

Baiashvili, Tamar; Gattini, Luca

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Impact of FDI on economic growth: The role of country income levels and institutional strength

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Authors

Tamar Baiashvili (National Bank of Georgia)

Luca Gattini (European Investment Bank)

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Impact of FDI on economic growth: the role of country income levels and institutional strength

Tamar Baiashvili^a and Luca Gattini^b

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Abstract

Foreign direct investment (FDI) is generally considered a driving factor to economic growth. Nevertheless, empirical evidence is rather mixed, reporting a positive, neutral, or even negative relationship of FDI with growth. Our investigation concentrates on the impact of FDI inflows on growth and their effect mediated by income levels and the quality of the institutional environment. Specifically, we focus the interaction between country income levels – including low-, middle- and high-income countries - and FDI. This was not analysed thoroughly in earlier studies. Moreover, we deploy a new perspective to look into the FDI effects on growth mediated by institutional quality whereby we make use of country income levels as the key elements to peer-reference countries. Our study is based on 111 countries, stretching from developed economies to developing and emerging markets starting in 1980. Our estimations make use of panel GMM techniques robust to sample size, instrument proliferation and endogeneity concerns. We find that FDI benefits do not accrue mechanically and evenly across countries. We detect an inverted-U shaped relationship between countries' income levels and the size of FDI impact on growth. Moving from low to middle-income countries the effect gets larger. On the other hand, it diminishes again transitioning to high income countries. Finally yet importantly, we find that absorptive capacity matters in channelling FDI effects. Institutional factors have a mediating positive effect on FDI within country income groups, whereby countries with better-developed institutions relative to their income group peers show a positive impact of FDI on growth.

JEL classification: C33, F21, E02, O43, O47

Keywords: Foreign Direct Investment (FDI), growth, income levels, institutions, absorptive capacity, global panel

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^a Contact: tamar.baiashvili@nbg.gov.ge; Department of Macroeconomic and Statistics, National Bank of Georgia

^b Contact: l.gattini@eib.org; Economics Department, European Investment Bank

1. Introduction

Our study focuses on the role of foreign direct investment (FDI) inflows in promoting economic growth. Our investigation focuses on the impact of FDI inflows on growth and their effect mediated by income levels and the quality of the institutional environment. Specifically, we consider the interaction between country income level and FDI impact on growth over a long time horizon and across a multitude of developing and developed countries. This was not thoroughly analysed in earlier studies. Moreover, we also introduce a further element of novelty analysing the effect of institutional quality mediated by the income level status. To do so, we deploy a new perspective to look into the FDI effects on growth mediated by institutional quality whereby we make use of country income levels as the key elements to peer-reference countries.

In early 1990s FDI started increasing steadily. This has prompted a surge in the economic literature studying FDI and its effects on growth outcomes. Broadly speaking, the impact of FDI on growth can operate via a direct or narrow channel and indirect or broad channel. FDI can support and complement capital accumulation through increased domestic investment in host economies. On the other hand, the growth enhancing property of FDI can go beyond the process of pure physical capital accumulation. Accordingly, Farrell (2008) defined FDI as a “package of capital, technology, management, and entrepreneurship, which allows a firm to operate and provide goods and services in a foreign market”. Ultimately, FDI can be seen as a “composite bundle” comprised of capital stock, new technologies, more advanced production practices, managerial expertise and innovative skills (Mello 1999).

Empirical evidence on the direct impact of FDI on growth, employing either country specific or cross-country datasets, is rather mixed (Li and Liu, 2005; Carkovic and Levine, 2005). A growing number of studies identified recipient countries’ absorption capacities to relate to FDI productivity (Crespo and Fontoura, 2007). Depending on the countries sample and time window, studies involving mediated effects of FDI on growth show a significant degree of positive (and/or at times neutral) relationship with human capital development (Borenstein et al., 1998); quality of economic, political and social environment (Choe, 2003); financial system penetration and development (Hermes and Lensink, 2003; Durham, 2004; Alfaro et al., 2006). Institutional quality is also likely to

affect the absorptive capacity (Busse and Groizard, 2008; Blomstrom and Kokko, 2003; Lipsey and Sjöholm, 2005), thus mediating the impact of FDI on economic growth.

Against this backdrop, our analysis contributes to the literature in two dimensions. First, we look at a possible different impact of FDI on growth across countries depending on their income level, thus empirically demonstrating a differential effect among low-, middle- and high-income countries. Second, a positive FDI-growth nexus needs an effective institutional framework (Prüfer and Tondl, 2008). Nonetheless there is limited research dealing with institutions in explaining a possible FDI impact on growth (Busse and Groizard, 2008; Prüfer and Tondl, 2008). We also introduce an element of novelty analysing the effect of institutional quality mediated by the income level status. Specifically, we look into how institutional quality influences the relationship between FDI and growth peer-referencing countries within each income group.

To investigate empirically the FDI impact on growth we have assembled a comprehensive and global database including 111 countries, spanning between 1980 and 2014. We control for host country's physical and human capital and others factors employed in the literature such as inflation, a measure of political freedom, and trade openness. The dataset includes time-variant identifiers for countries' income levels. Finally yet importantly, we include also institutional quality metrics.

We deploy dynamic panel methods, making use of Generalized Method of Moments (GMM) estimators, which provide several advantages compared to least square estimation methods (Carkovic and Levine, 2005). Specifically, we employed difference GMM (Arellano-Bond, 1991) and system GMM (Arellano and Bover, 1995; Blundell and Bond, 1998) estimators controlling for instrument proliferation. Inter alia, these methods allow correcting for endogeneity concerns (Bond et al, 2001) as well as heteroskedasticity of unknown form.

We find that FDI benefits do not accrue mechanically and evenly across countries. We detect an inverted-U shaped relationship between countries' income levels and the size of FDI impact on growth. Moving from low to middle-income countries the effect gets larger. On the other hand, it diminishes again transitioning to high income countries. Finally yet importantly, we find that absorptive capacity matters in channelling FDI effects. Institutional factors have a mediating positive effect on FDI within country income groups, whereby countries with better-developed institutions relative to their income group peers show a positive impact of FDI on growth.

Following this introduction, section 2 makes a review of the existing empirical literature on FDI and growth relationship. Section 3 describes the dataset and the estimation strategy. Section 4 is devoted to the results and section 5 concludes.

2. Literature review

In early 1990s FDI started increasing steadily. This has prompted a surge in the economic literature studying FDI and its effects growth. Under neoclassical growth models, FDI can serve as an exogenous factor contributing to growth through increases in investment volumes or its efficiencies (Sala-i-Martin, 1996; Solow 1956). Under the endogenous growth framework, sustained economic expansions are an outcome of technological transfers, diffusion and spillover effects (Romer, 1986; Lucas, 1988; Barro and Sala-I-Martin, 1995). Therefore, FDI can play a paramount role in lifting long-run growth. Despite the fundamental difference in assumptions, the empirical equations for both approaches are often similar in the literature (Dowrick S. and Rogers M., 2002).

Largely, macro-empirical evidence on the direct impact of FDI on growth, employing either country specific or cross-country datasets, is rather mixed. At the same time, several studies show positive mediated effects. Country perimeters and methodological approaches vary widely across studies. For example, some studies employ cross-sectional estimation techniques, while others rely on dynamic panel analysis to examine the FDI contribution to growth. Moreover, the treatment of endogeneity sometimes is absent and other times differs in the literature. A number of empirical studies suggested a positive contribution of FDI to growth (e.g. Li and Liu, 2005), while some point to weak or no influence (e.g. Carkovic and Levine, 2005). Country-specific evidence is also mixed (Ericsson and Manucheher, 2001; Chowdhury and George Mavrotas, 2005).

A growing number of studies identified recipient countries' absorption capacities to relate to FDI productivity (Crespo and Fontoura, 2007). Such factors included human capital development (Borenstein et al., 1998); quality of economic, political and social environment (Li and Liu, 2005; Choe, 2003); financial system penetration and development (Hermes and Lensink, 2003; Durham, 2004; Alfaro et al., 2006). There is some firm-level evidence that absorptive capacity influences FDI spillovers (Farole and Winkler, 2012). Some other studies examined the FDI impact on growth for subgroups in institutional quality terms (e.g. top 20-30 percent most regulated countries threshold)

and/or for disaggregated sub-indicators (e.g. market entry regulations, rule of law) (Busse and Groizard, 2008; Prüfer and Tondl, 2008). Overall, depending on the countries sample and time window, studies show a significant degree of positive (and/or at times negative) relationship with human capital, financial markets, openness, quality of political and institutional environment and income levels.

