Trade, FDI and Economic Growth in Emerging Economies

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Abstract

This paper investigates the impact of global integration on economic growth; global integration refers to both trade and FDI flows. The empirical investigation is made on two groups of emerging economies: BRICS and NEXT-11. The period of analysis is 1980-2015. Our hypothesis is that the impact of global integration (measured as foreign direct investment flows and share of trade as percentage of GDP) on economic growth is not only direct but also indirect through various other determinants of economic growth. Thus, by using panel data econometric estimation techniques, multiplicative models are estimated. Results show that global integration – both trade openness and FDI inflow – benefits economic growth. The results are however different between the two groups of countries.

Keywords: globalisation, global integration, economic growth, trade openness, FDI, emerging countries, BRICS, NEXT-11

JEL: P52, P33, F14, O53

1. Introduction

Globalization favoured, in particular in the last half century, the development of many previously "underdeveloped" or developing countries. The fast growth of the BRICS group, in particular China and India, is just the clearest example (while growth has been more volatile in Brazil, Russia and South Africa).[1] NEXT-11 is another group of fast growing countries.[2] Many other groupings of emerging countries can be found in the literature and in the reports by the World Bank and other international organizations.

Most economists generally view globalization in a positive way. As a matter of fact, income inequalities have been reduced in the world as a whole, although they have certainly increased within countries, at least in the developed world. A too rapid globalization may induce the excessive exploitation of both natural and human resource (also with the risk of dreadful "social dumping" events). We also know that fast economic liberalisations, especially in the financial sector, with lacking or weak international regulations, have been – and still may be – the cause of financial crises. So globalization, especially if unregulated, is not always the best policy option (see Stiglitz, 2002; Acemoglu et al., 2003; Rodrik, 2006).

Nevertheless, globalization has been mostly beneficial to developing countries. This paper investigates, in particular, the impact of global integration on economic growth in a large group – BRICS + NEXT-11 – of emerging countries and it tries to verify a possible different relation for the second group. The period of analysis is 1980-2015. Our hypothesis is that the impact of global integration (measured as foreign direct investment and share of trade as percentage of GDP) on economic growth is not only direct but also indirect through various other determinants of economic growth. Thus, by using panel data econometric estimation techniques, multiplicative models are estimated – which is an original feature of this paper – to capture the contemporaneous impact of global integration as well as other determinants of GDP per capita income growth.

We remark here that empirical investigations regarding the NEXT-11 group (as a whole) are extremely rare. Our results show that global integration – both trade openness and FDI inflow – benefits economic growth. The coefficients are however higher in the BRICS sample rather than in the complete sample (BRICS + NEXT-11), probably because in the countries of the NEXT-11 group with a lower development level the benefits of trade liberalisations cannot be fully exploited.

The structure of this paper is as follows. After this Introduction, we review both the literature on the links between trade opening and economic growth, then the growth effects of FDIs. In Section 3, we present our econometric model, with the specification of the estimation methods. Data are presented in Section 4, that includes also some descriptive statistics. Econometric results are presented and discussed in Section 5. Section 6 concludes.

2. Literature Review

Economic growth depends on several factors. Classical and neoclassical economic theories considered capital accumulation as a key driver of growth, while more recent growth models highlight the role of human capital.

Capital stock formation depends on both private and public fixed investment decisions, which can be supported by a high saving rate, but partly derives also from foreign direct

[1] Notice that exports of Russia and Brazil are much more dependent on raw materials and energy sources. The BRIC acronym was first employed by O'Neill (2001).

[2] It comprises Bangladesh, Egypt, Indonesia, Iran, Mexico, Nigeria, Pakistan, the Philippines, Turkey, South Korea, and Vietnam. These countries could potentially become some of the worlds' largest economies.

investment. So, FDI and fixed capital stock formation can enter into growth equations as independent variables.

On the other hand, extended endogenous economic growth models (Grossman and Helpman, 1990, was the first of a long series) provide a role for trade opening: growth depends on the rate of knowledge accumulation and technological progress, which is stimulated by (domestic and international) competition, hence by trade liberalisation policies. In particular, developing countries not only can access to intermediate and high-tech goods (so important for economic growth) through imports, but they can also acquire valuable foreign reserves through exports, thus making sustainable the mentioned imports. These theoretical underpinnings have favoured the adoption of trade liberalisation policies in many developing countries (Krueger, 1978).

However, we must add that trade openness can be potentially detrimental to economic growth for developing countries; for example when the latter tend to specialise in traditional industries or in sectors where R&D activities are not the core ones (see Rodríguez and Rodrik, 1999, 2001). Furthermore, countries may also become vulnerable to negative external shocks, boom-bust cycles of investment, volatile exchange rates, dumping, imported inflation (see Montalbano, 2011; Iyke, 2017).[3] Some studies found an income threshold below which more openness deters the growth prospects, the key reason concerning the human capital constraints that limit the benefits of international technology transfers (Kim and Lin, 2009).

Notice that most empirical studies focused on the links between trade openness and economic growth, while more recent investigations regard the relations between FDI and growth. However, trade and FDI are also interrelated, since FDIs are often "export-oriented", that is they establish productions partly (in some instances mostly) oriented to exports.

Although we shall present the literature review separately for the trade and the FDIs determinants of growth – consistently with the empirical studies focusing on one variable at a time – there are some researches considering them jointly. This is also the case of our paper.[4]

2.1 The links between trade openness and economic growth

The empirical works on the growth effects of trade have followed a variety of approaches (Dollar, 1992, was one of the initial studies). As far as the dependent variable is concerned, following the main literature (e.g. Frankel and Rose, 2002), almost all empirical studies chose the GDP per capita expressed in growth rates. More discussion arose relative to the key explanatory variable: trade openness.

A first important distinction refers to the choice between analysing trade growth – whatever is the driver (liberalisations but also reduction in transport and communication costs or other reasons) and explicit trade policy: liberalizations, reduction of duties or non-tariff barriers, participation to trade agreements, etc. Some studies (e.g. Edwards 1993, Milner et al. 2007), in order to assess the effects of liberalizations and institutional change, compute sophisticated indices of trade openness, based on tariffs, non tariff-barriers, degree of effective protection, etc.

Regarding this approach, we recall the sceptic's view of Rodrìguez and Rodrik (1999), who find "little evidence that open trade policies – in the sense of lower tariff and non-tariff barriers to

[3] A negative impact of trading opening may be caused by the worsened income distribution. Nayyar (2015) argues that policies that have stressed more openness in trade, investment and finance, have dampened output growth through a deteriorated income distribution.

[4] In addition to some studies reviewed in Section 2.1; for example, Cies´lik and Tarsalewska (2011), Marelli and Signorelli (2011), Ramanayakea and Leeb (2015).

trade – are significantly associated with economic growth"; the reason is that "the nature of the relationship between trade policy and economic growth remains an open question".

A second relevant issue refers to the measurement of trade openness (see also Sakyi et al. 2015, for a review of the alternative measures). The most frequently used variable is the total trade share in GDP, i.e. (exports + imports)/GDP. Sometimes the export share or import share alone are considered. Furthermore, instead of the "nominal trade shares", in some studies the "real trade shares" are computed, where the denominator is GDP adjusted for PPP. The nominal trade share are also accused to be biased, since they overestimate the openness degree of small trading countries (and vice versa). Thus, Squalli and Wilson (2011) propose "composite trade shares", that take into account to what extent an open economy trades internationally and how much it is a substantial contributor to world trade; in other words, it considers not only a country's share of trade (on domestic GDP), but also its interaction and interconnectedness with the rest of the world.

