AN INVESTIGATION OF COINTEGRATION AND CAUSALITY BETWEEN INVESTMENTS, EXPORTS, OPENNESS, INDUSTRIAL PRODUCTION AND ECONOMIC GROWTH: A COMPARATIVE STUDY FOR THE EAST EUROPEAN COUNTRIES

Simuţ Ramona[1], Meşter Ioana[1]
Department of Economics, Faculty of Economics, University of Oradea, Oradea, Romania
imester@uoradea.ro
simut.ramona@yahoo.com

Abstract: *The study of the economic growth has old implications. An analysis of relevant literature shows that there is a series of empirical studies that have analysed, tested and explained the correlation between the dynamics of exports, investments, the openness of economies and the process of economic growth. This paper examines the role of investments, export and openness in relation to economic growth for 10 East European countries using quarterly data between 2000 and 2013. Unit root tests were used in order to analyse the stationarity of variables. We have then employed the Johansen Cointegration test in order to identify the existence of a long-run relationship between the variables as well as the Granger causality test in order to test the hypotheses about the presence of causality between selected variables. At the same time VAR and VECM models were estimated for each of the 10 East European Countries; a comparative analysis of the results shows the presence, direction and intensity of the correlation and causality between investments, exports, openness and economic growth.*

Keywords: Granger causality, Economic Growth, Cointegration, VECM and VAR models.

JEL classification: C50, C59

1. Introduction
The economic growth process is one of the most debated aspects in field literature due to the major impact it has on the entire population of a country. This is the reason why the achieving or maintaining of a sustained growth rhythm represents a major objective of macro-economic policies. The concern for the study of economic growth has existed beginning with the representatives of the classical school and continuing with the Keynesists, Neo-Keynesists and the neo-classics. A series of empirical studies has tested the dynamics of the different factors and the economic growth process.

2. Literature review
In this paper we intend to offer a short round-up of the field literature dedicated to the analysis and pattern-making of the phenomenon of economic growth in different EU member countries.

The relationship between export and economic growth has long been one of those areas of international economy and development that have been given special attention in research. Based on a fundamental economic theory, the increase of exports contributes to economic growth through the element called the multiplication effect of foreign trade (Tekin, 2012, p. 869). According to economists Ben-David and Loewy (1998), Hart (1983),

Lal and Rajapatirana (1987) an increase of exports also generates an increase of the degree of economic openness, because the respective economical economies will be capable to absorb more rapidly the technology of the more developed countries. Thus, an increase in the overall productivity of the factors will positively influence the economic growth rate on the long run. At the same time, trade allows for more rapid access to technology, which represents an important factor for a sustainable economic growth (Reppas şi Christopoulos, 2005, p. 931).

Regarding investments, the neoclassical theory favours the increase of the capital stock for the countries that have an inferior level of economic development. The investment sources refer to both the growth of the saving rate and to the flux of foreign direct investment. If the flux of foreign direct investment also implies a transfer of technology, than the process of real convergence will be a sustainable one. In the case of some European Union member countries foreign direct investments sustained the process of economic growth, two of the transmission channels being represented by investments and exports (Marinaş, 2007, p. 12).

The correlation between export dynamics and the process of economic growth, but also the methods of transmitting the effects between the two variables were the subject of a series of empirical studies. Pereira and Xu (2000, p. 63) used the VAR Multivariate Autoregressive model to analyse the effects of export increase on GDP evolution. The hypothesis of growth through exports is the one best supported by the results. In accordance with their model, exports sustain economic growth, the estimation of growth being improved upon by the inclusion of exports as an independent variable. In a similar manner, the economic growth variable represents a cause for exports, if the estimation of the export variable shows a reduction of the forecast error by including the "economic growth" delayed variable. (Marinaş, 2008, p. 279).

Sultan and Haque use in their turn the Granger Causality to investigate the relationship between economic growth, investments and exports, trying to identify the long run relationship between these variables. Using the Johanson Cointegration Methodology, the studies have identified the presence of a long run relationship between investments, exports and economic growth (Sultan şi Haque, 2011, p. 226).

Another important research worth mentioning is the one belonging to Subat (2002). Subat's fundamental objective was to detect the structural characteristics which determine the orientation towards exports. He demonstrated that exports are a cause of economic convergence, the countries with a medium level of development and increasing exports having a higher growth rate than those with lower exports (Subat, 2002, p. 333).

