Growth effect of FDI in developing economies: the role of institutional quality

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Abstract

This paper investigates the effect of FDI on economic growth conditional on the institutional quality of host countries. As we consider institutional heterogeneity to be an explanation for the mixed results of previous empirical studies, we develop several arguments to show that institutional quality modulates the intensity of FDI knowledge spillovers. Using a comprehensive data set for institutional quality, we test this hypothesis on a sample of 94 developing countries over the period 1984-2009. The use of Panel Smooth Transition Regression (PSTR) allows us to identify both the heterogeneity and an endogenous threshold of institutional quality that influence the FDI growth effect. These results have significant implications for policy sequencing in developing countries. In order to benefit from increased inflows of FDI, the improvement of the institutional framework should precede FDI attraction policies.

Keywords: FDI, growth, heterogeneity, institutional quality, PSTR.

JEL Classification: F21, C34, F43, O16.

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1 Introduction

The research on the determinants of economic growth in developing countries points to institutional quality as the main force behind the growth generating mechanisms. The view that economic problems in developing countries are caused by poor-quality institutions has become widespread, both among researchers and policy-makers. Lower institutional quality is associated with lower investment, slower productivity growth, lower per capita income and overall slower output growth[1].

When searching for solutions to boost economic growth in developing countries, foreign direct investment (FDI) is often found on top of the list. FDI is seen as an important stimulus for productivity gains through the introduction of new processes and know-how, managerial skills, employee training and access to international markets. The perception of guaranteed solution to accelerate economic growth has led FDI inflows to be particularly encouraged by governments in developing countries attract FDI, leading to an increasing share of FDI in total capital flows.

Productivity improvements associated with technology transfer are considered the main contribution of FDI to the economic development of host countries (de Mello (1997)). Endogenous growth theory supports the idea of a multiplier mechanism of FDI spillovers to domestic firms, which leads to positive effects on aggregate productivity and economic growth (Grossman & Helpman (1991), Barro & Sala-i-Martin (1997)). Since developing economies often suffer from liquidity constraints, FDI also acts as a substitute for local investment in the capital accumulation process (Mody & Murshid (2005)).

Despite consistent theoretical arguments[2], empirical evidence on the growth effects of FDI is still inconclusive[3]. In a survey of the literature on FDI and economic growth, Doucouliagos, Iamsiraroj & Ulubasoglu (2010) count that only 43% of the studies report a

[1] All these points are demonstrated in Acemoglu, Johnson & Robinson (2001), Hall & Jones (1999), Olson, Sarna & Swamy (2000), Acemoglu et al. (2001), Rodrik, Subramanian & Trebbi (2004), Mauro (1995), La Porta, Lopez de Silanes, Shleifer & Vishny (1998) and Aghion, Alesina & Trebbi (2008).

[2] See for instance Markusen & Venables (1999) or Keller & Yeaple (2009).

[3] "*Empirical evidence for FDI generating positive effects for host countries is ambiguous at both micro and macro levels*" (Alfaro, Chanda, Kalemli-Ozcan & Sayek (2010)).

significantly positive coefficient, 17% are significantly negative while 40% find no effect of FDI on growth. A summary of these studies indicates that FDI plays an ambiguous role in economic growth, with little support for an independent positive effect.

The explanations for these mixed findings have pointed to methodological issues (Carkovic & Levine (2005), Hanousek, Kocenda & Maurel (2011)) and to the different absorptive capacity of host countries (Blomström & Kokko (2003), Lipsey & Sjöholm (2005)). Crespo & Fontoura (2007) argue that it is essential when investigating the existence FDI spillovers to complement the analysis with the different circumstances that might enhance or obstruct spillovers. Local conditions modulating the effect of FDI on growth have been associated with the level of development, trade openness, the level of human capital, financial development, the business environment or economic stability and liberalized markets[4]. With the drop in global flows of foreign direct investment in the turmoil of the recent economic crisis, the policy competition for FDI among developing countries has intensified. Identifying the specific conditions that favor the positive growth effects is thus of great importance for policymakers in developing countries, since large amounts of public funds have been used to attract FDI.

In line with the recent emphasis on the role of institutions in economic growth[5], institutional quality and the endorsed political risk could intervene in the growth generating mechanism of FDI. Since FDI affects economic growth through capital accumulation and total factor productivity growth, which are both affected by institutional quality, it is only natural to expect institutions to have an important modulating role in the FDI-growth nexus. While a good level of institutional development can induce complementarities between foreign and domestic investment, it can also favor synergies between FDI and local firms and therefore promote spillovers. On the contrary, an underdeveloped institutional framework can disrupt productive activities and may prevent productivity increases related

[4]These determinants are found significative in Blomstrom, Lipsey & Zejan (1994), Balasubramanyam, Salisu & Sapsford (1996), Borensztein, De Gregorio & Lee (1998), Alfaro, Chanda, Kalemli-Ozcan & Sayeknomics (2004), Busse & Groizard (2008), Azman-Saini, Baharumshah & Law (2010), and Bengoa & Sanches-Robles (2003).

[5]See Aghion et al. (2008), Acemoglu et al. (2001), Rodrik et al. (2004) and La Porta et al. (1998).

to the exploitation of technology spillovers from FDI. If this is the case, than countries with the same level of FDI should experience very different growth outcomes according to their institutional quality.

Though there are a number of studies investigating the role of institutions in attracting FDI flows[6], there is very limited research dealing with the role of institutions in explaining FDI growth effects (Busse & Groizard (2008), Farole & Winkler (2012)). In this paper we investigate the effect of FDI on economic growth conditional on the institutional quality of host countries, as given by several features of political risk, like law enforcement, bureaucratic quality, corruption or expropriation risk. We consider host country heterogeneity, in its wider form, to be a plausible explanation for the different results of empirical studies.

