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. We consider institutional heterogeneity to be an explanation for the mixed results of previous empirical studies and we develop several arguments to show that institutional quality modulates the intensity of FDI impact on growth. 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 the 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 FDI-led growth, the improvement of the institutional framework should precede FDI attraction policies. While some features of institutional quality have an immediate effect on fostering FDI-led growth, others need a consistent accumulation of efforts, therefore challenging the effectiveness of institutional reforms in developing countries.

Keywords: FDI, growth, heterogeneity, institutional quality, PSTR, Developing economies.
JEL Classification: F21, C34, F43, O16.

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1 Introduction

When searching for solutions to boost economic growth in developing countries, foreign direct investment (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. 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)). As a result, FDI inflows were particularly encouraged by governments in developing countries, leading to an increasing share of FDI in total capital flows.

Despite consistent theoretical arguments[1], empirical evidence on the growth effect of FDI is still inconclusive. A recent literature survey by Bruno & Campos (2013) shows that 50% of empirical studies report a significantly positive effect of FDI on growth, 11% find a negative effect while 39% find growth to be independent of FDI. It thus seems that FDI plays an ambiguous role in generating economic growth, with little support for an independent positive effect.

The explanations for these conflicting results have pointed to methodological issues (Carkovic & Levine (2005)) and to the different absorptive capacity of host countries (Blomström & Kokko (2003), Lipsey & Sjöholm (2005)). Empirical research seems to converge to the conclusion that the effect of FDI on economic growth is conditional on several local circumstances, as the level of development (Blomstrom, Lipsey & Zejan (1994)), trade openness (Balasubramanyam, Salisu & Sapsford (1996)), human capital (Borensztein, De Gregorio & Lee (1998)), financial development (Alfaro, Chanda, Kalemli-Ozcan & Sayeknomics (2004)) or the business environment (Busse & Groizard (2008)).

In line with the recent emphasis on the role of institutions in economic growth[2], weak institutions are likely to be responsible for several economic problems in developing countries. Lower institutional quality is often associated with lower investment, slower productivity

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

[2] See Aghion, Alesina & Trebbi (2008), Acemoglu, Johnson & Robinson (2001), Rodrik, Subramanian & Trebbi (2004) and La Porta, Lopez de Silanes, Shleifer & Vishny (1998).

growth, lower per capita income and overall slower output growth. It is thus only natural to expect institutions to have a significant modulating role in the FDI-growth relationship. While a good level of institutional development can favor synergies between FDI and local firms and hence promote productivity spillovers, it can also induce complementarities between foreign and domestic investment and therefore increase capital accumulation. On the contrary, an underdeveloped institutional framework can disrupt productive activities and may prevent the exploitation of knowledge spillovers by domestic firms. If this is the case, countries with the same level of FDI may experience very different growth outcomes according to their institutional quality.

While a number of studies investigate the role of institutions in attracting FDI flows[3], there is very limited research dealing with institutions in explaining FDI effects (Busse & Groizard (2008), Farole & Winkler (2012)). In order to provide some insights on this issue, in this paper we investigate the conditionality of the FDI growth effect on several features of institutional quality, like political risk, law enforcement, bureaucratic quality, corruption or expropriation risk. We argue that well developed institutions enhance the overall benefits of FDI on economic growth. As Nair-Reichert & Weinhold (2001), we consider host country heterogeneity, in its wider form, to be a plausible explanation for the mixed results of empirical studies.

Our research has several original features compared to the existing 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 allow us to capture all features of institutional quality. Third, the use of Panel Smooth Transition Regression models allows us to highlight the heterogeneity of the FDI effect on economic growth, as given by institutional quality. Alternatively, for robustness checks, we rely on the generalized method of moments (GMM) estimator. Finally, the PSTR method allows us to reveal endogenous threshold values for institutional indicators associated with a shift in the FDI-growth relationship.

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

Our empirical analysis shows that institutional quality modulates the effect of FDI on economic growth in developing countries. While FDI alone has no significant growth effect, there is a minimum level of institutional quality that induces a growth enhancing effect. We thus highlight the importance of heterogeneity in analyzing the FDI-growth relationship, as we show the existence of two extreme regimes in the FDI-growth mechanism. This has two significant policy implications for developing countries. First, sequencing is needed in implementing economic policies: governments should first improve the regulatory framework before engaging in FDI attraction policies. Second, in designing institutional reforms, some features of institutional quality prove to payoff faster in terms of marginal effect on growth. Therefore, priority should be given to these specific features, as further institutional complementarities would eventually lead to an incremental effect on growth.

