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Foreign Direct Investment Flows: The Effects of the Global Financial Crisis

MSc. Thesis

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ABSTRACT

In this Master dissertation, we examined the effects of specific macroeconomic variables of the host country on the FDI flows towards this country. We also analyzed the impact of crisis on these effects. The empirical examination was conducted with both pool OLS and Fixed Effects estimation, while we included two alternative crisis period definitions, i.e. 2007-2008 and 2007-2009. We found no empirical evidence that population growth affects FDI inflows whatsoever. Inflation, GDP per capita, trade openness, and inward FDI stock level found to affect FDI inflow regardless the choice of the crisis period, but results vary with the estimation technique indicating severe bias and inconsistency if appropriate model is not chosen. GDP growth was, also, found to affect FDI inflows and this finding is robust to the definition of the crisis period and to the estimation technique. Finally, we empirically documented that indeed during the global financial crisis a structural break occurred in the relationship between FDI inflows and its determinants; this finding is, also, robust to the definition of the crisis period and to the estimation technique.

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INTRODUCTION

The recent decades international financial integration had showed up a continuous rise. According to researches global capital flows - especially flows to and from advanced economies- had steadily increased from about 7% of word GDP in 1998 to 20% in 2007. In the middle of 2007 when started the global financial crisis, there was an unexpected pause to the continued increasing of international integration and the capital flows between countries turned steeply negative in late 2008 (Gian-Maria Milesi-Ferretti and Ce´ dric Tille,2011). Despite the fact that the literature is not fully conclusive, there is evidence that capital flows and especially Foreign Direct Investment (FDI) flows had not been affected as sharp as other flows. On the contrary, FDI flows are likely to continue increasing and particularly into emerging markets, have been taken off in recent years.

The big importance of Foreign Direct investment (FDI) flows is commonly accepted and they are deemed to be a key driver of international economic integration. Without be clear enough the causality (if FDI flows contribute to bigger growth or more growth attracts more FDI), the fact that the FDI flows have a special correlation with the growth of a country is proven. There is the impression among policymakers that foreign direct investment is more conducive to long-run growth and development than other forms of capital inflows. According to the literacy, Foreign Direct Investments (FDI) have a significant role in the development of both national and regional economies. These flows are key-tool for sustain development and economic growth at local level. Foreign firms bring new technologies, knowledge and management skills which can then be adapted by the host country and local firms can learn from this (E. Borenszteina, J. De Gregoriob, J-W. Leec,1998). Therefore, the presence of foreign firms can improve region's competitiveness, but fears can also be raised that foreign competitors crowd out local firms, and a net positive effect on the regional economy cannot be taken for granted.

So, with the right policy framework, FDI can provide financial stability, promote economic development and enhance the well-being of societies. For

all these reasons it is worth doing to investigate how eventually FDI inflows were affected by the crisis according to their main drivers (as they are determined by most researchers) and their progress during the crisis. This is the main query which we will try to answer in this paper.

THE IMPORTANCE OF FDI FLOWS

FDI is a form of international capital movements, whose importance is growing in all groups of countries - developed, developing countries and countries in transition. According to previous empirical studies, FDI flows seem to be less volatile than other capital flows (e.g., IMF, World Economic Outlook (2007)) and considering the impression that FDIs have a positive correlation with the growth and development for the host country it is not strange that there is big interest by policymakers for FDIs.

With the expansion, the late twentieth and early twenty-first century, FDI has become the dominant international flow of capital to developing countries and countries in transition, and their importance is growing for developed countries. They represent an increasingly important component of international capital flows, whose share in recent years, significantly increased, particularly with the decline in international loan capital. Analyzing the researches until now we will see that the period after World War II the loan capital was the prevailing source of financing. By the second half of 1980s the scenery started to change as the private sector refrained from any new crediting of the developing countries, except in the form of direct investments. The period from late 1980s, and especially 1990s FDIs became the main source of financing, in comparison with these other forms like loan capital and portfolio investments especially in the developing countries (Sandra Stojadinović Jovanović, PhD Faculty of Economics Belgrad).

As the flow of capital that reflects the continuing interest and long-term attachment to undertake investment, FDI proved to be the most stable form of international capital movements as it has already referred above.
The previous FDI flows globally characterized by certain general and almost constant characteristics: almost uninterrupted and continuous increase, by far the dominant role of the developed countries and on the inflow and the outflow side of the FDI, much smaller role and share of developing countries and almost imperceptible role and share transition countries - which are, however, in the past decade, significantly changed.

THE GLOBAL FLOWS OF FDI UNTIL NOWADAYS

General evidence of the progress of FDI flows

The last two decades of the twentieth century was characterized by almost uninterrupted growth of FDI. The penultimate decade of the twentieth century, from 1980 to 1990, was a period of fastest growth of FDI by then, which continued in the last decade of the twentieth century, resulting in the increase of FDI greater than ever before. From 1990 to 2000, total FDI inflows have increased seven times (with 0.2 billion USD to 1.4 billion USD), reaching its highest point so far. The total stock of inward FDI is, during this decade, tripled (from 1.9 billion USD in 1990 to 6.1 billion USD in 2000), which was the largest increase by then (UNCTAD, World Investment Report 2004, UN, New York and Geneva, 2004, p. 376).

This increase of FDI has contributed to a number of factors. Particularly significant was the transition process of a large number of countries from centrally planned to open market economy, which led to the liberal investment policies and opening previously closed, countries inflows of foreign capital.

Central, Eastern and Southeastern Europe, at that time, were part of "the world of euphoria for FDI", what was primarily affected by a lack of domestic capital, lack of investment banks and underdevelopment (or even lack of) financial markets, while the main channel of FDI in these countries was privatization process. By removing barriers to FDI, followed by their attracting all the liberal policies of FDI and even encouraging their inflow, has been created investment opportunities around the world and intense increase in global FDI flows. At the end of the twentieth and early twenty-first century, the global FDI picture characterized by:

- The traditional dominance of developed countries in global FDI flows, inflows and outflows;
- Strengthen the role of developing countries in global FDI flows, primarily in FDI inflows. With the liberalization of investment policies and regimes of the total economy, these countries have become increasingly attractive location

for FDI. This had contributed to the recession at the beginning of the 1990s, which spread only developed part of the world, while some developing countries, especially from East Asia and Latin America, in this period recorded significant rates of economic growth. During the 1990s increased the share of developing countries in total FDI inflows in the world and in 1993 reached the highest value until then - almost 40% of total FDI inflows in the world. Asian and Latin American countries had strengthened their investment potential and increasingly emerge as a significant investor and source of FDI;
- Central and Eastern Europe, abolishing barriers to FDI. With the process of privatization and liberalization of investment policy, FDI inflows to these countries strengthen.

The next years the image of FDI is characterized by sharp falls and rise of global FDI flows. After reaching his first record highs in 2000, FDI inflows in the world had recorded a decline for three consecutive years (to 2003), followed by four consecutive increases and in 2007 reached the highest value ever - over 2 billion USD. During this period (2000-2007) the value of the total stock of inward FDI has increased more than double, with 6 trillion to over 15 trillion USD. Global economic and financial crisis in the second half of 2007, was accompanied by a shift of falls and increase global FDI flows (UNCTAD, World Investment Report 2004, UN, New York and Geneva, 2004, p. 376)

Geographical distribution of FDI: the increasing importance of developing countries

An important trend, which characterizes today's global flows of FDI, is to change at their geographical distribution. The role of individual groups of countries in global FDI flows changed in the direction of increasing importance of developing countries and countries in transition at the expense of developed countries. FDI flows are, for the first time, significantly altered their geographical distribution in 2012, being predominantly directed to developing countries. FDI inflows in developing countries are, recent years, for the first time ever, exceeded FDI inflows in developed countries, and to 212 billion on them, for the first time accounted for more than half (54.8%) of

total global FDI inflows. Hereby, the FDI in developing countries has shown greater resilience to crisis shocks of FDI in developed countries. Position of developing countries also strengthened in the field of FDI outflows and their share in total FDI outflows in the world. On the outflows of FDI in developing countries fell off a record third of total global FDI outflows in 2012 (32.7%). Despite the global crisis, investors from developing countries continued its expansion abroad, and the largest source of FDI was the Asian countries (UNCTAD, World Investment Report 2014, UN, New York and Geneva, 2014, p.9)

FDI inflows to developing countries continued their rise in 2013, reaching even higher, the absolute value (778 billion USD) compared to 2012 (729 billion USD) and maintaining its record share of 54% in global developments FDI reached in 2012. The largest recipients of FDI among developing countries, remain more developed Asian countries. They are, at the same time, the largest recipients of FDI in the world. The high level of FDI in this country is primarily a result of high and growing FDI inflows into China, which is still the second largest recipient of FDI in the world.

Significant changes in the field of global FDI flows, characterized by the group of countries in transition. Another trend, which is characterized by global flows of FDI, is the growth of FDI inflows in emerging market countries. FDI inflows in transition countries increased by 28% in 2013 compared to 2012 and reached a value of 108 billion USD, continuing to increase his modest role and share in total FDI inflows in the world (with 5.6% in 2011 . year to 6.3% in 2012 and 7.4% in 2013). In South East Europe (SEE), FDI inflows increased from 2.6 billion USD in 2012 to 3.7 billion in 2013, driven primarily by privatization of the remaining state-owned enterprises in the service sector. In the Commonwealth of Independent States (CIS) increase in FDI of 28% was achieved primarily due to the significant increase in FDI in the Russian Federation. By far the largest recipient of FDI, in this group of countries, is the Russian Federation, whose FDI inflows increased by 57%, reaching 79 billion USD in 2013 (from 51 billion USD in 2012) and making it the first time, the third largest recipient of FDI in the world (in 2012, Russia was on the 8th

place on the list of countries the largest recipient of FDI. The largest investments in this group of countries (countries in transition) are coming from investors from developed countries.

Transition countries have, over the past decade, the region with the highest growth of FDI, both inward and outward. This increase was mainly influenced by the EU, such as investors in this country as well as recipients of FDI in these countries. The EU has the largest share (more than 2/3) in inward FDI. In the CIS countries, most of the investments of the EU countries went to the natural resources and industries in which they took place liberalization or privatization. In South East European countries, EU investments were also driven by privatization as well as lower production costs and expectations of joining the EU or EU membership.

Contrary to the trend of increase of the role and participation of developing countries and countries in transition in global FDI flows, developed countries are characterized by a declining trend in the share of total FDI in the world. After a sharp decline in 2012, FDI inflows to developed countries, as well as in the other two groups of countries, increased in 2013 compared to 2012, to almost 10% (to 566 billion USD). But others are still at the level of 39% of the total FDI inflow in the world as well as in 2012 and far from convincing once large share of total FDI in the world. In 2011, their share in total world FDI inflow amounted to 52%, and in the past, and much more (in 2000 80%). The increase in FDI in this group of countries is primarily the result of the increase in FDI inflows in the EU, where there has been a recovery of FDI in Germany, Spain and Italy, as well as the economic recovery of the United States whose FDI inflows increased by 17%, holding it in the first place most countries recipient of FDI in the world. Spain is the largest recipient of FDI in 2013 among the European developed countries.

The share of developed countries in total FDI inflows in the world had continuously been declined since 2000 and has remained at a low level. However, the further growth of global FDI flows, with a higher increase in FDI in developed countries and increasing their share to 52% in 2006, it will be

the regional distribution of FDI go back to the traditional form of greater participation of developed countries in the global FDI inflows. It is anticipated that the FDI flows in developing countries remain high in the future (UNCTAD, World Investment Report 2014, op. cit., Figure I.1., p. 2.)

Global FDI outflows in the world are characterized by identical trend as the global FDI inflows: increase the role and participation of developing and transition countries in total FDI outflows in the world at the expense of reducing the share of developed countries. In 2013, global FDI outflows are also, as well as global FDI inflows, increased (by 5% to 1.35 billion USD in 2012 to 1.41 billion USD in 2013), and with different participation of individual groups of countries. Investors from developing countries and countries in transition continued its expansion abroad, following the rapid economic growth of the economies of their countries and investment liberalization, as opposed to investors from developed countries which have opted for a more cautious strategy of waiting and a small investment

Developing countries and countries in transition in 2013 were the source of 39% of total FDI in the world, while at the end of the previous century, their share was only 7%. In contrast, the share of developed countries in this period, decreased from 93% in 1999 to 61% in 2013 (which was a reduction in the immediately preceding year 2012 when it was 63%, and 2011 when it was 71%).

FDI outflows from developed countries are characterized by continuous stagnation. The others are on a similar absolute level in 2013 (857 billion USD) as in 2012 (853 billion USD), accounting for only 55% of the record highs they reached in 2007, and their share in total FDI in world fell to its lowest level ever - to less than 61%. This decline was due to a reduction in investment the largest investor in the world - the United States, whose companies transferred funds from Europe back to the United States. Although investments from Europe increased, thanks to Switzerland, which became the largest European investor and a number of countries whose investment recovered in 2013 compared to 2012 (Italy, Netherlands, Spain), a significant

number of countries had a reduction in their investments (France, Germany, Great Britain), which resulted in the reduction of total FDI in this group of countries. According to the opposite trend highlights Japan, whose investment rose for the third year in a row, reaching 136 billion USD in 2013 and representing an increase of over 10% compared to the year 2012, which, however, did not change the declining trend of FDI in this country group as a whole.