Li and Liu (2005) find a connection between FDI and economic growth both directly and through interaction with local human capital and technology gaps. The positive direct impact is evidenced both for developed and developing countries. Nair-Reichert and Weinhold (2001) examined a causal relationship between FDI and economic growth in a dynamic panel of 24 developing countries, while controlling for domestic investment, inflation, degree of openness, and human capital. On average, there is evidence of positive impact from FDI on growth and a higher degree of openness intensifies positive aspects of FDI. Nevertheless, the relationship is heterogeneous across the panel.

Makki and Somwaru (2004) based on a panel of 66 developing countries conclude that FDI contribute significantly to advancing economic growth, while controlling for macroeconomic and institutional factors. However, the direct effect from FDI to growth not always proves to be significant, while FDI and trade interaction delivers a stable positive contribution to growth. On the other hand, FDI intermediated effect with human capital and domestic investment did not always have a significant impact. Furthermore, they point to the evidence of positive contribution from FDI to domestic investments, thus supporting the “crowd in” argument.

Carkovic and Levine (2005) find no robust positive impact of FDI on growth either directly or mediating via human capital levels. The study relied on dynamic panel estimation technique (GMM) employing a sample of 72 countries. Borensztein, De Gregorio, and Lee (1998) conclude that FDI is an important vehicle to spur the technological transfer and support growth based on cross-country study of 69 developing economies. However, the productivity enhancing effects of FDI holds only when a sufficient absorptive capability for advanced technologies is available in the host economy. Unless a given threshold is reached, the FDI in itself has no significant positive impact on growth. Mello (1999) finds positive impact of FDI on long-run growth via technological upgrading and knowledge spillovers, both for developed and developing economies. However, the extent to which FDI accelerates growth depends on the degree

of complementarity and substitution between FDI and domestic investment. On a pool of developed and developing countries, Choe (2003) also shows a positive impact from FDI to growth. However, this relationship is sensitive to outliers, thus making it rather weak. Some studies highlight that local financial markets development – including depth, financial intermediation effectiveness and financial sector regulation soundness - are relevant in generating positive effects from FDI to growth (Alfaro, 2004, Hermes and Lensink, 2003; Durham, 2004). Moreover, there is some limited evidence pointing at possible differentials in FDI impact on growth depending on the host country income level. For example, higher income developing countries may benefit from FDI spillovers thanks to better capabilities to learn by doing (Blomstrom et al, 1992). Moreover, Meyer and Sinani (2009) conducts a meta-analysis across many country specific studies primarily focused on developing economies. They propose the idea of a curvilinear relationship between FDI productivity spillovers and the recipient countries' institutional framework development as measured by transparency and economic freedom.

Institutional quality is likely to affect the absorptive capacity of the host economy (Busse and Groizard, 2008; Blomstrom and Kokko, 2003; Lipsey and Sjöholm, 2005), thus mediating the impact of FDI on economic growth. A positive FDI-growth nexus requires a functioning legal and institutional framework and political stability (Prüfer and Tondl, 2008). In line with this argument, a stable and business-friendly environment may support spillovers from FDI because it affects the business operating conditions and it can potentially determine how efficiently FDI resources are employed. Some studies suggest productivity-related positive spillovers from FDI conditional on host economies' institutional environment (Meyer and Sinani, 2009; Prüfer and Tondl, 2008). Nonetheless there is limited research dealing with institutions in explaining FDI impact on growth (Busse and Groizard, 2008; Prüfer and Tondl, 2008). Busse and Groizard, (2008) pointed to some evidence that a high regulatory burden can limit the effectiveness of FDI. Particularly, more regulated economies are less able to reap the benefits of FDI inflows and even more so for relatively restrictive regulations: top 20 percent most regulated economies seem to be mostly restricted from taking advantage of FDIs. Prüfer and Tondl (2008) demonstrated that well-developed legal framework and low political risks enhance FDI-growth nexus through positive impact on productivity growth for 16 Latin American for 1990-2003. Furthermore, they suggest that a stable legal environment upholds the FDI-growth relationship. Alguacil et al. (2011) contributes to the discussion on the role

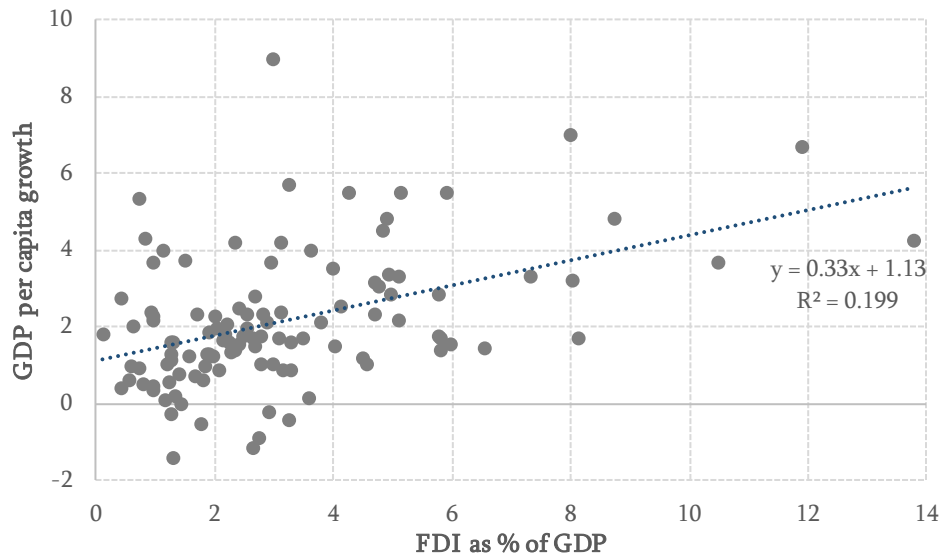
played by the absorptive capacities within host economies in their ability to grow and to exploit FDI efficiently. They suggest that host country governments should develop a set of policies that are not only focused on inward FDI promotion but also on the improvement of their own political and economic framework.

3. Data and estimation strategy

We investigate the cross border dimension of FDI and its impact on economic growth, controlling for other potential determinants of growth. The dependent variable in our empirical analysis is economic growth, defined as real GDP per capita growth. Foreign direct investment (FDI) is the explanatory variable of interest. These are the key variables generally employed in the literature. FDI was sourced from the United Nations Conference on Trade and Development (UNCTAD) database and complemented with World Bank's World Development Indicators (WDI) database to ensure the widest possible coverage in a consistent manner¹. The OECD defines foreign direct investment as a category of cross-border investment made by a resident in one economy (the direct investor) with the objective of establishing a lasting interest in an enterprise (the direct investment enterprise) that is resident in an economy other than that of the direct investor. The motivation of the direct investor is a strategic long-term relationship with the direct investment enterprise to ensure a significant degree of influence by the direct investor in the management of the direct investment enterprise. The "lasting interest" is evidenced when the direct investor owns at least 10% of the voting power of the direct investment enterprise. The objectives of direct investment are different from those of portfolio investment whereby investors do not generally expect to influence the management of the enterprise (OECD, 2008). Specifically, we employ FDI net inflows as a percentage of GDP. UNCTAD defines it as the value of inward direct investment made by non-resident investors in the reporting economy. Finally yet importantly, we make use of commonly employed control variables such as inflation, physical capital accumulation (gross fixed capital formation), human capital, government size, political rights and trade openness.

¹ The two data sources employ the same definition of FDI and therefore are consistent.

