

# International Credit Flows

**Alexandros Garefalakis<sup>1</sup>**

agarefalakis@hmu.gr

*Assistant Professor*

*Department of Business Administration and Tourism*

*School of Management and Economics Sciences*

*Hellenic Mediterranean University & Neapolis University Pafos*

**George Alexopoulos<sup>2</sup>**

alexopoulos.ga@gmail.com

*Department of Business Administration,*

*University of Patras*

**Panagiotis Kyriakogkonas<sup>3</sup>**

p.kyriakogkonas@nup.ac.cy

*Assistant Professor*

*Department of Accounting and Finance*

*School of Economics, Business and Computer Sciences*

*Neapolis University Pafos*

**Evangelia Pappa<sup>4</sup>**

evangelia.pappa@yahoo.com

*Postdoctoral Researcher*

*Department of Accounting and Finance*

*School of Economics, Business and Computer Sciences*

*Neapolis University Pafos*

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## Abstract

Financial openness across countries is a significant contributor to economic growth. However, excess capital mobility has been criticized for its role in transmitting crisis and supporting financial turmoil. Thus, the aim of the paper is to investigate the impact of credit flows on economic growth, taking into account certain macroeconomic growth-related variables. Methodologically we use a panel econometric model by applying a regression analysis on a sample of seven developed countries (G7) during the years from 2005 to 2014. The findings revealed that credit flows, measured by external loans and deposits; positively affect economic growth of these countries, measured by GDP growth rate.

**Key Words:** Credit flows, G7, volatility, financial development.

**JEL Classification:** F21, F41, O1.

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## 1. INTRODUCTION

Global financial integration has been placed prominently on the research agenda around the world and is a matter of contradictory views, taking into account the significant effects of the recent financial crisis. Given its important role in economic growth, financial openness is indeed in the focus of policy makers and academic researchers. Accordingly, the benefits of capital mobility across countries have been demonstrated long ago by economists, as it facilitates the efficient allocation of savings directing them to the most productive uses and, thus, bringing welfare gains. On the other hand, excess capital mobility has been criticized for its amplifying role during a crisis as observed again in the summer of 2015 during the China markets turmoil.

Lately, in the aftermath of the 2008 financial crisis the global recession followed, financial openness became a topic of economic policy debate. Capital flows and credit growth have been identified as important sources of macroeconomic imbalances, and consequently, capital flows are considered as a significant factor that has contributed to the expansion of the recent financial crisis. As such, the net effects of financial openness and international capital mobility around the world are questionable, as reflected in the controversial empirical evidence. On the same way, empirical evidence as regards to the determining factors affecting capital flows is also mixed, although examining these determinants is crucial for understanding credit flows impact on economic growth or financial instability. Furthermore, it is well documented that the structure and composition of capital flows is also important for investigating their outcomes on recipient countries.

The aim of this paper is to investigate the impact of credit flows on economic growth, taking into account a number of growth-related variables, in order to provide an understanding of the relationship between capital flows and economic development. In particular, this research uses a panel econometric model by applying a regression analysis on a sample of seven developed countries (G7) during the years from 2005 to 2014, taking as a dependent variable economic growth, as measured by GDP growth, and as independent variables credit flows (external loans and deposits), government consumption, imports, exports and interest rates. In addition, a cointegration test is applied, in order to examine the long-run equilibrium relationship between these variables and investigate the macroeconomic link between credit flows and economic growth in the long-run.

The remainder of the article is structured as follows. Section 2 provides a comprehensive literature review regarding the role of capital flows and financial openness as well as the patterns and determinants of international capital flows and link between capital flows and financial turmoil. Section 3 describes the research methodology. Section 4 provides the empirical findings and the last section concludes the paper.