Our research has several original features compared to the previous literature. First, we develop several theoretical arguments to show that institutional quality modulates the two main channels of FDI impact on economic growth, namely knowledge spillovers and capital accumulation. Second, while existing empirical studies use limited measures of institutions, we use a comprehensive set of 11 indicators that allows us to capture all the features of institutional quality. Third, using Panel Smooth Threshold Regression models allows us to show the heterogeneity of the effect of FDI on economic growth, conditionally to institutional quality, both in cross-sectional and time dimensions. Fourth, this method allows to reveal endogenous threshold values for institutional indicators.

We are able to show that institutional quality conditions the effect of FDI on economic growth in developing countries. While FDI alone has no significant growth effect, favorable institutional conditions induce a growth enhancing effect. The existence of a threshold level of institutional quality that conditions the FDI growth effect has significant policy implications. In order to benefit from increased flows of FDI governments first need to improve the regulatory framework in their countries. More, we highlight the importance of heterogeneity in analyzing the FDI-growth relationship, as we show the existence of two regimes in the relationship between FDI and economic growth.

[6]Busse & Hefeker (2007), Alfaro, Kalemli-Ozcan & Volosovych (2008), Javorcik & Wei (2009), Ali, Fiess & MacDonald (2010), Buchanan, Le & Rishi (2012).

The paper is organized as follows. Section 2 is dedicated to the main arguments in favor of a conditioning role of institutions in the FDI-growth mechanism. Section 3 describes the data and the methodology being used. Section 4 presents the results and discusses their implications, while section 5 highlights the main conclusions and policy implications.

2 How can institutional quality influence the growth effect of FDI?

Several studies investigate the role of institutions in attracting FDI flows[7], confirming FDI abundance in countries with sound institutional quality. Since most FDI originates in developed countries, it is natural for multinationals to try to minimize the institutional distance between the home and the host country environments. For example, Ali et al. (2010) show that institutions are a robust predictor of FDI inflows in developing countries and that the most significant institutional aspects are linked to propriety rights. However, institutional quality is found to matter only for FDI inflows in manufacturing and services.

In this paper, we consider institutional quality not only as a pre-requisite in order to attract foreign investors, but mostly as an absorptive capacity that conditions the growth effects of FDI. In order to support a heterogeneous effect of FDI on growth depending on institutional quality, we need to evaluate the influence of institutions on the traditional channels of FDI led growth, namely technological spillovers and capital accumulation. While there is no theoretical indication in the literature on the interaction between institutions and FDI in generating growth, we develop several arguments supporting the idea of a heterogeneous effect of FDI on growth depending on institutions.

The core influence of FDI on economic growth consists of productivity improvements trough technological spillovers. FDI is actually considered to be the cheapest way for developing countries to acquire technology (Blomstrom & Kokko (1998)). These productivity spillovers can occur through supplier and customer linkages, increased competition,

[7]See Busse & Hefeker (2007), Alfaro et al. (2008), Ali et al. (2010), Buchanan et al. (2012).

demonstration effects or labor turnover, supporting an informal transfer of knowledge from foreign affiliates to domestic firms. The institutional theory (North (1990)) suggests that institutions set market rules, structure interactions among economic actors and ensure that economic actions are bound by these rules. Furthermore, the institutional framework creates incentives and business practices that influence the nature of competition and the knowledge acquisition process (Meyer & Sinani (2009)). In the light of these arguments, we expect institutional quality to shape the relationship between foreign and domestic firms and affect the extent of spillovers. Bad institutions are often associated with high transaction costs and an increased risk for long term trade commitments, loosening the thighs between foreign and domestic firms. Moreover, direct technology transfer from the multinational to the affiliate depends on the quality of the host country's institutional environment, namely the protection of property rights. In the case of severe risk of technology leakage, multinationals transfer low-level technology, with a smaller spillover potential.

As a complement to Busse & Hefeker (2007) and Ali et al. (2010), we argue that institutions can influence not only the quantity, but also the quality of FDI. Pradhan (2006) explored the concept of FDI quality and argued that it should be included in empirical studies on spillover analysis, as foreign firms are non-homogeneous and of varying qualities concerning knowledge-spillover. Bad institutional quality is likely to attract low-technology, resource exploiting FDI, with limited growth potential. Uncertainty associated with lower investors' protection, expropriation risk or inefficient law enforcement discourages high-end technological investments, which have the highest knowledge-spillover potential. Furthermore, bad institutions deter agglomeration effects, known to be important factors in explaining the FDI growth relationship (Hilber & Voicu (2010)).

Institutions might also influence the entry mode of FDI, as an unstable institutional environment discourages risk taking behavior and therefore favors mergers and acquisitions. As opposed to greenfield investment, mergers and acquisitions are considered to have a less growth enhancing effect (Wang & Wong (2009)) due to the fact that they are basically a financial flow without a net creation of activity. Institutional quality can thus intervene in the FDI growth relationship through the influence on the entry mode of FDI. Furthermore,

if we take the example of former communist countries of Central and Eastern Europe, a weak institutional environment has often led to inefficiencies in the privatization process with penalizing effects on growth.

An implicit consequence of institutional quality could be reduced information asymmetries, as good institutions efficiently channel information to market participants and allow proper exploitation of market opportunities, which in turn favors technology transfer. Reduced information asymmetries could have a significant role in generating spillovers, both through the competition mechanism and the demonstration/imitation effects. The lack of transparency in financial institutions could alter the flow of financial resources coming from FDI and diminish the associated growth potential.

A second line of action of FDI on economic growth passes through capital accumulation and potential crowding-in effects on domestic investment. Mody & Murshid (2005) have shown that FDI has a short term crowding-out effect in developing countries, while stimulating domestic investment in the long run. The crowding-out effect is mostly observed in cases where FDI inflows follow the industrial structure of the local economy (Agosin & Machado (2005)) and create up-front competition with local producers. Morrissey & Udomkerdmongkol (2012) argue that the extent of crowding out is related to political stability in host countries. An increase in FDI flows has a significant effect on reducing private investment, but the effect is more than compensated in politically stable regimes by larger capital accumulation. We therefore argue that sound institutions may reduce the crowding-out effect by encouraging foreign investment in new industries and efficiently distribute the new demand of inputs created by the entry of FDI.

