

## **DETERMINANTS OF ECONOMIC GROWTH IN EU 28 COUNTRIES BEFORE, DURING AND AFTER THE RECENT CRISIS**

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**Abstract:** *This research is aiming to analyse using econometric methods the effects of induced on economic growth process by economic and non-economic determinants in the EU 28 countries, during the entire period of 2008-2013, but also separately in the period before crisis, respectively during and post crisis period. Our findings show that in all three periods economic growth was positively and significantly correlated with annual export growth, annual import growth, inflation, gross capital formation, stock market capitalisation and technology, but also significantly and negatively correlated with unemployment. On the other hand, economic growth appears to be significantly and positively correlated with domestic credit to private sector variation only in the period before crisis, but negatively correlated with it during the crisis and post crisis period. Analysing further the specific effects of different determinants, by building and testing a regression model using Panel Least Squares method, we found that exports, gross capital formation and technology had positive impacts on economic growth, while unemployment and imports affected it in all periods. However, the analysis showed that foreign direct investments inflows had low effects on economic growth, while education and domestic credit to private sector variation had positive effects on the economy in the period before crisis and, also negative effects during and after it. At the same time stock market capitalisation had favourable effects during crisis but opposite before it. These findings lead us to conclude that ensuring a sustainable economic growth and diminishing the crisis effects can be achieved by encouraging the exports and the internal and foreign investments, especially in new technologies and by using extensively the entire labour force and improving its performance by raising its education level.*

**Keywords:** economic growth; macroeconomic determinants; education; technology; crisis

**JEL classification:** C23; G01; O11

### **1. Introduction**

Permanently an objective for the government of any country, economic growth is at the same time one of the most important subjects of debate not only for the politicians, but especially for economists, in search of the proper recipe for maintaining the economy on an ascending trend and reaching a sustainable development, which reasonably should ensure the welfare of any people.

However, even wide, the efforts of understanding the influences induced by various factors on the economy's performance are still far from reaching a consensus and both theoretical and empirical studies are admitting that the

economic growth process needs further attention.

The issue of economic growth has yet different connotations in the case of the countries members of the European Union. While achieving a sustainable economic development is important for each of these countries, the specific target of making the entire European Union to act as a whole, as a European replica of USA, makes necessary to look further and seek for finding ways to reach the economic growth of this whole structure, meaning that the member states to fill the development gaps between them and to take common decisions for enhancing the economic growth of the group as well as of its members. This is why in our research we will analyse the subject of economic growth and search to identify its favourable or adverse determinants considering the conditions in all the countries of the group.

## **2. Literature review**

The subject of economic growth can be found in literature in the papers of many authors, treated from theoretical point of view or, more recently, empirically, but even though it remains still an issue to be analysed further.

Historically, Adam Smith, David Ricardo or Karl Marx were some of the first major economists that have stressed the importance of ensuring a sustainable economic growth and approached this subject from different angles, their theories being even nowadays considered as basis for analysing this issue. Their work was continued over time by many other researchers who concentrated their efforts in finding what helps the economy to grow and which are the the opponents of such a process. However, these new studies, especially the recent empirical ones, which took into consideration various determinants of economic growth succeeded only partially to establish undoubtedly clear linkages of economic growth with a number of specific determinants.

Moreover, the new theories on economic growth seem also to embrace different opinions, sometimes contradictory, on the importance attributed to the factors that could influence this process. In this respect, literature revealed in the past decades practically two kinds of approaching economic growth in terms of its determinants. First, the neoclassical approach, which was shaped by Solow (1956) has stressed that economic growth is depending on the capital accumulation, considered as the main condition for enhancing this process.

On the other hand, a second theory, launched by Romer (1986) and Lucas (1988) and known as the theory of endogenous growth, considers human capital and innovation as the most important boosters of economic growth. Starting from these theories many other authors have debated their foundations and completed them by adding into discussion more determinants, be they economic ones (Fisher, 1993; Edwin & Shajehan, 2001) or non-economic ones (Mankiw et al., 1992; Borensztein et al., 1988).

The issue of economic growth was also approached, especially in last decades, also in empiric studies, some of them on specific countries or (Chaudhary et al., 2007; Furuoka, 2007), while others have analysed groups of countries (Mankiw et al., 1992; Fisher, 1993; Barro, 1996; Borensztein et al., 1988; Li and Liu, 2005; Ristanovic, 2010). Such studies, even if started from the above theories, inclining

more to one of them or to the other, had taken into consideration usually economic determinants such as inflation, imports, exports, gross capital formation or foreign direct investments, but some of them considered also technology or the level of education as determinants that should be investigated.