Inflows and outflows of FDI in developed countries in 2013 remained at the level of barely half the record levels achieved in 2007. In terms of share in global FDI flows to developed countries accounted for 39% of total FDI inflows and 61% of total FDI outflows - both historically lowest levels (historically the lowest level of the share in total FDI outflows in the world, while the share in total FDI inflows in the world more in 2012 was at the level of the historic minimum - 38.8%).

In contrast to developed countries, FDI outflows from developing countries has been increasing steadily. In 2013, increased by 3% (from 440 billion USD in 2012 to 454 billion in 2013), maintaining its last year's record share of over 32% of total FDI outflows in the world. Investments in developing countries are growing in extent. As with FDI inflows, so in the outflow of FDI, the role of developed Asian countries is very important, here as continuous large and growing source of FDI, accounting for more than 1/5 of the total outflow of FDI in the world. The largest contribution to the increase of FDI this group of countries has given rise in investment of China and Hong Kong (China), which have both strengthened their positions on the list of countries the largest outflow of FDI in the world.

Between these three groups of countries, FDI outflows have increased most in the countries at transition, by as much as 84% (from 54 billion in 2012 to a record $ 99 billion in 2013), reaching a record high and ever share in total FDI outflows in the world of 7%. This share in the previous years (2011 and 2012) was at the level of 4%, while the end of the previous turn of the century was less than 1%. The most important recipients of FDI in these countries are EU

countries. Most of the outgoing FDI from transition countries, mainly from the Russian Federation, located in the countries of the European Union. Investors from these countries were guided by strategic motives to acquire property on the EU market, as in the energy sector and in the manufacturing industry. The bulk of FDI outflows this group of countries achieved the Russian Federation, which in 2013 is due to the position of the fourth largest investor in the world with the eighth position in 2012.

DETERMINANTS OF FDIs

Until now literacy has looked at the relationship of FDI with the several variables. The empirical studies vary in terms of the variables, methodologies, the characteristics of FDI and the countries. Main variables affecting the FDI flows can be classified into two categories, market-oriented variables and institutional-oriented variables. The role of these variables on FDI flows into countries changes by the time and the conditions. Some macroeconomic variables that might be thought to have a connection to FDI flows (IMF working papers) are the size and growth of the host market, the degree of openness of the host economy, the income level and the economic stability, as well as the quality of institutions and level of development. In our study we focused on the empirical literature with the highest priority on the market-oriented variables (market size & growth, openness, inflation).

About the market size and growth it is assumed until now, that the larger host countries' markets may be associated with higher foreign direct investments due to larger potential demand and lower costs, due to scale economies. When looking into the manufacturing FDI, it is found that countries with larger populations e.g. in Central & Eastern Europe tend to attract more FDI, while evidence shows that transition economies with larger economies also tend to attract more FDI (Bevan and Eastrin, 2000).

What is mainly believed about the factor of an economy's openness is that an increase in openness might attract more FDIs. So there are benefits on FDI inflows from increasing openness, as might be expected in a sector for which

international trade flows in intermediate and capital goods are important (Resmini 2000). On the other hand, it has been also found that, export-orientation is very important in attracting FDI, and it is linked to the rising complementarity of trade and FDI flows (Singh and Jun 1995).

About inflation a result which many previous studies have found is that it has some impact on FDI. James P. Walsh and Jiangyan Yu (2010) concluded that inflation does not appear to have a strong effect, at least once the real effective exchange rate is controlled for. They used the average inflation of 2007-2010, but other measures, such as longer and shorter horizons, or deviation from average inflation, also had little relationship with FDI flows. According to their study this may be due to the sample that is biased toward relatively stable emerging markets and advanced economies, but given that many of the emerging markets in this sample have higher rates of inflation than the advanced economies, this would imply that the benefit in reducing inflation from moderate to low levels is minimal in the highly specific terms of attracting additional FDI.

Moreover, James P. Walsh and Jiangyan Yu (2010) found in their research that countries with higher GDP growth have (weakly) more manufacturing investment. However, richer countries appear to attract a lower share of FDI relative to GDP than poor countries. Since lower wage costs are an important motivator of manufacturing FDI, this is also an intuitive result. They also examined some qualitative variables represent a wide range of institutional and development factors that might be expected to affect the willingness of investors to locate foreign investment in the target country and it is worth doing to refer to these variables. They are a measure of labor flexibility (based on hiring and firing costs), infrastructure quality, financial depth, judicial independence, legal system efficiency, and enrollment rates for primary, secondary, and tertiary education. With the exception of a negative finding for tertiary sector, developmental or institutional variables appear to have influence neither on total FDI flows nor on inflows into the primary sector. As with the macroeconomic specification, however, the stock of total FDI does appear to be associated with higher flows of FDI. The results for the primary

sector are intuitive, as enclave investments with little contact with the broader economy would not be expected to be affected by the development of the financial system or the degree of school enrollment in the population of the host country. There is a difference for the secondary sector. While most of the qualitative variables are not significant, two do stand out: labor market flexibility and financial depth. In both cases, the signs are as expected: economies with deeper financial systems and with more labor market flexibility have higher levels of FDI. As this specification controls for (log) GDP per capita, it is important to note that the coefficient on that variable is also significant, and negative. That is, higher levels of income are associated with lower average secondary sector FDI flows, as might be expected if higher levels of income are correlated with higher unit labor costs. At a given level of per capita income, a more flexible labor market and greater financial depth lead to more FDI in manufacturing. It is interesting to note that other variables that would appear to be important in firms' investment decisions do not appear significant in determining FDI flows. School enrollment, the legal system, and most crucially, infrastructure quality appear to have little effect on FDI flows. Contrary to this, Borensztein, de Gregorio and Lee (1995) find that FDI has its strongest effect on growth in countries with human capital above a certain level. For tertiary FDI, a different subset of qualitative variables is significant, with judicial independence and infrastructure quality having significant and expected signs. As with secondary FDI, factors associated with more developed economies, in this case a more independent judiciary and improved infrastructure, lead to higher FDI, even controlling for the level of GDP per capita. In fact, GDP per capita is generally significant and negative, at least in those specifications with significant qualitative variables, implying that while richer economies tend to get less FDI relative to GDP, those richer economies with better infrastructure or more independent judiciaries tend to get more, once income is controlled for.

ECONOMETRIC ANALYSIS

The framework

In the first place we analyze/ discuss the effects of specific macroeconomic variables of the host country on the FDI flows towards this country. We also examine the impact of crisis on these effects. The empirical examination was conducted with both pool OLS and Fixed Effects estimation, while we included two alternative crisis period definitions, i.e. 2007-2008 and 2007-2009. We found no empirical evidence that population growth affects FDI inflows whatsoever. Inflation, GDP per capita, trade openness, and inward FDI stock level found to affect FDI inflow regardless the choice of the crisis period, but results vary with the estimation technique indicating severe bias and inconsistency if appropriate model is not chosen. GDP growth was, also, found to affect FDI inflows and this finding is robust to the definition of the crisis period and to the estimation technique. Finally, we empirically documented that indeed during the global financial crisis a structural break occurred in the relationship between FDI inflows and its determinants; this finding is, also, robust to the definition of the crisis period and to the estimation technique.

The Variables and the Research Hypotheses

All observation data have been downloaded by the World Bank Data Bank, during December 2015, except of the FDI stock, inflow as a percentage of GDP which was downloaded by the UNCTADSTAT (data center). The dependent variable is the foreign direct investment, net inflows (% of GDP). Net inflows represent the new Foreign Direct investment minus the disinvestment in the host country divided by its GDP. Foreign Direct Investment (FDI) inflow represents the flow of funds towards the host country in order to acquire a long term management interest, i.e. more than 10% of voting stocks, provided that this host country is not that of the investor. FDI inflow is the sum of equity capital plus the reinvested earnings plus other long lasting capital.

Moving on to the independent variables, population growth (annual %) in year t reports the annual percentage growth of the mid-year population from t – 1 to t. All residents of a country, regardless the legal citizenship status, are incorporated in the population of a country, with the exception of refuges that do not permanently resident this particular country. Larger population growth would require larger capital formation, in order for the newly grown labor to become productive, therefore we may expect a positive impact of population growth to FDI inflow.

Hypothesis 1 (H1): Population growth positively affects FDI inflow as a percentage of GDP.

The next independent variable is the annual percentage GDP deflator that measures the implicit inflation and the overall price growth, at every time t it is the ratio of the GDP in current local currency prices (nominal) to the GDP in constant local prices (real). Higher inflation would imply accelerating labor cost, in order for the labor workers to be able to purchase their needs following the increase of the price level – in order to maintain a stable real wage. Secondly, higher inflation would lead to the depreciation of the local currency, reducing the value of the equity owned by foreign investors. That would reduce their wealth. As a result, we expect a negative impact of inflation to FDI inflow.

H2: GDP deflator negatively affects FDI inflow as a percentage of GDP.

Thirdly, the GDP per capita, in constant PPP international dollars, which equals the GDP in PPP values dived by the population in the mid-year. GDP value in PPP (Purchase Power Parity) is the gross domestic product in international dollars. What 1 international dollar can purchase in the local GDP, so can a US dollar in the US GDP. This GDP is measured at purchaser's prices, which is equal to the sum of the gross value added by all the domestic producers of the national economy, plus the indirect taxes, minus the subsidies. This measure of GDP (in PPP) does not account for the depletion of natural resources nor the degradation of capital. Higher GDP per capital would imply a larger market, and, as a result, larger investment opportunities

for foreigners. In addition, as income rises, consumer behavior evolves and the composition of consumption expands. Thus, we expect that GDP per capita of the host country positively affects FDI inflow.

H3: GDP per capita positively affects FDI inflow as a percentage of GDP.

Fourthly, openness measures the extent at which each economy, at time *t*, is engaged in trade; it is measured as the sum of imports of goods and services plus exports of goods and services, at time *t*, divided by the nominal GDP. Imports of goods and services measure the value (in nominal terms) of the goods and other market services that were imported during a year *t* from the rest of the world. Imports exclude the factor services income, such as investment , employee remuneration and transfer payments. Higher degree of openness implies that the more open economy is frequently engaged in transaction with foreigners, and, hence trade does not face large impediments and costs. As a result, we expect openness of the host country to have a positive impact on FDI inflows.

H4: Openness positively affects FDI inflow as a percentage of GDP.

In addition, GDP growth (annual %) is the annual percentage change of real GDP of a given country. Real GDP is measured, in our data, in constant local unit prices of 2005. It measures the sum of the gross value added by all resident production factors, plus the indirect taxes, and minus the subsidies, and it does not account for the depreciation of physical capital, and the consumption of natural resources. In that case, higher GDP growth offers greater opportunities for new market developments, and it indicates that income and, subsequently, consumption of the host economy will increase. Therefore, we may expect that GDP attracts FDI inflow.

H5: GDP growth positively affects FDI inflow as a percentage of GDP.

FDI stock, inflow as a percentage of GDP was downloaded from the OECD data base on December 2015. The FDI stock measures the total accumulated level of direct investment at a given point in time – in our data, at the end of each year. The inward FDI stock measures the FDI equity accumulated in the

host country by investments flows from the rest of the world. At the end of 2013, Luxemburg, Ireland and Switzerland had more that 100% of FDI inward stock as a percentage of GDP, which is particularly high, for the developed and the industrialized world. Assuming that capital and equity are subject to decreasing marginal returns, we expect that the higher the foreign equity stock already accumulated in the host country is, the lower its marginal return will be. As a result, lower marginal returns of FDI would make investors more hesitant, so higher inward FDI stock is expected to have a negative impact on FDI inflows.

H6: Inward FDI stock negatively affects FDI inflow as a percentage of GDP.

Finally, we expect that the interrelations between the FDI inflow and the independent variables would differ among the three sub-sample periods – namely, before, during and after global financial turmoil. As a result, we included the dummy variables for the sub-periods, in order to allow for shifts in the linear relations among the variables and for changes in the impact of the dependent variables. In other words, we will test for structural breaks during crisis.

H7: Structural breaks occurred during crisis.

We will appropriately reiterate H7 in the following section where the reader will have been presented the model that will be estimated.