## 2. LITERATURE REVIEW

### THE ROLE OF CAPITAL FLOWS AND FINANCIAL OPENNESS

Financial openness has been in focus among policy makers and academic researchers during the last decades regarding its role in the economic growth around the globe. More importantly, the benefits of capital mobility have been highlighted long ago by Keynes, who in the 1920s' lauded the significant role of the international integration in trade and financial flows (Passari & Rey, 2015). According to Alfaro et al (2008), the most powerful argument in favor of capital mobility is that facilitates the efficient allocation of savings among different countries, via the respective financial channels that direct resources to the most productive uses, thus, enhancing economic growth.

On the other hand, financial openness has been criticized for its contribution to the crises observed in developing countries and the higher risk of crises' transmission (Prasad et al, 2003), although it has also been argued that financial liberalization had stabilizing effects during times of economic crisis (Hartwell, 2012). Kirabaeva & Razin (2010) point out that capital mobility across countries is beneficial for three main reasons, first, international capital flows reduce the financial risk by diversifying investments and lending channels, second, capital integration favors the diffusion of best practices regarding corporate governance and, third, capital mobility prevent the application of inappropriate policies designed by governments and policy agents. As argued by Gourinchas & Jeanne (2006), financial integration and openness enhances capital mobility, bringing welfare gains, by improving the capital flows allocation efficiency in the economy which is characterized by scarce capital resources. Of course, the issue if international capital flows provide welfare gains or losses is still a matter of considerable debate among academics.

In either case, there are three major types on international capital flows that constitute financial integration across countries, i.e. foreign direct investment (FDI), foreign portfolio investment (FPI) and debt, which consists of bank loans and bonds and is regarded as the more volatile form of capital flows (Albuquerque, 2003). On the other hand, capital flows that are characterized by equity-like features, i.e. FDI and FPI, are more stable and less prone to reverse flows, while it should be also noted that FDI are considered as more beneficial than FPI and debt, due to the higher level of management control that accompanies them.

According to Lane & Pels (2012) capital flows and credit growth has been identified as important sources of macroeconomic imbalances, and consequently, capital flows are considered as a significant factor that has contributed to the expansion of the recent financial crisis. As previously mentioned, the effects of financial openness and international capital mobility around the world are questionable, as reflected in the controversial empirical evidence. For example, Edwards (2008), examining the link between capital flows and economic growth for 157 countries for a thirty years period (1970-2001), noticed that those countries that restricted capital mobility did not experience a higher decline in their growth in comparison with countries that allowed a higher level of capital mobility, concluding that financial openness is beneficial even in time of crises.

Accordingly, Hartwell (2012), investigating the relationship between financial openness and various economic indicators, including banking performance indexes, for 28 transition economies during 1989-2012, found that the more open is the financial sector the less is the probability of an economic crisis, although this relationship is mediated by factors related to the institutional quality. In the same mode, Brezigar-Masten et al (2010), examining the role of financial integration in the European Union after the recent financial crisis, proved that countries with a more open financial sector are characterized by a smaller decline in the capital inflows and concluded that financial integration has a stabilizing effect.

On the other hand, various researchers have documented that several factors play an important role as regards the effects of capital flows and financial openness on economic growth, such as the developmental level of individual countries and the different types of capital flows, including FDI, FPI and debt. For example,

Garita (2009) investigated the impact of financial openness on economic growth for 211 developed and developing countries around the world for more than 30 years (1970-2005) and found that FDI inflows are positively correlated with economic growth measured by GDP. In addition, Aizenman et al (2011) examined the link between economic growth and capital flows for more than 100 developed and developing countries for 20 years (1990-2010), proving that this relationship is not stable and in particular is affected by the country's economic structure, the time period under examination and the different type of capital flows, as FDI has a positive effect on economic growth measured by GDP, while debt has a negative impact during times of economic crisis.

Furthermore, Ito (2004) documented that the effect of capital flows depends both on the level of development of each country and the different type of capital. More recently, Bogdan et al (2014) investigated the real effects of bank-intermediated international capital flows to 11 developing countries from 1997 to 2012 and showed that there is no systematic relationship between international banks' exposures and countries' growth rates at normal times, although this relationship turns negative at times of crisis.