The interaction between foreign and domestic investment can also occur through the financial market, especially in the case of mergers and acquisitions. As a capital flow, FDI increases the local capital supply and can loosen financial constraints through a decrease in the market interest rate (Harrison, Love & McMillan (2004)). Domestic firms thus indirectly benefit from improved financial market conditions and better access to credit. The financial crowding-in effect seems to be particularly significant in developing countries, where capital supply is scarce (Harrison et al. (2004)). Its extent naturally depends on fi-

nancial development in host countries. Financial institutions are responsible for mobilizing and channelling capital towards local investment projects. We therefore argue that a good institutional environment favours a financial crowding-in of domestic investment through better access to finance, improved capital allocation and appropriate risk management.

Finally, low institutional quality is known to distort production and exports away from manufactured goods to non-manufactured goods (Kaufmann, Kraay & Zoido-Lobaton (1999), Méon & Sekkat (2008)). Additionally, backward and forward linkages between FDI and domestic firms traditionally arise in the manufacturing sector, while FDI in non-manufacturing follows a resource seeking strategy will less local reliance and smaller spillover potential.

In the light of these arguments, we expect sound institutional quality to favor technology transfer and productivity spillovers to domestic firms, while promoting crowding-in effects on domestic investment. There is still very limited research dealing with this catalytic role of institutions in explaining FDI growth effects. In a cross-country context, Busse & Groizard (2008) investigate the role of business regulations in both developed and developing countries. They and argue that countries with restrictive regulations cannot exploit FDI inflows efficiently due to constraints in factor reallocation. On the contrary, Farole & Winkler (2012) show that business freedom has no significant effect on intra-industry productivity spillovers from FDI in a firm-level sample of developing countries. Both of these studies use cross-sectional analysis, therefore only capturing individual heterogeneity at a specific moment in time and not being able to capture time heterogeneity. Harms & Méon (2011) compare the growth effects of greenfield investment and mergers and acquisitions and find both marginal effects to be independent of corruption and political stability. Finally, Meyer & Sinani (2009) run a meta-analysis of studies on FDI spillovers, mostly firm level studies, and highlight the existence of a non-linear relationship between institutions and spillovers.

As compared with the existing literature that concentrates on specific features of institutional quality, we use a comprehensive set of 11 indicators in order to capture the full extent of the interaction between institutions and FDI in generating growth. Moreover,

using a Panel Smooth Threshold Regression model, we focus our attention on developing countries as the potential for institutional heterogeneity, both in the individual and the time dimension, allows us to expect the existence of an endogenous threshold level in influencing the FDI-growth nexus.

3 Testing the heterogeneity of the growth effect of FDI: methodology and data

3.1 The Panel Smooth Transition Regression model

The previous arguments suggest that the impact of FDI on growth is not homogenous, but could depend on specific national factors, in particular on national institutional quality. This argument can explain why existing empirical papers fail to find a significant direct impact of FDI on growth. Moreover, due to econometrical constraints, most empirical papers assume that the impact of FDI is constant along the entire time span and homogeneous between the countries of the sample. We instead believe that the absorptive capacity of developing countries is first of all different due to different levels of institutional quality. Second, the absorptive capacity for the same country can improve in time, i.e. the impact of FDI can speed up, as institutional quality improves. Thus, it is reasonable to assume that the effects of FDI are not constant along the two dimensions (cross-sectional and time) and to estimate to what extent they are country-varying or time-varying.

The panel smooth transition regression (PSTR hereafter) model proposed by González, Teräsvirta & van Dijk (2005) and Fok, van Dijk & Franses (2005) is well suited to this purpose. This model allows us to address both the heterogeneity and the time variability issues. The PSTR model can be seen as a regime-switching model allowing for a small number of extreme regimes. The PSTR model represents a generalization of the PTR model (Hansen (1999)) in which the coefficients of some explanatory variables can take different values depending on the value of another observable variable (i.e. a "transition variable"). Endogenous values of this transition variable determine the switch from a

regime to another, with an evolution driven by a smooth transition function. While the PTR model imposes a sharp shift from a regime to another, the PSTR model allows the regression coefficients to change gradually. The regression coefficients are continuous functions of an observable variable through a bounded function of this variable.

Considering a given institutional indicator as a single transition variable q_{it}, the PSTR model can be defined as:

$$y_{it} = \mu_i + \beta_0' FDI_{it} + \beta_1' FDI_{it}\, g\left(q_{it}; \gamma, c\right) + \alpha' z_{it} + u_{it} \tag{1}$$

where y_{it} and FDI_{it} are the growth of domestic product and the Foreign Direct Investment for the ith country at time t respectively, for i = 1,...,N, and t = 1,. . . ,T. μ_i represents an individual fixed effect. $z_{i,t}$ is a k-dimensional vector of control variables usually considered in the literature (see *infra*). Following Granger & Teräsvirta (1993) and González et al. (2005), the transition function $g(.)$ is a continuous function of the transition variable q_{it}, bounded between 0 and 1:

$$g(q_{it}; \gamma, c) = \left(1 + \exp\left(-\gamma \prod_{j=1}^{m} (q_{it} - c_j)\right)\right)^{-1} \tag{2}$$

with $\gamma > 0$ and $c_1 \leqslant c_2 \leqslant \ldots \leqslant c_m$, where γ is the slope of the transition function and $c = (c_1, \ldots, c_m)'$ is an m-dimensional vector of threshold (or "location") parameters. For $m = 1$ (logistic function), there is one threshold, around which the effect of FDI_{it} on y_{it} is not linear, but given by a *continuum* of parameters between two extreme regimes which are defined by low and high values of q_{it}, respectively[8]. In a sense, even with $m = 1$, such a model considers a *continuum* of regimes (between the extreme high and low ones), each of them corresponding to a unique value of a given institutional quality indicator. More precisely, as q_{it} increases, the effect of FDI_{it} evolves from β_0 in the first extreme regime