A more decisive critique to traditional measures of openness is raised by Sulochani Ramanayakea and Leeb (2015). They show – in a study comprising 156 developing and 49 developed countries for the period 1980 to 2009 – that export growth is the most robust measure, in addition to export specialization, compared to traditional variables of trade openness and FDI; in fact, export growth requires capability building in indigenous firms and investments in innovations. Moreover, productivity increases are guaranteed through "learning-by-exporting" mechanisms only if export growth is maintained over time. This assumption is consistent with the evidence that some developing countries show growth surges for a certain period of time, but are unable to sustain this growth over a longer period (see also Rodrik, 2006).

From an econometric point of view, recent studies[5] follow either cross-section or panel approaches, usually with large samples of countries: see for example Edwards (1998), Makki and Somwaru (2004), Sarkar (2008). The distinction between developed countries and emerging economies has become more common in recent works, also because globalization has led most emerging countries to open their economies. Some specific studies are devoted to transition countries[6]; Iyke (2017), by using fixed-effects regressions for 17 CEE (Central and Eastern European) countries over the period 1994 – 2014 and an index of trade openness similar to the one proposed by Squalli and Wilson (above illustrated), find that trade openness is important for real GDP per capita growth. A similar positive link between trade liberalisation and growth for this group of countries is also detected by Nannicini and Billmeier (2011).

In this paper, we focus particularly on emerging economies. As already anticipated, it is in these regions of the world that some countries are unable to exploit the benefits of technology spillovers and so trade openness is not beneficial to growth. Hence, the link between trade openness and economic growth is not always significant or robust. In some cases, it can even be negative: Kim (2011), by using the instrumental variable threshold regressions approach, finds that greater trade openness has strongly beneficial effects on growth and real income for the developed countries, but significantly negative effects for the developing countries.

The structure of trade is also important to determine the final result; in fact, it has been found that developing countries specializing in manufacturing are the ones benefiting more from trade and achieving higher economic growth. Even the development of the financial sector can

[5] For previous works, see the extensive review of Edwards (1993). A recent survey is the one by Singh (2010).

[6] These countries have some specific features; for instance, their liberalisations and opening to trade have been much faster (the so-called "shock therapy" adopted in the '90s) compared to the more gradual approaches of China and India (see Marelli and Signorelli, 2010).

strengthen the link between trade openness and economic growth; Huang and Chang (2014), using panel data for 46 countries from 1983 to 2007, find that it is especially in countries with higher stock market development that more trade openness enhances economic growth. However, Herwartz and Walle (2014), using data from 78 economies for the period 1981-2006, interestingly find that very high levels of financial openness generally erode the growth-promoting role of financial development while high trade openness strengthens it.

Recent empirical research on this topic normally refers to a large number of developing countries. For instance, Cies´lik and Tarsalewska (2011), analyzing a group of 97 developing countries in the period of 1974–2006 and using static and dynamic panel data estimation methods, find that both international trade and FDI positively contribute to growth; this study is also worth to be mentioned because, differently from most works, derives the equations to be estimated from a theoretical model.

Some studies focus on a very limited number of countries.[7] Marelli and Signorelli (2011) investigate the case of China and India: the effect on economic growth (in terms of GDP per capita) of both trade openness and FDI is found to be positive, statistically significant and robust; here, the reverse causality issue is tackled with a 2SLS estimation. Mercant et al. (2013) confirm the positive and significant effect of openness on economic growth for a group of 5 countries (BRIC plus Turkey) in the period 1989-2010. In the literature, it is possible to find several studies focusing on individual countries, such as India, Mexico, Pakistan, South Korea, and many others.

Almost all econometric investigations include in the estimated equations some control variables. In some studies, the initial level of income is included among the explanatory variables, in order to analysis the "converge" of countries. The most common control variables include, however, total investment (gross capital formation), life expectancy, size or growth rate of population, human capital, R&D and innovations, size of firms, patent protection, credit, inflation rate, index of economic freedom, political institutions, government expenditure, export specialisation, and some others.

The role of human capital can be particularly relevant; in fact, the benefits from trade openness are adequately exploited if a country has adequate absorbing capacity of new technology, that depends on the level of human capital. Jadoon et al. (2015), by considering the case of eight Asian economies[8], further distinguishing between higher income and lower income countries, find that the impact of trade openness on human capital has been significant only for the formers (although both groups of countries enjoyed the trade-led growth).

A typical econometric problem encountered in econometric estimations is the issue of endogeneity, or reverse causality. Frankel and Romer (1999) were among the first to use instrumental variables to overcome it. In most instances, a GMM estimation is the solution. Difference-in-difference estimations are also common. Panel unit root tests are frequently used. The cross-country heterogeneity problem is generally faced by considering a sample of relatively homogenous countries.

The time-series approach is uncommon (see also Harrison, 1996). Xu and Wang (2007) use time-series estimating a system of four equations. Ramjerdi (2007) explain Chinese growth in terms of capital and technical progress; the effects of opening up are examined indirectly by

[7] In several cases, cross-sections are based on sub-national data, e.g. China's provinces: see Sun and Parikh (2001), or on many sectoral data: see Milner et al. (2007).

[8] Lower income countries considered in the study are: India, Indonesia, Pakistan and Sri Lanka; higher income countries: Japan, Malaysia, Singapore and South Korea. The period is from 1981 to 2012.

splitting the period into two sub-periods (before and after 1978, when the "open door" policy started).

Finally, some other studies follow cointegration or VAR approaches. We just mention[9] Sakyi et al. (2015), who investigate a large sample of 115 developing countries for the period 1970–2009, further distinguishing three mutually exclusive groups of countries: low-income, lower middle-income, and upper middle income countries. By employing non-stationary heterogeneous panel cointegration techniques, they find a positive bidirectional relationship between trade openness and income level, although the link between openness and income is higher for upper middle-income countries.

The general conclusion of most empirical studies is that the link between trade openness and economic growth is positive, significant and robust. The exceptions refer mainly to less developed countries (see Kim and Lin, 2009, as a good example of the negative link).

2.2 Growth effects of FDIs

The interdependence between FDI inflow into host countries and the economic growth has been subject to various research projects for years. The general belief suggests that FDI has contributed to economic growth in developing countries through direct and indirect channels. Notice that FDI is not only a major source of technology and know-how for developing countries[10], but also a key foreign financing font. The positive impact of FDI inflow in a host country reveals itself, more generally, as capital accumulation, technology transfer, know-how acquisition, innovative capacity and ultimately, economic growth. World Bank (2002) suggested that several studies prove that FDI can promote economic development of the host country, also by favouring exports of the country. However, it should be added that the relationship between foreign Multinational Corporations and their host countries varies and the effect of FDI on economic growth is chiefly dependent on the policy environment.

Therefore, most developing countries have been making an effort to increase the FDI inflow within their country due to the mentioned general belief, although the findings of empirical research on this topic vary. Some studies, such as Choe (2003), Yao (2006), Mullen and William (2005) share opinions with Anwar and Nguyen (2010), who state that FDI not only increases the supply of capital but it can also buttress technology transfer. On the other hand, some authors, such as Carcovic and Levine (2005) or Adams (2009), conclude that FDI has no significant impact on economic growth. Others, such as Borensztein et al. (1998), find little support for the correlation. Alfaro et al. (2004) conclude that FDI alone plays an uncertain role and that FDI entry could lead to positive economic growth when only fundamental factors are in play.

