

Submitted for Track 9: MNEs, governments and local development

Institutional Determinants of FDI Inflows in the Primary Sectors

ABSTRACT

A growing literature demonstrates the positive role, in general, for a favourable institutional environment in attracting foreign direct investment (FDI). Some studies have argued that this relationship is weaker in the primary sector. However, the primary sector itself consists of industries such as the mining and petroleum sector and the agricultural sector which have different characteristics that potentially matter for FDI. We provide a theoretical discussion identifying relevant dimensions of FDI that vary across sectors, and reinvestigate the institutions-FDI relationship using UNCTAD data on FDI inflows between 1996 and 2007 for total FDI, agricultural sector FDI and mining and petroleum sector FDI. Taking into account issues such as observations of zero, missing observations and sample selection through Tobit and Heckman analyses, we confirm the importance of institutions for total FDI. The evidence of differential impacts across primary subsectors is much weaker. In many analyses, institutions are important also for primary sector FDI, regardless of subsector. Some differences are found between the primary subsectors, but these are not robust.

Keywords: Institutions, foreign direct investment, primary sector, panel data

Institutional Determinants of FDI Inflows in the Primary Sector(s)

1. INTRODUCTION

A sizeable literature has demonstrated that host-country institutions matter for the location decisions of multinational enterprises (MNEs). Previous research has found a relationship between FDI and factors such as socio-political stability, political freedom, democracy, and institutional quality, though the size and direction of the effects for particular institutions remain somewhat unclear (Ali et al, 2010; Blonigen, 2005). Some of the inconsistent results among previous studies have been explained by varieties of research design, units of analysis, period of time, countries under investigation and independent variables, all affecting the result. For example, one proposed explanation for the conflicting results for democracy measures has been the change in the sectorial composition of FDI over time. Previously, when resource-seeking primary FDI had a greater share of FDI flows, democracy did not have a positive influence. However, as services (market-seeking FDI) and manufacturing (efficiency-seeking FDI) have grown in importance, the role of democracy as a positive FDI determinant has also increased (Schulz, 2009).

Most studies have used aggregate FDI figures, but recent research suggests that sector-specific characteristics matter. Schulz (2009) and Walsh and Yu (2010) find no evidence that institutional quality affect investment decisions in the primary sector. The primary sector, though, itself consists of several different industries facing different governmental regulations and having different investment characteristics. This heterogeneity is masked by using aggregated data, and there are, potentially, important differences across the various sub-sectors, affecting the institutions-FDI-relationship. Only a handful of studies have looked specifically at industries beyond the primary-secondary-tertiary classification. Kolstad and Villanger (2008), studying institutional quality and FDI in services suggest that there are

differences between types of industry; for instance, institutional quality is found to matter in the transport industry but not in the financial industry. To our knowledge, the only study looking at differences among *primary sectors* (in their case, petroleum versus mining) is Blanton and Blanton (2009) considering variables such as human rights, worker rights and democracy. Their study is, however, based only on US data, and it is unclear how generalizable the findings are to other source countries of FDI.

We develop theoretical arguments on differential impacts of institutions between primary sub-sectors. These lead to hypotheses which are tested empirically using UNCTAD data on inflows the agricultural, forestry and fishing sector and in the mining, quarrying and petroleum sector from 1996 to 2007. Overall, we confirm the important role of a “benign” institutional environment for aggregate FDI inflows. The differences across the primary subsectors are fewer than expected and not robust. The main result is, indeed, that many types of institutions also attract FDI in both primary subsectors.

We make several contributions. First, we extend the analysis of locational factors in the dominant analytical framework in international business, Dunning’s ownership-location-internalization (OLI) model (Dunning, 1998; Dunning & Lundan, 2008), by bringing in a richer characterization of countries’ institutional set up that has been developed in political science. Second, we identify a number of sectorial characteristics which are likely to affect the general institutions-FDI-relationship. We also take a first step towards linking arguments from the largely empirically based and eclectic institutions-FDI literature more closely with the economic-theoretical discussions of FDI risk based on the property rights literature (Grossman & Hart, 1986; Schnitzer, 1999); in particular by discussing notions such as effective *control rights* over investments, which may vary between sectors. Finally, our

separate investigation of agricultural, forestry and fishing FDI versus mining and petroleum FDI appears to be novel in the empirical institutions-FDI-literature.