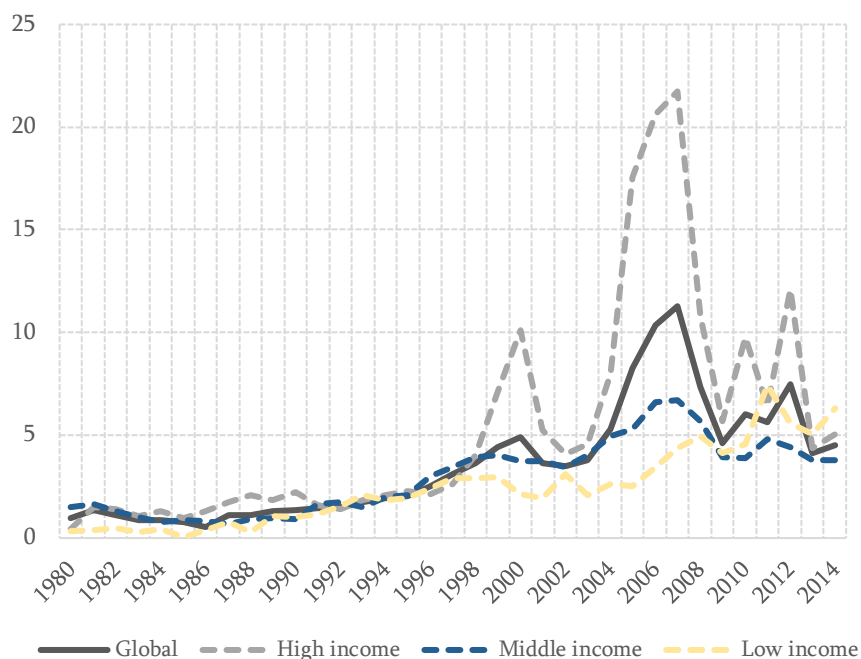
Figure 1. FDI and GDP growth per capita – country averages 1980-2014



Source: Authors' calculations

Figure 1 depicts the cross-country correlation of average growth per capita outcomes and average FDI as percentage of GDP. The country's averages are computed between 1980 and 2014. Average FDI ranged between a minimum close to zero and a maximum close to 14% of GDP. At the same time, average annual GDP growth per capita hovered in slight negative territory for few countries and above 5% for another similar group of countries, whilst it set in between the two boundaries for the vast majority of countries. The preliminary unconditional correlation between GDP per capita growth and FDI shows a positive contemporaneous link between FDI and real GDP per capita growth. This tentatively suggests that on average FDI may have exercised a positive impact on growth outcomes. Nevertheless, this should be taken only as an initial possible evidence of a positive nexus between FDI and growth outcomes. It does not account for many elements including controls for time and country dimensions, as well as other potential observable explanatory variables. It has the caveat of being a contemporaneous relationship. Finally yet importantly, it does not adjust for endogeneity concerns. These are all issues that will be tackled in our empirical analysis.

Figure 2. FDI as % of GDP – average across all countries and by country income group



Source: Authors' calculations on UNCTAD and WDI data

Note: the definition of income groups is based on World Bank clustering. For this representation the low-middle and high-middle income groups have been merged into the middle income group.

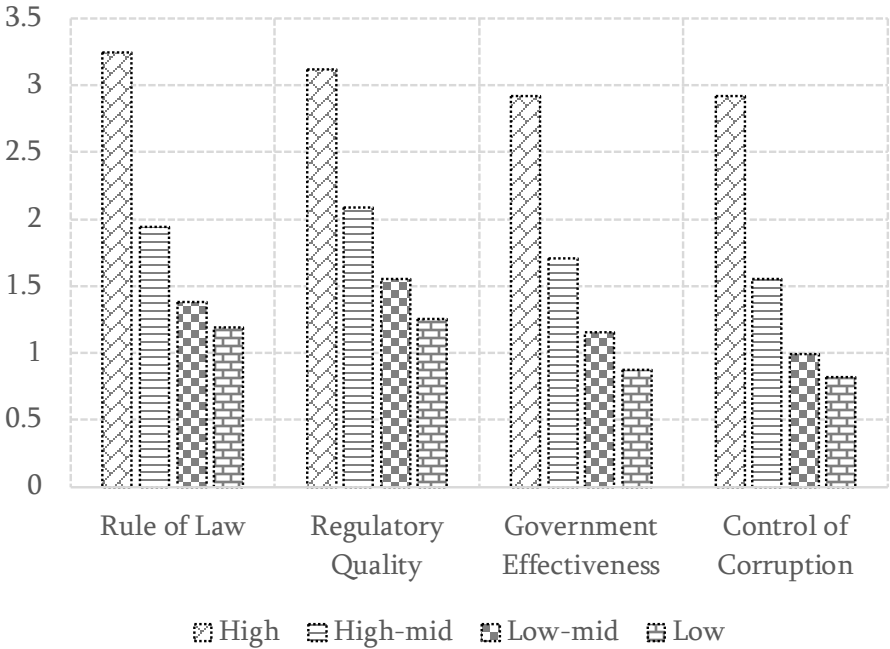
Figure 2 plots the average FDI to GDP ratio across countries in each year between 1980 and 2014. The average FDI as percentage of GDP increased over time, thus following global trends of financial account liberalization and policies favouring economic openness. As a result, the average global level of FDI oscillated between 5% and 10% of GDP after the 2000s whilst it has been well below 5% of GDP in the 1980s and 1990s. The average global picture hides different patterns across country income groups. The clustering of countries into low-, middle-² and high-income countries follows the World Bank (WB) classification. This indicator is very useful for our empirical analysis because it is time variant and guarantees enough variance across and within countries over time. Specifically, the three groups of countries showed a similar pattern until the second half of the 1990s. To the contrary, high-income countries recorded higher levels of FDI than the other groups starting from late 1990s. Also, FDI in high income countries recorded on average more pronounced swings during crisis periods – e.g. the early 2000s dot-com bubble, the 2008 global financial crisis and the following Great recession. All in all the

² In this representation we have bundled together low middle- and high middle-income countries.

level of FDI as a percentage of GDP has increased steadily also in low income countries, reaching levels comparable to other country groupings at the end of the sample.

To perform the empirical investigation we compiled a comprehensive database covering a wide geographical perimeter with a global coverage. The main sources for all the variables included in our analysis are: United Nations Conference on Trade and Development (UNCTAD); World Bank’s World Development Indicators (WDI) and Worldwide Governance Indicators (WGI); Freedom House; International Monetary Fund’s World Economic Outlook (WEO); Penn World Tables (PWT). A detailed description of variables used and their sources can be found in Annex I. The resulting database runs for the years 1980-2014 with annual frequency and includes 111 countries.

Figure 3. Institutional quality across country income groups – average across all countries



Source: Authors’caclutions on WDI data and Doing Business Indicators

Note: The original Doing Business Indicators range between a minimum -2.5 and a maximum of 2.5 – moving from weak to strong instotutional quality. The indicators in this chart have been transformed setting the minimum to zero and the theoretical maximum to 5. The averages refer to the period 2001-2014

We also employed institutional quality variables, specifically government effectiveness, regulatory quality, rule of law, and control of corruption. We have chosen these variables because they may affect directly FDI and the absorption capacity of the targeted countries. These variables are taken from the World Bank Doing Business Indicators and the time horizon starts from early 2000s. The original World Bank data on the quality of institutions range between a theoretical minimum of -2.5 and maximum of 2.5 – moving from low to high institutional quality. For our analysis, we have transformed the indicators setting the minimum to zero and the theoretical maximum to five. Figure 3 shows the average institutional quality over time and across countries within each income group. The average institutional quality increases moving from low- to high-income countries. Nevertheless, differences in the scale and, therefore in institutional quality, exists between indicators within each single income group.

3.1 Estimation strategy

The dependent variable is real GDP growth per capita. We develop our model by starting out with the determinants of growth per capita – physical and human capital, while also incorporating elements capturing the overall macroeconomic environment, such as market openness, inflation, public sector presence in the economy and political rights. When controlling for all these elements we incorporate FDI as growth driver. Adding institutional environment and income level identifiers expands further the analysis, thus enriching the model. All explanatory variables are included with one lag.

The dataset allows to exploit not only the cross-country dimension but also to explore time-variant features. Therefore, we deploy dynamic panel methods, making use of Generalized Method of Moments (GMM) estimators. These provide several advantages compared to least square estimation methods (Carkovic and Levine, 2005). Specifically, we deployed GMM approaches using dynamic estimators based on (i) the Arellano-Bond methodology (1991) – difference GMM and (ii) Arellano and Bover (1995) and Blundell and Bond (1998) – system GMM. These estimators allow correcting for endogeneity, when using a dataset with variables potentially endogenously determined (Bond et al, 2001). By employing the orthogonality conditions, GMM estimation techniques also allow for efficient estimation in the presence of heteroskedasticity of unknown form. Furthermore, system GMM accounts for weakly exogenous instruments and is also relevant for short panel datasets.