[8]González et al. (2005) assert that it is sufficient to consider $m = 1$ or $m = 2$, as these values allow for commonly encountered types of variation in the parameters. However, there are no arguments in our specific case to justify an U or inverted U elasticity of economic growth with respect to FDI, conditional on institutional quality. This is why we only consider $m = 1$.

corresponding to $g(.) = 0$, to $\beta_0 + \beta_1$ in the second extreme regime with $g(.) = 1$, following a single monotonic transition centered around the value c_1 (i.e. the threshold) of q_{it}[9]. Between these two extreme cases, the elasticity of GDP growth to FDI varies according to the value of q_{it}. This elasticity is defined as a weighted average of the parameters β_0 and β_1[10]. This gives for the ith country at time t an elasticity defined as:

$$\frac{\partial y_{it}}{\partial FDI_{it}} = \beta_0 + \beta_1 \times g\left(q_{it}; \gamma, c\right) \tag{3}$$

If each country i exhibits a different value of the threshold variable at time t, the elasticity will then be different for each country. Similarly, if a given country has a varying q_{it}, than its elasticity will vary in time. Both effects are captured by this model. Another advantage of such a method is the endogenous determination of the threshold levels. This is particularly relevant for this paper where we consider the well-known indicators stemming from the ICRG database. For any indicator in this database, it is easy and straight forward to examine where a country is located with respect to the identified threshold level.

Finally, before estimating (1), it is worth testing if a PSTR model is required, namely whether the impact of FDI is homogenous or not, depending on a given transition variable q_{it}. The details of the tests are provided in appendix 1. As a first step, the test of homogeneity ($H0$) against the PSTR alternative ($H1$) allows to select the appropriate transition variables q_{it} among a set of theoretical candidates, and to then identify factors that could explain the cross-country heterogeneity of FDI effects.

Before presenting the data we have used and our results, we addressed the issue of a potential endogeneity bias. Solutions such as instrumental variable methods have not yet been developed in a PSTR context[11]. However, according to Béreau, Lopez Villavicencio

[9]Note that if $\gamma \to \infty$, the function $g(.)$ becomes an indicator function $I[q_{it} > c_1]$, and the PSTR is then equivalent to a two-regime PTR. Conversely, if $\gamma \to 0$, the model is a standard linear model with individual effects - the so-called "within" model - with constant and homogeneous elasticity.

[10]The direct interpretation of the parameter values can be somewhat difficult. Still, that does not prevent from interpreting the sign of the parameters (which indicates an increase or a decrease in the elasticity depending on the value of q_{it}) and the time varying coefficient at individual level. These are precisely the main interests of the PSTR methodology.

[11]See the discussion in Fouquau, Hurlin & Rabaud (2008), which attempt to use a PSTR with IV

& Mignon (2012), Omay & Kan (2010) and Fouquau et al. (2008), non-linear modeling strategies can mitigate endogeneity issues. Typically, López-Villavicencio & Mignon (2011) estimate the non-linear impact of inflation on GDP growth with a PSTR similar to (1). For comparative purposes, they also use the generalized method of moments (GMM) - which deals with endogeneity problems - to estimate a usual equation with interaction terms. They conclude that the results obtained with the PSTR model are robust to endogeneity issues. Next, as our model captures the varying growth effects of FDI at different levels of the transition variable, this reduces the potential endogeneity bias in the same way as the presence of interaction terms in a linear models[12]. Notwithstanding uncertainty about endogenous bias, we use the first lag of FDI, and consequently the lag indicators of institutional quality in estimating (1)-(2) to circumvent the potential reverse causality problem. Rather than (1), the equation actually estimated is then:

$$y_{it} = \mu_i + \beta_0' FDI_{i,t-1} + \beta_1' FDI_{i,t-1}\, g\left(q_{i,t-1}; \gamma, c\right) + \alpha' z_{it} + u_{it} \tag{4}$$

3.2 The data

Traditional determinants of economic growth are included in the regressions as control variables. The choice of these variables is driven by the numerous developments on growth theories (see for example Barro (1991)). These determinants are: the initial level of GDP per capita to control for the effects of conditional convergence, the population growth rate, domestic investment, trade openness, government consumption (used as an indicator of fiscal policy) and the annual inflation rate. All these variables stem from the Word Development Indicators database.

In order to measure the quality of domestic institutions, we used the International Country Risk Guide (ICRG) database. This database, compiled by the Political Risk Services (PRS) Group, provides information on several risk indicators gathered in three categories: political, economic and financial risks. For the purpose of our research, we con-

method, but acknowledges that the convergence of the estimators has not been formally proved.

[12]See Aghion, Bacchetta, Rancière & Rogoff (2009) for more details.

sidered 11 indicators related to political risk, namely: political risk, government stability, investment profile, internal conflict, external conflict, corruption, the influence of the military in politics, law and order, the degree of tensions among ethnic groups, the democratic accountability of the government and the quality of the bureaucracy. These indicators are widely used in empirical studies to measure political risk and institutional quality[13]. The political risk indicator is a composite index of all other indicators of institutional quality, ranging from 0 to 100 points. Government stability, investment profile, internal conflict and external conflict range from 0 to 12, while corruption, military in politics, law and order, ethnic tensions and democratic accountability range from 0 to 6 points. Finally, quality of the bureaucracy ranges from 0 to 4. The higher the value of the indicator, the lower is the risk perceived related to that indicator. In order to test the effect of FDI on economic growth conditional on the quality of institutions, we use the net FDI inflows as share of GDP. Using the share of GDP allows us to take into account the relative country size. FDI data comes from UNCTAD database.

Our sample comprises 94 developing countries, situated in the lower and middle income groups according to the World Bank classification[14]. Our choice of countries was dictated by ICRG data availability. The list of countries is provided in appendix,. Details on the data are provided in table 5.