Empirical Methodology

The model specification that will be estimated is the following:

$$\frac{FDI_{it}^{F}}{GDP_{it}} = \beta_0 + \beta_1 \log\left(\frac{GDP_{it}}{N_{it}}\right) + \beta_2 g_{GDP,it} + \beta_3 OPEN_{it} + \beta_4 \frac{FDI_{it-1}^{ST}}{GDP_{it-1}} + \beta_5 INF_{it} +$$

$$+\beta_6 g_{N,it} + \boldsymbol{\delta_1 D_1 X^T} + \boldsymbol{\delta_2 D_2 X^T} + \gamma_1 D_1^{07-08\ or\ 07-09}$$

$$+\gamma_2 D_2^{09-14\ or\ 10-14} + u_i + e_{it}, \qquad \textbf{(I)}$$

$$\boldsymbol{\delta_1 D_1 X^T} = [\delta_1 D_1^{07-08}\ \ \delta_2 D_1^{07-08}\ \ \delta_3 D_1^{07-08}\ \ \delta_4 D_1^{07-08}\ \ \delta_5 D_1^{07-08}\ \ \delta_6 D_1^{07-08}] \cdot \mathbf{X^T}$$

and

$$\boldsymbol{\delta_2 D_2 X^T} = [\delta_7 D_2^{09-14}\ \ \delta_8 D_2^{09-14}\ \ \delta_9 D_2^{09-14}\ \ \delta_{10} D_2^{09-14}\ \ \delta_{11} D_2^{09-14}\ \ \delta_{12} D_2^{09-14}] \cdot \mathbf{X^T}$$

or

$$\boldsymbol{\delta_1 D_1 X^T} = [\delta_1 D_1^{07-09}\ \ \delta_2 D_1^{07-09}\ \ \delta_3 D_1^{07-09}\ \ \delta_4 D_1^{07-09}\ \ \delta_5 D_1^{07-09}\ \ \delta_6 D_1^{07-09}] \cdot \mathbf{X^T}$$

and

$$\boldsymbol{\delta_2 D_2 X^T} = [\delta_7 D_2^{10-14}\ \ \delta_8 D_2^{10-14}\ \ \delta_9 D_2^{10-14}\ \ \delta_{10} D_2^{10-14}\ \ \delta_{11} D_2^{10-14}\ \ \delta_{12} D_2^{10-14}] \cdot \mathbf{X^T}$$

$$\mathbf{X} = \left[\log\left(\frac{GDP_{it}}{N_{it}}\right), g_{GDP,it}, OPEN_{it}, \frac{FDI_{it-1}^{ST}}{GDP_{it-1}}, INF_{it}, g_{N,it}\right]$$

where i is the country index and t represents time, N_{it} is the population of country i at year t, $g_{N,it}$ is the population growth, $g_{GDP,it}$ is the GDP growth, FDI_{it}^{F} is the FDI flow, FDI_{it-1}^{ST} is the FDI stock, $OPEN_{it}$ is the openness proxy (defined as the sum of exports plus imports as a fraction of GDP). D_1 and D_2 are the dummy variables for the two (out of three) sub-periods: $D_1^{07-08} = 1$ if $t \in [2007, 2008]$, $D_2^{09-14} = 1$ if $t \in [2009, 2013]$, $D_1^{07-09} = 1$ if $t \in [2007, 2009]$ and $D_2^{10-14} = 1$ if $t \in [2010, 2013]$. That is, that we accounted for two different crisis periods: one with crisis during 2007 and 2008, and one with the crisis period extending from 2007 to 2009 inclusive. Sample time horizon will cover the years from 2004 to 2013, because we have a lot of missing data for 2014 – especially for the stock of the inward FDI.

Let us now focus on u_i component of equation (I). In case of the Fixed Effects (fixed effects) model scheme, u_i is not a random variable, it can be considered a constant, and, hence, $Var[u_i] = 0$. Therefore, for the fixed effects, the country specific regression constant is $\beta_{0,i} = \beta_0 + u_i$. Under the Random Effects (RE) scheme, u_i is a stochastic term, a country specific error term, and, hence, $Var[u_i] > 0$. Accordingly, for the RE estimation, there is no country specific constant, and the regression constant term, β_0, is the same for all the economies. The fact that RE assumes that the constant term of the model is the same for all the countries is counterintuitive with respect to the economic theory. Assuming that FDI inflow is irrelevant to the specific country that hosts it is a very *hard* assumption to make. Therefore we decided to follow our economic intuition and, hence, we estimated the panel regressions using Fixed Effects.

Additionally, we make the fixed effects estimation with both sub period breaks (two different crisis periods allowed) and one without the dummy variables. With this procedure we may conclude to more robust results. Our results will be robust to the choice of the crisis periods: others argue that the global financial crisis that begun in 2007 lasted until 2008, while others argue that it lasted until 2009. The fixed effects estimation of (I) without the dummy variables will serve so as to check the linear restriction hypothesis H6, that we can now technically restate it as follows:

H7: at least one of the $\delta_1, \delta_2, \dots, \delta_{12}, \gamma_1, \gamma_2$ *is not 0 (versus the null that* $\delta_1 = \delta_2 = \cdots = \delta_{12} = \gamma_1 = \gamma_2 = 0$*).*

Naturally, if the null of H7 holds ($\delta_1 = \delta_2 = \cdots = \delta_{12} = \gamma_1 = \gamma_2 = 0$), model (I) reduces to:

$$\frac{FDI_{it}^{F}}{GDP_{it}} = \beta_0 + \beta_1 \log\left(\frac{GDP_{it}}{N_{it}}\right) + \beta_2 g_{GDP,it} + \beta_3 OPEN_{it} + \beta_4 \frac{FDI_{it-1}^{ST}}{GDP_{it-1}} + \beta_5 INF_{it} + u_i + e_{it}, \qquad \text{(II)}$$

which implies that there is no structural break during crisis period, regardless of the choice of the crisis period.

Before presenting the fixed effects, we deemed necessary to additionally include the pool OLS estimation of (I). Again, using both alternatives for the identification of the crisis period: begun in 2007 and lasted until 2008, or it lasted from 2007 until 2009 inclusive. Our results, will, in that case too, be robust to the choice of the crisis period. We, also, decided to include the pool OLS for robustness reasons: our results will be robust (or not) to the choice of estimation method. In that case, too, we will estimate two pool OLS with the two alternative crisis periods and one with no dummies at all in order to statistically check H7.

H7 will be tested using likelihood ratio (LR) which is applicable for both fixed effects and pool OLS estimation (Wooldridge, 2010). The LR test is as follows:

$$LR = 2\big[[Log\ Likelihood\ of\ Unrestricted] - [Log\ Likelihood\ of\ Restriced]\big]$$

where the unrestricted is model (I), and the restricted is the one for which the null of H7 holds, i.e. the dummy coefficients all equal zero, and, hence model (II) is more appropriate. The LR statistic above follows $\boldsymbol{\chi^2_{df}}$ where df is the number of the linear restrictions, here $df = 14$ one for each coefficient that H7 hypothesizes that it equals zero. If $LR > \chi^2_{df,0.05}$ we reject hypothesis 7 at significance level 5%. (Wooldridge, 2010)

Following the model specification we may restate the Hypotheses 1 to 6 on a more technical basis by referring to the relevant statistical inference:

H1: $\beta_6 > 0$ *(opposed to the null* $\beta_6 \leq 0$*)*

H2: $\beta_5 < 0$ *(opposed to the null* $\beta_5 \geq 0$*)*

H3: $\beta_1 > 0$ *(opposed to the null (hypothesis)* $\beta_1 \leq 0$*)*

H4: $\beta_3 > 0$ *(opposed to the null* $\beta_3 \leq 0$*)*

H5: $\beta_2 > 0$ *(opposed to the null* $\beta_2 \leq 0$*)*

H6: $\beta_4 < 0$ *(opposed to the null* $\beta_4 \geq 0$*)*

The above six hypotheses will be tested with the t-test:

$$t_{\beta_i} = \frac{\beta_i}{\sigma_{b_i,ROBUST}} \sim z_{0.05}, i = 1,2,3,6$$

$$t_{\beta_i} = \frac{\beta_i}{\sigma_{b_i,ROBUST}} \sim -z_{0.05}, i = 4,5$$

where for $t_{\beta_i} > z_{0.05}, i = 1,2,3,6$ and for $t_{\beta_i} < -z_{0.05}, i = 4,5$ we reject the respective null hypothesis for the coefficient β_i, which implies that we may "accept" our respective hypothesis at a significance level of 5%. We may use the standard normal $z_{0.05}$, because our sample is adequately large (asymptotic). And $\sigma_{b_i,ROBUST}$ is the robust standard error of coefficient b_i as reported by Stata.

Empirical Results

Preliminary Examination of the Variables

In this empirical results chapter, we have included all the graphs and tables that we have computed. In the first parts of the empirical analysis we analyze the estimated correlations among our variables, and the graphs of their means and their development throughout out sampling period. The third part of the empirical examination present and comment on the findings of the estimation of equations (I) and (II) which are estimated with pool OLS, and, afterwards, with fixed effects. Finally, conclusions and discussion of findings follow.

In the first step of our analysis, we estimate the correlations among our dependent and the independent variables. This is crucial for two reasons. Primarily, because we need to exclude the possibility of correlations among the covariates of our estimations in the next steps, in order to judge for multicollinearity. Secondly, since we have these data in our hands, the correlations among those variables reserve some preliminary attention, as well. So we estimated correlations, in order to check for some first indications of dependencies and effects.

Table 1 reports the estimated correlations of the levels of the variables. From Table 1 we observe that highest correlation values exist between openness and three variables: FDI net inflows, GDP per capita and the stock of FDI inflow. Correlation between openness and FDI net inflows is 0.35; 0.35 between

openness and GDP per capita; and 0.45 between the openness and the accumulated inward FDI. Those figures imply that higher openness is associated with higher FDI net inflows, higher GDP per capita and higher stock of inward FDI. However, those associations appear to be weak, because the estimated correlation in all these three cases is lower that 50% or 60%.

Although these weak correlations might seem discouraging for the rest of our analysis, we should stress that they cover the entire sample period, namely from 2004 to 2013, and they bear the effects of the occurring global financial crisis. In addition, the weak correlations, between our explanatory variables ensures that there is limited, if any, multicollinearity. Multicollinearity would inflate the variance of our estimated coefficients adding bias towards not rejecting the null hypotheses of H1 to H6. Therefore, making sure that multicollinearity is not significant is crucial for our results.

The graphs following Table 1, show how the cross-country averages of our variables variated during our sampling time frame. Figure 1 shows the cross country yearly average of the FDI net inflow as a percentage of GDP, while Table 2 summarizes these cross-country yearly averages. As we may observe, FDI inflow experienced a strong growth between 2004 and 2007, but started declining in 2008 – yearly average was 7.225% of GDP in 2007, but dropped to 6.66% in 2008. The decline in the following year was even steeper followed by a sharp rise, but started declining again from 2011 to 2013. Overall, despite the surprising rise during 2010, when it peaked at 7.52%, the FDI net inflows were rather sluggish after the crises. Recent data reveal that FDI net inflows are still falling short of their 2007 peak (World Development Indicators, 2016). In other words, following the events of the global financial crisis, investors became more hesitant in investing abroad for a log run horizon, or became particularly pessimist about the prospects of engaging in FDI.

Figure 2 shows the cross-country yearly average of population growth. As we may observe, the average population growth was accelerating until 2006, but started declining from 2007 and on. A steep decline occurred in 2013, bringing average annual population growth down to 1.3%. Average population growth is not indicative of the world population growth, however. This is

because large migration flows from a country with low population to a country with larger population or to many countries, decreases the population growth of the origin country more than it increases the population growth of the destination countries. As a result, cross country average population growth may vary for the growth rates of the whole world population as a whole. We point this out in order to draw attention to our readers to be careful on how they may interpret the depicted trends of our graph.

Figure 1

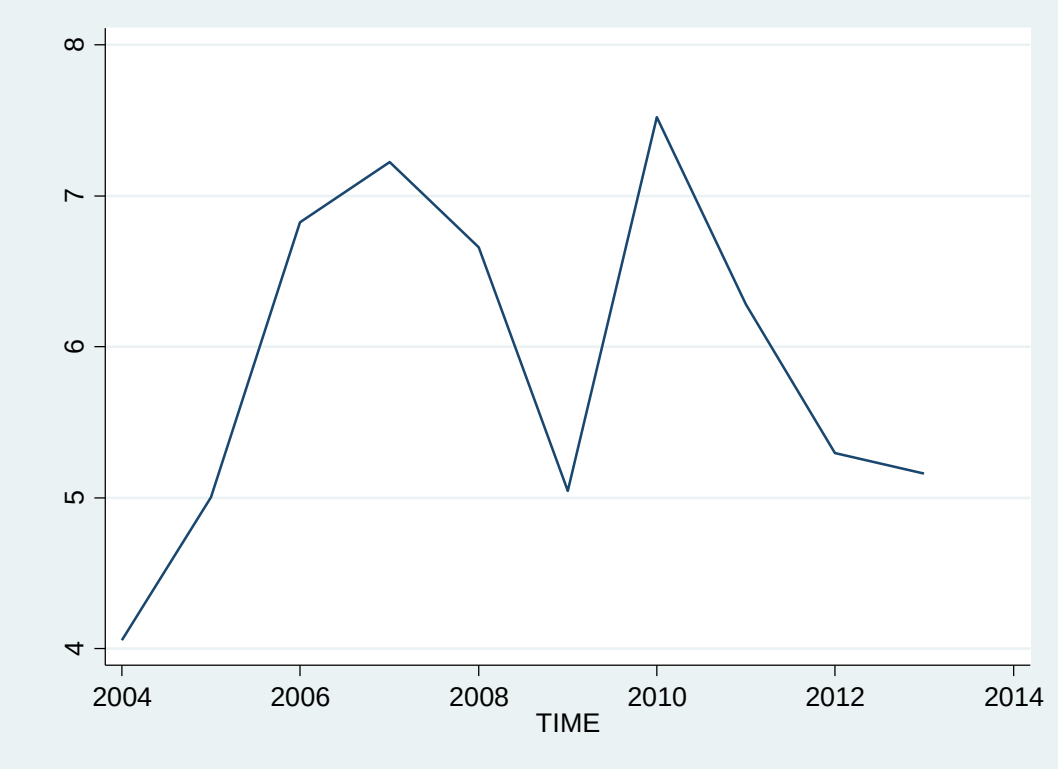


Table 1: Estimated Correlations Among Variables

	FDI, net inflows (% of GDP)	Population growth (annual %)	Inflation, GDP deflator (annual %)	GDP per capita, PPP (constant 2011 international $)	Openness	GDP growth (annual %)	FDI stock, inflow as a % of GDP
FDI, net inflows (% of GDP)	1.00						
Population growth (annual %)	-0.01	1.00					
Inflation, GDP deflator (annual %)	-0.03	0.15	1.00				
GDP per capita, PPP (constant 2011 international $)	0.14	0.19	-0.14	1.00			
Openness	0.35	-0.02	-0.08	0.35	1.00		
GDP growth (annual %)	0.05	0.22	0.23	-0.05	0.05	1.00	
FDI stock, inflow as a % of GDP	0.29	-0.07	-0.10	0.15	0.45	-0.06	1.00