All in all, it is obvious that the empirical evidence regarding the effect of financial openness and capital flows on economic growth is inconclusive, as well as that the type of the capital flows plays a significant role in the linkages. As Shirota (2013) explains, capital inflows is a dual-edged sword for economic growth, as on the positive side they bring welfare gains by financing the most productive investment opportunities and on the negative side, they bring inflationary pressures and amplify capital account deficits for the recipient countries, making them more vulnerable to external shocks.

### **PATTERNS OF INTERNATIONAL CAPITAL FLOWS**

The neoclassical macroeconomic models suggest that capital should flow from capital-rich countries to capital-poor ones, as in the first category the marginal return of investment is low and vice versa. But contrary to these predictions and taking into account the great growth observed in the international capital markets during the last decades, it is now well documented that capital often flows upstream, meaning from poorer to richer countries. This controversy was initially analyzed by Lucas (1990), who investigated the international capital movements from the perspective of capital-poor and capital-rich countries, proposing a puzzle, the so-called "Lucas paradox". Lucas (1990) argued that capital does not flow from rich to poor countries, in contrast to the neoclassical models, which presume that if capital was allowed to flow freely, the return of investment in any country should be the same.

Indeed, the neoclassical paradigm is not inclusive as to explain such reverse capital flows observed across countries during the last decades, as countries differ significantly in terms of production technology, the quality of credit institutions and the structure of the economy. Empirical evidence confirms that during the last two decades, there is an upstream capital movement pattern. Prasad et al (2007) documented that since 1998 net capital flows from poor to rich countries and that the average per capita income of those countries with current account surpluses have been lower than deficit ones. Additionally, Ju & Wei (2007) also confirmed this assumption, proving that during the last decade, many developing countries, such as China and South Africa, are net financial capital exporters and net FDI importers, while developed countries, such as the UK and the US are characterized by the opposite pattern of capital flows.

Obstfeld & Taylor (2004), investigating the patterns of international capital flows during the last century, argued that the latter waves of capital flows were inverse. In particular, they documented that there are four different periods of capital mobility that can be understood by examining various macroeconomic factors, noting that countries with fixed exchange rate regimes tend to restrict capital flows, as well as recent international capital flows aim mostly to financial diversification rather than financing economic development. von Hagen & Zhang (2009) argue that the empirical puzzle of the upstream capital flows detected in the latter years is explained by two strands of literature. On the one side, the patterns of international portfolio investments depend on the patterns or risk-sharing among investors, and on the other hand, it is argued that the credit market imperfection led to a state of equilibrium, in which financial capital flows from the poorer countries to the richer ones.

Indeed, Alfaro et al (2007) point out that the main theoretical explanations for the "Lucas paradox" can be categorized into two different types, i.e. those who focus on the differences in various fundamentals that affect the production structure of the economy of different countries, such as production technology, government policies and credit market institutions quality, and those who take into consideration the international capital market imperfections, especially as regards to sovereign risk and asymmetric information between borrowers and lenders. Based on these theoretical considerations, Alfaro et al (2007) overviewed the patterns of international capital flows in the period from 1970 to 2000 and found that institutional quality is an important determinant of capital flows internationally.

## **CAPITAL FLOWS DETERMINANTS**

Examining the capital flows determinants is crucial for understanding their impact on economic growth or financial instability, although there is no consensus regarding the exact determining factors that drive them. Empirical evidence is mixed, as researchers try to highlight capital flows determinants in various ways, focusing on different regions around the world and alternative types of capital. Prasad et al (2003), reviewing the relevant empirical literature, suggest that different academics examine different samples of countries, as well as different periods of time, while focusing on different forms of capital flows, including FDI, FPI, debt and private or public flows.

Shirota (2013) argues that capital flows determinants can be grouped into three categories, i.e., the global-common factors, which capture the worldwide movements in capital flows, the regional-common factors, which resemble the aforementioned ones but in a regional level, and the country-specific factors, which are related to the domestic conditions of recipient countries, such as several macroeconomic variables. More specifically, the global- and regional-related determinants are considered are push factors and the country-related ones are referred to pull factors.