4 The results

The results of the tests of homogeneity are reported in table 1. The hypothesis of homogeneous growth impact of FDI is widely rejected when the transition variables are political risk, investment profile, internal and external conflicts, military in politics, democratic accountability and bureaucracy quality. The impact of FDI is undoubtedly conditional on these variables. A PSTR model is thus appropriate with the previous indicators as transition variables. This implicitly assumes at least a threshold level for institutional quality

[13]See for instance Rodrik et al. (2004), Busse & Groizard (2008) and Busse & Hefeker (2007).
[14]Countries having in 2011 a GNI per capita lower than 12 476 current US dollars.

and a minimum of two regimes in the FDI-growth relationship. Next, the homogeneity assumption can also be rejected for Law & Order and Ethical tensions as transition variables, however at the 10% significance level only. While the results of the test are less clear cut for these variables, the results of the PSTR estimates confirm their role in explaining the heterogeneity of FDI impact on economic growth (see *infra*). Finally, the homogeneity hypothesis is widely accepted for political stability and corruption. They do not seem to explain the heterogeneous impact of FDI. This is somewhat disappointing as these two variables are often cited in the literature to characterize the institutional environment. However, Harms & Méon (2011) also found that the marginal effect of FDI does not depend on the ICRG's measure of corruption. Moreover, further tests indicate that our result holds for other measures of *political stability* and *corruption control* available in the World Governance Indicators Database (see the last part of the table 1). Thus, this first step allows to identify and to retain nine institutional indicators (among the eleven initial candidates) that are likely to explain the cross-country heterogeneity of FDI effects.

Insert Table 1

The estimations of the PSTR models are reported in table 2. The results deserve several comments. First, all the control variables have the expected sign and are highly significant. Next, interestingly, the direct impact of FDI on GDP growth, measured by β_0, is not significant in any of the regressions, with two exceptions. However, in the latter cases, namely when the threshold variables are external and internal conflicts, the direct elasticity of FDI is significantly negative (at the 10% level). This result is in line with the vast empirical literature which fails to reveal a significant positive impact of FDI on economic growth (Carkovic and Levine, 2005). The second line in the table offers the explanation: the growth impact of FDI is conditional on the institutional development. More precisely, the coefficient β_1, associated to the non-linear component of the model, is always positive and significant at the 1% level. Its value ranges between 0.126 and 0.229. Given the

underlying logistic function, this result implies that the elasticity of growth with respect to FDI varies from zero (as β_0 is not significantly different from zero in the majority of cases) for low values of institutional indicators, to β_1 for high values of institutional quality. The shift between these two extreme regimes occurs around the associated endogenous location parameter c_1. Somewhat encouraging for developing countries at this point is that the location parameters do not seem far from their respective mean values (reported in table 3 in appendix). Nevertheless, the slope of the transition function should simultaneously be considered for a comprehensive assessment on this point. The higher γ, the sharper the shift from one extreme regime to another.

Insert Table 2

Referring to table 2 and figure 1, where we plotted the obtained elasticities[15], the slope appears to be steep for several indicators: political risk, investment profile, internal and external conflict and low & order. Considering for instance the law & order index, any effort by a country just below the threshold value of 2.09 is likely to result in a sharp increase of the elasticity of GDP growth with respect to FDI, from 0.0 to 0.126. However, for a country which far below this threshold value, the same effort will have no effect on the elasticity. Similar effects of institutional quality are expected for political risk, investment profile, internal and external conflict.

At the opposite, we identified a smooth transition when considering ethnical tensions, democratic accountability, bureaucracy quality and military in politics. Interestingly, it is precisely for these indicators that the threshold values are higher than their corresponding mean values. Consider a typical country whose democratic accountability index is just below the threshold value of 4.08, namely the "mean country" with respect to this indicator (whose sample mean value is 3.21). Starting with an elasticity close to 0.02, any improvement in democratic accountability will result in a very gradual increase in the growth effect of FDI. As opposed to the sharp transition, the same effort by a country far below the

[15]As the results with internal conflicts are very close to the one obtained with external conflicts, we choose to only plot the former transition variable.

threshold value will result in a promising increase in the effects of FDI. Similar patterns are expected with ethnical tensions, bureaucracy quality and, to a lesser extent, military in politics. Note that the variety of profiles justifies *ex post* the use of a PSTR model.

Insert figure 1

Given the high number of countries in the sample, it would be inconvenient to precisely locate each of them in figure 1. However, referring to the available ICRG database, it is quite handy to compare the score of any country with the endogenous threshold parameters. In the same manner, considering the time-varying impact of FDI, it is possible to restore the evolution of the elasticity of GDP growth with respect to FDI, conditional on the evolution of institutional quality (whatever the indicator).

Our results thus validate the role of institutional quality in explaining the heterogenous impact of FDI on economic growth. Moreover, the shape of the transition functions and the location of a country compared to the threshold value allow us to anticipate the effects of institutional reforms. For immediate effects of such reforms to be noticeable, improving institutional characteristics related to political risk, law & order, investment profile and/or solving for external and internal conflicts appears to be worthwhile, provided the country is not far below the corresponding threshold value. Due to a smooth marginal effect, improving democratic accountability or bureaucracy quality, or solving ethnical tensions, are valuable in terms of absorptive capacity, even if the country is far below the corresponding threshold values. Note also that the correlation between the main features of institutional soundness can be high (see table 4). This means that improvements for one variable is likely to have positive effects on other institutional characteristics. Namely, a country can hope for institutional complementarities. Even for a country that would be far from the aforementioned thresholds, reforms intended to positively affect "smooth-transitional" variables would in the same time bring the "sharp-transitional" indicators closer to their respective thresholds. Thus, small efforts concerning these "sharp-transitional" indicators could afterwards significantly increase the elasticity of growth with respect to FDI. At

the opposite, without reforms, developing economies would not benefit at all from foreign investment. Any FDI promotion policy would be useless.