Dritsakis also studied, using the VAR Multivariate Autoregressive Model, the relationship between exports, investments and economic growth in two countries, which were in the process of EU pre-accession, respectively Bulgaria and Romania. The results of the co-accession analysis showed that between exports, investments and economic growth there is a vector of cointegration for the two countries. The Granger Causality tests indicated a strong Granger causal relationship between both economic growth and exports and investments and exports for the two countries (Dritsakis, 2004, p. 1831).

Concerning investments, the effect of foreign direct investment on growth has been debated at large in the field literature. Li and Liu have investigated the impact of foreign direct investment on the economic growth in both developed and developing countries, using a large sample of countries. Their study indicates a strong relationship between

foreign direct investment and economic growth in both developed and developing countries. Moreover, foreign direct investment influences directly economic growth, but also indirectly through its influential factors (Li and Liu, 2005, p. 404). Likewise, Bhandari et al. examine the efficiency of foreign aid and of foreign direct investment in the Czech Republic, Hungary, Latvia, Lithuania and Poland. After the identification of the stationarity of the data series, they used the cointegration test. The result indicates that foreign direct investment, as an independent variable, represents a significant factor which positively affects economic growth in these countries (Bhandari et al., 2007, p. 4).

In the literature dedicated to economic growth, investments and the openness towards international trade have been identified as being determinant for growth. Capolupo and Celi presented the relationship between the openness for trade and economic growth in the sample of former Communist countries before and after the transition from planned centralized economy to market economy, by applying the ordinary least squares method and the panel estimation techniques (Capolupo and Celi, 2005, p. 163). McLean and Shrestha suggest that the relationship between financial openness and economic growth is, at best, weak. They also postulate that the positive impact of foreign direct investment on growth is conditioned by the existence of relatively developed internal institutions as well as of a healthy macro-economic policy (McLean and Shrestha, 2002, p. 700).

We also encounter a series of other studies from the field of economic congruence, which analyse the impact of different influential factors on growth in the Central European and East European countries, respectively comparative analyses between the Central European and East European and EU-15. The results that derive from these studies show that productivity and innovation represent important sources of conversion for both Central and East European countries and initial EU-15 countries (Ark and Piatkowski, 2004, p. 215).

At the same time, Jungmittag draws similar conclusions regarding the importance of investments and technological specialization for economic growth. He concludes, after carrying out the empirical analysis, that besides capital accumulation, the transferable technical knowledge represents a growth force in the process of catching up for candidate countries and newly admitted countries, while for developed countries in the EU the Richardian technology is more important (Jungmittag, 2004, p. 247).

3. Data and methodology
In order to investigate the causality between the nominal GDP (LGDP), direct investments (LDI), export (LEXP)/openness(LGDE) and industrial production (LIP) we used quarterly deseasonalized data in log for 2000:1 – 2013:1 collected from the Monthly Bulletins of the Romanian National Bank and the INSSE Tempo Online series, available online on the Romanian Statistics Institute's website. The general objective is to estimate the long run relationship between economic growth, foreign direct investment, exports/the degree of economic openness, respectively the industrial production in the Central and East European countries with the help of some VAR and VECM models. Based on the results obtained by applying the ADF test for the ten countries, we can deduce the order of integration of the five variables for each country separately. The results are presented in the table below:

Table 1: The order of integration of model variables

	LGDP	LEXP	LDI	LGDE	LIP
Bulgaria	I=0 (10%) I=2 (5%, 1%)	I=1 (10%, 5%) I=2 (1%)	I=2 (1%, 5%, 10%)	I=0 (10%) I=1 (1%, 5%)	I=2 (1%, 5%, 10%)
Czech Republic	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)
Estonia	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)	I=1 (10%) I=2 (5%, 1%)
Hungary	I=0 (10%) I=1 (5%, 1%)	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)
Latvia	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)
Lithuania	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)
Poland	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)
Romania	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)	I=1 (10%, 5%) I=2 (1%)	I=1 (1%, 5%, 10%)
Slovakia	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)	I=1 (1%, 5%, 10%)
Slovenia	I=2 (1%, 5%, 10%)	I=1 (10%, 5%) I=2 (1%)	I=1 (10%) I=2 (5%, 1%)	I=1 (10%) I=2 (5%, 1%)	I=1 (10%, 5%) I=2 (1%)