In the Arellano-Bond GMM version, also referred as difference-GMM, the model is comprised of a system of separate equations for each period (Roodman, 2006). To account for possible endogeneity between the explanatory variables and the dependent variable, the first differences of endogenous variables are instrumented by lags of their own levels. As a result, endogenous variables become pre-determined. Regressors believed to be exogenous and other instruments can be used in a conventional way in first differences. Moreover, the first-differenced lagged dependent variable, also instrumented with its past level, mitigates the issue of serial correlation.

Arellano and Bover (1995) and Blundell and Bond (1998) expanded the GMM model developed by Arellano and Bond (1991) to address the issue of lagged variables being weak instruments. Particularly, the new model, also referred as system GMM, extended the original model by adding equations in levels to the regressions run in first differences. The second equation allows introducing additional instruments. For endogenous variables in levels their own lagged differences serve as instruments. Thus with additional moment conditions efficiency is increased. Such modelling also takes care of finite sample bias when variables are highly persistent and serve as weak instruments for the first differences (Bond et al, 2001).

In our estimation strategy we instrumented lagged FDI, lagged physical capital (GFCF) and lagged growth with their further lags. Moreover, we apply a backward orthogonal deviations transformation to the instruments for the transformed equation. We applied a combination of backward orthogonal deviations for the instruments and forward for the regressors, which is less biased and more stable than traditional transformation especially for difference GMM estimations (Hayakawa, 2009).

Consistency of the GMM estimators is dependent on the validity of the instruments. Instruments should be correlated with endogenous instrumented variables, while conforming to orthogonality condition to the errors (Baum, 2002). Hansen J-test³ is a widely used specification test for difference and system GMM (Roodman, 2006). The joint validity of all instruments are given under the null hypothesis, with the J statistic being

³ Sargan test is frequently employed as an alternative to the Hansen test. The former relies on the assumption of homoskedastic errors. The assumption puts limitations on the strength of the Sargan test, when homoskedasticity is under question. On the other hand, the test is not exposed to the weakness of large number of instruments. Given the nature of our dataset – high possibility of idiosyncratic shocks to individual countries and potential violation of homoskedasticity assumption across relatively long time horizon – the reliance on Sargan statistic can be misleading.

χ^2 distributed (Hansen 1982). The degree of freedom is defined by the degree of overidentification, i.e. the number of instruments minus the number of independent regressors. High p values under the test confirms the validity of instruments and, correspondingly, the GMM results. A too high or too low number of instruments can be problematic for GMM estimation quality. While a large number of instruments can lead to overfitting endogenous variables, a low instrument number can result in satisfying moment conditions, even in case of invalid instruments. Therefore we conformed to the rule of thumb to maintain the number of instruments below the number of groups – countries in our case – (Roodman, 2006; Roodman, 2009). We include time dummies to prevent a contemporaneous correlation - universal time-related shocks. We also report Arellano Bond test for autocorrelation that is applied on first differences and relies on the assumption that idiosyncratic errors are not correlated. The test is particularly important in panel GMM regressions, given that lags are used as instruments (Roodman, 2009).

Ultimately, we estimate the dynamic equation 1 in a panel framework, deploying difference GMM and system GMM approaches:

$$y_{i,t} = \beta y_{i,t-1} + Y' X_{i,t-1} + \rho_t + \mu_i + \varepsilon_{i,t} \quad (1)$$

for $i = 1, \dots, n$ and $t = 1, \dots, T$, whereby in our sample n corresponds to 111 countries and T to 25 periods. Moreover, μ_i and ρ_t are the (unobserved) individual and time-specific effects, and $\varepsilon_{i,t}$ the error (idiosyncratic) term with $E(\varepsilon_{i,t}) = 0$, and $E(\varepsilon_{i,t}\varepsilon_{j,s}) = \sigma_\varepsilon^2$ if $j = i$ and $t = s$, and $E(\varepsilon_{i,t}\varepsilon_{j,s}) = 0$ otherwise. $E(X_{i,t}\varepsilon_{i,s}) = 0$ if $t \leq s$, which essentially excludes exogeneity of some regressors. To the contrary, these are treated as predetermined. X_i is a vector of time-variant explanatory variables (some exogenous and others predetermined), including possible time-variant dummies and interaction terms depending on the model specification. y_i is the dependent variable and β is a coefficient to be estimated on the lagged dependent variable. The vector Y contains as many coefficients as the number of explanatory variables included in the X_i vector depending on the model specification.

4. Results

Most empirical studies conclude that FDI contributes to income growth in host countries, beyond what domestic investment normally would trigger. In section 3 we have shown some preliminary evidence of a positive nexus existing between FDI and growth. However, Figure 1 does not account for other unrelated factors, neither it accommodates for reverse effects due to endogeneity processes. Moreover, it is more difficult to assess the magnitude and direction of this impact, not least because large FDI inflows often concur with unusually high growth rates triggered by unrelated factors above all in to developing and emerging markets.

In this first stage of the analysis the vector of explanatory variables X_i in equation 1 includes FDI as well as controls for physical capital, human capital, government size, political rights, inflation and trade openness. We consider lagged FDI, physical capital and GDP growth per capita not strictly exogenous, thus subject to endogeneity correction via appropriate instrumenting as explained in section 3.1. Table 1 reports estimates of the impact of FDI on growth per capita across all countries. We find that FDI somewhat positively contribute to growth. Nevertheless, the evidence is not strong as suggested by a non-significant coefficient in the system GMM estimates. This finding is in line with the literature, which has so far found mixed evidence on a direct positive impact of FDI on growth (e.g. Borensztein, De Gregorio, and Lee, 1998; Mello, 1999; Carkovic and Levine, 2005; Li and Liu, 2005). Broadly speaking this suggests that the positive effects of FDI may be partially mitigated by a “crowding out” effect of domestic investment. Some researchers have found evidence of crowding out due to, for instance, increased competition, while others conclude that FDI may actually serve to increase domestic investment (e.g. Jude, 2019; Agosin and Machado, 2005; Makki and Somwaru, 2004; Markusen and Venables, 1999; Cardoso and Dornbusch, 1989). Regardless, even where crowding out does take place, the net effect may remain beneficial, not least as the replacement tends to result in the release of scarce domestic funds for other investment purposes.

Table 1. Direct impact of FDI on Growth

	(1)	(2)
	Difference	System
	GMM	GMM
GDP per capita growth (-1)	0.296***	0.394***
	(0.073)	(0.066)
FDI (-1)	0.016**	0.006
	(0.008)	(0.010)
Physical capital (GFCF) (-1)	0.009***	0.008***
	(0.002)	(0.003)
Human Capital (-1)	-0.103	0.094*
	(0.385)	(0.050)
Government size (-1)	0.083	-0.061**
	(0.157)	(0.025)
Political rights (-1)	-0.114	0.012
	(0.287)	(0.078)
Inflation (-1)	-0.000	-0.001*
	(0.000)	(0.000)
Openness - Trade share (-1)	0.063*	0.004*
	(0.037)	(0.002)
Constant		-0.225
		(0.738)
Obs	3,109	3,222
No of countries	111	111
No of instruments	64	93
year dummies	yes	yes
AR(2) p_value	0.634	0.331
p-value Hansen	0.079	0.247

Robust standard errors in parentheses. All explanatory variables lagged; *** p<0.01, ** p<0.05, * p<0.1

Note: Sys GMM refers to estimation using the Arellano-Bover/Blundell-Bond estimator. 'AR-2' is the p-value of the Arellano - Bond test. The H0 is that the average autocovariance in the residuals is of order 2. 'Hansen J' is p-value of the Hansen J test for overidentifying restrictions which is asymptotically distributed as chi2 under the null of instrument validity. Year dummies are included in the model but not showed in the results.

