**53.3**	93.4	72.8	51.9	**70.7**
2006	36	103.10	38	**53.3**	102.6	69.1	53.5	**69.3**
2007	38	103.30	40	**54.8**	115.0	74.8	55.1	**74.9**
2008	40	105.67	44	**57.4**	113.7	74.6	52.8	**74.2**
2009	40	98.75	44	**55.7**	81.8	72.9	43.1	**67.8**
2010	42	98.43	43	**56.4**	96.4	74.2	46.9	**71.0**
Share	0.5	0.25	0.25		0.1	0.7	0.2	

Source: Eurostat database and authors' work

Appendix B **Real and Structural Convergence Index for Czech Republic**

Year	Labor Productivity	GDP growth	GDP per capita	**Real Convergence Index**	Economic openness degree	Sectoral Convergence Index	Trade Intensity	**Structural Convergence Index**
2001	64	100.49	70	**74.6**	112.6	68.2	94.3	77.9
2002	63	100.69	70	**74.2**	104.6	67.5	83.1	74.3
2003	67	102.27	73	**77.3**	109.7	68.3	85.8	76.0
2004	69	101.95	75	**78.7**	126.6	67.1	99.8	79.6
2005	69	104.22	76	**79.6**	124.0	67.4	93.6	78.3
2006	70	103.39	77	**80.1**	131.8	66.0	93.7	78.1
2007	72	103.01	80	**81.8**	137.9	67.2	92.1	79.3
2008	73	101.99	81	**82.2**	132.8	67.2	86.2	77.6
2009	73	100.21	82	**82.1**	114.0	65.4	78.9	73.0
2010	72	100.49	80	**81.1**	134.7	66.3	87.3	77.4
Share	0.5	0.25	0.25		0.1	0.7	0.2	

Source: Eurostat database and authors' work

Appendix C **Real and Structural Convergence Index for Poland**

Year	Labor Productivity	GDP growth	GDP per capita	**Real Convergence Index**	Economic openness degree	Sectoral Convergence Index	Trade Intensity	**Structural Convergence Index**
2001	56	99.22	0.48	**52.9**	45.3	77.9	35.2	**66.1**
2002	59	100.20	0.48	**54.7**	48.7	77.9	36.5	**66.7**
2003	60	102.57	0.49	**55.8**	56.3	76.6	41.8	**67.6**
2004	62	102.73	0.51	**56.8**	64.8	72.4	47.4	**66.6**
2005	62	101.57	0.51	**56.5**	62.8	73.5	43.7	**66.5**
2006	61	102.81	0.52	**56.3**	69.6	73.1	45.1	**67.2**
2007	62	103.69	0.54	**57.1**	71.8	73.9	43.9	**67.7**
2008	62	104.58	0.56	**57.3**	71.0	75.1	42.4	**68.2**
2009	65	106.17	0.61	**59.2**	66.0	68.7	42.6	**63.2**
2010	67	101.96	0.62	**59.1**	70.1	69.2	42.4	**63.9**
Share	0.5	0.25	0.25		0.1	0.7	0.2	

Source: Eurostat database and authors' work

Appendix D **Real and Structural Convergence Index for Romania**

Year	Labor Productivity	GDP growth	GDP per capita	**Real Convergence Index**	Economic openness degree	Sectoral Convergence Index	Trade Intensity	**Structural Convergence Index**
2001	**26**	103.63	28	**45.9**	22.4	57.7	16.5	**45.9**
2002	**29**	103.85	29	**47.7**	23.9	59.4	17.0	**47.4**
2003	**31**	103.85	31	**49.2**	25.7	59.6	18.1	**47.9**
2004	**35**	105.85	34	**52.5**	30.4	56.4	19.9	**46.5**
2005	**36**	102.16	35	**52.3**	35.7	59.8	21.2	**49.7**
2006	**40**	104.45	38	**55.6**	41.6	58.4	23.5	**49.7**
2007	**43**	103.20	42	**57.8**	47.7	59.0	27.6	**51.6**
2008	**49**	106.77	47	**62.9**	52.8	57.7	29.6	**51.6**
2009	**48**	97.07	46	**59.8**	40.4	54.9	25.2	**47.5**
2010	**47**	96.95	45	**59.0**	48.7	54.1	28.7	**48.5**
Share	0.5	0.25	0.25		0.1	0.7	0.2	

Source: Eurostat database and authors' work

Appendix E **Real and Structural Convergence Index for Hungary**

Year	Labor Productivity	GDP growth	GDP per capita	**Real Convergence Index**	Economic openness degree	Sectoral Convergence Index	Trade Intensity	**Structural Convergence Index**
2001	62	**101.76**	59	**71.2**	119.9	86.4	93.0	**91.1**
2002	65	**102.87**	62	**73.7**	128.1	87.0	95.7	**92.9**
2003	66	**102.67**	63	**74.4**	134.7	84.0	98.3	**91.9**
2004	68	**101.95**	63	**75.2**	156.5	83.1	111.3	**96.1**
2005	68	**101.18**	63	**75.0**	174.5	83.7	118.6	**99.8**
2006	68	**100.29**	63	**74.8**	205.0	84.7	130.8	**105.9**
2007	68	**97.86**	62	**74.0**	233.6	84.5	139.9	**110.5**
2008	72	**100.30**	65	**77.3**	247.8	84.4	145.3	**112.9**
2009	73	**97.49**	65	**77.1**	193.2	82.3	121.2	**101.2**
2010	71	**99.41**	64	**76.4**	232.1	80.4	137.3	**107.0**
Share	0.5	0.25	0.25		0.1	0.7	0.2	

Source: Eurostat database and authors' work