Previous research literature has well documented the significance of both push and pulls factors. For example, Calvo et al (1996), examining the inflows of capital to developing countries in the 1990s, found that both push and pull determinants are important for explaining the FDI flows, noting that low interest rates in the US have played an important role in the capital flows on developing countries during this period of time. In accordance, Wei (2000), investigating the role of corruption in the global capital flows, used data on bilateral FDI from 1994 to 1996 and documented that corruption is a significant determinant of capital flows, as it reduces the volume of inward FDI, affecting also the composition of total capital flows. Likewise, Wei & Wu (2002) proved that emerging market funds invest systematically less in less transparent countries that are characterized by higher level of corruption, concluding that capital flows can be partly explained by politics and other institutional features, such as the legal system quality, the quality of the corporate governance practices and the governmental control on the financial intermediaries.

Lane (2004) focuses on push factors, providing evidence that credit market frictions and imperfections are crucial for explaining the debt flows between 1970 and 1995 in developing countries around the world and Alfaro et al (2008) argue that push factors and particularly institutional quality is a causal determinant of capital inflows. Furthermore, Hernandez et al (2001) argue that both the global and the local pull factors, including inflation rates, price per earnings ratios and credit ratings of the recipient countries, are significant determinants of the capital inflows in the developing countries of Latin America and Asia during the late 1980s and early 1990s.

Accordingly, Fratzscher (2012) points out that the type of agent involved in the international capital flow movement also important, documenting that the global push factors in the form of shocks to liquidity and risk were the key determinant of funds' flows during the financial crisis in 2008 while other local pull factors related to the particular countries' macroeconomic fundamentals, institutions and policies were the key drivers in the aftermath of the crisis, in particular for emerging economies. Shirota (2013) analyzed the determinant of the cross-border credit flows through global banks taking into account the relative contributions of the global-common factor, the regional-common factor and the national-specific factor, providing evidence that the global-common factor explains a large part of the volatilities in overall cross-border banking flow and suggesting that the international propagations of shocks through global banks are quantitatively important, although the main drivers of the credit flows are largely heterogeneous across countries and different sectors.

## **THE LINK BETWEEN CAPITAL FLOWS AND FINANCIAL TURMOIL**

Financial openness accompanied by increasing international capital flows is theoretically quite beneficial for recipient countries, enhancing economic growth by a variety of channels, such as increased national savings used for investments and promotion of better financial and macroeconomic policies applied by governmental bodies. Yet, a great number of researchers have provided opposite empirical evidence, suggesting that these benefits are questionable, as well as that they significantly depend on the composition of international capital flows. Indeed, one of the most widespread critics of international financial integration is the increased likelihood for developing recipient countries to experience a currency crisis and other forms of financial turmoil (Prasad et al, 2003).

In this frame, the literature suggests that financial downturns due to respective financial globalization can be attributed to the composition of capital flows, the so-called the composition hypothesis (Wei, 2006). According to Bekaert et al (2005), international direct investment and international portfolio capital flows can significantly improve economic growth, but this hypothesis does not stand for debt flows. Thus, the composition hypothesis suggests that not all capital flows are equal and have the same impact on welfare of recipient countries. Reisen & Soto (2001), investigating the types of capital inflows that foster developing countries' growth, documented that international lending has a negative effect. Frankel & Rose (1996),

studying a number of currency crashes in emerging markets around the world for more than twenty years (1971-1992), provided strong evidence that the composition of the international capital flows is one of the most important variables that can predict a currency crisis.