By and large, the control variables are significant and with the expected sign. Physical investment affects positively growth. This effect comes directly from capital accumulation via a standard production function mechanism. Inflation has a negative impact on growth, whereby higher inflation is frequently associated to instable systems not conducive to sustained growth. Market openness has a positive effect on growth (Wacziarg, 2001;

Fukase, 2010). This is frequently so because open host economies are well-positioned to exploit global supply chain externalities. Public sector size, proxied with government size, impacts negatively on growth. This suggests that public sector allocates resources and consumes less efficiently than the private sector.

4.1 Impact of FDI on growth: country income levels

In this section, we investigate the impact of FDI on growth across different country income levels. In our estimation strategy we exploit the property of time-variant country groupings. To do so, we employ the World Bank classification dividing countries into four income groups — high, upper-middle, lower-middle, and low. As a result, we expand the vector of explanatory variables X_i in equation 1 to include interactions between FDI and income group identifiers. By doing so, we isolate the effect of FDI on growth depending on the time-variant income group positioning as well as FDI. These new variables are treated as predetermined and not exogenous, thus instrumented in the GMM methodology. This decision is based on two elements: the FDI component as well as the country income clustering itself. The latter is assigned based on Gross National Income (GNI) per capita (current USD) calculated using the Atlas method (see Annex, section 1.1)⁴.

Figure 4 shows the results of this analysis whilst the complete estimation details and coefficients are reported in the Annex (see Table A.1). We find that FDI benefits do not accrue evenly across countries. We detect an inverted-U shaped relationship between countries' income levels and the average size of FDI impact on growth across the estimated models. Moving from low to middle-income countries the effect gets larger. On the other hand, it diminishes again transitioning to high income countries. Specifically, we find a relatively strong impact for Low-Middle and High-Middle income countries, whilst High and Low income countries show a much smaller impact. Moreover, the magnitude of the impact on low-income countries is more uncertain than for the other country groupings.

⁴ The World Bank's official estimates of the size of economies are based on GNI converted to current U.S. dollars using the World Bank Atlas method. The Atlas method smoothes exchange rate fluctuations by using a three year moving average, price-adjusted conversion factor. See details here:

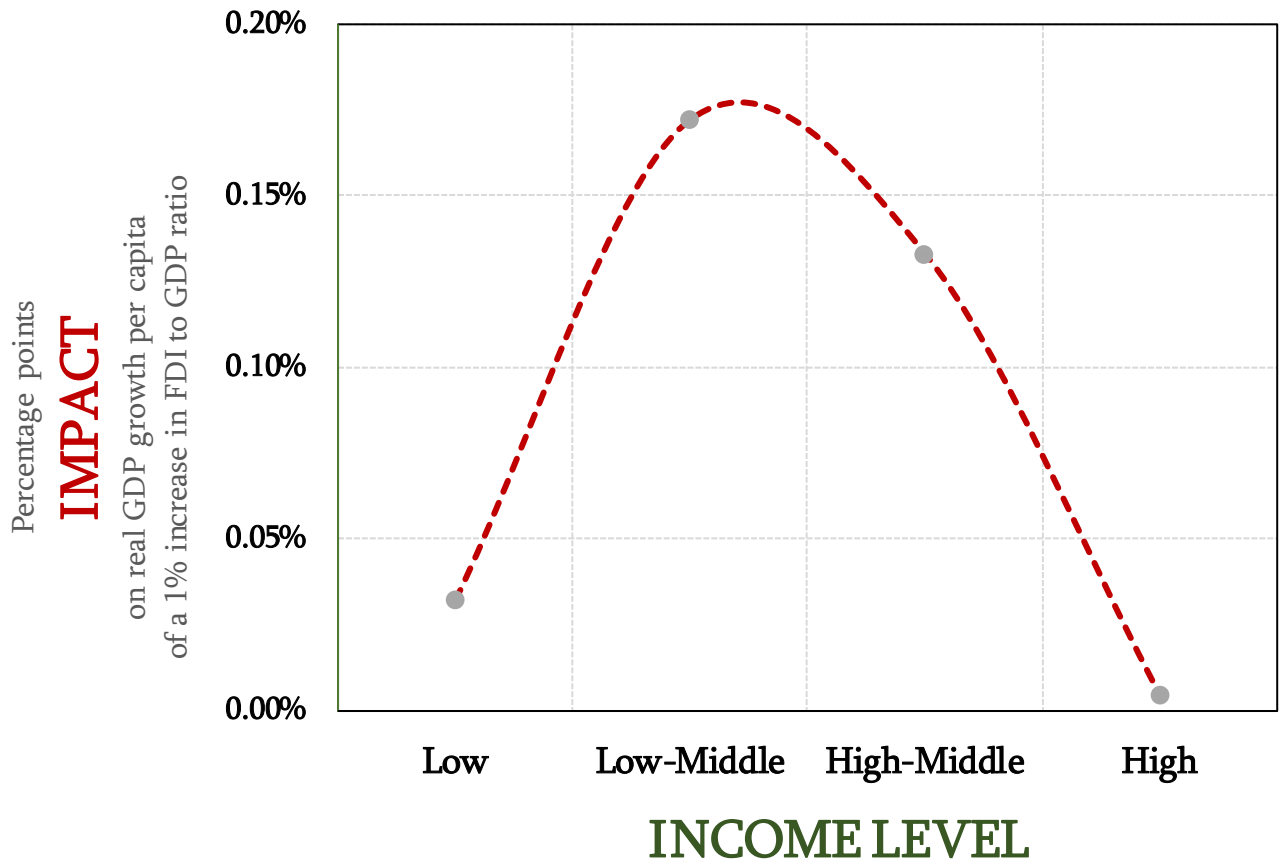
<https://datahelpdesk.worldbank.org/knowledgebase/articles/378832-what-is-the-world-bank-atlas-method>

It should be noted that the granular results are rather mixed primarily for low-income countries. The first method (difference GMM) suggests that low-income countries do not get any growth benefit from FDI while the other method (system GMM) implies that they benefit from FDI little less than middle-income countries.

On average, the impact on growth of a 1 percentage point increase of FDI to GDP ratio ranges between 20 percent (or 0.2 percentage points of real GDP growth per capita) and 1 percent (or 0.01 percentage points of real GDP growth per capita) depending on the method and income group. The estimated coefficients of the control variables behave similarly to the baseline model reported in table 1. The rationale follows from the definition of FDI. FDI does not only provide needed financing for capital accumulation, but also supports the import of positive externalities in terms of new inputs and foreign technologies in the production function. Therefore, FDI are more beneficial – or have a higher impact on growth – for developing economies that have higher demand for investment and higher needs for advanced technologies compared to developed countries. The latter may very well have a better-developed domestic capacity to invent new or manage existing technologies, enhance production processes and draw from a domestically generated pool of skills to support tangible and intangible activities.

On the other hand, countries that develop from low starting levels will progressively face stronger direct competition between local and foreign investment firms, while opportunities for demonstration effects decline. In contrast, stronger results for middle-income countries may reflect the fact that firms in middle-income countries are likely to have stronger motivation and capability to counter competitive challenges of FDI, and to use their higher absorptive capacity to attract and utilize knowledge spillovers. This is in line with Blomstrom et al. (1992). They found that inflows of direct investment were an important influencer on growth rates for higher income developing countries, but not for lower income ones. Wu and Hsu (2008) find that FDI have a positive and significant impact on growth in countries with better levels of GDP. However, they do not differentiate explicitly among country income groups. Alguacil et al. (2011) looking at emerging Asian and Latina American economies suggested the idea of a differential impact of foreign direct investment across country income groups. Specifically, FDI has a smaller impact in lower income economies and a larger impact in higher middle-income economies.