In Section 2, we briefly review previous literature on institutions and FDI. In Section 3, we provide our theoretical discussion identifying a range of relevant dimensions of FDI that may affect the role of institutions. Section 4 describes our method and data, and Section 5 reports the results. Section 6 concludes.

2. INSTITUTIONS AND FOREIGN DIRECT INVESTMENT

Following North's (1990, p. 3) widely cited definition, institutions are "the rules of the game in a society, or, more formally, are the humanly devised constraints that shape human interaction." It is now generally agreed that host-country institutions can be potentially important location advantages (Blonigen, 2005; Dunning, 1998). The literature has considered the effects from a wide range of institutionally related variables on received FDI volumes. Interpretation of the results is complicated by the fact that some of these variables are political regime type characteristics, some are "lower-order" institutional characteristics such as property rights protection, while still others may be considered more in terms of being "outputs" of the institutional characteristics, such as political stability or regime duration. To complicate even more, much of the effect of institutions on FDI may be indirect via policy characteristics such as trade openness and economic outcomes e.g. in terms of economic growth and inflation (Knutsen, 2011b). Some of these linkages are illustrated in Figure 1 below. In the following, we first briefly review some of the main theoretical arguments and cite relevant empirical studies. We next discuss a small number of studies that have considered effects at more disaggregated industry levels.

[FIGURE 1 ABOUT HERE]

The most general institutional characteristics relate to *political regime type* (i.e. democracy versus autocracy). The relationship between autocracy, democracy and FDI has long been a contentious one in the literature. Many studies from the 1960s and 1970s found a positive effect of autocratic characteristics (Huntington & Dominguez, 1975), but later many scholars have argued for a positive effect from democracy for general economic outcomes (North & Weingast, 1989; Olson, 1993), and a number of studies have found positive effects also on FDI (Busse, 2004; Harms & Ursprung, 2002; Jakobsen & De Soysa, 2006).

Part of the disagreement about the effects of regime type concerns how the latter affect lower-order institutional characteristics. One particularly important such characteristic is *property rights protection*, defined by North (1990, p. 33) as “the rights individuals appropriate over their own labor and the goods and services they possess. According to North, “[a]ppropriation is a function of the legal rules, organizational forms, enforcement, and norms – that is, the institutional framework” (1990, p. 33). The relationship between democracy and property rights is much discussed (Knutsen, 2011a). At one end of the spectrum authors have argued that autocracy promotes property rights protection *inter alia* by more efficiently sheltering property from popular demands for redistribution. At the other end of the spectrum, authors argue that democracy, through greater restrictions on power of the executive, limits the discretion of power holders e.g. to expropriate property for personal gains or to reward political supporters. Overall, the evidence seems to support the latter view (Knutsen, 2011a).

This account implies that the main effect of democracy on FDI comes via property rights protection. Thus, for instance Li and Resnick (2003) found that the positive effect of democracy on FDI disappeared once property rights were controlled for. Similarly, Adam and Filippaios (2007) found that the political liberties component of democracy, which is most closely linked with constraints on executive power, attracted FDI while the civil liberties

component did not. Nevertheless, some studies have found a positive effect of democracy on FDI even when controlling for property rights (Jakobsen & De Soysa, 2006), and it is likely that also other mechanisms are at work. For instance, democracy, as well as related factors such as human rights (Blanton & Blanton, 2006, 2007) and labour rights (e.g., Busse et al, 2011; Mosley, 2010) may have a positive effect on FDI by encouraging investment in human capital (Kucera, 2002), leading to higher productivity. Finally, it has been suggested that democracy, human rights and labour rights could have a more direct effect on FDI location decisions through normative concerns. Such an effect could both work via moral concerns among MNE decision makers themselves (Brown et al, 2010) or because MNEs, in particular from developed country markets, increasingly see a need to take into account morally motivated consumers and investors (Vogel, 2005). Facing a “spotlight regime” (Spar, 1998), MNEs may be reluctant to invest in autocracies with poor human rights and labour rights protection.