The consideration of additional control variables can make the difference also in this case (additionally to what illustrated for the links between trade openness and economic growth). For example, Batten and Vo (2009) show that FDI has a stronger positive impact on economic growth in countries with a higher level of education attainment, openness to international trade and stock market development, and a lower rate of population growth and lower level of risk.

Now we shall briefly illustrate the results of empirical investigations regarding some individual developing countries. We begin with the studies where the link between FDI and growth results to be positive and significant, then we analyse research where the relation turns out to be absent, weak or even negative.

[9] Other works include Liu et al. (2002), Sahoo and Mathiyazhagan (2008), Zhao and Du (2007); while Tsen (2006) focused on Granger causality.

[10] In particular, general wisdom is that multinational firms sustain, through FDI, the international knowledge diffusion.

A first interesting case is that of China. Tang et al. (2008) analyze the data from 1988 to 2003 and, using an integration and Granger casualty analysis, found causality running from FDI to GDP in China.

A study based on simultaneous equation model, using panel dataset for 61 provinces of Vietnam, reveals that in overall terms a mutually reinforcing two-way linkage between FDI and economic development exists in Vietnam (Anwar & Nguyen, 2010). The study also suggests that the impact of FDI on development is related to the amount of resources that are invested in education and training, financial market development and the capacity of reducing the technology gap between the foreign and local firms.

In another study (Narayanamoorthy et al, 2009) the casual relationship between FDI and growth of BRICS countries was examined; the results show that economic growth leads FDI bi-directionally for Brazil, Russia and South Africa and FDI leads growth uni-directionally for India and China respectively.

In some studies, the sign and significance of the link between the two variables depend on the economic sectors and other economic conditions. Chakraborty and Nunnenkamp (2008) assess the relationship between FDI and economic growth in India, by using industry-specific FDI and output data; they apply Granger causality tests within a panel cointegration framework. The results prove that growth effects of FDI vary widely across sectors: the casual relationship is absent in the primary sector whereas in the manufacturing sector the relationship is strong. Though the effects were only transitory in the services sector, FDI in the services promotes growth in the manufacturing sector through cross-sector spillovers. The economic reforms of 1991 attracted booming FDI into the country to foster growth. Yet, earlier studies on India have failed to find a significantly positive growth impact (e.g., Agrawal, 2005; Pradhan 2002)

Similarly, Khaliq and Noy (2007) find that FDI's impact varies over the different sectors in Indonesia. The authors conclude that, at an aggregate level, FDI is observed to have a positive effect on economic growth; whereas, when accounting for the different average growth performance across sectors, the beneficial impact of FDI is no longer apparent. In fact, few sectors showed a positive impact of FDI on growth and one sector, mining and quarrying, even shows a negative impact.

In another study, Yalta (2013) explore the casual relationship between foreign direct investment and GDP in China for 1982-2008, both in bivariate and a multivariate framework. The results show that a statistically significant relationship between FDI and GDP does not exist. The author argue that the effects of capital accumulation and positive knowledge spillovers, predicted by endogenous growth models, may not occur in developing countries due to negative spillover effects. For example, multinationals may try to protect their firm-specific knowledge (see also Görg and Greenway, 2004).

In Falki (2009), the relationship between the two variables is investigated for Pakistan, in the period 1980-2006. By using the production function based on the endogenous growth theory, the relationship between FDI and economic growth is analyzed. The study shows that a statistically significant relation between the GDP and FDI inflows in Pakistan is not found.

Temiz and Gokemen (2014) analyze the relationship between FDI and GDP growth in Turkey by using the Johansen cointegration test and Granger causality analysis. Their results suggest that no significant relation is determined between the FDI inflow and GDP growth in the country, both in short and in the long run.

Akinlo (2004) uses data for Nigeria in the period 1970-2001 to understand the relationship between FDI and economic growth. The ECM results show that both private capital and lagged

foreign capital have small, and not statistically significant effect, on the economic growth. The results seem to support the argument that FDI in the extractive sector might not be growth enhancing as much as manufacturing FDI. In addition, the results show that exports, on the contrary, have a positive and statistically significant effect on growth; at the same time, labour force and human capital have significant positive effects on growth. These findings suggest the need for labour force expansion and education policies to raise the stock of human capital in the country, policies that are much more important for economic growth.

3. Model specification

The dependent variable in our model is GDP per capita growth (GDPCG). We are interested to explore the role of global integration for promoting growth of economies. We use two measures (openness and foreign direct investment inflow) as our measure for global integration. Openness measures economy's trade as percentage of its GDP.

We have included, following the common literature (see Section 2), various control variables (inflation, gross capital formation, government expenditure, role of services sector), along with our variables of interest. The value added of this paper is to test whether global integration has a direct implication for GDPCG, or also have an indirect impact through other determinants of per capita income.

In our baseline model, we assume that GDPCG is dependent on several socio-economic variables in the country. Hence our baseline model:

$$\mathrm{GDPCG}_{it} = \alpha_i + \beta_1 IGDPC_i + \beta_2 GI_{it} + \beta_3 Controls_{it} + \varepsilon_{it} \quad (1)$$

where i represents a country and t a time period. *IGDPC is an initial level of GDPC measured at the beginning of the period, GDPCG* denotes GDP per capita growth; *GI is our global integration variable, measured by openness* (trade as the percentage of the GDP) and FDI inflow (as the percentage of the GDP), controls represent a vector of control variables. Our control variables include gross capital formation, inflation rate, and government size measured as government expenditure as percentage of GDP. ε_{it} is an independently and identically normally distributed error term with zero mean and variance σ^2.

To check whether the impacts of other GDPCG determinants are conditional on global integration, we introduce an interaction term between openness and one of the variables of interest. Consequently, our model extends to

$$GDPCG_{it} = \beta_1 IGDPC_i + \beta_2 OPEN_{it} + \beta_3 Controls_{it} + \beta_4 \Psi_{it} + \beta_5 \Psi_{it} * OPEN_{it} + \varepsilon_{it} \quad (2)$$

where Ψ *is our variable for which we want to check its impact at different level of global integration .* Ψ ** OPEN* is the interaction term of one of our variables of interest with openness. Since we are primarily interested in evaluating the effect of three explanatory variables and their interaction with openness, we will estimate four separate models extended to include:

1) OPEN * Value added of service sector;
2) OPEN * value added of industry ;
3) OPEN * government expenditure;
4) OPEN and economic freedom index.

For example, to determine the impact of government size, measured as government expenditure as percentage of GDP, we estimate the model:

$$\mathrm{GDPCG}_{i,t} = \alpha_i + \beta_1 IGDPC_i + \beta_2 OPEN_{it} + \beta_3 Controls_{it} + \beta_4 GEXPG_{it} + \beta_5 GEXPG_{it} * OPEN_{it} + \varepsilon_{it} \quad (3)$$

As a next step, we calculate the marginal effect of each variable of interest at different levels of openness. For this purpose, we differentiate equation (2) with respect to that particular variable. Thus for the calculation of the marginal effect of government size conditional on openness, we take the derivative of equation (3) with respect to the financial development variable to obtain

$$\partial GDPCG / \partial GEXPG = \beta_4 + \beta_5 OPEN \quad (4)$$

The marginal effect of other variables of interest can be calculated accordingly.