Table 2: Yearly average FDI, net inflows (% of GDP) per year

Year	Yearly average FDI, net inflows (% of GDP)
2004	4.056283
2005	5.003388
2006	6.824602
2007	7.225255
2008	6.660031
2009	5.045403
2010	7.521217
2011	6.281934
2012	5.296452
2013	5.158198

Figure 2

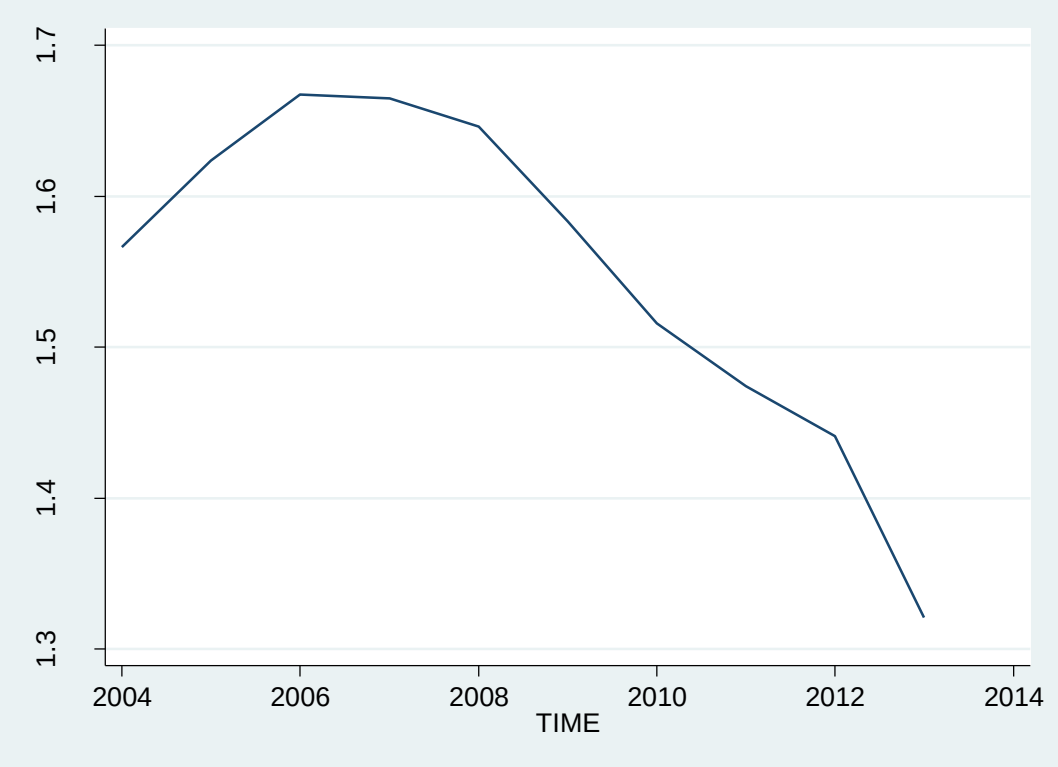


Figure 3 depicts the average inflation as measured by the GDP deflator, once more, in cross-country yearly averages. Naturally, average price growth shows much larger variation than the FDI net inflow and the population growth. Although for the largest economies price growth turned negative for a short period in the middle of the crisis, on average, price growth remained positive throughout the entire sample period. However, the deflator declined precipitously in 2009 to the 1/5 of the 2008 price growth. Overall, from the crisis and on, price developments have, also, been sluggish.

The sluggishness of the price growth unravels two important implications. Firstly, low price growth obstructs GDP growth acceleration, because, for some firms their price may fall lower than their average cost driving them out of the market, and, because, consumers are willing to postpone the purchase of durable goods in markets where prices decline – most probably, when inflation is that low, it is likely that some markets and sectors might experience deflationary pressures. Secondly, anemic price growth aggravates the debt burden in real terms, and this offers incentives for deleveraging and disinvestment.

Figure 3

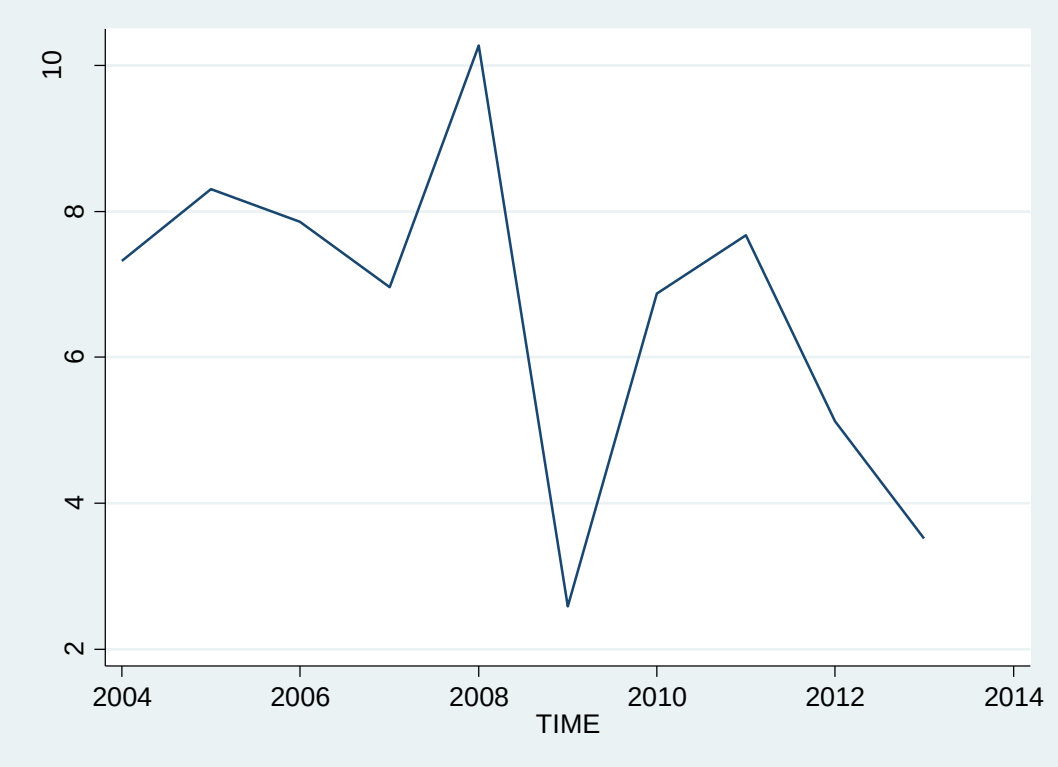
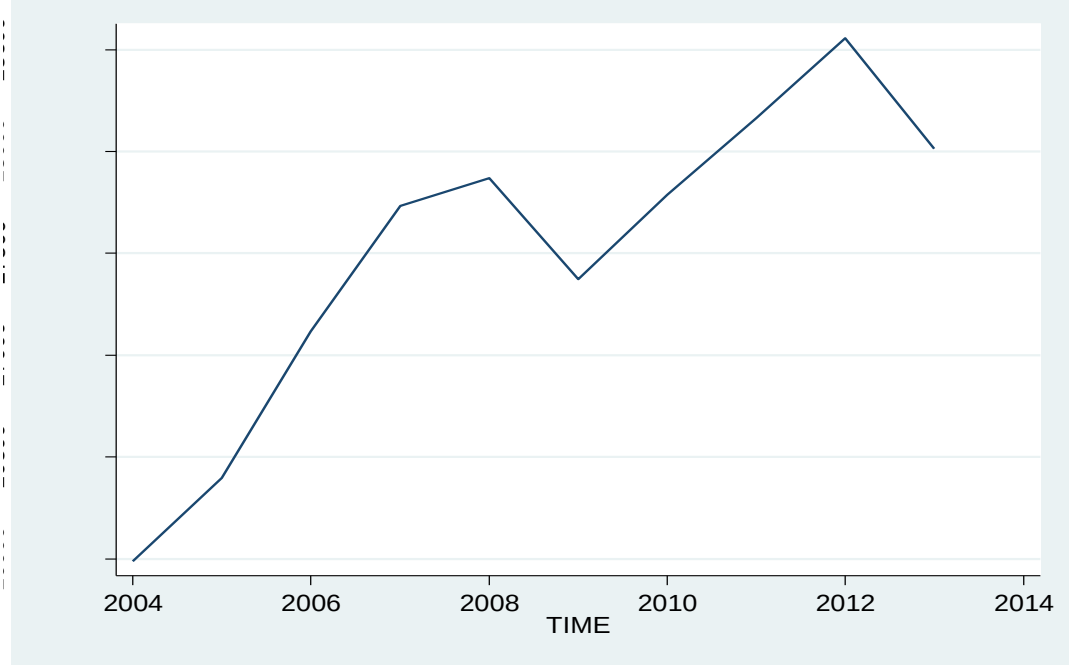


Figure 4 adds more credits to our economic intuition that GDP growth is at stake when price developments are weak. We observe in Figure 4 that GDP per capita (the cross-sectional yearly average) declined during 2008 and 2013, which is when average price growth slowed down more significantly. We, also observe, the conflicting messages for the duration of the crisis: Figure 1 indicates that crisis begun in 2007 up to 2009, but figures 3 and 4 imply that this financial crisis was transmitted to the real economy a year later. This substantiates our choice of two alternative periods for the crisis: 2007-2008 when only FDI – our dependent variable – was affected, and 2007-2009 when all FDI and the real economic variables were impacted.

Figure 4

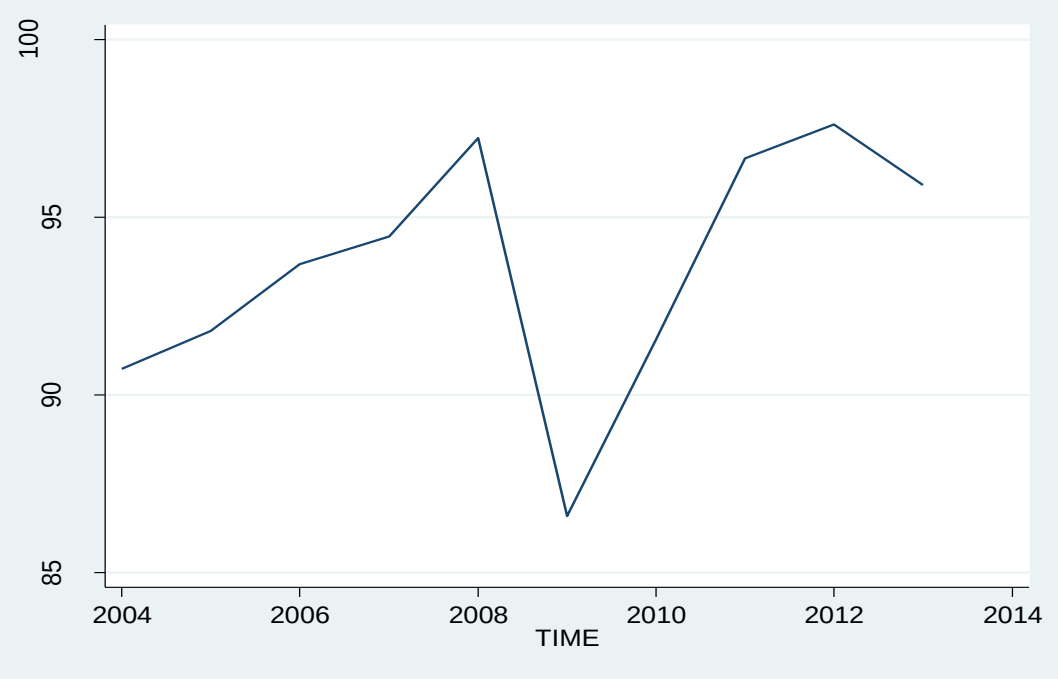


As Figure 5, also shows the severe impact of the global financial crisis on foreign trade. This figure depicts the cross-country yearly average of the sum of imports plus exports as a percentage of the GDP, which is the trading openness index of ours. The figure clearly shows a considerable slump in foreign trade during 2009 followed by a rapid recovery afterwards. In other

words, during 2009, on the peak of the crisis, trade just froze and recovered the following year. However, it shows some indications of slowdown in 2013.

Figure 6 shows the cross-country yearly average real GDP growth rates. We observe that average growth rate falls sharply in 2008 and 2009, when it reached almost zero. It started recovering in 2010, but this recovery did not last long and average growth has been decelerating since 2012. This global growth sluggishness is in accordance with the findings in the previous graphs, namely the declining FDI inflow, population, price growth, GDP per capita and trade. In other words there are clear indications of a recessionary environment during 2007-2009, and of slow down after 2013.