In accordance, Frankel & Wei (2005) found similar results, showing that the composition of capital inflows, including the maturity structure of debt and its currency composition, plays an important role during financial turmoil. Kirabaeva & Razin (2009) also argue that the empirical literature on financial openness documents a systematic empirical link between exposure to debt flows and both the likelihood and the severity of financial crises. Indeed, Rodrik & Velasco (1999) showed that countries characterized by an extended short-term debt stock in comparison to reserves have a greater likelihood of experiencing a financial flow reversal and, thus, financial crises, while Tong & Wei (2009) argue that the composition of capital flows matters examining capital inflows and liquidity crunch during the recent global economic crisis, documenting that a large exposure to capital inflows, besides FDI, during the years before the crisis is significantly and positively linked to severe credit crunch.

Within the EMU, greater debt flows in the last years have contributed not only to widening public deficits and excessive private sector leverage of the “peripheral” countries but also inflated private debt liability and asset positions for countries that experienced systemic banking crisis after 2007, including Belgium, France and the Netherlands (Hale & Obstfeld, 2014). Wei (2006) examining the composition hypothesis in the frame of global financial globalization, suggests that unexpected reversals of capital flows are more likely to happen in countries that rely more on debt flows rather than other types of capital flows, such as FDI. In this way, McKinnon & Pill (1996) argue that debt flows can have a negative impact on economic growth, as banks are exposed to currency risks, and, thus, financial globalization can result to financial turmoil without proper supervision.

Furthermore, Wei (2006) proposes that the combination of the composition and the threshold hypotheses matter when looking for the benefits of financial globalization for the recipient countries. That is to say that there is a significant connection between the type of capital flows and the institutional quality, meaning that countries with institutions of higher quality are more likely to attract more beneficial capital inflows, i.e. international direct investment in relation with international bank loans. This dual effect is also confirmed by Gelos & Wei (2005), who showed that international mutual funds tend to invest more on international equity in countries where the institutional quality is higher, as measured by governmental and corporate transparency. All in all, it is a common view that the type of capital inflows plays an important role in economic growth within financial globalization and in particular during times of financial turmoil.

Indeed, Giannetti & Laeven (2012) document that global banks have played an important role in the transmission of the global financial crisis to emerging markets via international credit flows, a hypothesis that highlights the value of regulating international capital flows. Milesi-Ferretti & Tille (2011) prove that the holdings of cross-border bank credit has significantly increased during the years before the recent global financial crisis, suggesting that bank credit flows increase to the late 2000s has played a key role in the transmission of the crisis to emerging markets. Taking into account the enormous expansion of global banks since the 2000s, credit flows have become a topic of debate in the field of financial globalization.

### 3. RESEARCH METHODOLOGY

The empirical implementation of the study focuses on the influence exerted on the GDP per capita that take place by a number of other variables. Main aim is to clarify the relationship between the GDP per capita that take place in a group of countries (G7), which is set as dependent variable in the regression equation formed and external loans and deposits of the banks of G7. Also, as independent variables set into the model is the growth rate of government consumption, imports, exports and interest rates. The econometric model used for examining the nature of the relationship between the dependent and independent variables is illustrated afterwards and is consisted by panel data.

Panel data are data consisted by observations of many stratified units (countries in our case) for different time periods. Its advantages over simple cross-section data or time-series data are obvious. Usually have large cross-sectional dimension so as to provide the researcher large samples to work. The observations are often given in a subdivided (disaggregated) level avoiding the problems of aggregation that are usually displayed in macroeconomic time series. Panel data can also be used to test research questions that cannot be tested using simple cross section or time series data. However, there are also some problems associated with Panel data. The collection of the data must be done carefully so as to provide a representative coverage of the test population. If this does not happen, the problem of selectivity arises because some groups of the population are not included in it. It is also likely to arise the problem of attrition as observations of the sample can change significantly (Frees, 2004). These problems are likely to create a bias. Finally, Panel data with short time dimension cannot easily measure dynamic effects.