4. Data description and analysis

We have employed the panel data estimation technique to analyze the determinants of GDP per capita growth. We have treated two independent variables, trade as percentage of GDP (openness) and FDI inflow as our main variables of interest. We consider both of these variables to represent the level of global integration in any economy. Through an empirical analysis we intend to understand the effect of global integration (measured as openness and FDI inflow) on per capita GDP growth. The period of analysis is 1980-2015. Our analysis focuses on emerging economies, BRICS and NEXT-11 (N-11 henceforth)[11], to understand the role of global integration in promoting growth in these economies.

Our dependent variable is GDP per capita growth. Data for dependent and explanatory variables are taken from World Development Indicators. Our explanatory variables include two indicators of Global Integration (GI), trade and foreign direct investment inflow as percentage of GDP. Other control variables include inflation, gross capital formation, and government expenditure, value added in industry and services sectors. Selection of our control variables is based on literature review presented in previous section. The precise definitions and data source of all variables used are given in Table 1A in the appendix. Summary statistics of the dependent variable and the independent variables are presented in Table 2A in the appendix.

The rationale for including the two key explanatory variables was discussed in Section 2.1. We repeat here the main arguments concerning FDI. FDI helps jumpstart an economy by adding to the direct capital financing as well as by being a source of valuable technology and know-how while fostering linkages with local firms. Lipsey et al. (2001) reviewed the literature and argued that there was evidence of positive effect of the spillovers from FDI. The impact of FDI inflow can also impact positively on human capital. When a Multi-National Company (MNC) invests in a country, it requires a certain level ofhuman capital; in fact, MNCs usually invest in training the workforce. Therefore, the host country enjoys certain advantages such as knowledge accumulation, skill acquisition and manpower training. Moreover, MNCs can be advantageous to develop international networks to improve the trade potentials of a country. MNCs can also

[11] BRICS: Brazil, Russia, India, China, South Africa. N-11 excludes South Korea, because its growth is much higher as compared to other countries in N-11. We have however done empirical analysis including South Korea as well, but results remain more or less the same.

facilitate the movement of domestic goods and services across borders, create economies of scale and scope and thus contribute to economic growth (see Zhao & Du, 2007).

5. Empirical results and interpretation

The estimation results are reported in Table 1. The results are based on annual data over the period 1980-2014 for our group of emerging economies (BRICS and N-11). For better understanding the structural characteristics of these economies, Figure 1A in appendix presents the level of global integration (openness) and GDP per capita in our sample countries.

Country specific random effects model is used. It is not feasible to use country specific fixed effects as we have time invariant variable (initial GDP per capita) as one of our explanatory variable. Since we are using time series data, serial correlation can be a potential issue. We applied panel data autocorrelation tests. The results suggest that there is not a problem of serial correlation in our residuals and in our time series macro variables; we can reject the null of unit root at 1 percent level of significance. Moreover, we also checked for possible multicollinearity among our explanatory variables; correlation matrix is presented in Table 3A in appendix.

5.1. Basic Model for complete sample (BRICS + N11)

In Table 1, our first column (model M1) is evaluating the impact of openness on per capita growth, which is positive and significant. The impact of other indicator (FDI inflow) is evaluated in model N1. Our hypothesis is that an increase in FDI inflow would lead to an increase in the GDP per capita growth. The results show that FDI inflow positively affects the dependent variable. The results are statistically significant. The coefficient values of FDI flow are higher as compared to coefficients of openness.

The results are in coherence with Ray (2012). In the study the author analyzed the casual relationship between economic growth and FDI in India. Study employed ordinary least square method and the results suggest that there is a positive relationship between FDI and gross domestic product.

Table 1: Impact of Global Integration on Per Capita Growth- Complete Sample

	M1	M2	M3	M4	M5	N1	N2	N3	N4	N5
	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se
INGDPC	-0.000*	-0.000***	-0.000**	-0.000***	-0.000***	-0.000*	-0.000***	-0.000***	-0.000***	-0.000***
	0	0	0	0	0	0	0	0	0	0
GCFG		0.172***	0.177***	0.174***	0.172***		0.164***	0.172***	0.165***	0.164***
		0.01	0.01	0.01	0.01		0.01	0.01	0.01	0.01
OPEN	**0.032*** **	**0.019** **	**0.020** **	**0.011**	**0.019** **					
	0.01	**0.01**	**0.01**	**0.01**	**0.01**					
FDIFLOW						**0.565*** **	**0.300*** **	**0.339*** **	**0.298*** **	**0.286** **
						0.13	**0.11**	**0.1**	**0.11**	**0.11**
GEXPG			0.063***					0.062***		
			0.01					0.01		
INDEM				0.047*					0.059**	
				0.03					0.03	

SEREM					0.025					0.015
					0.02					0.02
Constant	1.793**	1.464**	1.032*	0.315	0.369	2.472***	1.972***	1.494***	-0.021	1.347
	0.9	0.6	0.58	0.95	1.14	0.7	0.46	0.43	1.01	1.11
Observations	509	494	489	494	494	485	470	465	470	470
Number of Countries	15	15	15	15	15	15	15	15	15	15
R-Square	0.161	0.522	0.531	0.613	0.483	0.34	0.627	0.633	0.673	0.606
Chi-Square	12.772***	277.260***	511.387***	288.711***	278.009***	24.147***	256.954***	493.018***	268.592***	255.581***

Robust standard errors are reported below the coefficients. *** indicates significance at 1 percent level, ** indicates significance at 5 percent and * indicates significance at 1 percent level.

We used Initial level of GDP per capita (INGDPC) in all specifications as a proxy for the level of economic development in the country. The coefficient sign is negative and significant which reflects the convergence in terms of growth among our sample countries.

In the second model (M2 and N2), gross capital formation growth is introduced as our control variable. The coefficient of GCFG is positive and statistically significant. Therefore, an increase in physical assets or the capital accumulation leads to an increase in the GDP per capita. Temiz and Gokeman (2013) believe that an increase in FDI flow by MNC can help a country to accumulate capital. FDI inflow is a substantial source in the case of low domestic savings rate and investment volume in a host country. Therefore, if the country's domestic saving rate is low then FDI might be used as a remedy to accumulate capital. Moreover, as proven in many empirical studies, an increase in GCFG would lead to an increase in GDP.

To control for biases and errors, we incorporated other explanatory variables: government expenditure growth and the values added to GDP by the Services and Industry sectors (GEXPG, INDEM, SEREM respectively): see the models M3 to M5 and N3 to N5 in Table 1). The result of the explanatory variables has their expected signs but are not statistically significant, except for government expenditure growth and value added to GDP by industry (see the models M3, N3 and N5). Government expenditure growth has the expected positive sign and is also statistically significant to 1 percent.

The sign and significance of our variables of interest (openness and FDI Inflow) remain positive and statistically significant in all specifications, which ensures the robustness and reliability of our results. Results reflect that global integration promotes economic growth. This result is coherent with De Mello (1999) study, among many others. De Mello in his investigation, conducted through time-series analysis, showed an increase in the amount of GDP through the effects of FDI on capital accumulation.

5.1. Restricted Model (BRICS only)

To understand the potential differences between emerging economies of N-11 and BRICS, now we empirically investigate this relationship, impact of global integration on per capita income growth, specifically for BRICS group alone. Results are presented in Table 2.