With the drop in global FDI flows in the turmoil of the recent economic crisis, competition among developing countries has intensified in order to attract foreign investors. Since large amounts of public funds have been devoted to FDI attraction policies, identifying the specific conditions that favor the returns on FDI is thus of great importance for policymakers in developing countries. Seeking to provide some guidance to this end, our 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 relationship. Section 3 describes the data and the methodology being used, while Section 4 presents the results and discusses their robustness. Section 5 highlights the main conclusions and policy implications for developing countries.

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

Several studies investigate the role of institutions in attracting FDI flows, confirming FDI abundance in countries with sound institutional quality[4]. 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. Institutions appear there-

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

fore to be a robust predictor of FDI inflows in developing countries, especially in what concerns property rights (Ali et al. (2010)).

In this paper, we go beyond the role of institutions as a determinant of FDI inflows and consider institutional quality as a feature of absorptive capacity. 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. To this end, we evaluate the influence of institutions on the two traditional channels of FDI led growth, namely technological spillovers and capital accumulation.

2.1 Institutional quality and productivity spillovers

The core influence of FDI on economic growth consists of productivity improvements from foreign affiliates to domestic firms. These spillovers can occur through supplier and customer linkages, increased competition, demonstration effects or labor turnover. We argue that good institutions can shape the relationship between foreign and domestic firms and therefore affect the extent of spillovers. The institutional theory (North (1990)) suggests that institutions set market rules, structure interactions among economic actors and ensure that economic actions are bounded by these rules. Furthermore, Meyer & Sinani (2009) argue that the institutional framework creates incentives and business practices that influence the nature of competition and the knowledge acquisition process. Both foreign and domestic firms are encouraged to compete in an environment protected by market rules. Adversely, bad institutions are often associated with high transaction costs and an increased risk for long term trade commitments, loosening the ties 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 prefer to transfer low-level technology, with 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, as foreign firms are non-homogeneous and of varying qualities concerning knowledge-spillovers. Bad insti-

tutional quality is likely to attract low-technology, resource exploiting FDI, with limited growth potential. Demonstration effects of foreign firms are thus stronger if institutions are well developed (Blomström & Kokko (2003)). Uncertainty associated with lower investors' protection, expropriation risk or inefficient law enforcement discourages high-end technological investments, which have the highest knowledge-spillover potential.

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 have a less growth enhancing effect (Wang & Wong (2009)) due to the fact that they do not consist of a net creation of activity[5]. Furthermore, bad institutions could also deter agglomeration effects, known to be important factors in explaining the FDI growth relationship (Hilber & Voicu (2010)).

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. Finally, the institutional environment might have implications for labor mobility between foreign and domestic firms. Excessive labor market regulation may prevent workers trained in multinationals to join domestic firms, therefore hindering potential productivity spillovers.

2.2 Institutional quality and capital accumulation

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. Morrissey & Udomkerdmongkol (2012) argue that the extent of crowding out is actually related to political stability in host countries. More precisely, the initial crowding-out effect seems to be more than compensated by larger capital accumulation in politically stable regimes. We thus argue that sound institutions

[5]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.

may reduce the crowding-out effect by encouraging foreign investment in new industries, where competition with domestic firms is less intense. Sound institutions can also efficiently channel the demand for inputs created by the entry of FDI towards local suppliers and therefore stimulate domestic activity.

The interaction between foreign and domestic investment can also occur through the financial market, especially in the case of mergers and acquisitions. As a financial flow, FDI increases the local capital supply and can favor a decrease in the market interest rate (Harrison, Love & McMillan (2004)). Domestic firms thus indirectly benefit from better access to credit and improved financial market conditions. This effect seems to be especially important in developing countries, where capital supply is scarce, provided that a minimum level of financial development is acquired. In this sense, we argue that sound financial institutions are needed for mobilizing and channeling capital towards domestic firms, by ensuring improved capital allocation and appropriate risk management. On the contrary, the lack of transparency in financial institutions could alter the flow of financial resources stemming from FDI and diminish the associated crowding-in effects.