Figure 5



On the other hand, the stock of inward FDI as a percentage of GDP appears not to have been considerably affected during the global financial crisis and during the recession after it. Figure 7 sums up the cross-country yearly average of the accumulated stock of inward FDI, as a percentage of GDP. From this graph we observe that inward FDI stock showed a constant growth during the crisis period, but a slight decline occurred in 2012. That is to say, that although the economic activity was significantly affected during the 2007-

2009 crisis, FDI stock continued to increase. On the other hand, in 2012 when economic activity was only slowing down, FDI stock was being consumed. In other words, in 2012 the main trend was disinvestment, especially of foreign portfolios.

However, regardless the observations that we discussed above we should keep in mind that the graphs represent the annual average of all the variables across the different national economies. This cannot be compared with the respective annual world-level variables that are properly aggregated – here we use a simple arithmetic mean. For instance, although GDP per capita declines, growth remains positive, it slows down but remains positive. The same is true for the FDI inflow: on the one hand stock declines in 2012, but not the other hand net inflow remains positive this year, both in cross-national yearly averages. We deemed that this stage of the analysis is important in order to identify some average trends and results, and that is our motivation why we included this analysis. However, the reader should keep in mind that we have not aggregated the variables, rather their arithmetic means.

Figure 6

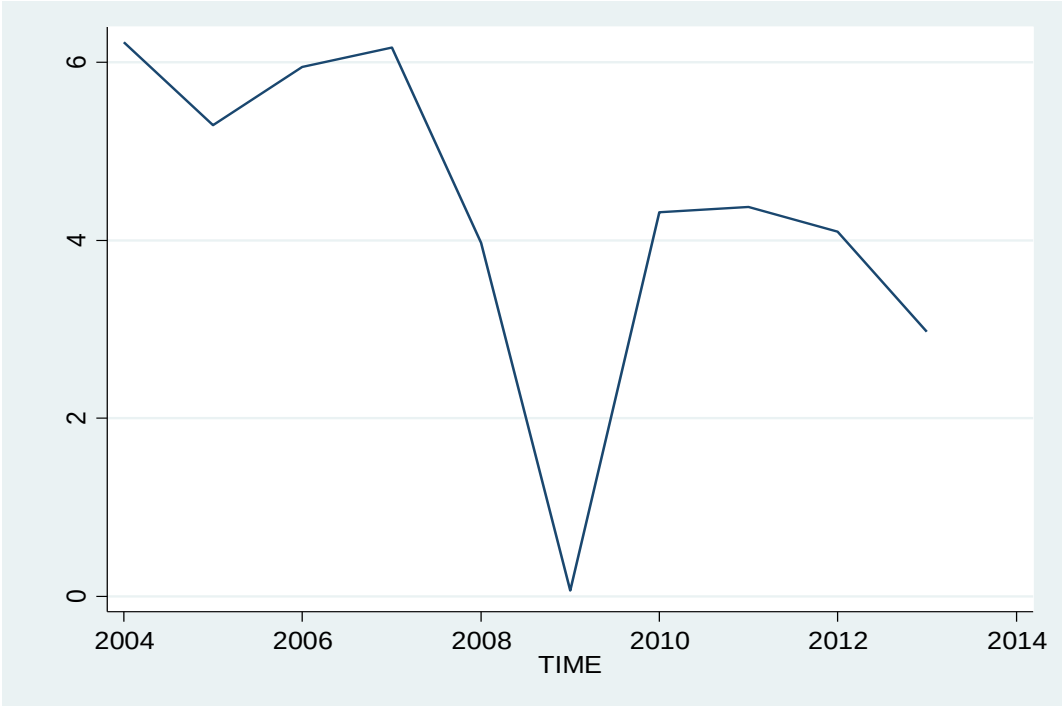
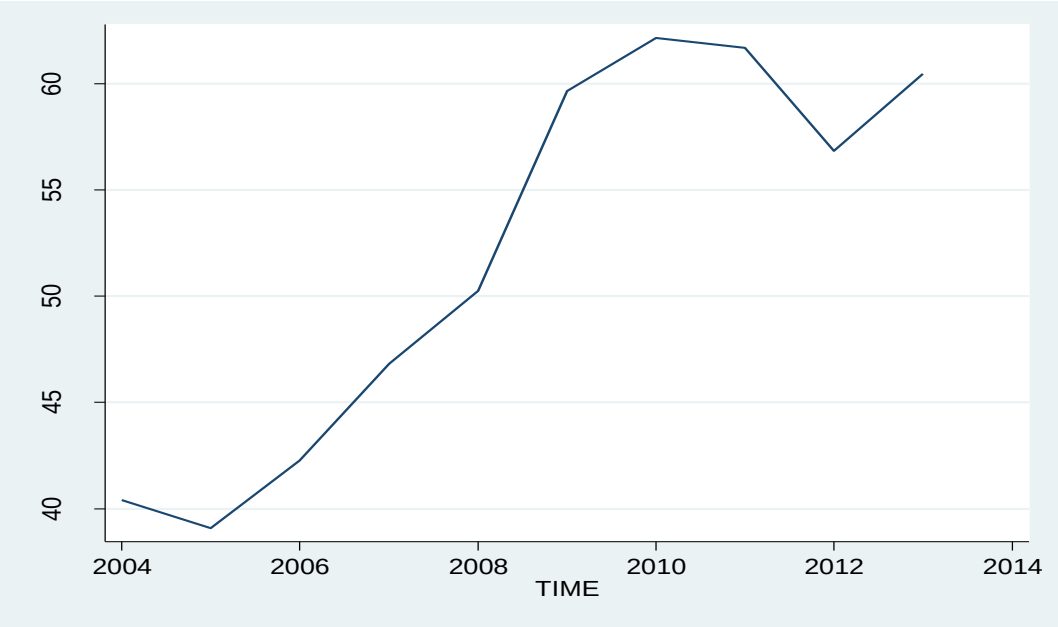


Figure 7



Overall we may conclude that all the variables indicated an on average recession during 2007-2009. This is in the aftermath of the global financial crisis, which was followed by a recession. In addition, we observe an on average slowdown in economic activity during 2012. As a result, the recovery of the economic activity, following the end of the crisis, was hampered. This 2012 slow down might be linked with the Euro crisis that culminated in the middle of 2012. Intuitively, investors were feeling rather insecure and pessimist with the increasing probability of a Euro area collapse and a default from Greece; this insecurity and, perhaps, pessimism slowed down most of our economic variables. Yet, this is an intuitive explanation that necessitates empirical investigation before we draw any conclusions.

In the next section, we will examine the regression estimations in order to assess the impact of our explanatory variables to the FDI net inflows.

Estimated Regressions

This section will present to the reader the main results or our empirical examination and will examine our research questions; we will accept or reject each of our seven hypotheses. Initially, the first three regressions are (Tables 3, 4 and 5) are estimated with pooled OLS while the last three regressions (Tables 6, 7 and 8) are estimated with fixed effects. At the bottom of each table, below the estimated coefficients, we report the number of the included observations, the coefficients of determination (adjusted, and overall for the fixed effects models) as well as the log likelihoods of each estimated model. The log likelihood will be used for the chi-squared likelihood ratio test for hypothesis seven. Finally, we will conclude with a table that will sum up our results of acceptance or not of our research hypotheses.

Table 3: Pool Estimation of (II) without sub-periods

VARIABLES	$\frac{FDI_{it}^{F}}{GDP_{it}}$
$\log(GDP_{it}/N_{it})$	-0.136
	(0.192)
$g_{GDP,it}$	0.128**
	(0.0540)
$OPEN_{it}$	0.0674***
	(0.0197)
$FDI_{it-1}^{ST}/GDP_{it-1}$	0.0271**
	(0.0114)
INF_{it}	-0.00264
	(0.0168)
$g_{N,it}$	-0.0417
	(0.102)
Constant	-0.792
	(3.151)
Observations	1,543
R-squared	0.147
R-squared adjusted	0.144
Log Likelihood	-6076

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3 reports the results of the estimation with pool OLS of the restricted model, namely model (II). This model includes no dummies for the sub periods.

Firstly, we observe that the adjusted coefficient of determination is 14.4% which implies that model (II) sufficiently explains only a small fraction, that is 14.4%, of the overall variance of the net FDI inflows as a percentage of GDP. This is well expectable, because FDI can be influenced by other factors apart from the ones that we have included. For example FDI inflows are, also, influenced by corruption and bureaucracy, which are not included in our model. The main purpose of this present research is to examine the impact of certain key macroeconomic (aggregate level) variables and examine how this impact was altered because of the global financial crisis. Therefore, we chose not to include further variables in order to concentrate on certain ones.

In Table 3 we additionally observe that the coefficient of the log of the real (in constant 2011 PPP prices) GDP per capita is negative, but statistically insignificant, which means than the 95% confidence interval extends from negative numbers to positive ones, including zero. For that reason, we may not safely reject for β_3 the null hypothesis that $b_3 \geq 0$. That means that according to our findings, based on the pooled OLS estimation, we cannot substantiate our hypothesis that GDP per capita positively affects FDI net inflows. As a result, Hypothesis 3 cannot be supported.

Below the coefficient of the GDP per capita, lies that of the real GDP growth, $g_{GDP,it}$. The coefficient of real GDP growth is positive, it equals 0.128, and statistically significant at 5% ($p - value < 0.05$), which means that the 95% confidence interval of this coefficient lies entirely in the positive numbers line. In other words, for the coefficient β_2 of (II) we reject the null hypothesis that $\beta_2 \leq 0$ and the pooled OLS estimation of (II) confirms our hypothesis that the real GDP growth positively affects FDI net inflow as a percentage of GDP. Therefore, research hypothesis 5 is supported by the pool OLS estimation.

The next estimated regressor is β_3 which measures the effect of openness (the sum of exports plus imports as a percentage of GDP) on FDI inflows as a percentage of GDP. The estimated coefficient is positive, $\beta_3 = 0.0674$, and statistically significant at 5% level, $p - value < 0.01 < 0.05$, which means that the 95% confidence interval lies entirely in the positive numbers. This indicates that we may reject the null hypothesis that $\beta_3 \leq 0$, based on the pool

OLS estimation of (II), which, in turn, shows that indeed openness positively affects FDI net inflows as our hypothesis demands. As a result, research hypothesis 4 is supported, based on the pool OLS estimation of (II).

Following the openness index, we examine the impact of accumulated inward FDI as a percentage of GDP on the FDI net inflow as a percentage of GDP. Estimations in Table 3 report that the coefficient of FDI stock is positive, $\beta_4 = 0.0271$, and statistically significant at 5% $(p - value < 0.05)$ which implies that the 95% confidence interval is entirely positive. This finding contradicts our research hypothesis 6 that expected the accumulated FDI in the host (destination) country to negatively affect FDI inflow towards this country. In other words, the pool OLS estimation indicates that FDI stock encourages – instead of discouraging – FDI inflows. Therefore, research hypothesis 6 is not supported by the pool OLS estimation of (II).

Moving on, to inflation, as measured by the GDP deflator, Table 3 reports that the estimation of inflation coefficient is $\beta_5 \approx -0.003$. This estimation indicates that the effect of inflation to FDI net inflow is negative. However, this estimation is not statistically significant at any reasonable level, which implies that 0 is included in the 95% confidence interval of β_5, which extends from negative to positive numbers. This indicates that we cannot reject the null hypothesis that $\beta_5 \geq 0$. As a result, research hypothesis 2 cannot be supported by the pooled OLS estimation of equation (II).

The last variable estimated for the model in Table 3 is the population growth, $g_{N,it}$. The coefficient of population growth is negative, showing a negative impact of population growth to FDI inflows, which is rather counterintuitive. However, the estimated result is not statistically significant at any level, which means that β_6 might, also, be positive; 95% confidence interval of β_6 includes both negative and positive numbers. The latter leads us to fail to reject the null hypothesis of H1, that $\beta_6 \leq 0$, based on the pool OLS estimation; our findings do not substantiate out research hypothesis 1. As a result, research hypothesis 1 is not supported by the pool OLS estimation of (II).

Overall, based on the pooled OLS estimation of model (II) we can only support research hypotheses 4 and 5, which Openness positively affects FDI inflow and GDP growth positively affects FDI inflow, respectively.

Table 4 reports the results of the estimation with pool OLS of the unrestricted model, namely model (I). This model includes dummies for the sub periods 2007-2009 and for 2010-2013.

Firstly, we observe that the adjusted coefficient of determination is 15.3%, slightly higher than the unrestricted one, which implies that model (I) with the sub-period dummies (for 2007-2009 and for 2010-2013) sufficiently explains only a small fraction, that is 15.3%, of the overall variance of the net FDI inflows as a percentage of GDP. This is reasonable, because FDI can be influenced by other factors apart from the ones that we have included. As we noted previously, as well, the main purpose of this present research is to examine the impact of certain aggregate level variables and examine how this impact was altered because of the global financial crisis. That is why we chose not to include further variables in order to concentrate on certain ones.

In Table 4 we observe that the coefficient of the log of the real (in constant 2011 PPP prices) GDP per capita is positive and statistically significant at 5%, which means than the 95% confidence interval does not include the 0 and includes only positive numbers. For that reason, we may reject the null hypothesis that $b_3 \geq 0$. That means that according to our pool OLS estimation, we can indeed substantiate our hypothesis that GDP per capita positively affects FDI net inflows. As a result, Hypothesis 3 can be supported, based on the pool OLS estimation of (I) with 2007-2009 and 2010-2013 dummies.