Out of the economic determinants, inflation was found to have, most of the times, a negative impact on the economic growth in several studies (Fisher, 1993; Barro, 1996; Rahman and Salahuddin, 2010), but the authors also noted that this effect was specific to the situations when inflation was high. Moreover, they found also cases when, some countries recorded a growth of their economies even during inflationary periods. Positive influences of inflation were also found in other research papers such as the study on four south Asian countries performed by Mallik and Chowdhury (2001) and the study on five Central and Eastern European countries, during 1993-2007 of Ristanovic (2010).

Fewer papers have considered unemployment as determinant of economic growth, but, as we see this issue, it should be undoubtedly that the productivity is affected by unemployment and the effect cannot be other than strongly negative on the economic growth (Filip, 2015). In this regard, we have to mention that looking somehow from an opposite point of view to this dependency, some studies (Edwin & Shajehan, 2001) proved that labour has a strong positive effect on economic growth.

Exports and imports, were considered, either separately or together, when speaking about trade openness, in different empirical studies, as determinants of economic growth, following the theories known as Export-Led-Growth and Import-Led-Growth. Both of these latter theories were most of the time confirmed by several studies (Chaudhary et al., 2007, Ullah et al., 2014, etc.), even if there were found also cases when some of them were not confirmed (Furuoka, 2007).

Economic growth cannot happen without ensuring the needed financial resources, and this is why we need to look at factors as foreign direct investments, domestic credit or stock market functioning and also, following Solow's opinion, to the capital formation or investments. In this regard, we found in literature papers that take into consideration such determinants, but usually only some of them, not all.

In literature, foreign direct investments (FDI) is considered a positive determinant of economic growth and some studies confirmed it (Lensink and Morisey, 2006; Rahman and Salahuddin, 2010; Moudatsou and Kyrkilis, 2011). Another study (Alfaro et al., 2004) showed a questionable impact of FDI on the economy, while Li and Liu (2005) concluded that in countries having a technological gap, FDI has a significant negative impact on economic growth. All of these results lead to the conclusion previously formulated by Borensztein et al. (1988) that foreign direct investments' effects would depend on the capacity of the host economy to absorb and integrate them. On the other hand, we find in literature papers proving significant positive impacts of domestic credit (King and Levine, 1993; Rahman and Salahuddin, 2010) and of the financial markets development (Alfaro et al., 2004; Wu et al., 2010) on economic growth process.

Investments or capital accumulation, proxied usually by gross capital formation or gross fixed capital formation, is considered by many researchers (starting with Solow) as a positive determinant of economic growth and this relation was confirmed in several studies (Edwin & Shajehan, 2001, Ullah et al., 2014). Furthermore, other theoretical studies (Romer, 1986; Lucas, 1988), completed by

empirical findings (Barro, 1996; Borensztein et al., 1988; Rahman and Salahuddin, 2010; Ullah et al., 2014) sustain the idea that education, perceived as an investment in human capital, is one of the most influential positive determinants of economic growth. However, according to the same theories, economic growth process needs to be enhanced by the assimilation and diffusion of the new technologies, while their combination with the other factors can improve the general positive effects on the economy, as well as, using old technologies, less competitive, makes slower the development.

Based on the above findings, we may say that economic growth is a complex process which evolves under the impact of many determinants having direct or indirect impacts on it. Moreover, while the actions of some of them were found to be contradictory under different circumstances and also for different countries their relevance proved to vary, these facts sustain our opinion on the need of exploring further this subject, especially considering the fast transformations recorded in the last years in the economy and society as well, but also in the specific before, during and post crisis periods.

### **3. Data and methodology**

Our research is developed further based on the idea of selecting specific determinants of economic growth and of analysing their impact in the case of the European Union 28 countries, aiming, in the end, to draw documented conclusions regarding the encountered experience, but also to suggest some measures to be taken in order to ensure economic growth and sustainable development within this group of countries.

In our analysis we use annual data gathered from international databases World Bank Databank and Global Financial Development Database (GFDD) of World Bank, for the period 2000-2013, for all the 28 countries, members of European Union: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden and United Kingdom.