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.

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

There is still very limited research dealing with the 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 argue that countries with restrictive regulation 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. When comparing the growth effects of greenfield investment and mergers and acquisitions, Harms & Méon (2011) 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, we focus our attention on developing countries as the potential for institutional heterogeneity allows us to expect the existence of a threshold level influencing the FDI-growth nexus.

3.1 The Panel Smooth Transition Regression model

The arguments in the previous section suggest that the impact of FDI on growth could depend on specific national factors, in particular institutional quality. This argument could alternatively explain why existing research fails to find a significant direct impact on growth. Most empirical papers indirectly assume a constant impact of FDI along the entire time span and homogeneous among the countries in the sample. Since the absorptive capacity of a country can improve, i.e. the benefits associated with FDI can intensify, as institutional quality improves. It is thus reasonable to assume that the FDI impact is not constant, but rather country or/and 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 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. It actually 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 induce the switch from an extreme regime to another, with an evolution driven by a potentially 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.

Considering a given institutional indicator as a 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} is the growth rate of gross domestic product and FDI_{it} is foreign direct investment in country i at time t, for i = 1,...,N, and t = 1,...,T. μ_i represents an individual fixed effect, while $z_{i,t}$ is a k-dimensional vector of growth determinants 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:

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

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 $m = 1$ - namely the case we will focus on[6] - there is one threshold of institutional quality, around which the effect of FDI_{it} on y_{it} is non-linear. This non-linear effect is represented by a *continuum* of parameters between two extreme regimes. The first extreme regime corresponds to $g(.) = 0$ and is associated with low values of q_{it}, while the second regime corresponds to $g(.) = 1$ and is associated with high values of q_{it}. Therefore, as q_{it} increases, the effect of FDI_{it} evolves from β_0 to $\beta_0+\beta_1$ following a single monotonic transition centered around the value c of q_{it}[7]. Between these two extreme cases, the elasticity of GDP growth

[6]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 theoretical arguments in our specific case to justify a U or inverted U elasticity of economic growth with respect to FDI, conditional on institutional quality. Moreover, note that even with $m = 1$, such a model considers a *continuum* of regimes (between the extreme high and low ones).

[7]Note that if $\gamma \to \infty$, the function $g(.)$ becomes an indicator function $I[q_{it} > c]$, and the PSTR is

to FDI, for country i at time t, is defined as a weighted average of the parameters β_0 and β_1:

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

If each country i exhibits a different value of the transition 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 be time varying. 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 institutional indicators stemming from the ICRG database. For any indicator in this database, it is easy and straightforward to examine the location of a country with respect to the identified threshold level.

Before estimating equation (1), we perform a homogeneity test of the FDI-growth coefficient, conditional on a given transition variable q. This test, presented into detail in appendix 1, indicates whether a PSTR model is suited to evaluate the effect of FDI on growth. Moreover, the rejection of the homogeneity hypothesis ($H0$) against the PSTR alternative ($H1$) allows us to select the appropriate transition variables among a set of theoretical candidates.

Finally, the issue of a potential endogeneity bias must be addressed. Solutions such as instrumental variable methods have not yet been developed in a PSTR context[8]. However, according to Béreau, Lopez Villavicencio & 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 model similar to (1). For comparative purposes, they use the generalized method of moments (GMM) to estimate a growth equation with interaction terms. As they obtain similar results (in terms of interactions significance), they conclude that the results obtained with the PSTR model are robust to endogeneity and reverse causality issues. Moreover, as our model captures the varying growth effects of FDI at different levels of the transition variable, this reduces the potential endogeneity

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.

[8]See the discussion in Fouquau, Hurlin & Rabaud (2008), which attempt to use a PSTR with instrumental variable method, but acknowledges that the convergence of the estimators has not been formally proven.

bias in the same way as the presence of interaction terms in linear models (see Aghion, Bacchetta, Rancière & Rogoff (2009) for more details). Notwithstanding uncertainty about the endogeneity 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:

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

Finally, robustness checks will be performed by comparing the results of the PSTR model with the GMM estimations of a single growth equation including interaction terms between FDI and each institutional variable.