However the impact of $\log(GDP_{it}/N_{it})$ on FDI net inflows has been negatively affected during 2007-2009 and for 2010-2013. We observe this in Table 4, where Dummy (=$\log(GDP_{it}/N_{it})$ if 2007-2009) and Dummy (=$\log(GDP_{it}/N_{it})$ if 2010-2013) are both negative. Only Dummy (=$\log(GDP_{it}/N_{it})$ if 2010-2013) is statistically significant at 5%, thought, which means that only during 2010-2013 the effect of real GDP per capita on FDI net inflow had been statistically significantly (at 5%) reduced.

Below the coefficient of the GDP per capita, lies that of the real GDP growth, $g_{GDP,it}$. The coefficient of real GDP growth is positive, it equals 0.235, and statistically significant at 5% ($p-value<0.05$), meaning that the 95% confidence interval of this coefficient lies entirely in the positive numbers line. In other words, for the coefficient β_2 of (I), with the sub period dummies, we reject the null hypothesis that $\beta_2 \leq 0$ and the pooled OLS estimation of (I) confirms our hypothesis that the real GDP growth positively affects FDI net inflow as a percentage of GDP. Therefore, research hypothesis 5 is supported by the pool OLS estimation of (I) with 2007-2009 and 2010-2013 dummies.

This effect of GDP growth has remained stable overtime, as Dummy (=$g_{GDP,it}$ if 2007-2009) and Dummy (=$g_{GDP,it}$ if 2010-2013) indicate. They are both statistically insignificant, meaning that that their coefficient does not affect the impact of GDP growth on FDI inflows.

The next estimated regressor is β_3 which measures the effect of openness (the sum of exports plus imports as a percentage of GDP) on FDI inflows as a percentage of GDP. The estimated coefficient is positive, $\beta_3 = 0.0485$, and statistically significant at 5% level, $p-value<0.01<0.05$, which means that the 95% confidence interval lies entirely in the positive numbers. This indicates that we may reject the null hypothesis that $\beta_3 \leq 0$, based on the pool OLS estimation of (I), which, in turn, shows that indeed openness positively affects FDI net inflows as our hypothesis demands. As a result, research hypothesis 4 is supported, based on the pool OLS estimation of (I) with 2007-2009 and 2010-2013 dummies.

Dummy (=$OPEN_{it}$ if 2007-2009) and Dummy (=$OPEN_{it}$ if 2010-2013) are both statistically insignificant, and this means their coefficient does not affect the impact of openness on FDI inflows.

Following the openness index, we examine the impact of accumulated inward FDI as a percentage of GDP on the FDI net inflow as a percentage of GDP. Estimations in Table 4 report that the coefficient of FDI stock is positive, $\beta_4 = 0.0334$, and statistically significant at 5% ($p-value<0.05$) which implies that the 95% confidence interval is entirely positive. This finding

contradicts our research hypothesis 6 that expected that the accumulated FDI in the host(destination) country to negatively affect FDI inflow towards this country, because of decreasing marginal returns of capital. In other words, the pool OLS estimation indicates that FDI stock encourages – instead of discouraging – FDI inflows. Therefore, research hypothesis 6 is not supported by the pool OLS estimation of (I) with 2007-2009 and for 2010-2013 dummies.

This effect of FDI stock has remained stable overtime, as Dummy (=$FDI_{it-1}^{ST}/GDP_{it-1}$ if 2007-2009) and Dummy (=$FDI_{it-1}^{ST}/GDP_{it-1}$if 2010-2013) indicate. They are both statistically insignificant, meaning that that their coefficient does not affect the impact of accumulated FDI on FDI inflows.

Moving on, to inflation, as measured by the GDP deflator, Table 4 reports that the estimation of inflation coefficient is $\beta_5 \approx -0.01$. This estimation indicates that the effect of inflation to FDI net inflow is negative. However, this estimation is not statistically significant at any reasonable level, which implies that 0 is included in the 95% confidence interval of β_5 that extends from negative to positive numbers. This indicates that we cannot reject the null hypothesis that $\beta_5 \geq 0$. As a result, research hypothesis 2 cannot be supported by the pooled OLS estimation of equation (I) with 2007-2009 and 2010-2013 dummies.

The effect of inflation remained stable overtime, as Dummy (=INF_{it} if 2007-2009) and Dummy (=INF_{it} if 2010-2013) indicate. They are both not statistically significant, meaning that that their coefficient does not adds up to the impact of inflation on FDI inflows.

The last variable estimated model in Table 5 is the population growth, $g_{N,it}$. The coefficient of population growth is negative, showing a negative impact of population growth to FDI inflows, which is rather counterintuitive. However, the estimated result is not statistically significant at 5% level, which means that β_6 might, also, be positive; 95% confidence interval of β_6 includes both negative and positive numbers. The latter leads us to fail to reject the null hypothesis of H1, that $\beta_6 \leq 0$. As a result, research hypothesis 1 is not supported by the pool OLS estimation of (I) with 2007-2009 and 2010-2013

dummies. Dummy (=$g_{N,it}$ if 2010-2013) and Dummy (=$g_{N,it}$ if 2007-2009) are not statistically significant, and, hence, the effect of population growth does not vary overtime.

Table 4: Pool Regression Estimation of (I) for sub-period breaks 2007/2010

VARIABLES	$\frac{FDI_{it}^{F}}{GDP_{it}}$
$\log(GDP_{it}/N_{it})$	0.828***
	(0.234)
$g_{GDP,it}$	0.235**
	(0.0950)
$OPEN_{it}$	0.0485***
	(0.0154)
$FDI_{it-1}^{ST}/GDP_{it-1}$	0.0334***
	(0.00984)
INF_{it}	-0.0410
	(0.0278)
$g_{N,it}$	-0.206*
	(0.120)
Dummy (=$\log(GDP_{it}/N_{it})$ if 2007-2009)	-0.643*
	(0.340)
Dummy (=$g_{GDP,it}$ if 2007-2009)	-0.108
	(0.114)
Dummy (=$OPEN_{it}$ if 2007-2009)	-0.00784
	(0.0237)
Dummy (=$FDI_{it-1}^{ST}/GDP_{it-1}$ if 2007-2009)	-0.0118
	(0.0155)
Dummy (=INF_{it} if 2007-2009)	0.0320
	(0.0383)
Dummy (=$g_{N,it}$ if 2007-2009)	-0.140
	(0.175)
Dummy (=$\log(GDP_{it}/N_{it})$ if 2010-2013)	-1.567***
	(0.526)
Dummy (=$g_{GDP,it}$ if 2010-2013)	-0.160
	(0.118)
Dummy (=$OPEN_{it}$ if 2010-2013)	0.0479
	(0.0444)
Dummy (=$FDI_{it-1}^{ST}/GDP_{it-1}$if 2010-2013)	-0.00506
	(0.0201)
Dummy (=INF_{it} if 2010-2013)	0.0603
	(0.0436)
Dummy (=$g_{N,it}$ if 2010-2013)	0.830*
	(0.478)
Dummy (=1 if 2007-2009)	8.044**
	(3.597)
Dummy (=1 if 2010-2013)	8.730
	(8.340)
Constant	-8.025***
	(2.429)
Observations	1,543
R-squared	0.164

R-squared adjusted	0.153
Log likelihood	-6060
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1	

Overall, based on the pooled OLS estimation of model (I) we can only support research hypotheses 3, 4 and 5. More specifically, model (I) with 2007-2009 and 2010-2013 dummies shows that GDP per capita, openness and GDP growth, all positively affect FDI inflow. In addition, these effects are time-invariant, with the exception of GDP per capita whose effect severely declines during 2010-2013.

Table 5 reports the results of the estimation with pool OLS of the unrestricted model, namely model (I). This model includes dummies for the sub periods 2007-2008 and 2009-2013.

Firstly, we observe that the adjusted coefficient of determination is 15.3%, slightly higher than the unrestricted one, and approximately equal to the previous specification with 2007-2009/2010-2013 dummies. This means that model (I) with the sub-period dummies (2007-2008 and for 2009-2013) sufficiently explains only a small fraction, that is 15.3%, of the overall variance of the net FDI inflows as a percentage of GDP. Low adjusted R-squared implies that FDI can be influenced by other factors apart from the ones that we have included. As we have noted already, the main purpose of this present research is to examine the impact of certain aggregate level variables and examine how this impact was altered following the global financial crisis. That is why we chose not to include further variables in order to concentrate on certain ones.

In Table 5 we observe that the coefficient of the log of the real (in constant 2011 PPP prices) GDP per capita is positive and statistically significant at 5%, which means than the 95% confidence interval does not include the 0 and includes only positive numbers. For that reason, we may reject the null hypothesis that $b_3 \geq 0$. That means that according to our findings, we can indeed substantiate our hypothesis that GDP per capita positively affects FDI

net inflows. As a result, Hypothesis 3 can be supported, based on the pool OLS estimation of (I) with 2007-2008 and 2009-2013 dummies.

The impact of $\log(GDP_{it}/N_{it})$ on FDI net inflows has been negatively affected during 2007-2008 and for 2009-2013. As shown in Table 5, Dummy (=$\log(GDP_{it}/N_{it})$ if 2007-2008) and Dummy (=$\log(GDP_{it}/N_{it})$ if 2009-2013) are both negative, but only Dummy (=$\log(GDP_{it}/N_{it})$ if 2009-2013) is statistically significant at 5%, which means that only during 2009-2013 the effect of real GDP per capita on FDI net inflow had been statistically significantly (at 5%) reduced.

Below the coefficient of the GDP per capita, lies that of the real GDP growth, $g_{GDP,it}$. The coefficient of real GDP growth is positive, it equals 0.235, and statistically significant at 5%, which means that the 95% confidence interval of this coefficient lies entirely in the positive numbers line. In other words, for the coefficient β_2 of (I), with the sub period dummies, we reject the null hypothesis that $\beta_2 \leq 0$ confirming our hypothesis that the real GDP growth positively affects FDI net inflow as a percentage of GDP. Therefore, research hypothesis 5 is supported by the pool OLS estimation of (I) with 2007-2008 and 2009-2013 dummies.

This effect of GDP growth has remained stable overtime, as Dummy (=$g_{GDP,it}$ if 2007-2008) and Dummy (=$g_{GDP,it}$ if 2009-2013) indicate. They are both statistically insignificant, meaning that that their coefficient does not affect the impact of GDP growth on FDI inflows.

The next estimated regressor is β_3 which measures the effect of openness (the sum of exports plus imports as a percentage of GDP) on FDI inflows as a percentage of GDP. The estimated coefficient is positive, $\beta_3 = 0.0485$, and statistically significant at 5% level, which means that the 95% confidence intervals lies entirely within the positive numbers. This indicates that we may reject the null hypothesis that $\beta_3 \leq 0$, based on the pool OLS estimation of (I), which, in turn, shows that indeed openness positively affects FDI net inflows as our hypothesis demands. As a result, research hypothesis 4 is supported, based on the pool OLS estimation of (I) with 2007-2008 and 2009-2013 dummies.

Neither Dummy (=$OPEN_{it}$ if 2007-2008) nor Dummy (=$OPEN_{it}$ if 2009-2013) are statistically insignificant, and this means their coefficient does not affect the impact of openness on FDI inflows.

Following the openness index, we examine the impact of accumulated inward FDI as a percentage of GDP on the FDI net inflow as a percentage of GDP. Estimations in Table 5 report that the coefficient of FDI stock is positive, $\beta_4 = 0.0334$, and statistically significant at 5% which implies that the 95% confidence interval is entirely positive. This finding contradicts our research hypothesis 6 and indicates that FDI stock encourages – instead of discouraging – FDI inflows. Therefore, research hypothesis 6 is not supported by the pool OLS estimation of (I) with 2007-2008 and 2009-2013 dummies.

The effect of FDI stock has remained stable overtime, as Dummy (=$FDI_{it-1}^{ST}/GDP_{it-1}$ if 2007-2008) and Dummy (=$FDI_{it-1}^{ST}/GDP_{it-1}$if 2009-2013) indicate. They are both statistically insignificant and, hence, their coefficient does not affect the impact of accumulated FDI on FDI inflows.

As far as inflation is concerned (measured by the GDP deflator) Table 5 reports that the estimation of inflation coefficient is $\beta_5 \approx -0.01$. This estimation indicates that the effect of inflation to FDI net inflow is negative. However, this estimation is not statistically significant at any reasonable level, which implies that 0 is included in the 95% confidence interval of β_5 and this 95% confidence interval includes negative numbers, as well. This indicates that we cannot reject the null hypothesis that $\beta_5 \geq 0$. As a result, research hypothesis 2 cannot be supported by the pooled OLS estimation of equation (I) with 2007-2008 and 2009-2013 dummies.

The effect of inflation does not change over time, as Dummy (=INF_{it} if 2007-2008) and Dummy (=INF_{it} if 2009-2013) indicate. They are both not statistically significant, meaning that that their coefficient does not adds up to the impact of inflation on FDI inflows.