The impact of openness and FDI inflow is positive and statistically significant (see models M1 to M5 and N1 to N5). The respective coefficient values for openness and FDI inflow are much

higher as compared to the complete sample. This indicates the strong impact and significant role played by global integration in promoting economic growth in these economies. We can infer that in comparative terms trade opening (including FDI inflow) has been more beneficial to BRICS, that reached a comparatively higher level of development and were the first in the world (soon after the "Tigers" of South-Eastern Asia) to liberalize trade. On the contrary, it is likely that some countries of the N-11 group haven't yet reached the threshold level of development that allows them to fully exploit the benefits of trade liberalisation (as commented in the literature review section).

Coefficients of most control variables are significant and have the expected sign. Another interesting finding is that value added to GDP in services sector impact is negative and significant and the corresponding variable in the industry sector is positive and statistically significant. Industrial sector growth contributes positively towards global integration as economy's trade with other countries increases and it attracts more FDI in the country.

5.3. Multiplicative effects

Our stated hypothesis is that global integration will impact GDP growth not only directly but also indirectly through other explanatory variables of growth. To evaluate this hypothesis, we introduce multiplicative terms of explanatory variables and openness. We introduce four interactive terms with our variable of interest. Empirical results are presented in table A4 in appendix.

Table 2: Impact of Global Integration on Per Capita Growth- BRICS

	M1	M2	M4	M5	M6	N1	N2	N4	N5	N6
	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se
INGDPC	-0.001	-0.001**	-0.001***	-0.001***	-0.001***	-0.001*	-0.001	-0.001***	-0.001***	-0.000***
	0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCFG		0.147***	0.146***	0.164***	0.156***		0.149***	0.145***	0.152***	0.154***
		0.014	0.018	0.018	0.017		0.015	0.017	0.016	0.017
OPEN	0.110***	0.088***	0.072***	0.032**	0.124***					
	0.016	0.013	0.013	0.014	0.014					
FDIFLOW						0.762***	0.635***	0.954***	0.633***	1.141***
						0.171	0.133	0.135	0.143	0.134
GEXPG			0.322***					0.249***		
			0.043					0.043		
INDEM				0.160***					0.154***	
				0.024					0.022	
SEREM					-0.192***					-0.118***
					0.023					0.02
Constant	1.022	0.504	-0.392	-2.588***	8.467***	4.155***	2.892**	1.233***	-1.923***	7.857***
	1.816	1.087	0.55	0.784	0.991	1.083	1.241	0.368	0.693	0.967
Observations	160	159	159	159	159	158	158	158	158	158
Number of Countries	5	5	5	5	5	5	5	5	5	5
R-Square	0.289	0.421	0.781	0.747	0.872	0.645	0.684	0.891	0.862	0.965
Chi-Square	46.839***	181.192***	301.516***	274.793***	324.022***	24.059***	139.238***	335.313***	372.301***	337.970***

Robust standard errors are reported below the coefficients. *** indicates significance at 1 percent level, ** indicates significance at 5 percent and * indicates significance at 1 percent level.

In the first model (SC1) we introduce an interaction term of openness with economic freedom index.[12] Similarly we include interactive terms between openness and government expenditure, openness and value added in services sector and openness and value added in industry (in models SC2 to SC4 respectively). The same analysis is presented for BRICS economies from model C1 to C4 in Table 4A.

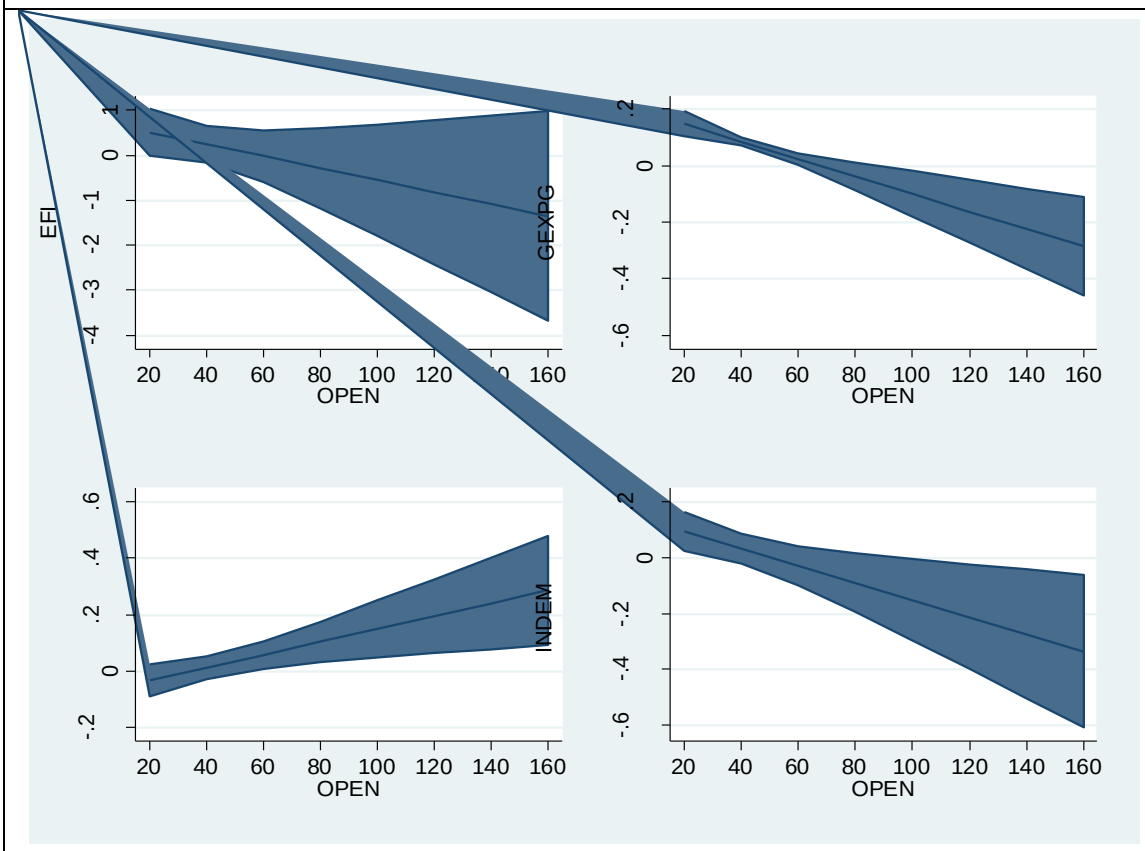
5.4. Marginal effects

As suggested by Bramber et al (2006), on the basis of empirical results from SC1 to SC4, we calculated the respective marginal effects of interactive terms and present them in Figure 1 below. Figure 1 presents the marginal effect of various explanatory variables on per capita growth, conditional on different levels of openness.

The solid line in each panel of Figure 1 shows the marginal impact of one variable of interest on per capita growth at different levels of openness. The 95% confidence intervals around the solid line allow us to determine the conditions under which that variable has a statistically significant effect on GDP per capita growth labor productivity – that is, its effect is statistically significant positive (or negative) whenever the upper and lower bounds of the confidence interval are both above (or below) the zero line.