3.2 The data

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, provided by UNCTAD. Growth is computed as the annual real growth rate of GDP per capita, stemming from the Word Development Indicators database.

Traditional determinants of economic growth are included in the regressions as control variables. The choice of these variables is driven by the numerous developments of 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 annual 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 of the World Bank.

In order to measure the quality of domestic institutions, we use the International Country Risk Guide (ICRG) database. This database, compiled by the Political Risk Services (PRS) Group, provides information on several risk indicators grouped in three categories: political, economic and financial risks. For the purpose of our research, we consider 11 indicators related to institutional quality, 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[9]. 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.

Our sample comprises 94 developing countries, situated in the lower and middle income categories according to the World Bank classification[10], with annual observation for the period 1984-2009. Our choice of countries and period sampling was dictated by ICRG data availability. The list of countries is given in appendix. More details on the data are provided in table 6.

4 The results

The results of the homogeneity tests are reported in table 1. The hypothesis of homogeneous growth impact of FDI is widely rejected for political risk, investment profile, internal and external conflicts, military in politics, democratic accountability and bureaucracy quality. As the impact of FDI is proven to be conditional on these variables, a PSTR model is thus appropriate, with the previous indicators as transition variables. The homogeneity assumption can also be rejected for law & order and ethnical tensions as transition variables, however at the 10% significance level only. While the results of the test are less clear cut for these two 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 accepted for political stability and corruption. The impact of FDI on growth is therefore independent of these two variables. This is somewhat disappointing as they are often cited in the literature as important features of the institutional environment. How-

[9]See for instance Rodrik et al. (2004), Busse & Groizard (2008) and Busse & Hefeker (2007).

[10]Countries having in 2011 a GNI per capita lower than 12 476 current US dollars.

ever, Harms & Méon (2011) also found that the marginal effect of FDI does not depend on the ICRG's measure of corruption. Moreover, this result is robust to the change of proxies being used, namely when using *political stability* and *corruption control* available in the World Governance Indicators Database (see the last part of the table 1). This first step thus 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

In the second step, we perform the PSTR regressions according to equation (4), with estimations reported in table 2. The results deserve several comments. First, all the control variables have the expected sign and are highly significant. Second, we find the direct impact of FDI on GDP growth, measured by β_0, to be 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 consistent empirical literature which fails to reveal a significant positive impact of FDI on growth (Carkovic & Levine (2005)). The second line in table 2 offers some insight: the growth impact of FDI is actually conditional on institutional development. More precisely, the β_1 coefficient, associated with the non-linear component of the model, is always positive and significant at the 1% level, with values ranging 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) to β_1, as institutional indicators range from low to high values. The shift between these two extreme regimes occurs around the associated endogenous location parameter c. This result implies that without a sound institutional framework, developing economies cannot benefit from foreign investment and any FDI promotion policy would be, in this case, useless. 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 4 in appendix).

Insert Table 2

Nevertheless, the slope of the transition function should simultaneously be considered for a comprehensive assessment on this point. The higher the γ, the sharper is the shift from one extreme regime to another. Referring to table 2 and figure 1, where we plotted the obtained elasticities[11], the slope appears to be sharp for several indicators: political risk, investment profile, internal and external conflicts[12] and law & order. Considering for instance the law & order indicator, 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 growth with respect to FDI, from 0.0 to 0.126. However, for a country which is far below this threshold value, the same effort will have no effect on the elasticity. Similar patterns are obtained for political risk, investment profile, internal and external conflicts.

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 country whose democratic accountability indicator is just below the threshold value of 4.09. According to the smooth transition function, any improvement in democratic accountability will result in a very gradual increase in the growth effect of FDI (from 0.011 to eventually reach 0.225). As opposed to the sharp transition previously described, any effort to improve institutional quality, even by a country far below the threshold value, will always be rewarded (by a gradual increase in the marginal effect of FDI). Similar patterns are expected with ethnical tensions, bureaucracy quality and, to a lesser extent, military in politics[13].

Insert figure 1

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 function and the

[11] Given the high number of countries in the sample, it would be confusing to precisely locate each of them in figure 1. However, referring to the available ICRG database, it is quite straightforward to compare the score of any country with the endogenous threshold parameters. In the same manner, considering the time-varying impact of FDI for a given country, 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).