Starting from the previous studies found in literature and based on the above reasoning on the potential factors that may influence the economy, we have selected and taken into consideration for our analysis the determinants showed in Table 1. We mention in the same table, the indicators we will use as proxies for the selected determinants and also the expected impact of them on the economic growth, considered as dependent variable and proxied, in turn, by the real GDP per capita annual growth (GDPCPGR).

**Table 1: Determinants of economic growth –independent variables**

<b>Independent variable/ Determinant</b>	<b>Indicator name</b>	<b>Indicator symbol</b>	<b>Expected influence (+/-)</b>	<b>Source</b>
<b>Inflation</b>	Inflation rate	INF	+/-	World Bank Databank
<b>Unemployment</b>	Unemployment rate variation	$\Delta$ UNEM	-	World Bank Databank
<b>Exports growth</b>	Annual exports growth	EXPGR	+/-	World Bank Databank
<b>Imports growth</b>	Annual imports growth	IMPGR	+/-	World Bank Databank
<b>Domestic credit to private sector</b>	Variation of domestic credit to private sector as percentage of GDP	$\Delta$ DCR_PG	+	World Bank GFDD database
<b>Foreign Direct Investments</b>	Foreign direct investments net inflows - percentage of GDP	FDII_PG	+/-	World Bank GFDD database
<b>Gross Capital Formation</b>	Gross Capital Formation annual growth	GCFGR	+	World Bank GFDD
<b>Stock market capitalization</b>	Variation of Stock market capitalization -percentage of GDP	$\Delta$ SMCAP_PG	+	World Bank GFDD database
<b>Education</b>	Labor force with tertiary education (of total) variation	$\Delta$ LF_TERTED	+	World Bank Databank
<b>Technology</b>	Mobile cellular subscriptions per 100 people variation	$\Delta$ MOBSUBS	+	World Bank Databank

Based on our above considerations we develop further our research by processing the panel of data, for the EU 28 countries, using Pearson correlations, respectively building an econometric model using the Panel Least Squares method and testing it for the entire period, but also for the period before crisis (2000-2007) and for the crisis and post crisis period (2008-2013). Thus, we expect we will be able to find out which factors have acted in favour of economic development or against it, but also if their actions or their importance have changed during the crisis.

#### 4. Results and remarks

We start our analysis by using Pearson correlations in order to establish whether the panel data are confirming expected linkages between the real GDP per capita annual growth and the determinants selected by us. Processing data for the EU 28 countries and the three periods, we have obtained the results in Table 2.

**Table 2:** Correlations of economic growth with the independent variables

<b>Period:</b>	<b>Total</b>	<b>Pre-crisis</b>	<b>Crisis and post crisis</b>
<b>Sample (adjusted):</b>	<b>2000- 2013</b>	<b>2000- 2007</b>	<b>2008- 2013</b>
<b>Oservations:</b>	<b>359</b>	<b>195</b>	<b>136</b>
<b>Correlation/ Probability</b>	<b>GDPCPGR</b>	<b>GDPCPGR</b>	<b>GDPCPGR</b>
<b>INF</b>	0.300415***	0.327658***	0.249379***
	0.0000	0.0000	0.0034
<b>ΔUNEM</b>	-0.674231***	-0.446654***	-0.733167***
	0.0000	0.0000	0.0000
<b>EXPGR</b>	0.706928***	0.576285***	0.793853***
	0.0000	0.0000	0.0000
<b>IMPGR</b>	0.831810***	0.729778***	0.873058***
	0.0000	0.0000	0.0000
<b>ΔDCR_PG</b>	0.049453	0.138122*	-0.500344***
	0.3501	0.0542	0.0000
<b>FDII_PG</b>	0.020032	0.019744	0.023524
	0.7052	0.7841	0.7857
<b>GCFGR</b>	0.818935***	0.692318***	0.847411***
	0.0000	0.0000	0.0000
<b>ΔSMCAP_PG</b>	0.339618***	0.175691**	0.402692***
	0.0000	0.0140	0.0000
<b>ΔLF_TERTED</b>	-0.108871**	-0.059741	-0.092939
	0.0392	0.4068	0.2819
<b>ΔMOBSUBS</b>	0.447330***	0.290432***	0.190669**
	0.0000	0.0000	0.0262

\*\*\*, \*\*, \* - denotes significance at 1%, 5%, respectively 10% level

Source: own calculations and estimations using Eviews 7.2.