[12] The index measures the degree of economic freedom present in five major areas: 1) Size of Government; 2) Legal System and Security of Property Rights; 3) Sound Money; 4) Freedom to Trade internationally and 5) Regulation. It ranges from 0 to 10 (where 0 means no economic freedom and 10 means complete economic freedom)

Figure 1 - Marginal impact of Economic Freedom Index, government expenditure, Value added by Services and by industry on per capita income growth at different levels of openness - complete sample



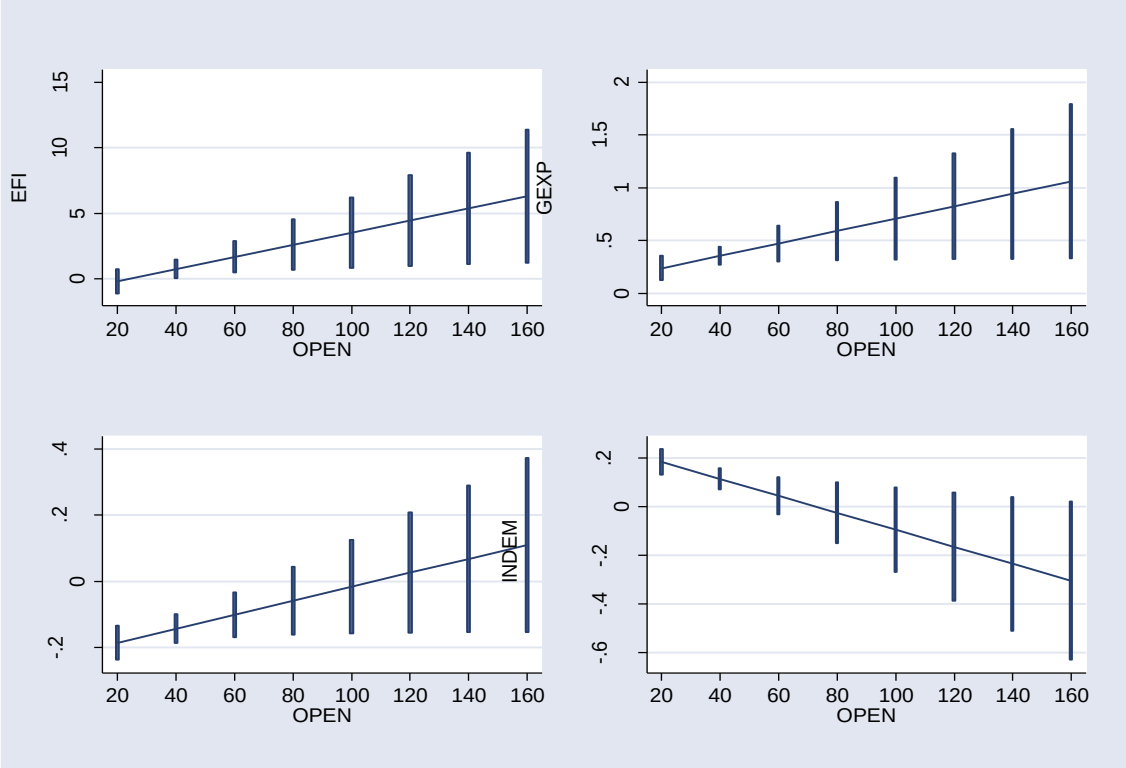
This figure shows the impact of economic freedom index, government expenditure and value added by services and by industry on per capita growth at different levels of openness**.** These figures correspond to our main results as set out in columns SC1 to SC4 of Table A. The upper panels show the marginal effect of economic freedom index (EFI) and government expenditure (GEXPG) and the lower panels show the marginal effect of value added by services sector (SEREM) and industry (INDEM) at different levels of openness.

To evaluate and understand the difference between N-11 and BRICS, we have plotted marginal effect of these variables in Figure 2 for BRICS only. Economic Freedom Index (EFI) is summary measure of economic freedom of the economy. While we found that economic freedom role is positive and statistically significant at low level of openness for the complete sample and then it turns negative, in case of BRICS sample results suggest that economic freedom role for promoting per capita growth increases with a higher level of global integration. (see upper left panel in Figures 1 and 2).

Similarly, we find that government expenditure impact turns negative after certain level of openness in the whole sample, however its impact remains positive and significant for per capita growth in BRICS economies and it increases with a high level of integration. This may be due to

crowding out effect in developing and emerging economies of N-11 (see upper right panel in Figures 1 and 2).

Figure 2 - Marginal impact of Economic Freedom Index, government expenditure, Value added by Services and by industry on per capita income growth at different levels of openness – BRICS



This figure shows the impact of economic freedom index, government expenditure and value added by services and by industry on per capita growth at different levels of openness**.** These figures correspond to our main results as set out in columns S1 to S4 of Table A. The upper panels show the marginal effect of economic freedom index (EFI) and government expenditure (GEXPG) and the lower panels show the marginal effect of value added by services sector (SEREM) and industry (INDEM) at different levels of openness.

The marginal impact of value added in industry and services sectors at different levels of openness is presented in the lower panels of Figures 1 and 2. We find that the role of the services sector in promoting growth augments with an increase in global integration. This is true both for the complete and BRICS samples. It is statistically significant only in the case of BRICS economies. This might be due to the spillovers due to the trade. An increase in the trade would have positively affected the value added by the services sector.

On the contrary, the industry sector contribution towards promoting per capita income growth decreases with an increase in global integration. This finding is applicable both for the complete and BRICS samples. Sachs and Warner (1999) argued that extractive industries may have a negative effect on economy. The changes in local market structures, as a result of the incoming

investment flows, could raise rent-seeking activity and deteriorate the institutions of the local economy.

5.5. Robustness and Sensitivity Analysis

Our empirical results suggest that global integration promotes economic growth. Now, we need to make sure that our results are consistent and robust. For this purpose, we conduct sensitivity analysis by changing our empirical model specifications and by treating for any potential endogeneity issue in our model.

There can be a potential issue of endogeneity and reverse causality, which can plague our results. High economic growth can lead to more FDI and trade openness. The FDI inflow is expected to supply technology, knowledge and capital, which lead to higher economic growth. In fact, the relationship between trade openness/FDI and GDP could be either way, i.e. trade openness/FDI increases GDP growth or GDP growth leads to trade openness/FDI increases.

In addition to what discussed in the literature review section, Basu, Charaborty & Regale (2003) believe that a stable amount of GDP growth, capital accumulation, technology and competent workforce could foster foreign capital inflow that can make further contribution to the GDP growth, both in the short run and long run. Furthermore, high growth can lead to more gross capital formation, with the consequent need to import more machinery and capital goods.

To overcome this potential issue of reverse causality and check robustness of our findings, we employ the Hausman-Taylor (1981) estimation technique. This technique has been used extensively in the literature to control for endogeneity problems (see for example Degryse et al., 2012). Under this technique, weighted instrumental variable estimators are used to obtain coefficients by instrumental variable regression. Table 3 presents the estimation results regarding the complete sample.

Results reconfirm that global integration has positive and significant impact on growth of the economies. Coefficients for openness and FDI inflow remain positive and statistically significant. The impact of other control variables also remains the same and they have the expected signs, which confirms the robustness of our findings. It also reflects that endogeneity issue does not contaminate our results.