[12] 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 in figure 1.

[13] Note that the variety of profiles justifies *ex post* the use of a PSTR instead of a PTR model.

location of a country with respect to the threshold value allow us to anticipate the effectiveness of institutional reforms in terms of FDI-led growth. 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 that the country is not far below the corresponding threshold value. Due to a smooth marginal effect, improving democratic accountability, 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 5). This means that improvements in one variable are likely to have positive effects on other institutional characteristics. A country can thus hope for institutional complementarities. Even for a country that would be far from the aforementioned thresholds, reforms intended to improve "smooth-transitional" variables would in the same time bring the "sharp-transitional" indicators closer to their respective thresholds and eventually lead to a shift. Thus, small efforts concerning these "smooth-transitional" indicators could afterwards significantly increase the elasticity of growth with respect to FDI.

The GMM estimations (Arellano & Bond (1991), Blundell & Bond (1998)), reported in table 3 confirm the robustness of the PSTR results. While explicitly taking into account the endogeneity of FDI, all interaction terms between FDI and institutions are positive and significant, confirming the non-linear effect on economic growth. More, as in the PSTR regression, FDI alone has a negative or, at best, a non-significant effect on growth. These results reinforce our conclusion that FDI is growth enhancing only in countries having attained a minimum level of institutional development.

Insert table 3

5 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 can influence the FDI-growth mechanism.

We first develop several theoretical arguments to show that institutional quality modulates the two main channels of FDI-led 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 of 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, while a favorable institutional environment induces a growth enhancing effect. This implies an elasticity of economic growth with respect to FDI that is time and country varying. Our findings are robust to the methodology used since similar results are obtained using the GMM estimator.

Two main policy implications can be derived from our results. First, the existence of a threshold level of institutional quality that conditions the FDI growth effect sheds doubt on the effectiveness of FDI attraction policies. More precisely, these policies will have no benefit for host countries unless there is an improvement of their institutional framework first. Therefore, sequencing is needed in implementing economic policies, with a priority given to measures upgrading the local institutional environment before engaging in FDI attraction policies.

Second, our results may provide guidance in constructing institutional reforms in developing countries, as they provide insights on the effectiveness of institutional reforms in terms of FDI-led growth. More precisely, we show that certain features of institutional quality have an immediate potential for fostering FDI-growth effect (smooth transitional indicators), while others need an accumulation of efforts in order to allow FDI to become

growth-enhancing (sharp-transitional indicators). This remark has serious implications for countries situated just below the threshold value of institutional quality. Any reforms in the field of democratic accountability, bureaucracy quality, ethnical tensions or military in politics will likely result in a gradual increase of FDI benefits, even for countries situated far below the threshold. On the contrary, reforms focused on law and order, political risk, investment profile or internal and external conflicts are only effective for countries close to the threshold value. Nevertheless, due to institutional complementarities, reforms targeting specific features of institutional quality can actually bring other features closer to their respective thresholds, therefore leading to a potentially incremental effect on growth.

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Threshold variable	LM Test	F Test	Threshold variable	LM Test	F Test
Political risk	0.001	0.002	Bureaucracy quality	0.026	0.032
Government stability	0.665	0.681	Corruption	0.775	0.765
Investment profile	0.006	0.008	Military in politics	0.013	0.017
Internal conflicts	0.001	0.002	Law and Order	0.107	0.103
External conflicts	0.001	0.002	Ethnic tensions	0.104	0.120
Democratic accountability	0.001	0.002			
WGI indicators:					
Political stability	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**	**Ethnic tensions**	**Democratic 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)	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