Encoding the advantages of Panel data these are:

- Large number of observations
- Increased degrees of freedom
- Reduced multicollinearity between the explanatory variables
- Improved efficiency in econometric estimates
- Greater volatility
- Better predictability
- More reliable and stable parameter estimations

The disadvantages of Panel data are:

- Problems in the collection and management of data
- Problems of selectivity and friction

The data that will be used for the completion of the research are collected by the Organization for Economic Co-operation and Development (OECD) and Bank for International Settlements (BIS) databases and are referred in G& countries for a period of 10 years. More specifically countries which constitute the data set are Canada, France, Germany, Italy, Japan, United Kingdom and United States of America, for a time period of 2005 to 2014. The collected observations are quarterly and the numbers of total observations are 280, which are considered as satisfactory. Additionally, the research data were strongly balanced.

Based on the above the model that will be examined is the following:

$$GDP_{i,t} = b_0 + b_1EP_{i,t} + b_2GOV_{i,t} + b_3IMP_{i,t} + b_4EXP_{i,t} + b_5INTR_{i,t} + \varepsilon_{it}$$

Where:

$GDP_{i,t}$  : is the GDP per capita growth rate for country i at time t

$EP_{i,t}$  : is the external loans and deposits of banks growth rate for country i at time t

$GOV_{i,t}$  : is the government consumption growth rate for country i at time t

$IMP_{i,t}$  : is the imports growth rate for country i at time t

$EXP_{i,t}$  : is the exports growth rate for country i at time t

$INTR_{i,t}$  : is the average interest rates for country i at time t

Before estimating the model, we will proceed with basic econometric analysis of the variables used presenting the descriptive statistics and the correlation matrix obtained for them. The estimation of the model will be firstly carried out by using random effects regression. Additionally, the given model will be estimated by using panel data FMOLS cointegration method in order to detect any long run equilibrium relationships between the dependent and the independent variables.

#### 4. EMPIRICAL FINDINGS

Starting the presentation of the results of our study we proceed to the clarification of the basic properties of the indices-variables used. Initially table 1 presents the descriptive statistics of the research variables. More specifically mean, median, minimum, maximum, standard deviation, skewness and kurtosis are presented.

**Table 1: Descriptive statistics**

	EP	EXP	GDP	GOV	IMP	INTR
Mean	1.26	0.70	0.06	5.28	1.00	3.09
Median	1.08	1.10	0.13	4.19	1.35	3.31
Maximum	19.96	14.80	6.06	29.33	14.80	6.61
Minimum	-19.73	-27.40	-4.32	-9.99	-27.40	0.40
Std. Dev.	5.77	6.12	1.20	4.79	5.96	1.26
Skewness	0.13	-1.51	0.27	1.73	-1.70	-0.18
Kurtosis	4.28	7.22	8.57	8.18	8.20	2.18

As it is shown above, the average growth rate of the external loans and deposits of the banks of G7 is equal to 1.26% which is quite high. In contrast, the of GDP per capita average growth rate is low (0.06%), while the imports average growth rate is higher than exports average growth rate (1.00% and 0.70% respectively). Government consumption average growth rate is equal to 5.28 and average interest rates value equal to 3.09%. Focusing on descriptive statistics related to the distribution of the data such as skewness and kurtosis it is noticed that variables EP, GDP and GOV show significant positive (right) asymmetry as skewness is positive, while the variables EXP, IMP and INTR in which mean is lower than median show significant negative (left) asymmetry. In order to have symmetrical distribution skewness values should be zero or at least close to zero, fact that does not stand in any case. Furthermore, it is observed that kurtosis is greater than 3 for the all variables except INTR and the distribution of these variables is platykurtic, while for interest rates the distribution is leptokurtic as kurtosis is lower than 3.

Interpreting the correlation matrix arising, it is observed that there is a positive and moderate correlation of GDP and EP ( $r=0.268$ ,  $p<0.001$ ), which means that as external loans and deposits of the banks of G7 increase GDP of these countries also increases, while similar is the relationship between the variables GDP and IMP ( $r=0.509$ ,  $p<0.001$ ). Also, it is documented that the correlation between the variable EP and the variables GOV ( $r=0.147$ ,  $p=0.014$ ), IMP ( $r=0.393$ ,  $p<0.001$ ) and INTR ( $r=0.152$ ,  $p=0.011$ ) is also positive and statistically significant. Finally, it is shown that the government consumption growth rate is positively correlated with imports growth rate ( $r=0.125$ ,  $p=0.037$ ) and interest rates ( $r=0.235$ ,  $p<0.001$ ), while in contrast is negatively correlated with exports growth rate ( $r=-0.131$ ,  $p=0.029$ ).