Source: drawn up by the author

According to the data in the table above, it can be observed that seven of the nine analysed countries are characterized by an order of integration of 1 for the three levels of signification. The exceptions are Bulgaria, Hungary and Slovenia whose GPD becomes stationary in the initial structure for a level of signification that equals 10% in the case of Bulgaria and Hungary, respectively as a result of applying the level 2 difference for the three levels of signification in the case of Slovenia and for the levels of signification equalling 5% and 1% for Bulgaria. In the case of the export variable, all ten analysed countries are level 1 integrated for a level of significance of 10% respectively 5%, and regarding the significance level of 1, only in the case of Bulgaria and Slovenia it is necessary to apply the level 2 differences in order to stationarize the series. In what foreign direct investments are concerned, in nine of the analysed countries we encounter a level of integration of 1, except for Bulgaria, which becomes stationary as the result of applying the level 2 difference for all three levels of signification. We have a similar situation in the case of the degree of economic openness variable. This variable becomes stationary after applying the level 1 difference, exceptions being Bulgaria, where the variable becomes stationary at its initial level for a level of 10%, respectively Slovenia and Romania, which become stationary by applying the second difference for the levels of significance of 5% and 1% for Slovenia and 1% for Romania. The industrial production variable becomes stationary through the first difference for nine countries, except for Slovenia, which becomes stationary through the second difference for the level of significance of 1%. As long as the orders of integration of the variables are the same, there is the possibility of the emergence of some cointegration relationships within the models that are to be estimated.

We will develop two models for each economy. The first will contain the following as variables: economic growth indicated with the help of the GDP, foreign direct investment, industrial production and export; the second one will contain the same variables except for export, which will be replaced by the degree of economic openness. Thus, we will continue to apply the Johansen Cointegration Test in order to identify a possible long run relationship within the models for the Central and East European countries. Depending on the results of the Johansen Cointegration Test, we may decide the convenience of applying the VEC model for each economy. This model is valid only in the situation in which the δ adjustment coefficient is negative. Should this coefficient be positive or irrelevant, we infer that the correction vector does not contribute to the achieving the balance of the dependent variable on the long run.

According to the estimations from the table above, we note that the majority of the analysed economies are characterized by the existence of a single cointegration relationship between the four variables of the model, except for Hungary, Latvia and Slovakia. According to the results obtained for Romania, it can be observed that foreign direct investments have a long run influence on the economic growth process. The highest value of economic elasticity in relation to investments is scored by The Czech Republic. Thus, an increase of the gross building up of capital with 10% will generate a 15% growth (in the model that contains exports) and respectively a 7% growth of the GDP (in the model that contains the degree of economic openness). Also, the Baltic countries are characterized by the significant influence of investments on the balance of the GDP on the long run, as these small scale economies are benefitting from high fluxes of foreign direct investments as a percentage share in the GDP.

Table 2: The results of applying the VAR Methodology

Number of cointegraration relationships	Long run relationship	δ adjustment coefficient	VAR level
Bulgaria (GDP, FDI, EXP, IP)			
1 (5%)	LogGDP = 0.07LogFDI + 0.50LogEXP + 0.79LogIP + 1.05	-0.29*	2
Bulgaria (GDP, FDI, GDE, IP)			
1 (1%)	LogGDP = 0.01LogFDI + 0.97LogGDE + 1.30LogIP + 1.95	-0.01	2
Czech Republic (GDP, FDI, EXP, IP)			
1 (1%, 5%)	LogGDP = 0.15LogFDI + 1.55LogEXP + 4.49LogIP + 5.68	-0.06*	2
Czech Republic (GDP, FDI, GDE, IP)			
1 (1%, 5%)	LogGDP = 0.07Log FDI + 0.49LogGDE + 1.54LogIP + 5.90	-0.17*	2
Estonia (GDP, FDI, EXP, IP)			
1 (1%, 5%)	LogGDP = 0.01Log FDI + 0.30LogEXP + 1.03LogIP + 0.89	-0.09*	2
Estonia (GDP, FDI, GDE, IP)			
1 (1%)	LogGDP = 0.03Log FDI + 0.77LogGDE + 1.43LogIP -2.61	-0.06	2
Hungary (GDP, FDI, EXP, IP)			
1 (1%, 5%)	LogGDP = 0.05Log FDI + 0.37LogEXP + 2.09LogIP + 3.83	-0.01*	1
Hungary (GDP, FDI, GDE, IP)			
0 (1%, 5%)	We apply a VAR with differences, its level is 1 dLogGDP = 0.25dLogGDP (-1) + 0.01dLogFDI(-1) + 0.81dLogGDE(-1) - 1.65dLogPI(-1) + 0.01		
Latvia (GDP, FDI, EXP, IP)			
0 (1%, 5%)	We apply a VAR with differences, its level is 1 dLogGDP = 0.66dLogGDP (-1) + 0.07dLogFDI(-1) + 0.95dLogEXP(-1) + 0.83dLog IP (-1) + 0.01		
Latvia (GDP, FDI, GDE, IP)			
0 (1%, 5%)	We apply a VAR with differences, its level is 1 dLogGDP = 0.17dLogGDP (-1)+0.09dLogFDI(-1) + 0.66dLogGDE(-1) +1.03dLogIP(-1) +0.02		
Lithuania (GDP, FDI, EXP, IP)			