Interaction variable:	**Political risk**	**Investment profile**	**Internal conflicts**	**External conflicts**	**Military in politics**	**Law and Order**	**Ethnic tensions**	**Democratic accountability**	**Bureaucracy quality**
FDI	-0.665***	-0.250	-0.603*	-0.543***	-0.167	-0.275	-0.309	-0.471***	-0.077
	(0.240)	(0.168)	(0.361)	(0.143)	(0.142)	(0.197)	(0.235)	(0.166)	(0.055)
FDI × Institut. quality	0.014***	0.048**	0.084**	0.076***	0.091**	0.119*	0.109*	0.158***	0.164***
	(0.004)	(0.023)	(0.040)	(0.018)	(0.038)	(0.062)	(0.059)	(0.031)	(0.036)
Institutional quality	0.062***	0.267**	0.196**	-0.207*	-0.001	0.492**	0.135	-0.309*	-0.217
	(0.020)	(0.117)	(0.095)	(0.108)	(0.141)	(0.200)	(0.173)	(0.177)	(0.198)
Initial GDP per capita	-0.716***	-0.593***	-0.492***	-0.405**	-0.496**	-0.373**	-0.594***	-0.448**	-0.478**
	(0.178)	(0.194)	(0.187)	(0.189)	(0.195)	(0.180)	(0.195)	(0.196)	(0.186)
Openess	0.001	0.006	0.001	0.007	0.006	0.007	0.008	0.008	0.006
	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)
Gov. Consumption	-0.188***	-0.187***	-0.185***	-0.177***	-0.202***	-0.200***	-0.179***	-0.195***	-0.181***
	(0.032)	(0.032)	(0.031)	(0.037)	(0.035)	(0.033)	(0.034)	(0.037)	(0.035)
Inflation	-2.10^{-4}**	-2.10^{-4}**	-2.10^{-4}**	-2.10^{-4}**	-3.10^{-4}**	-2.10^{-4}**	-2.10^{-4}**	-3.10^{-4}**	-3.10^{-4}**
	($1.3\ 10^{-4}$)	($1.3\ 10^{-4}$)	($1.2\ 10^{-4}$)	($1.4\ 10^{-4}$)	($1.3\ 10^{-4}$)	($1.3\ 10^{-4}$)	($1.3\ 10^{-4}$)	($1.4\ 10^{-4}$)	($1.4\ 10^{-4}$)
Pop. Growth	-0.818***	-0.933***	-0.870***	-1.049***	-0.915***	-0.806***	-0.961***	-1.064***	-0.954***
	(0.188)	(0.194)	(0.188)	(0.177)	(0.189)	(0.195)	(0.175)	(0.198)	(0.188)
Domestic inv.	0.172***	0.191***	0.179***	0.197***	0.180***	0.164***	0.200***	0.193***	0.197***
	(0.032)	(0.035)	(0.033)	(0.036)	(0.039)	(0.036)	(0.036)	(0.041)	(0.040)
Constant	3.816**	4.477**	4.295**	6.661***	5.872***	3.626**	5.398***	6.530***	5.507***
	(1.853)	(1.877)	(1.855)	(1.897)	(1.801)	(1.634)	(1.704)	(1.928)	(1.655)
Hansen Statistic	67.36	74.37	67.85	70.54	71.29	73.04	73.49	72.83	71.89
Hansen P-value	0.363	0.176	0.348	0.268	0.248	0.205	0.195	0.210	0.233
AR(2) Statistic	-1.426	-1.434	-1.523	-1.355	-1.430	-1.489	-1.421	-1.278	-1.446
AR(2) P-value	0.154	0.151	0.128	0.176	0.153	0.136	0.155	0.201	0.148
Number of obs.	1741	1743	1743	1743	1743	1743	1743	1743	1743

Note: Standard errors in brackets. *,** and *** denote significance at the 10%, 5% and 1% level, respectively. Estimation is run using System GMM Blundell & Bond (1998) with robust standard errors, consistent with panel-specific autocorrelation and heteroskedasticity. The Hansen test has the null hypothesis of joint exogeneity of the instrument set, while the Arellano & Bond (1991) AR(2) test has the null of no second order serial correlation in the residuals. Failure to reject the null of both tests provides support for the consistency of the estimated model.