The results in Table 2 show that real GDP per capita annual growth is significantly and positively correlated with annual export growth, but also with annual import growth in all three analysed periods suggesting that international trade and economic growth are enhancing each other.

We note that gross capital formation growth and the variation of the stock market capitalisation are also positively and significantly correlated with real GDP per capita annual growth which leads to the conclusion of a strong linkage between investments and financial markets with economic growth, as expected.

Moreover, technology appears strongly and positively correlated with economic growth, data confirming previous theories on the positive influence of technology on the economic development, but also the reverse effect, suggesting that economic development enhances in turn adoption and spread of new technologies. Unlike some other studies, inflation rate results also positively correlated with the real GDP per capita annual growth, in all three periods, which can be explainable while both indicators were evolving on the background of many money and fiscal policy measures taken by the authorities.

Data in Table 2 show that foreign direct investments are positively correlated with economic growth but, in all three periods, had an almost insignificant impact on it.

The variation of domestic credit as percentage of GDP proves to have a different correlations, from one period to another, with GDP per capita annual growth. While before crisis we note a significant positive correlation between the two of them, during crisis they appear significantly negatively correlated and for the entire period their correlation results positive but insignificant. We might say yet that such correlations are explainable both for the period before crisis, but also for the crisis period, while crisis induced malfunctions both in economy and in credit market.

On the other hand, for all three periods we note the significant negative correlation of unemployment with economic growth, especially during crisis period, which proves again that there is a strong negative connection between the two of them.

Even we expected a positive correlation of GDP per capita annual growth with education, but the results show for all three periods that in EU 28 countries the correlation is a negative one, even if in most of the cases insignificant.

Since according to Table 2 there are enough ground to consider the chosen variables as potential determinants of economic growth, the next step of our analysis will be concentrated on finding their direct impacts on the economic growth of EU 28 countries. In this respect, we will use the Panel Least Squares method for building an econometric regression model for testing it for each of the three periods considered. Considering the real GDP per capita annual growth as the dependent variable, respectively the other indicators, as independent variables, we propose the following econometric model (1):

$$y_{jt} = c + \sum_i \beta_i X_{ijt} + \varepsilon \quad (1)$$

, where j stands for the specific country, t stands for the year, y represents real GDP per capita annual growth,  $X_{ijt}$  represent the considered determinants from Table 1,  $\beta_i$  are the coefficients of these determinants and  $\varepsilon$  stands is the error term. We tested the model using the data of the EU 28 countries for each of the three periods considered in analysis and the results are synthetized in Table 3:

**Table 3: Results of testing the proposed model**

Dependent Variable: GDPCPGR						
Period:	Total		Pre-crisis		Crisis and post crisis	
Sample:	2001-2013		2000-2007		2008-2013	
Variable	Coeff.	Prob.	Coeff.	Prob.	Coeff.	Prob.
INF	0.119413	0.0002	0.134678	0.0002	-0.279507	0.0020
$\Delta$ UNEM	-0.554787	0.0000	-0.276304	0.0109	-0.823651	0.0000
EXPGR	0.183914	0.0000	0.270342	0.0000	0.262938	0.0000
IMPGR	-0.033324	0.3348	-0.106425	0.0187	-0.114720	0.0256
$\Delta$ DCR_G	0.017434	0.1334	0.030111	0.0590	-0.024024	0.1920
FDII_PG	-0.001333	0.8052	-0.027966	0.0060	-0.006102	0.3553
GCFGR	0.153638	0.0000	0.224037	0.0000	0.115047	0.0000
$\Delta$ SMCAP_PG	0.007690	0.2747	-0.025120	0.0076	0.018267	0.0782
$\Delta$ LF_TERTED	0.013608	0.8257	0.124272	0.0502	-0.253347	0.0992
$\Delta$ MOBSUBS	0.062617	0.0000	0.083366	0.0000	0.027154	0.1421
C	0.112869	0.5171	-0.203364	0.4595	1.009391	0.0011

<b>R-squared</b>	0.824843	0.742233	0.897271
<b>Adj. R-squared</b>	0.819810	0.728224	0.889053
<b>F-statistic</b>	163.8789	52.98239	109.1799
<b>Prob(F-statistic)</b>	0.000000	0.000000	0.000000

Source: own calculations and estimations using Eviews 7.2.