Conclusion

This paper investigates the effect of FDI on economic growth conditional on the institutional quality of host countries. Starting from the observation that countries with the same level of FDI may experience very different outcomes in terms of growth, we consider host country heterogeneity, both in its individual and time dimension, to be a plausible explanation for the different results of previous empirical studies. In line with the recent emphasis on the role of institutions in economic growth, we associate host country heterogeneity to institutional quality and show how it influences the growth generating mechanism of FDI.

We first develop several theoretical arguments to show that institutional quality modulates the two main channels of FDI impact on economic growth, namely knowledge spillovers and capital accumulation. In the light of these arguments, we indicate that sound institutional quality is expected to favor technology transfer and productivity spillovers to domestic firms, while promoting crowding-in effects on domestic investment. Second, the use a panel smooth transition technique allows us to confirm the existence of heterogeneity and to identify an endogenous threshold of institutional quality that influences the FDI growth effect. For this purpose we use a sample of 94 developing countries over the period 1984- 2009, with 11 institutional indicators stemming from the ICRG database.

Our main conclusion is that institutional quality clearly modulates the effect of FDI on economic growth in developing countries. Our results show that FDI alone has no significant effect on economic growth in developing countries. Nevertheless, a favorable institutional environment induces a growth enhancing effect. This result implies an elasticity of economic growth with respect to FDI that is time and cross-country varying.

The identification of an endogenous threshold of institutional quality allows us to position each country along the non-linear curve of elasticity and to anticipate its evolution given that domestic policies to improve the institutional environment are put into place.

According to the smooth or the sharp transition from the no effect regime to the growth enhancing regime, countries situated just below the threshold value may be particularly concerned. For law and order, political risk, investment profile, internal and external conflicts, the switch to the growth enhancing effect seems to be rather sharp. This implies a net gain in terms of growth only for countries close to the threshold value. On the contrary, for ethnical tensions, democratic accountability, bureaucracy quality and military in politics the transition is quite smooth. A smooth transition implies that even for a country far below the threshold value, improvement of the institutional environment will result in a promising growth effect of FDI.

The existence of a threshold level of institutional quality that conditions the FDI growth effect has significant policy implications. Promotion policies targeted to attract FDI will have no benefit for host countries unless there is an improvement of their institutional framework. This conclusion implies that sequencing is needed in implementing economic policies, with a priority given to measures that upgrade the local institutional environment before engaging in FDI attraction policies.

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Threshold variable	LM Test	F Test	Threshold variable	LM Test	F Test
Pol_risk	0.001	0.002	Bur_quality	0.026	0.032
Pol_stab	0.665	0.681	Corruption	0.775	0.765
Inv_profile	0.006	0.008	Mil_politics	0.013	0.017
Int_conflict	0.001	0.002	Law_Order	0.107	0.103
Ext_conflict	0.001	0.002	Eth_tensions	0.104	0.120
Demo_account	0.001	0.002			
WGI indicators:					
Pol_stab	0.625	0.642	Corruption control	0.789	0.799

Table 1: LM and F tests of homogeneity (P-values)

Threshold variable:	**Political Risk**	**Investment profile**	**Internal conflict**	**External conflict**	**Military in politics**	**Law and Order**	**Ethical tensions**	**Democraty accountability**	**Bureaucracy quality**
β_0: FDI	-0.054	-0.037	-0.071*	-0.075*	0.002	$2.4\ 10^{-4}$	0.003	0.011	-0.062
	(0.038)	(0.038)	(0.038)	(0.039)	(0.033)	(0.035)	(0.036)	(0.030)	(0.059)
β_1: $FDI \times g(.)$	0.204***	0.172***	0.226***	0.229***	0.207***	0.126***	0.163***	0.214***	0.212***
	(0.046)	(0.046)	(0.047)	(0.046)	(0.062)	(0.046)	(0.063)	(0.057)	(0.089)
Loc. parameter (c_1)	47.07	4.772	6.5860	7.915	3.993	2.093	3.916	4.088	0.695
	(0.000)	(0.088)	(0.023)	(0.0127)	(0.008)	(0.068)	(0.077)	(0.093)	(0.247)
Slope parameter (γ)	159.9	132.13	160.74	173.95	24.263	136.84	3.861	2.654	2.183
	(57.77)	(2.066)	(19.73)	(77.469)	(8.869)	(6.638)	(0.634)	(0.509)	(0.936)
Control variables:									
Initial level of GDP	-2.131***	-2.084***	-2.069***	-2.395***	-2.016***	-2.036***	-2.071***	-2.128***	-2.105***
	(0.611)	(0.612)	(0.609)	(0.617)	(0.611)	(0.614)	(0.616)	(0.613)	(0.619)
Openess	0.028***	0.028***	0.027***	0.030***	0.032***	0.031***	0.032***	0.031***	0.031***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Gov. Consumption	-0.329***	-0.326***	-0.325***	-0.322***	-0.319***	-0.326***	-0.314***	-0.339***	-0.326***
	(0.037)	(0.037)	(0.037)	(0.037)	(0.037)	(0.037)	(0.037)	(0.037)	(0.037)
Inflation	-0.005***	-5.10^{-4}***	-5.10^{-4}***	-5.10^{-4}***	-5.10^{-4}***	-5.10^{-4}***	-5.10^{-4}***	$-5.\ 10^{-4}$***	-5.10^{-4}***
	(0.001)	($1.\ 10^{-4}$)	($1.\ 10^{-4}$)	($1.\ 10^{-4}$)	(1.10^{-4})	(1.10^{-4})	(1.10^{-4})	(1.10^{-4})	(1.10^{-4})
Pop. Growth	-0.813***	-0.787***	-0.795***	-0.797***	-0.738***	-0.753***	-0.740***	-0.801***	-0.739***
	(0.205)	(0.204)	(0.203)	(0.203)	(0.204)	(0.204)	(0.204)	(0.204)	(0.204)
Domestic Inv.	0.188***	0.186***	0.188***	0.187***	0.184***	0.181***	0.190***	0.182***	0.189***
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.021)	(0.020)	(0.021)
AIC Criterion	2.852	2.855	2.849	2.848	2.856	2.858	2.859	2.855	2.859
Schwartz Criterion	2.884	2.886	2.881	2.880	2.887	2.889	2.890	2.886	2.890
Number of obs	1745	1747	1747	1747	1747	1747	1747	1747	1747

Note: *,** and *** denote significance at the 10%, 5% and 1% level, respectively.