1 (5%)	LogGDP = 0.05Log FDI +0.33LogEXP + 0.82LogIP + 2.05	-0.42*	1
Lithuania (GDP, FDI, GDE, IP)			
1 (5%)	LogGDP = 0.08Log FDI + 0.60LogGDE + 1.21LogIP +0.05	-0.31*	1
Poland (GDP, FDI, EXP, IP)			
1 (1%)	LogGDP = 0.03Log FDI + 0.04LogEXP + 1.99LogIP + 3.65	-0.53*	1
Poland (GDP, FDI, GDE, IP)			
1 (5%)	LogGDP = 0.04Log FDI - 0.21LogGDE +1.82LogIP - 8.30	-0.74*	1
Romania (GDP, FDI, EXP, IP)			
1 (1%, 5%)	LogGDP = 0,15Log FDI + 0,79LogEXP + 0,68LogIP – 0,44	-0,96*	1
Romania (GDP, FDI, GDE, IP)			
1 (1%, 5%)	LogGDP = 0,30Log FDI + 0,05LogGDE + 4,16LogIP + 9,48	-0,66*	1
Slovakia (GDP, FDI, EXP, IP)			
1 (1%, 5%)	LogGDP = 0.06Log FDI - 0.65LogEXP + 2.70LogIP + 3.50	0.10*	2
Slovakia (GDP, FDI, GDE, IP)			
0 (1%, 5%)	We apply a VAR with differences, its level is 1 dLogGDP = 0.04dLogGDP (-1) + 0.09dLog DFI (-1) + 0.38dLogGDE(-1) - 0.52dLogIP(-1) + 0.02		
Slovenia (GDP, FDI, EXP, IP)			
1 (1%, 5%)	LogGDP = 0.07Log FDI +0.66LogEXP + 3.18LogIP + 2.74	-0.05*	2
Slovenia (GDP, FDI, GDE, IP)			
1 (1%, 5%)	LogGDP = 0.07Log FDI + 0.85LogGDE +3.33LogIP +2.10	-0.08*	2

statistically significant for a level of significance of 5%
Source: the authors' calculus
The economic elasticity in relation to investment is of 0.08 for Lithuania, respectively 0.09 for Latvia, both in the model that contains the degree of economic openness. We cannot say the same thing about Estonia, as the investments it has benefitted from have had a small influence on the balance of the GDP on the long run, according to the results obtained, namely 0.01 (in the case of the model that contains the export). Estonia, together with Bulgaria, has registered the lowest value of economic growth elasticity versus foreign direct investment. Regarding the impact of exports on economic growth, we note that the highest value of economic elasticity in relation to exports is registered in The Czech Republic, namely a 1% increase of these will generate a 15.5% growth of the GDP. According to the estimations obtained, it can be observed that the positive impact of exports on economic growth is to be found in the majority of the analysed economies, except in the case of Slovakia, where the impact is negative. This result must be interpreted with caution, as the VECM model that was obtained has a positive (δ) adjustment coefficient. This aspect involves the excluding of the export variable, because it does not insure the achievement on the long run of a balance of the dependent variable, i.e. the GDP. The error correction model is thus valid in the case of Bulgaria, The Czech Republic, Lithuania, Poland, Slovenia and Hungary, and in the case of the other economies it is considered that there is at least a variable that affects the model.