Table 3 reveals a very good viability of the proposed model, especially in the crisis and post crisis period (R-squared=0.8891), but also over the entire period (R-squared=0.8198) and in period before crisis (R-squared=0.7282), which confirms that the chosen variables were the main determinants of the economic growth.

The results, prove that annual exports growth and the gross capital formation annual growth were the most significant positive impact factors on economic growth, while unemployment had a significant negative impact on it, in all three periods. At the same time, inflation appears to have significant impacts on economic growth, positive on the pre-crisis period and on the whole interval of 2000-2013, but negative during and post crisis.

Data in Table 3 show also that the direct effect of annual imports growth on real GDP per capita annual growth was negative and significant in all three periods, even if the previous correlations would made us to expect another behaviour. However, this is not unexpected at all, because, as literature has stated many times, if the imports were not made to bring especially technologies or high technology goods, but common goods and services, which is the case in most of the countries, they just consumed resources instead of bringing added value or creating premises to increase the internal added value.

Technology, by the way, had positive effects on economic growth also in all three periods, but its significance was strong mainly in the pre-crisis period, while in the crisis and post- crisis period had less significant impact, leading yet, over the whole period to a positive significant effect and confirming thus the previous expectations. On the other hand, it is obvious from the results that while in the pre-crisis period the credit market had a significant impact on sustaining economic growth and respectively the stock market had an opposite effect, during crisis it appears that credit market had an insignificant and negative effect and the stock market sustained the economy. At the same time, the impact of foreign direct investments inflows was rather negative in all three periods, suggesting that their levels were not high enough to contribute to enhancing the economic development.

Interesting results were somehow found regarding the impact of the education level on economic growth. According to data in Table 3, education had a significant positive impact on economic growth in the pre-crisis period, but also a negative impact in the crisis period, leading to a general positive but insignificant impact over the entire 2000-2013 period. These observations are leading us to consider that under proper circumstances, education can become an important leverage for obtaining the improvement of the economy's performance.

## 5. Conclusions

Taking into consideration all the previous theories and also some of the empiric findings on the process of economic growth, this research aims to draw conclusions regarding the effects of the most relevant determinants on this process and to reveal if their actions are similar or different in periods marked by major distortions such as the recent economic and financial crisis. In this regard, using data for the enlarged group of European Countries (EU 28), for the period 2000-2013, we developed econometric analyses of the economic growth, both on the entire period, but also separately, on the time intervals, before, respectively, during and post crisis.

We used, on one hand, in our analyses, real GDP per capita annual growth as proxy for economic growth and, on the other hand, we considered economic determinants as inflation, unemployment, annual growth of exports and imports, the variation of domestic credit to private sector, stock market capitalisation, foreign direct investments and gross capital formation, but also non-economic determinants as technology and education.

Using Pearson correlations we found that in all three periods the economic growth was positively and significantly correlated with annual export growth, annual import growth, inflation, gross capital formation, stock market capitalisation and technology, but also significantly and negatively correlated with unemployment. On the other hand, domestic credit to private sector was significantly and positively correlated with economic growth only in the period before crisis, but during crisis the correlation was significant yet negative and for the other variables we found less significant correlations.

Seeking to find the effects of the determinants we built a regression model and tested it on all three periods, using Panel Least Squares method. The results proved that for all three cases the model is reliable and that during all of them, the annual growth of exports, the gross capital formation and technology played the most significant positive role in sustaining economic growth, while unemployment and the annual growth of imports affected it significantly. Also, the results show that foreign direct investments seem not to contribute to helping economic growth for these countries in all periods.

Domestic credit to private sector was found to have a significant positive influence only before crisis and its influence has reversed during the crisis period, while stock market had an opposite impact in these periods, favourable during crisis and negative before it. Moreover, we found that education had significant positive impact on economic growth before crisis, but a negative influence during crisis period, even this was less significant than the first one.

Based on the previous findings, in our opinion, the target of ensuring a sustainable economic growth, at least in the case of the analysed group of countries may be achieved first of all, by encouraging exports and investments, both internal and external, using massively the most advanced technologies, but also by ensuring a high level of occupation and by improving the education of the labour force. Imports should also be channelled towards bringing mainly new technologies and less for common merchandise for usual consumption and there should be ensured the conditions for the efficient functioning of the financial sector.

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