Table 3: Global Integration and Growth-Hausman Taylor Estimation

	Complete Sample				BRICS			
	T1	T2	T3	T4	t1	t2	t3	t4
	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se
INGDPC	-0.000*	-0.000**	-0.000***	-0.001***	-0.001*	-0.001**	-0.001**	-0.001*
	0	0	0	0	0.001	0	0	0
GCFG	0.133***	0.133***	0.130***	0.131***	0.146***	0.147***	0.151***	0.148***
	0.011	0.011	0.012	0.012	0.014	0.014	0.015	0.015
OPEN	0.043***	0.042***			0.093***	0.089***		
	0.01	0.01			0.013	0.017		
FDIFLOW			0.252**	0.212*			0.654***	0.515***
			0.109	0.112			0.133	0.152
SEREM		0.026		0.02		0.006		0.052*
		0.022		0.023		0.034		0.031
INDEM	0.012		0.067**		-0.047		0.091**	
	0.029		0.029		0.043		0.042	
Constant	0.41	-0.318	0.371	1.79	1.878	0.182	-0.131	0.565
	1.157	1.205	1.093	1.143	1.927	1.719	1.55	1.785
Observations	473	473	450	450	159	159	158	158
Number of Countries	15	15	15	15	5	5	5	5
Panel Standard Deviation	1.678	1.687	1.194	1.438	2.428	2.117	1.258	2.096
Wald Chi-squared	164.724	167.756	150.975	142.213	185.006	182.684	152.659	143.904

All models have been estimated by Hausman–Taylor regressions. Robust standard errors are reported below the coefficients. *** indicates significance at 1 percent level, ** indicates significance at 5 percent and * indicates significance at 1 percent level.

In the next sensitivity test, we incorporate more control variables, which are potential determinants of per capita GDP growth. We introduce inflation, working age population, real interest rate, financial depth (measured as stock market capitalization), telephone line per 100 persons and literacy rate. Results are presented in the appendix in Table 5A. Inflation rate (INF) impact is negative but not significant. High working age population share (TPOP) is positive for growth. Financial depth (FIND) impact is positive and significant. High real interest rate can lead to lower growth by increasing the cost of investment; in our results, RIR is positive but not significant. The impact of literacy rate (Lit) is positive for economic growth. The impact of trade openness (OPEN) remains positive and significant in five specifications; however, its impact is statistically insignificant in model M5. One potential reason for this can be the significant decline in the number of observations[13].

Next we estimated our model by using fixed effects but excluding the initial GDP per capita from the explanatory variables. Our global integration variables remain positive and significant[14].

[13] Time series data on literacy rate are not available.

[14] Results are not presented here but are available on request.

We also included the lag dependent varibale to check the persitance of this impact. We find that lagged dependent variable has positive and significant impact but global integration impact is still positive and significant. See Table 6A. As our sensitivity tests show, our main conclusion holds: global integration as a positive role in promoting economic growth in our sample economies.

6. Conclusions

The impact of global integration on economic growth of N-11 and BRICS economies is confirmed in this paper. The impact of global integration – measured as foreign direct investment and share of foreign trade as percentage of GDP – on economic growth of per capita GDP is not only direct but also indirect, through various other determinants. Results with the multiplicative model confirmed our hypothesis. Our econometric results are robust, according to different specifications and tests.

However, the impact of trade openness (including FDI inflow) is much stronger and robust for BRICS compared to the whole sample of countries (N-11 and BRICS). It is likely that some N-11 countries, because of their comparatively lower level of development, cannot fully exploit the benefits of trade liberalization. They should, in the first place, invest in physical and human capital as well as improve their institutions, also learning from experiences of their peers, the earliest "globalizers" (China, India, and the other countries of the BRICS group).

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Appendix

Table 1A: Data Description and Source

Variables	Description	Source
GDPCG	GDP per capita growth	World Development Indicators (WDI)
OPEN	Trade as percentage age of GDP	WDI
FDIFlow	FDI Inflow (as percentage of GDP)	WDI
GCFG	Gross capital formation growth	WDI
GEXPG	Government final expenditure growth	WDI
INDEM	Industry value added (% of GDP)	WDI
SEREM	Services value added (% of GDP)	WDI
TELE	fixed telephone line subscription(per 100 people)	WDI
LIT	adult literacy rate 15+ both sexes percentage	WDI
INF	CPI	WDI
RIR	Real interest Rate	WDI
EFI	Economic freedom index	Fraser Institute

Table 2A: Summary Statistics

Variables	Mean	Std. Dev.	Min	Max
GDPG	3.044	3.878	-13.296	30.342
GCFG	6.909	12.158	-24.534	75.200
OPEN	46.999	24.915	12.009	169.535
GEXPG	5.512	26.758	-23.926	565.539
INF	40.847	214.321	-1.710	2947.733
TELE	8.003	8.887	0.103	38.981
IGDPC	1815.107	2154.165	0.000	6773.804
FDIFLOW	1.702	1.902	-2.757	11.939
SEREM	33.648	7.613	20.051	52.997
INDEM	49.193	10.589	19.736	71.030