If we make a comparison between the two models obtained for each country separately we may note that in The Czech Republic, Latvia and Poland the variation of exports had a bigger impact on the economic growth in comparison with the degree of openness. In turn, in Bulgaria, Estonia, Lithuania, Hungary and Slovenia, the degree of economic openness represents the most important variable in explaining the elasticity of the GDP. It can be observed that Poland is the only country that registeres a negative elasticity of the GDP in regard to the degree of openness, all other economies being characterised by a positive and statistically significant effect on the GDP. Even though an increase of the degree of economic openness has a negative effect on the GDP in Poland, it had a positive effect on investments. In other words, the imports of capital goods increased the deficit of current account, but also generated an increase of investment rate. According

to estimations, one can observe that GDP elasticity in relation to investments is superior to the value in the model that contains the export with 0.01 percent.

Results also show that the most important increase of industrial production was recorded in The Czech Republic, Slovenia, Slovakia and Hungary. In these countries, the statistically relevant elasticity of the GDP in relation to industrial production were situated between 4.49 (The Czech Republic) and 2.09 (Hungary), this indicator having the greatest impact on economic growth in the analysed time period.

Industrial production is, in the majority of the countries, strongly affected by the decrease in foreign demand which started especially with the emergence of the economic crisis. Thus, based on the estimations made, this was demonstrated with the help of the value of the industrial production coefficients, respectively those of export and degree of openness. In the case of the countries which exhibit a higher value of the elasticity of economic growth in relation to export, a higher value of industrial production is to be observed in the model that contains the export variable and a lower one in the case of the model that contains the degree of economic openness. Latvia, Slovakia and Hungary are characterized by the absence of a cointegration relationship between the variables of the model. Thereby, in order to identify the impact which the endogenous variables have on the economic growth, we used a lagged VAR model. The results pointed out a positive impact of the three exogenous variables which were lagged by a trimester, but also of the delayed endogenous one in the case of Latvia, while in the case of Slovakia and Hungary, industrial production lagged by a trimester recorded a negative impact.

We conclude that the VECM model constitutes a suitable instrument for the studying of the long run relationship between economic growth, export/degree of economic openness, foreign direct investment and industrial production in the case of the following studied countries: Bulgaria, The Czech Republic, Estonia, Lithuania, Poland, Romania, Slovenia and Hungary. This aspect is confirmed by the adjustment coefficient, which is negative and significantly different from zero.

Table 3: Granger causality tests

Hypothesis	The country in which the hypothesis is accepted (probability)
LogFDI constitutes a cause of LogGDP	Bulgaria (0.003), Latvia (0.01), Romania (0.005)
LogGDP constitutes a cause of LogFDI	Slovakia (0.004)
LogEXP constitutes a cause of LogGDP	Bulgaria (0.01), The Czech Republic (0.002), Latvia (0.02), Lithuania (0.04), Romania (0.01), Poland (0.00), Slovakia (0.002), Slovenia (0.02), Hungary (0.04)
LogGDP constitutes a cause of LogEXP	Bulgaria (1.2E-07), Latvia (0.00), Lithuania (0.01), Poland (0.002), Slovakia (0.008), Slovenia (8.5E-07), Hungary (0.001)
LogIP constitutes a cause of LogGDP	Bulgaria (7.4E-07), The Czech Republic (3.4E-07), Estonia (8.0E-07), Latvia (4.5E-05), Lithuania (9.2E-05), Romania (0.01), Poland (0.0003), Slovakia (6.4E-05), Slovenia (3.2E-10), Hungary (0.004)
LogGDP constitutes a cause of LogIP	Bulgaria (7.0E-08), The Czech Republic (2.3E-05), Latvia (0.0006), Lithuania (0.008), Romania (0,00009), Poland (0.02), Slovakia (0.01), Slovenia (0.006), Hungary (1.6E-06)
LogGDE constitutes a cause of LogGDP	Latvia (0.0005), Lithuania (0.04), Slovenia (0.04)
LogGDP constitutes a cause of LogGDE	Hungary (0.01)
LogFDI constitutes a cause of LogEXP	The Czech Republic (0.03)
LogEXP constitutes a cause of LogFDI	Slovakia (0.01)
LogFDI constitutes a cause of LogIP	Bulgaria (0.02), Latvia (0.01)
LogIP constitutes a cause of LogFDI	Slovakia (0.03)
LogFDI constitutes a cause of LogGDE	The Czech Republic (0.003), Latvia (0.02), Slovakia (0.03), Slovenia (0.05)
LogGDE constitutes a cause of LogFDI	Latvia (0.007)