Table 2: PSTR estimates of economic growth with respect to FDI

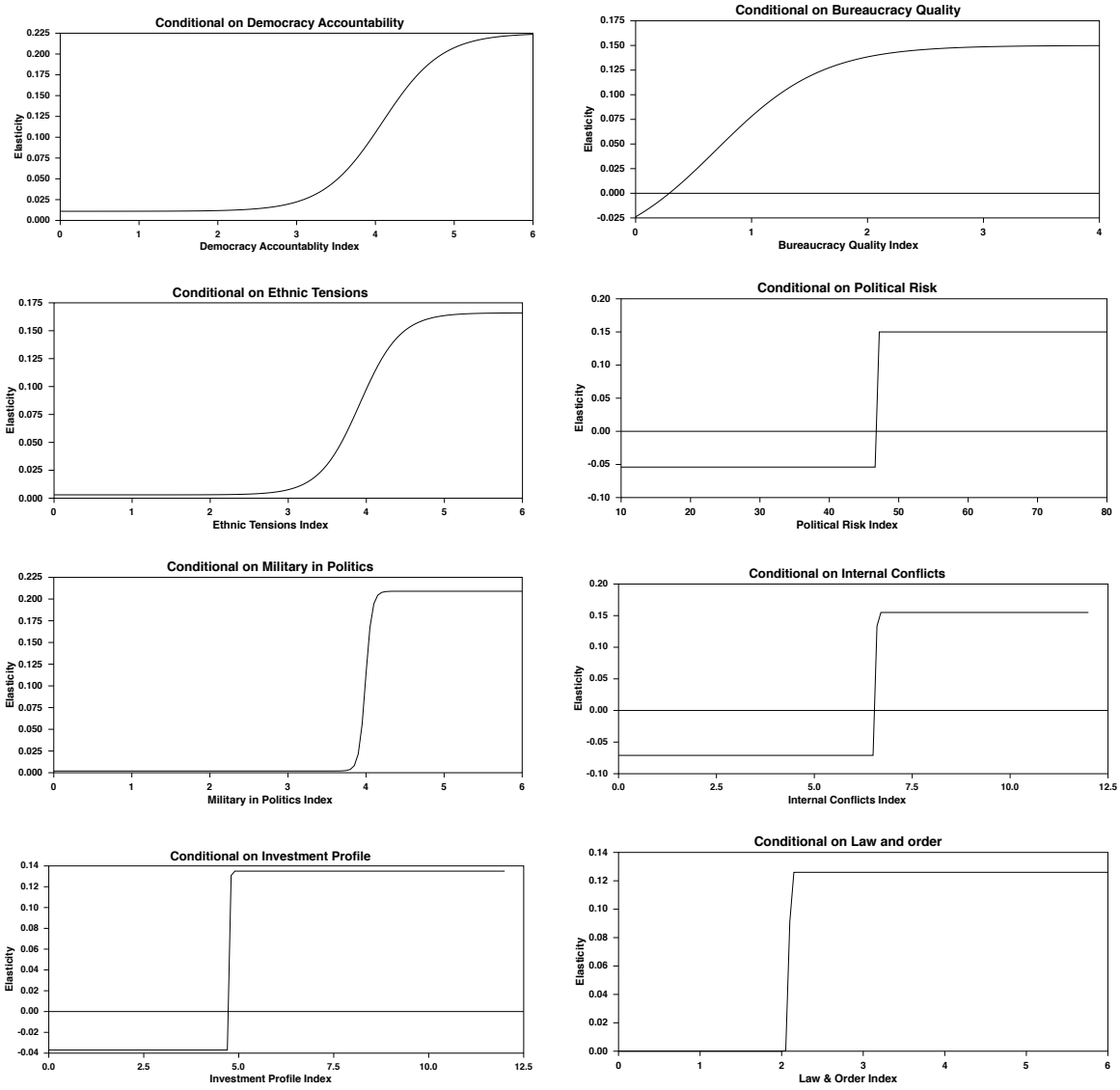

Figure 1: Elasticities of growth with respect to FDI - conditional on institutional indicators

Appendix 1: Testing homogeneity against PSTR

We follow the procedure proposed by Gonzales & Al. (2005) for testing the linearity against the PSTR model. An easy way to examine the homogeneity of the effect of FDI_{it} on y_{it} would equivalently consist in testing $\gamma = 0$ or $\beta_1 = 0$ in (1) or (2), respectively. However, in both cases the associated tests are nonstandard due to the presence of unidentified nuisance parameters under the null (see Hansen (1996)). A solution consists then in replacing $g(q_{it}; \gamma, c)$ in (1) by its first-order Taylor expansion around $\gamma = 0$. This leads to the following auxiliary regression:

$$y_{it} = \mu_i + \beta_0^{'*} FDI_{it} + \beta_1^{'*} FDI_{it} q_{it} + u_{it}^* \tag{5}$$

where the vectors β_0^* and β_1^* are proportionnal to γ, and u_{it}^* is u_{it} plus the remainder of the Taylor expansion. Testing H0 : $\gamma = 0$ in (1) is equivalent to testing H0 : $\beta_1^* = 0$ in (5) by an usual LM test or its F-version. Considering a panel of N countries over T periods ($i = 1, \ldots, N$ and $t = 1, \ldots, T$), noting SSR_0 the panel sum of squared residuals under H0 (linear panel model with individual effects) and SSR_1 the panel sum of squared residuals under H1 (PSTR model with $m = 1$), the corresponding LM statistics is computed as $LM = TN\left(SSR_0 - SSR_1\right)/SSR_0$, while the F-statistics is defined as $LM_F = (SSR_0 - SSR_1)\ /\ [SSR_0/(TN - N - 1)]$. Under the null hypothesis, the LM statistics is distributed following a $\chi^2(1)$, while the F-Statistics has an approximate $F(1, TN - N - 1)$ distribution.