Table 5: Pool Regression Estimation of (I) for sub-period breaks 2007/2009

VARIABLES	$\frac{FDI_{it}^{F}}{GDP_{it}}$
$\log(GDP_{it}/N_{it})$	0.828***
	(0.234)
$g_{GDP,it}$	0.235**
	(0.0950)
$OPEN_{it}$	0.0485***
	(0.0154)
$FDI_{it-1}^{ST}/GDP_{it-1}$	0.0334***
	(0.00984)
INF_{it}	-0.0410
	(0.0278)
$g_{N,it}$	-0.206*
	(0.120)
Dummy (=$\log(GDP_{it}/N_{it})$ if 2007-2008)	-0.396
	(0.383)
Dummy (=$g_{GDP,it}$ if 2007-2008)	-0.149
	(0.127)
Dummy (=$OPEN_{it}$ if 2007-2008)	-0.0382
	(0.0279)
Dummy (=$FDI_{it-1}^{ST}/GDP_{it-1}$ if 2007-2008)	0.0219
	(0.0155)
Dummy (=INF_{it} if 2007-2008)	0.0562
	(0.0569)
Dummy (=$g_{N,it}$ if 2007-2008)	-0.158
	(0.186)
Dummy (=$\log(GDP_{it}/N_{it})$ if 2009-2013)	-1.528***
	(0.437)
Dummy (=$g_{GDP,it}$ if 2009-2013)	-0.171
	(0.111)
Dummy (=$OPEN_{it}$ if 2009-2013)	0.0438
	(0.0382)
Dummy (=$FDI_{it-1}^{ST}/GDP_{it-1}$if 2009-2013)	-0.0103
	(0.0157)
Dummy (=INF_{it} if 2009-2013)	0.0478
	(0.0394)
Dummy (=$g_{N,it}$ if 2009-2013)	0.602*
	(0.314)
Dummy (=1 if 2007-2008)	7.566*
	(4.002)
Dummy (=1 if 2009-2013)	9.533
	(6.776)
Constant	-8.025***
	(2.429)
Observations	1,543
R-squared	0.164
R-squared adjusted	0.153
Log Likelihood	-6061

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The last variable estimated model in Table 5 is the population growth, $g_{N,it}$. The coefficient of population growth is negative, showing a negative impact of population growth to FDI inflows, which is rather counterintuitive. However, the estimated result is not statistically significant at 5% level (but it is statistically significant at 10%), which means that β_6 might, also, be positive; 95% confidence interval of β_6 includes both negative and positive numbers. The latter leads us to fail to reject the null hypothesis of H1, that $\beta_6 \leq 0$. As a result, research hypothesis 1 is not supported by the pool OLS estimation of (I) with 2007-2008 and 2009-2013 dummies. Dummy (=$g_{N,it}$ if 2010-2013) and Dummy (=$g_{N,it}$ if 2007-2009) are not statistically significant, and, hence, the effect of population growth does not vary overtime.

Overall, based on the pooled OLS estimation of model (I) we can only support research hypotheses 3, 4 and 5. More specifically, model (I) with 2007-2008 and 2009-2013 dummies shows that GDP per capita, openness and GDP growth, all positively affect FDI inflow. In addition, these effects are time-invariant, with the exception of GDP per capita whose effect severely declines during 2009-2013. These findings are, also, in complete accordance with the findings of Table 4 with model (I) with 2007-2008 and for 2009-2013 dummies. The latter indicates that the results of the pool OLS are robust to the choice of the crisis period.

Finally, the LR statistics are:

$$LR(for\ 2007-2009) = 2 * [-6060 - (-6076)] = 32$$

$$LR(for\ 2007-2008) = 2 * [-6061 - (-6076)] = 30$$

and chi-squared statistic with 14 degrees of freedom equals $\chi^2_{14} = 23.685$. As a result, we reject the null hypothesis $\delta_1 = \delta_2 = \cdots = \delta_{12} = \gamma_1 = \gamma_2 = 0$ of H7 regardless the choice of the crisis period. Therefore, research hypothesis 7 is fully supported and it is robust to alternative specifications of crisis period.

Table 6: FE Estimation of (I) without sub-periods	
VARIABLES	$\frac{FDI_{it}^{F}}{GDP_{it}}$
$\log(GDP_{it}/N_{it})$	1.862
	(2.947)
$g_{GDP,it}$	0.150**
	(0.0676)
$OPEN_{it}$	0.0303
	(0.0287)
$FDI_{it-1}^{ST}/GDP_{it-1}$	0.00219
	(0.0103)
INF_{it}	0.00324
	(0.0146)
$g_{N,it}$	0.162
	(0.188)
Constant	-14.69
	(26.60)
Observations	1,543
Number of Countries	179
Log Likelihood	-5909
R-squared (overall)	0.0699
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1	

Moving on to the Fixed effects estimations, Table 6 reports the results of the estimation with fixed effects of the restricted model, namely model (II). This model includes no dummies for the sub periods.

Firstly, we observe that the overall coefficient of determination is particularly low which implies that model (II) does not adequately reproduce the variance of the net FDI inflows as a percentage of GDP across time and national economies. We have noted previously that the main purpose of this present research is to examine the impact of certain key macroeconomic (aggregate level) variables and examine how this impact was altered because of the global financial crisis. Therefore, we chose not to include further variables in order to concentrate on certain ones.

In Table 6 we observe that the coefficient of the log of the real (in constant 2011 PPP prices) GDP per capita is positive, but statistically insignificant, which means than the 95% confidence interval extends from negative numbers to positive ones, including zero. We cannot reject the null hypothesis that $b_3 \geq 0$. That means that according to our findings, based on the fixed effects estimation of (II), we cannot substantiate our hypothesis that GDP per

capita positively affects FDI net inflows. As a result, Hypothesis 3 cannot be supported.

Below the coefficient of the GDP per capita, lies that of the real GDP growth, $g_{GDP,it}$. The coefficient of real GDP growth is positive, it equals 0.15, and statistically significant at 5% meaning that the 95% confidence interval of this coefficient lies entirely in the positive numbers line. In other words, we reject the null hypothesis that $\beta_2 \leq 0$ and the fixed effects estimation of (II) confirms our hypothesis that the real GDP growth positively affects FDI net inflow as a percentage of GDP. Therefore, research hypothesis 5 is supported by the fixed effects estimation.

Next to growth regressor is β_3 which measures the effect of openness (the sum of exports plus imports as a percentage of GDP) on FDI inflows as a percentage of GDP. The estimated coefficient is positive, $\beta_3 = 0.0676$, is not statistically significant at 5% level, which means that the 95% confidence intervals includes positive and negative numbers. This indicates that we cannot reject the null hypothesis that $\beta_3 \leq 0$, based on the fixed effects estimation of (II). As a result, research hypothesis 4 is not supported, based on the fixed effects estimation of (II).

Following the openness index, we examine the impact of accumulated inward FDI as a percentage of GDP on the FDI net inflow as a percentage of GDP. Estimations in Table 6 report that the coefficient of FDI stock is positive, $\beta_4 \approx 0.02$, and not statistically significant at 5% implying that the 95% confidence interval includes 0. This finding contradicts our research hypothesis 6 that expected the accumulated FDI in the host country to negatively affect FDI inflow towards this country. Therefore, research hypothesis 6 is not supported by the fixed effects estimation of (II).

Moving on, to inflation, as measured by the GDP deflator, Table 6 reports that the estimation of inflation coefficient is $\beta_5 \approx -0.003$. This estimation indicates that the effect of inflation to FDI net inflow is negative. However, this estimation is not statistically significant, which implies that 0 is included in the 95% confidence interval of β_5 extending from negative to positive numbers. So, we cannot reject the null hypothesis that $\beta_5 \geq 0$, based on the

fixed effects estimation of (II). As a result, research hypothesis 2 cannot be supported by the fixed effects estimation of equation (II).

The last variable estimated for the model in Table 6 is the population growth, $g_{N,it}$. The coefficient of population growth is positive, but not statistically significant at any level, which means that β_6 might, also, be negative; 95% confidence interval of β_6 includes both negative and positive numbers. The latter leads us to fail to reject the null hypothesis of H1, that $\beta_6 \leq 0$, based on the fixed effects estimation. As a result, research hypothesis 1 is not supported by the fixed effects estimation of (II).

Overall, based on the fixed effects estimation of model (II), without any sub-period dummies, we can only support research hypotheses 5 that GDP growth positively affects FDI inflow, respectively.

Table 7 reports the results of the estimation with fixed effects of the unrestricted model, namely model (I). This model includes dummies for the sub periods 2007-2009 and 2010-2013.

Table 7: FE Regression Estimation of (I) for sub-period breaks 2007/2010

VARIABLES	$\frac{FDI_{it}^{F}}{GDP_{it}}$
$\log(GDP_{it}/N_{it})$	0.543
	(4.168)
$g_{GDP,it}$	0.279**
	(0.111)
$OPEN_{it}$	0.0178
	(0.0483)
$FDI_{it-1}^{ST}/GDP_{it-1}$	-0.0254***
	(0.00745)
INF_{it}	-0.0475**
	(0.0240)
$g_{N,it}$	0.344
	(0.421)
Dummy (=$\log(GDP_{it}/N_{it})$ if 2007-2009)	-0.366
	(0.275)
Dummy (=$g_{GDP,it}$ if 2007-2009)	-0.128
	(0.116)
Dummy (=$OPEN_{it}$ if 2007-2009)	-0.0216
	(0.0272)
Dummy (=$FDI_{it-1}^{ST}/GDP_{it-1}$ if 2007-2009)	0.0171**
	(0.00808)
Dummy (=INF_{it} if 2007-2009)	0.0423
	(0.0338)

Dummy (=$g_{N,it}$ if 2007-2009)	-0.191
	(0.179)
Dummy (=log(GDP_{it}/N_{it}) if 2010-2013)	-1.139**
	(0.483)
Dummy (=$g_{GDP,it}$ if 2010-2013)	-0.151
	(0.142)
Dummy (=$OPEN_{it}$ if 2010-2013)	0.0348
	(0.0295)
Dummy (=$FDI^{ST}_{it-1}/GDP_{it-1}$if 2010-2013)	0.0296**
	(0.0116)
Dummy (=INF_{it} if 2010-2013)	0.0906**
	(0.0398)
Dummy (=$g_{N,it}$ if 2010-2013)	0.668*
	(0.340)
Dummy (=1 if 2007-2009)	6.041*
	(3.486)
Dummy (=1 if 2010-2013)	5.331
	(6.066)
Constant	-1.314
	(40.07)
Observations	1,543
Number of Countries	179
Log Likelihood	-5888
R-squared (overall)	0.0626
Robust standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	

Firstly, we observe that the overall coefficient of determination particularly low which implies that model (I) with the sub-period dummies (for 2007-2009 and for 2010-2013) does not adequately reproduce the variance of the net FDI inflows as a percentage of GDP across time and national economies. Because we are principally interested in examining the impact of certain key macroeconomic (aggregate level) variables and how this impact was altered after the global financial crisis, we do not to include further variables.

In Table 7 we observe that the coefficient of the log of the real (in constant 2011 PPP prices) GDP per capita is positive but not statistically significant at 5%, which means than the 95% confidence interval includes both positive and negative numbers. For that reason, we cannot reject the null hypothesis that $b_3 \geq 0$. That means that according to our findings, based on the fixed effects estimation, we cannot substantiate our hypothesis that GDP per capita positively affects FDI net inflows. As a result, Hypothesis 3 cannot be supported, based on the fixed effects estimation of (I) with 2007-2009 and 2010-2013 dummies.

However the impact of $\log(GDP_{it}/N_{it})$ on FDI net inflows has been negatively affected during 2007-2009 and 2010-2013, since Dummy (=$\log(GDP_{it}/N_{it})$ if 2007-2009) and Dummy (=$\log(GDP_{it}/N_{it})$ if 2010-2013) are both negative. However, only Dummy (=$\log(GDP_{it}/N_{it})$ if 2010-2013) is statistically significant at 5%, which means that only during 2010-2013 the effect of real GDP per capita on FDI net inflow had been statistically significantly (at 5%) reduced.

Below the coefficient of the GDP per capita, lies that of the real GDP growth, $g_{GDP,it}$. The coefficient of real GDP growth is positive, it equals 0.279, and statistically significant at 5%. In other words, for the coefficient β_2 of (I), with the sub period dummies, we reject the null hypothesis that $\beta_2 \leq 0$. Therefore, research hypothesis 5 is supported by the fixed effects estimation of (I) with 2007-2009 and 2010-2013 dummies.

This effect of GDP growth has remained stable overtime, as Dummy (=$g_{GDP,it}$ if 2007-2009) and Dummy (=$g_{GDP,it}$ if 2010-2013) indicate. Neither is statistically significant and their coefficient does not affect the impact of GDP growth on FDI inflows.

The next estimated regressor is β_3 which measures the effect of openness (the sum of exports plus imports as a percentage of GDP) on FDI inflows as a percentage of GDP. The estimated coefficient is positive, $\beta_3 \approx 0.018$, but contrary to the pool OLS in Table 4, under fixed effects it is not statistically significant. We cannot reject the null hypothesis that $\beta_3 \leq 0$. As a result, research hypothesis 4 is not supported, based on the fixed effects estimation of (I) with 2007-2009 and 2010-2013 dummies.

Dummy (=$OPEN_{it}$ if 2007-2009) and Dummy (=$OPEN_{it}$ if 2010-2013) are both statistically insignificant, and this means their coefficient does not affect the impact of openness on FDI inflows.