Figure 4. Estimated impact of FDIs on growth by host country’s income levels
(grey dots report the average impact across models)



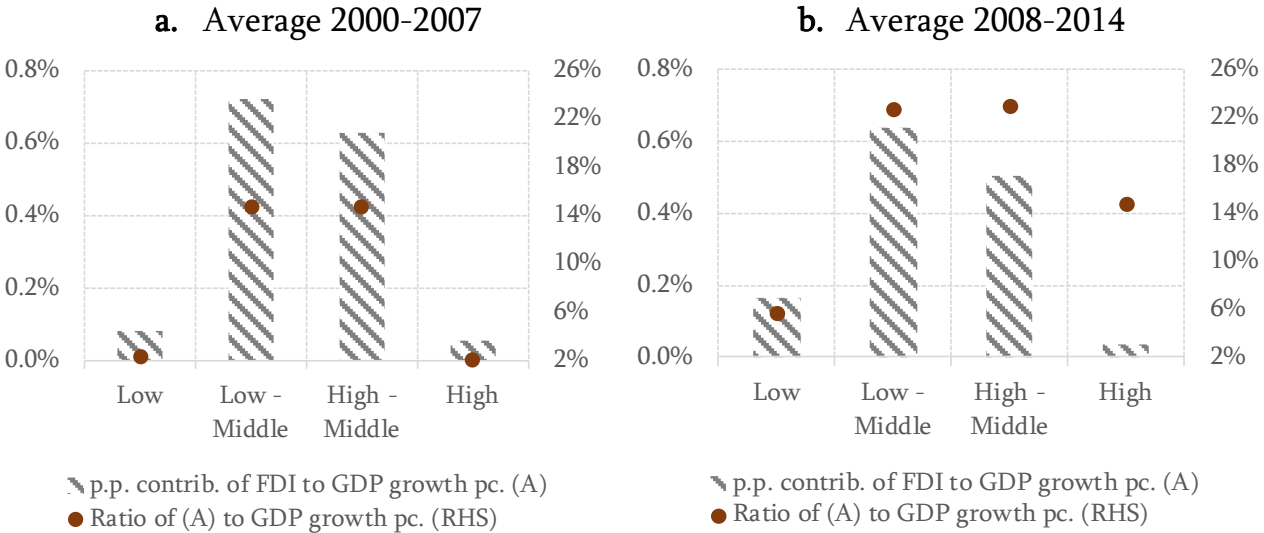
Source: Authors' calculations

Note: the average impact for each income group is derived from the coefficient estimates reported in table A.1 of the Annex

We have also conducted an audit of the results looking at the implications of the estimations in terms of impact on real GDP per capita growth by employing the regression estimates in Annex Table A.1. Figure 5 summarizes the results based on the average cross-country statistics for each income group reported in Annex table A.2 and A.3. First, the percentage contributions of FDIs to average GDP growth per capita was similar pre- and post- 2009 crisis. This can be grasped looking at the grey shaded bars in figures 5.a and 5.b. Nevertheless, the importance of FDI has increased after the crisis – i.e. the share of its contribution to average GDP growth was higher after the crisis. The brown spots in figures 5.a and 5.b show the magnitude of the share of FDI contribution. The overall impact of FDI on GDP growth (in terms of percentage contributions) as well as its share in average GDP growth per capita are significantly higher in middle-income countries. Finally, the percentage point contributions as a share of GDP per capita growth

has increased significantly post-crisis in high-income countries, thus making FDI an even more relevant driver of growth in the current decade. This is even more relevant in the current low growth environment, whereby market based engines of growth are very much needed.

Figure 5. FDI contribution to real GDP per capita growth



Source: Authors' calculations

Note: statistics are computed using coefficients reported in Annex Table A.1 and average FDI and growth statistics reported in Annex Table A.2 and A.3

4.2 Impact of FDI on growth: the mediation of institutional quality

Empirical research emphasizes the key role of institutions in our economies. Institutions are the rules of the game in a society and good institutions reduce production and transaction costs (North, 1990). As a result, they increase profitability, returns on investments and ultimately economic activity, whereas poor and weak institutions increase uncertainty and costs of production (Cuervo-Cazurra, 2006; 2008). Moreover, upholding democracy and political rights can facilitate entry to the markets, protection of vested interests, minority rights and, as a consequence, deliver growth-enhancing properties⁵ (North, 1990; Aghion et al, 2007). Ultimately, institutional reforms are likely to significantly affect economic performance – see Acemoglu et al. (2005), Cavalcanti et

⁵ The positive impact of institutions might be especially prevalent for sectors of the economy that are particularly advanced in terms of value added per worker (Aghion et al, 2007)

al. (2008), Aghion et al. (2007), Acemoglu et al. (2001), Rodrik et al. (2004) and La Porta et al. (1998).

The institutional system plays a role in influencing the cross border flow of capital, including FDI (Demekas et al., 2007). FDI involves high sunk costs that are affected by insecurity and by the effectiveness of the legal and political systems (Demekas et al., 2007 and Daniele and Marani, 2006). Studies identified different socio-economic and political characteristics of recipient economies that favor FDI inflows. They reveal that the institutional settings such as government stability, law and order, financial liberalization, privatization policies, bureaucratic quality, and efficient domestic financial systems have strong influence on foreign investment inflows (Campos and Kinoshita, 2008; Busse and Hefeker, 2007; Farole and Winkler, 2012). To the contrast, lack of transparency and corruptive activities can be associated with increased costs, while threat to confidentiality in technological know-hows might impose additional constraints to joint activities with foreign investors (Javorcik and Wei, 2009). In addition, favourable domestic conditions potentially provide fairer rules of game, thus allowing a more efficient allocation of resources and exploiting FDI more efficiently. For example, Buchanan et al (2012) found that good governance has not only positive impact on FDI inflows but it also reduces FDI volatility and related uncertainty. The latter may potentially damage long-term economic growth (Lensik and Morrissey, 2006).

A positive FDI-growth nexus needs an effective legal framework. Countries with the same level of FDI may experience different growth outcomes depending on their institutional quality. In line with this argument, a stable institutional environment may increase spillovers from FDI as it directly affects the business operating conditions (Prüfer and Tondl, 2008). Institutional quality is likely to affect the absorptive capacity (Busse and Groizard, 2008; Blomstrom and Kokko, 2003; Lipsey and Sjiholm, 2005) of the host country, thus mediating the impact of FDI on economic growth. Nevertheless, the question is still open on whether FDI impact on growth is different between countries with weaker and stronger institutional frameworks. This investigation can be done by engaging interactive elements of FDI and institutional variables.

We attempt to estimate the FDI impact conditional on institutional quality. We investigate the FDI growth effect conditional on several features of institutional quality, like corruption, rule of law, regulatory quality and government effectiveness. These structural features of the economy have already been identified in previous studies to be

paramount for FDI attractiveness. Figure 3 demonstrates that institutional quality differs among country income groups, with higher income coinciding with higher average institutional quality. As a first attempt, we have interacted institutional quality with FDI. However, this generates counterintuitive results because institutional quality captures the degree of development of a country and does not allow discerning the actual impact of institutional quality on the capacity absorption of FDI in this framework. We also noticed that in previous studies the appropriate benchmarking was missing.

Institutional factors may mediate differently the impact of FDI among countries with a certain level of similarity. The results in section 4.1 suggest a way to define a benchmark group. We found that FDI impact differs across country income groups. Therefore, we employ country income levels (time-variant) as an identifying factor to compare each country institutional quality level against a certain threshold within each income group. Kurul (2017) examines the effect of institutional quality on FDI attractiveness. It finds a positive relationship between institutional quality and FDI after the country attains a certain minimum threshold level of institutional quality. This result supports our initial intuition on defining an institutional quality threshold levels to discriminate between countries. Specifically, we construct an institutional quality identifier, defined as h . Equation 2 makes explicit this selection process. h takes value 1 if the country (i) quality level of institutions (z) is above a \bar{z} level within the income country group (g) in a given year (t). It take value 0 otherwise.

$$h_{i,g,t}|z_{i,g,t} = \begin{cases} 1 \text{ or high institutional quality} & \text{if } z_{i,g,t} > \bar{z}_{g,t} \\ 0 \text{ or low institutional quality} & \text{if } z_{i,g,t} \leq \bar{z}_{g,t} \end{cases} \quad (2)$$

As a result, we expand the vector of explanatory variables X_i in equation 1 to include interactions between FDI and the h identifier. By doing so, we isolate the effect of FDI on growth depending on the time-variant income group positioning as well as the relative level of institutional quality. The threshold level is defined by model training. It is identified with the minimum threshold that still guarantees across the board the most ample number of statistically significant coefficients for the FDI interactive term. By doing so, we set the minimum threshold at the 20th percentile of the within income group institutional quality distribution.