**Table 2: Correlation matrix**

	GDP	EP	GOV	IMP	EXP	INTR
GDP	1					
EP	0.268 (0.000)	1				
GOV	-0.045 (0.452)	0.147 (0.014)	1			
IMP	0.509 (0.000)	0.393 (0.000)	0.125 (0.037)	1		
EXP	-0.058 (0.331)	-0.062 (0.300)	-0.131 (0.029)	0.088 (0.141)	1	
INTR	-0.080 (0.181)	0.152 (0.011)	0.235 (0.000)	0.102 (0.089)	-0.001 (0.981)	1

In order to select the appropriate method of estimation of the model we apply the corresponding Hausman test, to determine if the model is correct to be estimated using fixed effects or random effects. The null and alternative hypotheses of Hausman test are:

$H_0$ : Fixed effects estimator is consistent and the random effects estimator is consistent and efficient (i.e., has the lowest asymptotic variance)

$H_1$ : Fixed effects estimator is consistent and the random effects estimator is inconsistent

Large values of  $\chi^2$  statistic constitute rejection of the null hypothesis of random effects and the model should be estimated through fixed effects method while small values of  $\chi^2$  statistic constitute acceptance of the null hypothesis and the model should be estimated through random effects method.

As it is shown in table 3 is selected the random effects regression model as by the corresponding Hausman test  $\chi^2$  is equal to 1.770 ( $p=0,880$ ). According to the method of Random Effects, the variance-covariance matrix of coefficients is calculated in a different way. This means that after the correction, the estimated coefficients are identical to those resulting by the application of the Ordinary Least Squares method, but the estimated standard errors of the coefficients are different (Lee, 2002).

The correction of standard errors relies on the principle that the squared residuals which are used in order to correct violations of the linear model provide more reliable estimates of variations and therefore can be used to calculate the correct standard errors of parameters.

**Table 3: Hausman test**

$\chi^2$	p
1.770	0.880

The results obtained by applying random effects regression are presented in Table 4:

**Table 4: Random effects model results**

Variable	Coefficients	t	p-value	Significance
constant	0.442	2.798	0.006	***
EP	0.020	2.049	0.041	**
GOV	-0.027	-1.808	0.072	*
IMP	0.102	8.901	0.000	***
EXP	-0.022	-2.559	0.011	**
INTR	-0.115	-2.402	0.017	**
$R^2$			0.305	
F(p)			24.103 (0.000)	

\* Coefficient is significant at the  $\alpha=10\%$  level; \*\*.Coefficient is significant at the  $\alpha=5\%$  level;\*\*\*.Coefficient is significant at the  $\alpha=1\%$  level

As observed the variable EP affects in a positive way the dependent variable of GDP growth rate ( $b_1=0.020$   $p=0.041$ ). Consequently, as the growth rate of the external loans and deposits of the banks of G7 increases also the per capita GDP increases and vice versa. Conversely the coefficient of the variable GOV is not presented to be statistically significant for  $\alpha=5\%$  but is significant for  $\alpha=10\%$  ( $b_2=-0.027$ ,  $p=0.072$ ) and therefore the growth rate of per capita GDP is affected negatively by the variations of the government consumption.

Examining the rest variables that complement the econometric model, it is observed that the variable of the imports growth rate does affects the dependent variable positively ( $b_3=0.102$ ,  $p<0.000$ ). Conversely statistically significant and negative are the coefficients of the variables EXP and INTR. This shows that as exports and interest rates increase real GDP per capita decreases.