Following the openness index, we examine the impact of accumulated inward FDI as a percentage of GDP on the FDI net inflow as a percentage of GDP. Estimations in Table 7 report that the coefficient of FDI stock is negative, $\beta_4 = 0.0254$, and statistically significant at 5%; the 95% confidence interval is

entirely negative. This finding contradicts the pool OLS findings of Table 4. In other words, the fixed effects estimation indicates that FDI stock indeed discourages FDI inflows. Therefore, research hypothesis 6 is supported by the fixed effects estimation of (I) with 2007-2009 and 2010-2013 dummies.

This effect of FDI stock is also time varying: Dummy (=$FDI_{it-1}^{ST}/GDP_{it-1}$ if 2007-2009) and Dummy (=$FDI_{it-1}^{ST}/GDP_{it-1}$if 2010-2013) are positive and statistically significant. Their coefficient reduces, in absolute value, the negative affect of accumulated FDI on FDI inflows.

Moving on, to inflation, as measured by the GDP deflator, Table 7 reports that the estimation of inflation coefficient is $\beta_5 \approx -0.045$. This estimation indicates that the effect of inflation to FDI net inflow is negative. It is, also, statistically significant at 5%. This indicates that we can reject the null hypothesis that $\beta_5 \geq 0$. As a result, research hypothesis 2 can be supported by the fixed effects estimation of equation (I) with 2007-2009 and 2010-2013 dummies.

The effect of inflation did not remain stable overtime, as Dummy (=INF_{it} if 2010-2013) is positive and statistically significant at 5%. In particular, as we observe in Table 7, the negative effect of inflation on FDI inflows was negated during 2010-2013.

The last variable estimated model in Table 7 is the population growth, $g_{N,it}$. The coefficient of population growth is greater than zero, showing a positive impact of population growth to FDI inflows. However, the estimated result is not statistically significant at 5% level and we fail to reject the null hypothesis of H1, that $\beta_6 \leq 0$, based on the fixed effects estimation of (I). As a result, research hypothesis 1 is not supported by the fixed effects estimation of (I) with 2007-2009 and 2010-2013 dummies. Dummy (=$g_{N,it}$ if 2010-2013) and Dummy (=$g_{N,it}$ if 2007-2009) are not statistically significant, and, hence, the effect of population growth does not vary overtime.

Overall, based on the fixed effects estimation of model (I) we can only support research hypotheses 2, 5 and 6. More specifically, model (I) with 2007-2009 and 2010-2013 dummies shows that GDP deflator and inward FDI stock

negatively impact FDI inflows, and GDP growth positively affects FDI inflow. In addition, the effect of growth is time-invariant.

Table 8: Pool Regression Estimation of (I) for sub-period breaks 2007/2009

VARIABLES	$\frac{FDI_{it}^{F}}{GDP_{it}}$
$\log(GDP_{it}/N_{it})$	1.037
	(3.750)
$g_{GDP,it}$	0.265**
	(0.111)
$OPEN_{it}$	0.0253
	(0.0333)
$FDI_{it-1}^{ST}/GDP_{it-1}$	-0.0253***
	(0.00910)
INF_{it}	-0.0529**
	(0.0263)
$g_{N,it}$	0.305
	(0.381)
Dummy (=$\log(GDP_{it}/N_{it})$ if 2007-2008)	-0.239
	(0.280)
Dummy (=$g_{GDP,it}$ if 2007-2008)	-0.213*
	(0.125)
Dummy (=$OPEN_{it}$ if 2007-2008)	-0.0280
	(0.0349)
Dummy (=$FDI_{it-1}^{ST}/GDP_{it-1}$ if 2007-2008)	0.0173
	(0.0115)
Dummy (=INF_{it} if 2007-2008)	0.0681
	(0.0613)
Dummy (=$g_{N,it}$ if 2007-2008)	-0.240
	(0.180)
Dummy (=$\log(GDP_{it}/N_{it})$ if 2009-2013)	-1.114***
	(0.426)
Dummy (=$g_{GDP,it}$ if 2009-2013)	-0.145
	(0.138)
Dummy (=$OPEN_{it}$ if 2009-2013)	0.0276
	(0.0227)
Dummy (=$FDI_{it-1}^{ST}/GDP_{it-1}$if 2009-2013)	0.0270***
	(0.00959)
Dummy (=INF_{it} if 2009-2013)	0.0626*
	(0.0336)
Dummy (=$g_{N,it}$ if 2009-2013)	0.473*
	(0.265)
Dummy (=1 if 2007-2008)	6.121
	(3.800)
Dummy (=1 if 2009-2013)	6.201
	(5.179)
Constant	-6.286
	(34.97)
Observations	1,543
Number of Countries	179
Log Likelihood	-5892

R-squared (overall)	0.0841

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8 reports the results of the estimation with fixed effects of the unrestricted model, namely model (I). This model includes dummies for the sub periods 2007-2008 and for 2009-2013.

Firstly, we observe that the overall coefficient of determination is particularly low which implies that model (I) with the sub-period dummies (for 2007-2008 and for 2009-2013) does not adequately reproduce the variance of the net FDI inflows as a percentage of GDP across time and national economies. We have not included further explanatory variables, since we are principally interested in examining the impact of certain key macroeconomic (aggregate level) variables and how this impact was altered because of the global financial crisis.

In Table 8 we observe that the coefficient of the log of the real (in constant 2011 PPP prices) GDP per capita is positive but not statistically significant at 5%, . For that reason, we cannot reject the null hypothesis that $b_3 \geq 0$. As a result, Hypothesis 3 can be supported, based on the fixed effects estimation of (I) with 2007-2008 and 2009-2013 dummies.

The impact of $\log(GDP_{it}/N_{it})$ on FDI net inflows has been negatively affected during 2007-2008 and 2009-2013. As shown in Table 8, Dummy (=$\log(GDP_{it}/N_{it})$ if 2007-2008) and Dummy (=$\log(GDP_{it}/N_{it})$ if 2009-2013) are both negative, but only Dummy (=$\log(GDP_{it}/N_{it})$ if 2009-2013) is statistically significant at 5%, which means that only during 2009-2013 the effect of real GDP per capita on FDI net inflow had been statistically significantly (at 5%) reduced.

Below the coefficient of the GDP per capita, lies that of the real GDP growth, $g_{GDP,it}$. The coefficient of real GDP growth is positive, it equals 0.265, and statistically significant at 5%. In other words, for the coefficient β_2 of (I), with the sub period dummies, we reject the null hypothesis that $\beta_2 \leq 0$. Therefore,

research hypothesis 5 is supported by the fixed effects estimation of (I) with 2007-2008 and 2009-2013 dummies.

This effect of GDP growth has remained stable overtime, as Dummy (=$g_{GDP,it}$ if 2007-2008) and Dummy (=$g_{GDP,it}$ if 2009-2013) indicate. They are both statistically insignificant, meaning that that their coefficient does not affect the impact of GDP growth on FDI inflows.

The next estimated regressor is β_3 which measures the effect of openness (the sum of exports plus imports as a percentage of GDP) on FDI inflows as a percentage of GDP. The estimated coefficient is positive, $\beta_3 = 0.0485$, but not statistically significant at 5% level. This indicates that we cannot reject the null hypothesis that $\beta_3 \leq 0$. As a result, research hypothesis 4 is not supported, based on the fixed effects estimation of (I) with 2007-2008 and 2009-2013 dummies.

Neither Dummy (=$OPEN_{it}$ if 2007-2008) nor Dummy (=$OPEN_{it}$ if 2009-2013) are statistically insignificant, and this means their coefficient does not affect the impact of openness on FDI inflows; this impact remains stable overtime.

Following the openness index, we examine the impact of inward FDI stock as a percentage of GDP on the FDI net inflow as a percentage of GDP. Estimations in Table 8 report that the coefficient of FDI stock is negative, $\beta_4 \approx -0.025$, and statistically significant at 5%. This finding agrees with our research hypothesis 6 and indicates that FDI stock discourages FDI inflows. Therefore, research hypothesis 6 is supported by the fixed effects estimation of (I) with 2007-2008 and 2009-2013 dummies.

The effect of FDI stock has not remained stable overtime, however: Dummy (=$FDI^{ST}_{it-1}/GDP_{it-1}$if 2009-2013) is statistically insignificant and positive. It appears that during 2009-2013 the impact of accumulated FDI on FDI inflows disappears.

As far as inflation is concerned (measured by the GDP deflator) Table 8 reports that the estimation of inflation coefficient is $\beta_5 \approx -0.05$. This estimation is statistically significant at 5%. This indicates that we can reject

the null hypothesis that $\beta_5 \geq 0$, based on the fixed effects estimation of (I). As a result, research hypothesis 2 can be supported by the fixed effects estimation of equation (I) with 2007-2008 and 2009-2013 dummies.

The effect of inflation does not change over time, as Dummy (=INF_{it} if 2007-2008) and Dummy (=INF_{it} if 2009-2013) indicate. Neither is statistically significant, meaning that that their coefficient does not adds up to the impact of inflation on FDI inflows.

The last variable estimated model in Table 8 is the population growth, $g_{N,it}$. The coefficient of population growth is positive, but not statistically significant at 5% level, which means that β_6 might, also, be negative. Se we fail to reject the null hypothesis of H1, that $\beta_6 \leq 0$. As a result, research hypothesis 1 is not supported by the fixed effects estimation of (I) with 2007-2008 and 2009-2013 dummies. Dummy (=$g_{N,it}$ if 2010-2013) and Dummy (=$g_{N,it}$ if 2007-2009) are not statistically significant, and, hence, the effect of population growth does not vary overtime.

Overall, based on the fixed effects estimation of model (I) we can only support research hypotheses 2, 5 and 6. More specifically, model (I) with 2007-2008 and 2009-2013 dummies shows that inflation and inward FDI stock negatively impacts FDI inflows, while GDP growth positively affects FDI inflow. In addition, these effects are time-invariant, with the exception of FDI stock which severely declines during 2009-2013. These findings are in accordance with the findings of Table 7 with model (I) with 2007-2008 and 2009-2013 dummies. The latter indicates that our findings about the impact of our variables on FDI net inflows are robust to the choice of the crisis period. However, the effects of the sub period dummies on our main variable coefficients are not the same for the two models with the two alternative crisis period choice.

The fixed effects results are not very similar with the pool OLS estimations, either. That is to say, that the effects of our explanatory variables and the impact of the global financial crisis vary across different estimation models. In other words, model selection severely affects bias and consistency of estimations.

Finally, the LR statistics are:

$$LR(for\ 2007-2009) = 2 * [-5888 - (-5909)] = 42$$

$$LR(for\ 2007-2008) = 2 * [-5892 - (-5909)] = 34$$

and chi-squared statistic with 14 degrees of freedom equals $\chi^2_{14} = 23.685$. As a result, we reject the null hypothesis $\delta_1 = \delta_2 = \cdots = \delta_{12} = \gamma_1 = \gamma_2 = 0$ of H7 regardless the choice of the crisis period. Therefore, research hypothesis is fully supported and it is robust to alternative specifications of crisis period, under the fixed effects estimation, as well.

Summary of Findings

Table 9: Summary of Findings		
Hypotheses	Supported	Finding
H1: Population growth positively affects FDI inflow as a percentage of GDP.	-	Cannot be supported at all
H2: GDP deflator negatively affects FDI inflow as a percentage of GDP.	Only with fixed effects estimators with sub period dummies; independent of crisis period	Not globally supported; Depending on model estimation technique
H3: GDP per capita positively affects FDI inflow as a percentage of GDP.	Only with pool OLS estimators with sub period dummies; independent of crisis period	Not globally supported; Depending on model estimation technique
H4: Openness positively affects FDI inflow as a percentage of GDP.	In all pool OLS estimators; independent of crisis period	Not globally supported; Depending on model estimation technique
H5: GDP growth positively affects FDI inflow as a percentage of GDP.	In all model specifications and estimations	Globally supported
H6: Inward FDI stock negatively affects FDI inflow as a percentage of GDP.	Only with fixed effects estimators with sub period dummies; independent of crisis period	Not globally supported; Depending on model estimation technique
H7: Structural breaks occurred during crisis.	In all model specifications and estimations	Globally supported

CONCLUSION

In this Master dissertation, we examined the effects of specific macroeconomic variables of the host country on the FDI flows towards this country. We also examined the impact of crisis on these effects in order to assess if any structural breaks occurred. For purposes of robustness, the empirical examination was conducted with both pool OLS and Fixed Effects estimation, while we included two alternative crisis period definitions, i.e. 2007-2008 and 2007-2009.

As far as the findings are concerned, we found no empirical evidence that population growth affects FDI inflows. On the other hand, inflation, GDP per capita, trade openness, and inwards FDI stock level found to affect FDI inflow regardless the choice of the crisis period, but results vary with the estimation technique indicating severe bias and inconsistency. According to these findings, inflation and stock have negative impact on FDI inflows, as our hypotheses suggested, while GDP per capita and trade openness affect FDI inflows positively.

Interestingly, GDP growth was, also, found to significantly affect FDI inflows, and this finding is robust to the definition of the crisis period and to the estimation technique. Finally, we empirically documented that indeed during the global financial crisis a structural break occurred in the relationship of FDI inflows and its determinants, and this finding is robust to the definition of the crisis period and to the estimation technique, as well.

In the future, we believe that research attentions should be paid on examining which estimation technique is most appropriate for estimating these effects and the determinants of FDI inflows. In addition, population growth might take long to affect FDI, so future research might focus on determining if past, and how long in the past, population growth affects future FDI inflows. The average global growth slowdown of 2012 and 2013, also, deserves some research attention in order to identify its causes.

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