Appendix 2: Details on the data

The countries in the sample are: Albania, Algeria, Angola, Argentina, Armenia, Azerbaijan, Bangladesh, Belarus, Bolivia, Botswana, Brazil, Bulgaria, Burkina Faso, Cameroon, Chile, China, Colombia, Congo Democratic Republic, Congo, Costa Rica, Cote d'Ivoire, Cuba, Dominican Republic, Ecuador, Egypt, El Salvador, Ethiopia, Gabon, Gambia, Ghana, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, India, Indonesia,

Iran, Iraq, Jamaica, Jordan, Kazakhstan, Kenya, Korea Dem. Rep., Latvia, Lebanon, Liberia, Libya, Lithuania, Madagascar, Malawi, Malaysia, Mali, Mexico, Moldova, Mongolia, Morocco, Mozambique, Myanmar, Namibia, Nicaragua, Niger, Nigeria, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Romania, Russian Federation, Senegal, Serbia, Sierra Leone, Somalia, South Africa, Sri Lanka, Sudan, Suriname, Syrian Arab Republic, Tanzania, Thailand, Togo, Tunisia, Turkey, Uganda, Ukraine, Uruguay, Venezuela, Vietnam, Yemen, Zambia, Zimbabwe.

Indicators	Mean	Std Error	Minimum	Maximum
Political risk	56.58	12.41	10.00	81.83
Government stability	7.32	2.37	0.67	12.00
Investment profile	6.31	2.18	0.00	11.50
Internal conlfict	7.94	2.56	0.00	12.00
External conflict	9.17	2.27	0.00	12.00
Corruption	2.49	1.02	0.00	6.00
Military in politics	2.95	1.64	0.00	6.00
Law & Order	2.99	1.20	0.00	6.00
Ethnic tensions	3.62	1.44	0.00	6.00
Democracy accountability	3.21	1.43	0.00	6.00
Bureaucracy quality	1.55	0.91	0.00	4.00

Table 3: Statistics of institutional indicators

	Political risk	Gov. stab.	Invest. profile	Internal conflicts	External conflicts	Corruption	Milit. in politics	Law-order	Ethn. tensions	Demo. account.	Bureau. quality
Political risk	1,000										
Government stability	0,589	1,000									
Investment profile	0,712	0,589	1,000								
Internal conflicts	0,826	0,472	0,468	1,000							
External conflicts	0,672	0,322	0,379	0,577	1,000						
Corruption	0,361	-0,027	0,042	0,192	0,114	1,000					
Milatry in politics	0,668	0,179	0,409	0,480	0,336	0,330	1,000				
Low and order	0,668	0,418	0,334	0,626	0,338	0,302	0,383	1,000			
Ethnic tensions	0,598	0,306	0,271	0,558	0,332	0,214	0,319	0,460	1,000		
Democratic accountability	0,561	0,148	0,438	0,345	0,361	0,279	0,516	0,243	0,196	1,000	
Bureaucracy quality	0,551	0,184	0,354	0,318	0,276	0,376	0,468	0,334	0,214	0,448	1,000

Table 4: Correlation coefficients between ICRG indicators

Variable	Description	Source
Growth	The annual growth rate of GDP per capita, in 2000 USD	WDI
FDI	FDI net inflows as a percentage of GDP	UNCTAD
Initial GDP per capita	Log of GDP per capita, in the first year of each five year sub-period, expressed in constant 2000 US dollars	WDI
Population growth	The annual growth rate of total population	WDI
Domestic investment	Gross fixed capital formation as a share of GDP	WDI
Trade openness	Total imports and exports of goods and services as a share of GDP	WDI
Government consumption	General government final consumption as a share of GDP	WDI
Inflation	The annual increase in Consumer Price Index	WDI
Political risk	Assesses the overall political stability based on an weighted average of the following components: Government stability, Socioeconomic conditions, Investment profile, Internal conflict, External conflict, Corruption, Military in politics, Religious tensions, Law and order, Ethnic tensions, Democratic accountability, Bureaucracy quality.	ICRG
Government stability	Assesses the government's ability to carry out its declared programs and to stay in office. The risk rating assigned is the sum of 3 sub-components: Government unity, Legislative strength and Popular support.	ICRG
Investment profile	Assesses factors affecting the risk to investment that are not covered by other political, economic and financial risk components. The rating assigned is the sum of 3 subcomponents: Contract viability/expropriation, Profits repatriation, Payment delays	ICRG
Internal conflicts	Assesses political violence in the country and its actual or potential impact on governance. The rating assigned is the sum of 3 subcomponents: Civil war/coup threat, Terrorism/Political violence, Civil disorder.	ICRG
External conflicts	Assesses the risk to the incumbent government from foreign action, ranging from non-violent external pressure to violent external pressure. The rating assigned is the sum of 3 subcomponents: War, Cross-border conflict, Foreign pressures.	ICRG
Corruption	Assesses corruption within the political system. Includes demands for special payments and bribes related to import and export licenses, exchange controls, tax assessments, excessive patronage, nepotism, 'favor-for-favors', secret party funding	ICRG
Military in politics	Assesses the involvement of military in politics, as a diminution of democratic accountability and distortion of government policy	ICRG
Law and order	Assesses the strength and impartiality of the legal system and the popular observance of the law.	ICRG
Ethnic tension	Assesses the degree of tension within a country attributable to racial, nationality, or language divisions	ICRG
Democratic accountability	Assesses how responsive government is to its people, assuming that the less responsive it is, the more likely it is that the government will fall, peacefully in a democratic society, but possibly violently in a non-democratic one.	ICRG
Bureaucracy quality	Assesses the institutional strength and quality of the bureaucracy as a shock absorber that tends to minimize revisions of policy when governments change.	ICRG

Table 5: Details on the data: definition and source