Table 2 reports the results of the estimations on the impact of FDI on growth focusing on the results for the mediating effect of institutional quality. A full set of estimates is reported in the Annex Table A.4.

Table 2. FDI impact on growth mediated by institutional quality

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Difference	System	Difference	System	Difference	System	Difference	System
	GMM	GMM	GMM	GMM	GMM	GMM	GMM	GMM
FDI - low corruption	0.014*** (0.004)	0.013** (0.005)						
FDI - high corruption	0.140 (0.145)	0.092 (0.082)						
FDI - high reg. quality			0.021*** (0.007)	0.013** (0.006)				
FDI - low reg. quality			0.126* (0.067)	0.063 (0.064)				
FDI - stronger rule of law					0.022*** (0.007)	0.013** (0.005)		
FDI - weaker rule of law					-0.014 (0.085)	-0.013 (0.047)		
FDI - high govt. effectiveness							0.018*** (0.005)	0.010** (0.005)
FDI - low govt. effectiveness							0.085 (0.085)	0.070 (0.060)
Observations	1,077	1,186	1,077	1,186	1,077	1,186	1,077	1,186
Number of cuntrnumber	111	111	111	111	111	111	111	111
Obs	1077	1186	1077	1186	1077	1186	1077	1186
No of countries	111	111	111	111	111	111	111	111
No of instruments	27	110	100	103	100	103	100	110
AR(2) p_value	0.0815	0.0594	0.0654	0.0727	0.0683	0.0650	0.0760	0.0712
p-value Hansen	0.0999	0.200	0.113	0.102	0.133	0.137	0.185	0.248

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

Source: Authors' computations

Note: Sys GMM refers to estimation using the Arellano-Bover/Blundell-Bond estimator. 'AR-2' is the p-value of the Arellano - Bond test. The H0 is that the average autocovariance in the residuals is of order 2. 'Hansen J' is p-value of the Hansen J test for overidentifying restrictions which is asymptotically distributed as chi2 under the null of instrument validity. Year dummies are included in the model but not showed in the results. Low and high institutional quality is identified employing equation 2 and applying a threshold level equal to the 20th percentile of the distribution of institutional quality within each income group. The full table with all estimated coefficients is reported in Annex Table A.4

We find supporting evidence that *controlling corruption* mediates the impact of FDI on GDP growth – higher control of corruption enables a positive impact of FDI on growth. Only the most corrupt countries in each income bucket (bottom 20%) do not seem to benefit from FDI inflows.

We find supporting evidence that better *regulatory quality* have a positive mediating effect on FDI. In other words, countries with higher regulatory quality compared to their income group peers benefit the most from FDIs because FDI impact on growth is positive and significant mainly in the better performing countries. This finding is in line with recent studies (Dellis K. et al., 2017; Sabir S. et al., 2019; Hayat, 2016). Regulatory quality boosts inward FDI by introducing market-friendly policies (Fazio and Talamo, 2008). Regulatory quality reflects government's ability to formulate and implement sound policies and regulations that promote economic development.

We find evidence that countries with stronger *rule of law* compared to their income group peers benefit the most from FDIs, thus exercising a positive mediating effect on FDI. Rules and laws are sets of agreements by which countries implement FDI policies and that protect future returns (Hoff and Stiglitz 2005). Stronger rule of law discourages market-unfriendly policies and minimizes risks.

Government effectiveness captures the quality of public and civil service and the degree of its independence from political pressure (Buchanan et al. 2012). We find supporting evidence that a better quality of services including their independence from capture compared to their income group peers benefit growth via a positive mediation on FDI impact.

Some argued that foreign investors would not be attracted to countries where uncertainty induced by arbitrariness in corruption is pervasive or where the quality of institutions is low. Others contended that companies have been seeking investment opportunities where they can exploit rent benefits, thus paying a price (corruption) for a gain (profits). Our empirical evidence supports the idea that controlling corruption and reforming institutions benefit countries growth performance inter alia via enabling a positive impact of FDI on growth. In addition, our results nuance this message suggesting that for countries at the bottom of their ranking within each income group even relatively small improvements – shifting them out of the bottom 20th percentile – can facilitate the positive impact of FDI inflows.

5. Conclusions

This study contributes to the literature analyzing FDI as a factor driving economic growth. Our investigation focused on the impact of FDI inflows on growth and their effect mediated by income levels and the quality of the institutional environment. We focus on the role of income levels. This was not thoroughly analysed in earlier studies. Specifically, we consider the interaction between country income levels and FDI over a long time horizon and across a multitude of developing and developed countries. Moreover, we also introduce an element of novelty analysing the effect of institutional quality mediated by the income level status. To do so, we deploy a new perspective to look into the FDI effects on growth mediated by institutional quality, whereby we make use of country income levels as the key elements to peer-reference countries.

We find that FDI have a positive impact on growth. However, the nexus without any other form of mediation is weak. We detect a statistically significant inverted *U*-shaped relationship between countries' income levels and the size of FDI impact on growth. Moving from low- to middle-income countries the effect gets larger. On the other hand, it diminishes again transitioning to high-income countries. FDI does not only provide needed financing for capital accumulation, but also supports the import of positive externalities in terms of new inputs and foreign technologies in the production function. Therefore, FDI are more beneficial – or have a higher impact on growth – for developing economies that have higher demand for investment and larger needs for advanced technologies compared to developed countries. Firms in middle-income countries are likely to have stronger capability to use their absorptive capacity to attract and utilize knowledge spillovers than low-income countries. This is in line with Blomstrom et al. (1992), Wu and Hsu (2008) and Alguacil et al. (2011). Finally, we find that institutional factors have a mediating effect on FDI within country income groups. This is also aligned to the findings of other studies deploying different technologies and smaller country perimeters (e.g. Prüfer and Tondl, 2008; Busse and Groizard, 2008). Countries with better institutions – i.e. higher control of corruption, more robust rule of law, better-developed regulatory frameworks and more efficient government frameworks - register a positive impact of FDI on growth. The effects appear to be statistically significant for countries scoring at least above the bottom 20% within each income group.

These findings lead to a set of policy implications. FDI seem to be a useful tool to help middle income countries sustain and support growth. The contribution of FDI on growth seems to be paramount after the 2009 crisis whereby average growth is lower. An improvement in the quality of the institutional frameworks help increasing the likelihood of FDI influencing positively growth. Specifically we find that FDI – irrespectively of their level – do not impact positively growth only for the bottom 20% (in institutional quality terms) of countries. This suggests that even small but significant improvements shifting the country outside of the bottom 20% - within its own income group - should in principle be conducive to positive spillovers of FDI on growth outcomes. Ultimately, a commitment to a genuine reform agenda is not only conducive to a more sustained growth performance in the medium term, but it also enhances the abortion capacity of FDI, thus reaping the benefits of financial and trade liberalization.

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ANNEX

1.1 Detailed Data Description

- Foreign Direct Investment: The United Nations conference on Trade and Development (UNCTAD) defined the FDI as the investment that involves a long-term relationship reflecting a lasting interest of a resident entity in one economy (direct investor) in an entity resident in an economy other than that of the investor (UNCTAD, 2018). FDI net inflow⁶ is defined as the value of inward direct investment made by non-resident investors in the reporting economy. We use FDI net inflows as a percentage of GDP. Source: UNCTAD database complemented with data in WDI database.
- General government final consumption expenditure: includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures on national defense and security, but excludes government military expenditures that are part of government capital formation (World Bank). We use general government final consumption expenditure as percentage of GDP. Source: WDI
- Gross fixed capital formation: Gross fixed capital formation includes land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. According to the 1993 SNA, net acquisitions of valuables are also considered capital formation (WB). We use gross fixed capital formation as a percentage of GDP. Source: WDI
- Trade: Trade is defined as the sum of exports and imports of goods and services (WB). This indicator is used as a measure of openness. We use trade as percentage of GDP. Source: WDI.
- Human capital index: based on the average years of schooling and an assumed rate of return to education (PWT, version 9)⁷. We use logarithmic transformation of the Index
- Inflation: measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly (WB). We use average annual inflation. Source: WDI.
- Political rights index: indicator that is based on the assessment of three subcategories: Electoral Process, Political Pluralism and Participation, and Functioning of Government (Freedom House). We use the index that ranges from 1 to 7, with 1 representing the greatest degree of freedom. Source: Freedom house.