The coefficient of determination on the above random effects regression is equal to 0.305. This means that the variability of the dependent variable (per capita GDP growth) is determined by the variability of the independent variables in a percentage of 30.5%.

Cointegration test is performed with the intention to check whether a long-run equilibrium relationship holds between series that are integrated in the same order. In particular, the existence of cointegration relationship between the levels of two variables means that a linear combination of these variables is stationary. In the case of the multivariate models this successfully tested by fully modified Ordinary Least Squares (FMOLS) estimator developed by Pedroni [1999b; 2001] which not only generates consistent estimates of the parameters in relatively small samples, but also controls for potential endogeneity of the regressors and serial correlation. In the present study we test for cointegration between the variables GDP, EP, GOV, IMP, EXP and INTR. According to this approach, firstly we test the stationarity of the above series. The following table presents the unit root results.

**Table 5: Unit root tests**

ADF test		
	Test Statistic	Unit Root
GDP (level)	-12.376 (0.000)	No
EP (level)	-8.554 (0.000)	No
GOV (level)	-8.828 (0.000)	Yes
IMP (level)	-11.160 (0.000)	No
EXP (level)	-10.969 (0.000)	Yes
INTR (level)	-6.102 (0.000)	No

Taking into consideration the ADF test for panel data we find strong evidence of stationarity, allowing moving to cointegration test by using FMOLS method.

As it is shown the only cases that there is evidence of long run relationship is between GDP per capita growth and government consumption growth for  $\alpha=10\%$  ( $p=0.060$ ) and imports growth rate for  $\alpha=1\%$  ( $p<0.001$ ). The signs of the coefficients are negative and positive respectively as in the random effects regression, while the value of the coefficient of determination is equal to 0.368 which is higher than in the random effects regression. It is noted that the growth rate of the external loans and deposits of the banks of G7 is not cointegrated with per capita GDP growth rate and thus there is no long-run equilibrium relationship between these two variables.

**Table 6: FMOLS model results**

Variable	Coefficients	t	p-value	Significance
EP	0.018	1.515	0.131	ns
GOV	-0.028	-1.887	0.060	*
IMP	0.113	9.900	0.000	***
EXP	-0.012	-1.201	0.231	ns
INTR	-0.117	-1.564	0.119	ns
R <sup>2</sup>			0.368	

\*. Coefficient is significant at the  $\alpha=10\%$  level; \*\*\*. Coefficient is significant at the  $\alpha=1\%$  level; n.s.. Non significant coefficient



## 5. CONCLUSION

Financial openness across countries is a significant contributor to economic growth, although excess capital mobility has been criticized for its role in transmitting crisis and supporting financial turmoil. Although it has been well documented that financial integrations enhances capital mobility and improves efficiency of capital allocation in the economic system, the issue of the exact impact of international capital flows is still a matter of debate regarding if such flows provide welfare gains or losses. This assumption also stands for credit flows, as empirical evidence suggests a systematic link between exposure to debt flows and both the likelihood and the severity of financial crises. Indeed, one of the most widespread critics of international financial integration is the increased likelihood for developing recipient countries to experience a currency crisis and other forms of financial turmoil.

According to the composition hypothesis, unexpected reversals of capital flows are more likely to happen in countries that rely more on debt flows rather than other types of capital flows, such as FDI. Taking into account the significant expansion of global banks during the last two decades, credit flows have become a topic of debate in the field of financial globalization, since they have been criticized for their important role in the transmission of the global financial crisis to emerging markets. In sum, the positive impact of credit flows on economic growth is still questionable and remains in the current research agenda of economic policy.

The aim of this paper was to investigate the impact of credit flows on economic growth, taking into account a set of growth-related macroeconomic variables, including imports, exports, interest rates and government consumption in a sample of 7 developed countries (G7) using a panel data methodology and applying regression analysis and cointegration tests as to test for their long-term equilibrium relationship. According to research results, it was documented that credit flows, measured by external loans and deposits, positively affect economic growth of these countries, measured by GDP growth rate.

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