Figure1A: GDP per Capita Growth and Openness in sample countries

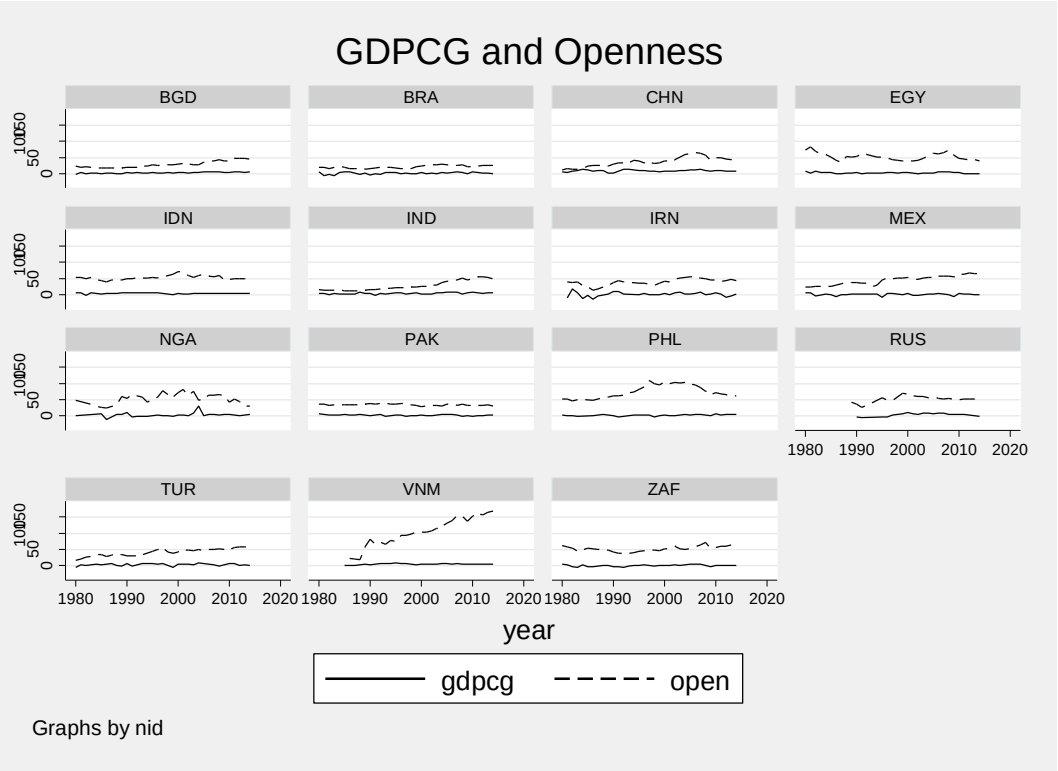

Figure 2A: GDP per Capita Growth and FDI Inflow in sample countries

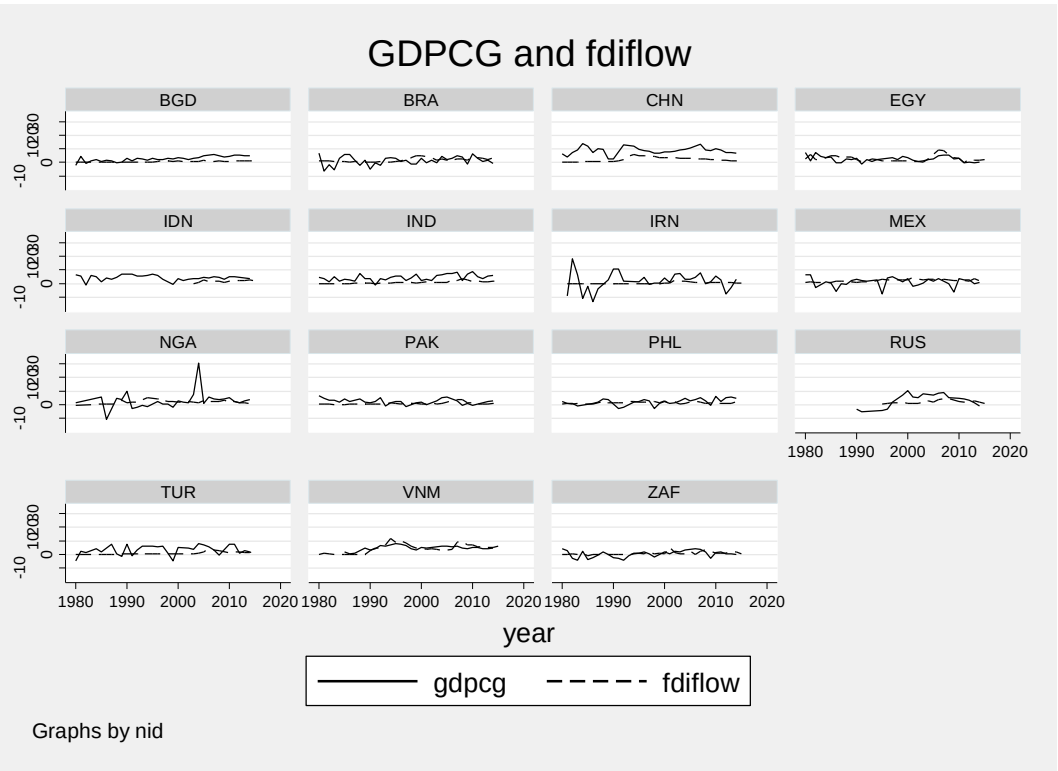

Table 3A: Correlation Matrix

	GDPG	GCFG	OPEN	GEXPG	INF	TELE	IGDPC	FDIFLOW	SEREM	INDEM
GDPG	1.00									
GCFG	0.48	1.00								
OPEN	0.18	0.08	1.00							
GEXPG	0.42	-0.07	0.01	1.00						
INF	-0.10	-0.07	-0.16	-0.02	1.00					
TELE	0.04	0.03	0.08	-0.07	-0.01	1.00				
IGDPC	-0.29	-0.10	-0.16	-0.06	0.13	0.32	1.00			
FDIFLOW	0.14	0.09	0.51	0.03	-0.09	0.17	-0.08	1.00		
SEREM	0.04	0.03	0.35	0.06	0.14	0.24	0.12	0.13	1.00	
INDEM	-0.14	-0.09	-0.20	-0.16	0.00	0.43	0.55	-0.10	-0.44	1.00

Table 4A: Global Integration and Growth: Multiplicative Model

	sc1	sc2	sc3	sc4	s1	s2	s3	s4
	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se
OPEN	0.097	0.051***	-0.074*	0.138***	-0.206*	0.041**	0.013	0.159***
	0.06	0.009	0.039	0.043	0.118	0.02	0.053	0.046
EFI	0.779*				-1.108			
	0.41				0.795			
OPEN*EFI	-0.013				0.046**			
	0.01				0.02			
GCFG	0.126***	0.143***	0.135***	0.134***	0.137***	0.149***	0.140***	0.146***
	0.011	0.01	0.011	0.011	0.02	0.018	0.015	0.016
GEXPG	0.055***	0.209***			0.277***	0.12	0.257***	0.287***
	0.004	0.038			0.06	0.11	0.039	0.038
INGDPC	-0.000**	-0.000**	-0.000***	-0.000***	-0.001***	-0.001***	-0.001***	-0.001***
	0	0	0	0	0	0	0	0
OPEN*GEXPG		-0.003***				0.006**		
		0.001				0.003		
SEREM			-0.078*				-0.228***	
			0.042				0.043	
OPEN*SEREM			0.002***				0.002**	
			0.001				0.001	
INDEM				0.156***				0.254***
				0.054				0.049
OPEN*INDEM				-0.003***				-0.003***
				0.001				0.001
Constant	-2.377	-0.009	5.115***	-3.820**	6.415	0.646	9.124***	-7.313***
	2.489	0.683	1.978	1.915	4.287	0.754	1.972	1.577
observations	251	468	473	473	86	159	159	159
countries	15	15	15	15	5	5	5	5

R-square	0.569	0.403	0.429	0.47	0.809	0.817	0.952	0.927
Chi-squared	306.636***	445.230***	177.433***	178.357***	180.427***	311.281***	461.183***	446.738***

Table 5A: Sensitivity Analysis-Complete Sample

	M1	M2	M3	M4	M5	M6	M7	M8
	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se
OPEN	0.037***	0.036***	0.031***	0.022*	0.003	0.002	0.016*	0.019**
	0.012	0.012	0.01	0.012	0.012	0.016	0.009	0.008
IGDPC	-0.000	-0.001**	-0.000	-0.001**	-0.001***	-0.000**		-0.000***
	0	0	0	0	0	0		0
INF	-0.002*							
	0.001							
RIR		0.018						
		0.019						
TPOP			0.000***					
			0					
GCFG					0.129***	0.204***	0.161***	0.179***
					0.016	0.022	0.009	0.01
TELE				0.072**				
				0.03				
EFI					0.874***			
					0.307			
Lit						0.042*		
						0.022		
FIND							0.016***	
							0.005	
GEXPG							0.060***	0.063***
							0.004	0.005
Total Area								0.000*
								0
Constant	1.213	1.856*	0.162	1.844**	-1.909	-1.014	0.292	0.661
	0.9	1.011	0.759	0.922	1.789	1.403	0.607	0.576
Observations	457	364	509	506	257	99	328	489
Number of Countries	15	13	15	15	15	15	15	15
R-Square	0.034	0.035	0.026	0.032	0.227	0.511	0.648	0.513
Chi-Square	17.813***	14.283***	44.975***	17.942***	88.328***	93.274***	548.550***	518.438***

Table 6A: Results with Lagged Dependent Variable

	t1	t2	t3	t4
	b/se	b/se	b/se	b/se
GCFG	0.131***	0.127***	0.130***	0.131***
	0.012	0.013	0.012	0.013
INDEM	0.006		0.060**	
	0.029		0.028	
Lagged dependent variable	0.160***	0.138***	0.161***	0.152***
	0.041	0.044	0.043	0.046
OPEN	0.041***	0.039***		
	0.01	0.012		
INGDPC	0	-0.000*	-0.000***	-0.000***
	0	0	0	0
INF		0		0
		0.001		0.001
FDIFLOW			0.219**	0.167*
			0.109	0.1
Constant	0.019	0.185	-0.009	1.788***
	1.13	0.778	1.045	0.35
Observations	448	405	427	385
Number of Countries	15	15	15	15
Panel Standard Deviation	1.51	1.104	0.99	0.403
Wald Chi-squared	187.799	151.687	182.135	165.283