LogEXP constitutes a cause of LogIP	Bulgaria (2.0E-06), Latvia (0.05), Lithuania (0.010), Poland (0.000), Slovakia (3.6E-05), Slovenia (0.04), Hungary (8.5E-06)
LogIP constitutes a cause of LogEXP	Bulgaria (0.000), Estonia (7.0E-06), Latvia (0.002), Poland (0.000), Slovakia (0.000), Slovenia (1.2E-05), Hungary (0.002)
LogGDE constitutes a cause of LogIP	Latvia (0.01), Poland (0.01), Slovakia (0.01), Slovenia (0.03), Hungary (0.03)
LogIP constitutes a cause of LogGDE	Estonia (0.05)

Source: the authors' calculus

In the case of Slovakia we can state that the VECM model does not insure the balance of the GDP on the long run, because the adjustment coefficient is a positive one. The Czech Republic and Slovenia are the two countries characterized by a similar evolution to that of Romania. Thus, foreign direct investment, exports and industrial production positively influence the economic growth process on the long run. Further we will test the causality in the Granger sense between the five analysed variables, and for this we have kept a number of four lags (under the conditions of some quarterly data). The results are presented in the table above.

According to the results it can be noted that foreign direct investment, export and industrial production constitute those variables which improve the forecast of economic growth only in the case of Bulgaria, Romania and Latvia. Moreover, Latvia is the only country in which the degree of economic openness together with investments and industrial production constitute a cause of the GDP. The predictability of the economic growth rate is improved in all the countries from the panel by including the industrial production variable. Even though the economies become more and more dominant in the service sector, the spread of service companies is wider; the industrial sector continues to remain a fundamental sector that contributes to the well-functioning of the other sectors of national economy, continuing to be one of the most important factors of economic growth. There is a bidirectional relationship between these two variables in eight countries from the panel; the exception is in the case of Estonia, where the relationship is unidirectional, namely from industrial production towards GDP. The bidimensional direction is also present in the case of export and GDP variables. The causal relationship from GDP towards export can be explained by the fact that the increase of the GDP had as main cause the increase of GED and only after that it was conditioned by export increase. In regard to the economic openness variable, it can be noted that the predictability of the growth rate is improved by this variable only in the case of Latvia, Lithuania and Slovakia. We know that the degree of openness of a country is calculated as the sum of imports and exports in relation to the GDP. Therefore, we expect that a country that registeres a high export level to have a high degree of openness. The paradox is though, that at first sight, the very strong economies like the Japanese or the American one, have a relatively reduced degree of openness, despite the fact that they occupy the first two places in the top of the world's goods export. Regarding the analysed countries, the highest degree of openness is seen in Bulgaria, 0.97, and the lowest is in Poland, only 0.21. But if we carefully analyse the data concerning the three indicators with the help of which we calculate the degree of openness of a country, (import, export and GDP) we can observe that in the case of Bulgaria both import and export represent a large percentage of the GDP (between 70 and 80%) unlike in the case of Poland where the values are significantly lower (between 40 and 50%)(Eurostat Statistics).

Conclusions

Based on the results obtained we can state that foreign direct investments have an influence on the process of economic growth on the long run, but this is relatively reduced in the majority of the analysed countries. This is mainly due to the world economic crisis and to the restlessness which penetrated the Eurozone and which has led to a considerable decrease in investment in 2008, namely with 9% in the new member states and with 22% in Eastern Europe. The countries that have succeeded to maintain themselves at a constant level concerning investments are The Czech Republic, Hungary and Slovakia. Here foreign direct investments as capital share have been at a constant level even after the beginning of the crisis, and investments continued within export-oriented projects, in industries that suffered from important decrease in production during those times (Popa, 2009, p. 106). Furthermore, once with the admission of these countries to the European Union, the economic growth process became more sensitive to the evolution of commercial trade than to the investment rate, aspect which has also been confirmed by the results obtained within the econometric models presented above.