Table 3: GMM estimates of economic growth with respect to FDI with institutional interaction variables

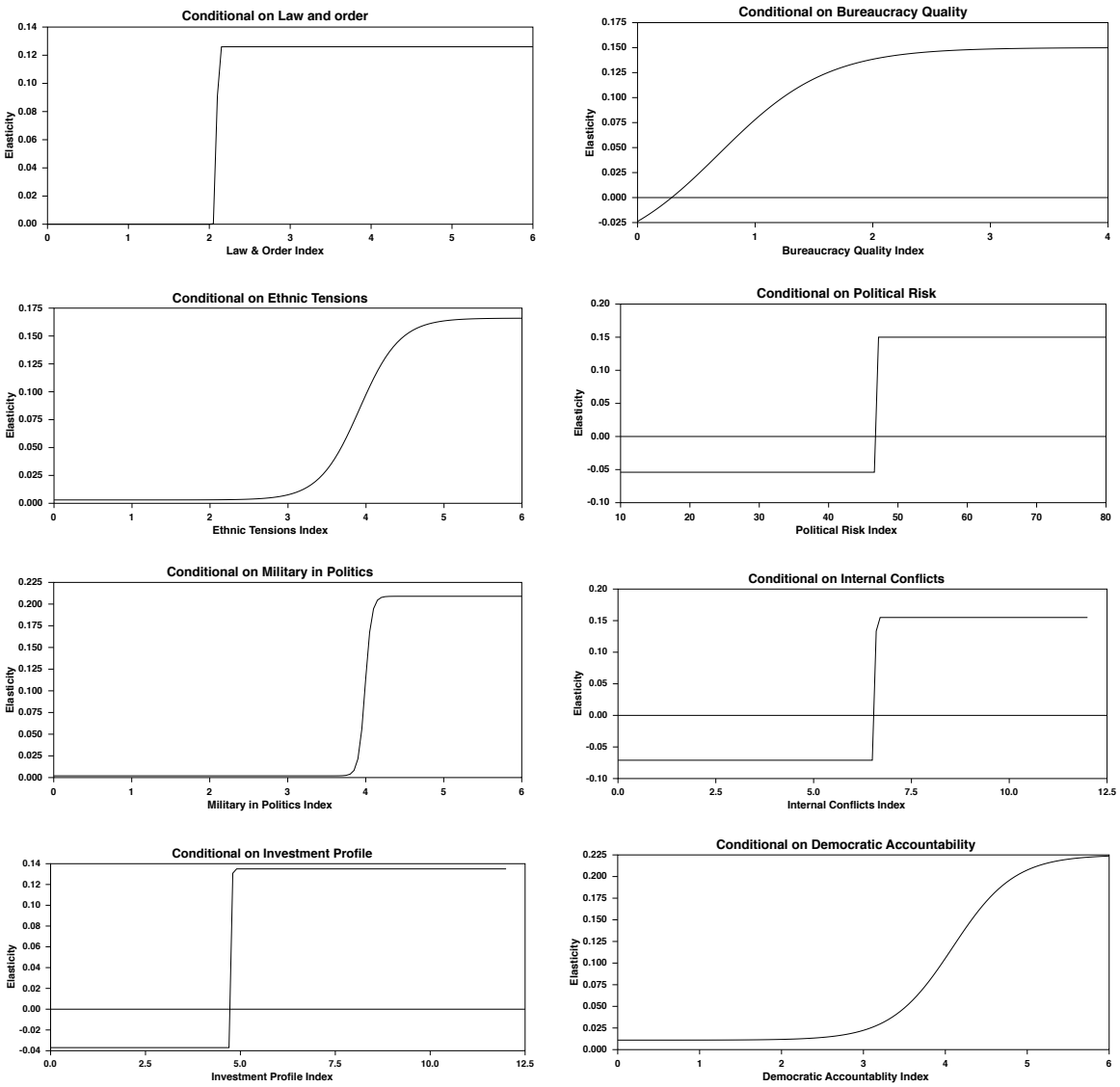

Figure 1: Elasticities of growth with respect to FDI - conditional on institutional indicators

Appendix 1: Testing homogeneity against PSTR

We follow the procedure proposed by Gonzales & Al. (2005) for testing 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 remaining of the Taylor expansion. Testing H0 : $\gamma = 0$ in (1) is equivalent to testing H0 : $\beta_1^* = 0$ in (5) by a 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, Mon-

golia, 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
Democratic accountability	3.21	1.43	0.00	6.00
Bureaucracy quality	1.55	0.91	0.00	4.00

Table 4: Statistics of institutional indicators

	Political risk	Gov. stab.	Invest. profile	Internal conflicts	External conflicts	Corruption	Milit. in politics	Law-order	Ethn. tensions	Dem. 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 5: 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 reduction 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 6: Details on the data: definition and source