⁶ Negative figures are associated with declining FDI liabilities of the reporting country.

⁷ $HC=e^{\varphi(s)}$; where s is average years of schooling; and φ is a function for return to education.

https://www.rug.nl/ggdc/docs/human_capital_in_pwt_90.pdf

$$\phi(s) = \begin{cases} 0.134 \cdot s & \text{if } s \leq 4 \\ 0.134 \cdot 4 + 0.101(s-4) & \text{if } 4 < s \leq 8 \\ 0.134 \cdot 4 + 0.101 \cdot 4 + 0.068(s-8) & \text{if } s > 8 \end{cases}$$

- Institutional factors: we use several indicators from the World Bank Worldwide Governance Indicators (WGI) database to construct a composite index describing institutional environment. The WGI indicators used for the composite are: Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption. Source: WB WGI.
- Income group classifications: The income classification is based on a measure of national income per capita, or GNI per capita, calculated using the Atlas⁸ method. Four groupings are used: low-income, lower middle-income, upper middle-income, and high-income countries. The thresholds to distinguish between the income groups have been adjusted for prices over time (WB). Source: WDI.

⁸ In calculating gross national income (GNI) in U.S. dollars, the World Bank uses the Atlas conversion factor instead of simple exchange rates. The purpose of the Atlas conversion factor is to reduce the impact of exchange rate fluctuations in the cross-country comparison of national incomes (WB).

2.1 Supplementary tables

Table A.1. Impact of FDI on Growth among different income groups

	(2)	(3)
	Difference	System
	GMM	GMM
Lagged GDP per capita growth (-1)	0.245*** (0.064)	0.380*** (0.070)
FDI - Low income economies (-1)	-0.088 (0.056)	0.152*** (0.040)
FDI - Low-Middle income economies (-1)	0.205** (0.080)	0.139** (0.058)
FDI - High-Middle Income economies (-1)	0.145** (0.066)	0.121* (0.071)
FDI - High Income economies (-1)	0.014*** (0.004)	-0.005 (0.004)
Physical capital (GFCF) (-1)	0.008*** (0.002)	0.008** (0.003)
Human Capital (-1)	-0.125 (0.401)	0.195*** (0.064)
Government size (-1)	0.099 (0.148)	-0.039 (0.028)
Political rights (-1)	-0.140 (0.279)	-0.084 (0.071)
Inflation (-1)	-0.0001*** (0.000)	-0.0001*** (0.000)
Openness - Trade share (-1)	0.060* (0.035)	0.006*** (0.002)
Low income dummy	8.972*** (1.586)	1.450*** (0.473)
LowMiddle income dummy	4.893*** (1.047)	0.891** (0.395)
HighMiddle income dummy	2.232*** (0.718)	0.435 (0.420)
Constant		-1.262 (1.096)
Obs	3109	3222
No of countries	111	111
No of instruments	82	108
year dummies	yes	yes
AR(2) p_value	0.974	0.439
p-value Hansen	0.177	0.322

Robust standard errors in parentheses. All explanatory variables lagged;

*** p<0.01, ** p<0.05, * p<0.1

Note: Sys GMM refers to estimation using the Arellano-Bover/Blundell-Bond estimator. 'AR-2' is the p-value of the Arellano - Bond test. The H0 is that the average autocovariance in the residuals is of order 2. 'Hansen J' is p-value of the Hansen J test for overidentifying restrictions which is asymptotically distributed as chi2 under the null of instrumenting validity. Year dummies are included in the model but not showed in the results.

Table A.2. FDI as % of GDP - averages across income groups and periods

Period	FDI % of GDP across income groups			
	Low	Low-Middle	High-Middle	High
2000-2007	2.5	4.2	4.7	12
2008-2014	5.1	3.7	3.8	7.9
1980-2014	2.2	3.0	3.4	6.0
1980-1999	1.4	1.6	2.1	2.1

Table A.3. Real GDP per capita growth - averages across income groups and periods

Period	GDP growth across income groups			
	Low	Low-Middle	High-Middle	High
2000-2007	3.3	4.9	4.2	2.6
2008-2014	2.9	2.8	2.2	0.2
1980-2014	1.7	1.9	2.5	1.8
1980-1999	0.7	0.4	1.6	2.2

Table A.4. FDI impact on growth mediated by institutional quality

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Difference	System	Difference	System	Difference	System	Difference	System
	GMM	GMM	GMM	GMM	GMM	GMM	GMM	GMM
Lagged GDP per capita growth	0.341*** (0.083)	0.379*** (0.057)	0.304*** (0.071)	0.379*** (0.065)	0.293*** (0.071)	0.370*** (0.063)	0.312*** (0.077)	0.386*** (0.065)
FDI - low corruption	0.014*** (0.004)	0.013** (0.005)						
FDI - high corruption	0.140 (0.145)	0.092 (0.082)						
FDI - high reg. quality			0.021*** (0.007)	0.013** (0.006)				
FDI - low reg. quality			0.126* (0.067)	0.063 (0.064)				
FDI - stronger rule of law					0.022*** (0.007)	0.013** (0.005)		
FDI - weaker rule of law					-0.014 (0.085)	-0.013 (0.047)		
FDI - high govt. effectiveness							0.018*** (0.005)	0.010** (0.005)
FDI - low govt. effectiveness							0.085 (0.085)	0.070 (0.060)
Government size	0.382** (0.178)	-0.084*** (0.025)	0.342** (0.156)	-0.087*** (0.025)	0.332** (0.158)	-0.089*** (0.022)	0.318** (0.157)	-0.078*** (0.024)
Political rights	-1.314*** (0.440)	0.078 (0.088)	-1.302*** (0.439)	0.099 (0.081)	-1.295*** (0.435)	0.132 (0.081)	-1.304*** (0.434)	0.102 (0.079)
Human Capital	-1.501* (0.810)	0.050 (0.044)	-0.510 (0.931)	0.069* (0.041)	-0.461 (0.905)	0.067 (0.041)	-0.692 (0.861)	0.052 (0.041)
Inflation	0.014 (0.026)	0.017 (0.017)	0.009 (0.024)	0.015 (0.017)	0.009 (0.024)	0.017 (0.017)	0.009 (0.025)	0.017 (0.018)
Openness - Trade share	0.017 (0.028)	-0.001 (0.002)	0.039 (0.030)	-0.000 (0.002)	0.043 (0.028)	-0.001 (0.002)	0.029 (0.027)	-0.000 (0.002)
Physical capital (GFCF)	0.004 (0.012)	0.010 (0.009)	0.007 (0.008)	0.015* (0.009)	0.007 (0.008)	0.015* (0.009)	0.006 (0.008)	0.010 (0.009)
Constant		-2.987*** (0.804)		0.000 (0.000)		0.351 (0.754)		0.000 (0.000)
Observations	1,077	1,186	1,077	1,186	1,077	1,186	1,077	1,186
Number of cuntrnumber	111	111	111	111	111	111	111	111
Obs	1077	1186	1077	1186	1077	1186	1077	1186
No of countries	111	111	111	111	111	111	111	111
No of instruments	27	110	100	103	100	103	100	110
AR(2) p_value	0.0815	0.0594	0.0654	0.0727	0.0683	0.0650	0.0760	0.0712
p-value Hansen	0.0999	0.200	0.113	0.102	0.133	0.137	0.185	0.248

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

Source: Authors' computations

Note: Sys GMM refers to estimation using the Arellano-Bover/Blundell-Bond estimator. 'AR-2' is the p-value of the Arellano - Bond test. The H0 is that the average autocovariance in the residuals is of order 2. 'Hansen J' is p-value of the Hansen J test for overidentifying restrictions which is asymptotically distributed as chi2 under the null of instrument validity. Year dummies are included in the model but not showed in the results. Low and high institutional quality is identified employing equation 2 and applying a threshold level equal to the 20th percentile of the distribution of institutional quality within each income group.

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**European
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Economics Department
✉ economics@eib.org
www.eib.org/economics

European Investment Bank
98-100, boulevard Konrad Adenauer
L-2950 Luxembourg
☎ +352 4379-22000
www.eib.org – ✉ info@eib.org

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