Due to the fact that the member states of European Union are interconnected, and the commercial trade between them is extremely strong, the effects of the crisis have spread very quickly to all these economies. The financial crisis affected the different member states differently. As our estimations show, in Bulgaria, Estonia, Hungary and Slovenia, the crisis led to a decrease of the export influence on economic growth, while Latvia, The Czech Republic, Romania and Poland seem to be less affected than the other Central and East European countries. One of the causes that determined this process can be due to the economy dependency on export. Therefore, the countries in which the export demand was high and which have reported surplus in their accounts are more exposed to the decrease of world trade, and those who have large surpluses can also be exposed to the correction effects, of the balance, regarding the financial assets of the markets (Burghelea, 2011, p. 110). In what industrial production is concerned, this is in the majority of the countries affected by the decrease in foreign demand, which also started with the emergence of the economic crisis. Industrial production in the European Union member states reached a peak in April 2008, followed by a decline of the activity which lasted for a year, time period in which production decreased with 19,1% (Dachin, 2012, p. 47). Even though in the first half of the year 2011 there were again signs of reduction of industrial production in the European Union member countries, in the 3rd trimester of 2011 Romania registered one of the biggest increases of industrial production (7.7%) compared to the same time period in 2010, bigger than that of the European Union (5.3%). Considering the results, we can affirm that in both Romania and the Central and Eastern-European countries, the process of real convergence has become more sensitive to the evolution of commercial trade and industrial production than to the evolution of foreign direct investment.

References

Bhandari, R., Dharmendra, D., Gyan, P., Kamal, U., 2007. Foreign Aid, FDI and Economic Growth in East European Countries, Economics Bulletin 6, No. 13, 1-9, p. 4.

Capolupo, R., Celi, G., 2005. Openness and growth in Central-Eastern European Countries, journal International Economics 58, Issue 2, 141-165, p. 163.

Dritsakis, N., 2004. Exports, investments and economic development of pre-accession countries of the European Union: an empirical investigation of Bulgaria and Romania, Applied Economics, Vol. 36, Issue 16, 1831-1838, p.1831.

Eller, M., Haiss, P., Steiner, K., 2006. Foreign direct investment in the financial sector and economic growth in Central and Eastern Europe: The crucial role of the efficiency channel, Emerging Markets Review 7, 300–319, p. 316.

Konya, L. 2004. Export-Led Growth, Growth-Driven Export, Both or None? Granger Causality Analysis on OECD Countries, Applied Econometrics and International Development, Vol. 4, No. 1, 73-94, p. 92.

Li, X., Liu, X., 2005. Foreign Direct Investment And Economic Growth: An Increasingly Endogenous Relationship, Worm Development 33, No. 3, 393-407, p. 404.

Marinaş, M. 2008. Covergenţa economică. Economic Publishing House, Bucureşti, p. 279, 280.

Marinaş, M., 2007. The Estimation of the Cointegration Relationship between the Economic Growth, Investments and Exports. The Romanian Case, Theoretical and Applied Economics 7(512), p. 12.

McLean, B., Shrestha, S., 2002. International financial liberalization and economic growth, Research Discussion Paper 03, Reserve Bank of Australia, p. 12.

Pereira, A.M., Xu, Z., 2000. Export Growth and Domestic Performance, Review of International Economics, Blackwell Publishing 8.

Pop Silaghi, M.I., 2009. Exports-economic growth. Causality: evidence from CEE Countries, Romanian Journal of Economic Forecasting 2, 105-117, p. 106.

Socol, C., Socol, A., 2006. Modelul European: creştere economică, convergenţă şi coeziune, Theoretical and Applied Economics 8, 61-66, p. 62.

Subasat, T., 2002. Does Export Promotion Increase Economic Growth? Some Cross-Section Evidence, Development Policy Review, Vol. 20, Issue 3, 333-349, p. 333.

Sultan, Z.A., Haque, Md.I., 2011. The Estimation of the Cointegration Relationship between Growth, Domestic Investment and Exports: The Indian Economy, International Journal of Economics and Finance, Vol. 3, Issue 4, 226-232, p. 226.

Tekin, R.B., 2012. Economic growth, exports and foreign direct investment in Least Developed Countries: A panel Granger causality analysis. Economic Modelling 29, 868–878, p.869, 868.