Other host country political institutions have also been linked to FDI decisions. In particular, one much studied factor is *corruption*. Again, diverging theoretical arguments have been proposed. On the one hand, it has been suggested that corruption may work as “grease in the wheels” by allowing transactions in contexts with poorly functioning institutions. On the other hand, corruption may work as “sand in the wheels” to increase both the costs and uncertainty of doing business (Shleifer & Vishny, 1993). On balance, the evidence on the link between corruption and FDI seems to suggest that the negative effects prevail (e.g., Bénassy-Quéré et al, 2007; Busse & Hefeker, 2007; Cuervo-Cazurra, 2006; Wei, 2000).

Overall, though the results for particular institutional indicators sometimes vary, the literature has generally demonstrated a role for a “benign” institutional environment in attracting FDI. While most of the studies referred to above have used aggregate data, a

number of recent contributions have used more disaggregated data to bound and qualify some of the mechanisms described above. For example, researchers have taken into account the source country of the investment (Buckley et al, 2007; Cuervo-Cazurra, 2006) and investing firm characteristics such as state ownership (Knutsen et al, 2011).

Of particular interest for the present paper are a handful of studies considering the *differential effects across sectors and industries*. While both theory and empirical studies suggest that institutions matter, institutions as a “man-made” location advantage must be traded off against other “exogenous” location variables such as market size, and in particular the presence of resources that are difficult to find elsewhere. This is, of course, particularly relevant for the resource sector, where investment is primarily resource-seeking and “[c]hoices are greatly limited when choosing between alternative investment sites” (Ali et al, 2010, p. 205). Although MNEs prefer better institutions, the limited availability of certain resources could mean that good institutions are an unaffordable luxury. Moreover, arguments have been made, for instance, that institutions should generally be less important in the primary sector also because the sectors are generally less integrated in the host economy and are less dependent on obtaining a “social license” for their activities (Alfaro, 2003; Blanton & Blanton, 2009); and involve less complex products that do not equally require good contracting institutions to achieve coordination and ensure contracts are upheld (Nicolini, 2008). Clearly, the primary sector is a very special sector, linked to “resource curse” (Van der Ploeg, 2011) and transparency issues (Haufler, 2010). In general, the prediction of a lesser role for institutions in the primary sector has been borne out by the few studies available (Ali, et al, 2010; Schulz, 2009; Walsh & Yu, 2010), though Berge (2012) found corruption to deter Norwegian FDI in natural resources, and Blanton and Blanton (2009) found worker rights to attract US FDI in the petroleum sector, but not in the mining sector.

However, as noted there is also substantial heterogeneity between the resource sectors. For one thing, while some types of resources (e.g. certain types of minerals) may be found only in a limited set of locations, for others (e.g. forests or fisheries) there may be a much greater set of choices. Primary sectors also differ substantially in terms of the size of the investments and the technological level that is required. Industries such as petroleum extraction and mining are generally characterized by large investments which once made are "sunk", and which may subsequently be vulnerable to expropriation or other unfavourable actions by the host government. Such actions may still be less tempting for host governments to the extent that a high technological knowledge level is required to operate the investments, which makes the host country dependent on the MNEs. This is unlikely to be true to the same extent in, for instance, the agricultural sector, where access to land and cheap labour is what counts. In the next section, we investigate differences between the primary sectors in terms of the institutions-FDI-relationship.

3. INSTITUTIONS AND FDI IN THE PRIMARY SECTOR: A CLOSER LOOK

The simplified framework for the discussion to follow is represented in Figure 2 below. In the figure, the arrows represent a collection of proposed causal mechanisms, as discussed in Section 2. As we conceptualize it, the "general" institutions-FDI-relationship is "moderated" by a number of investment characteristics that make the proposed mechanisms more or less relevant (for example, the characteristics may be taken as indicating scope or boundary conditions for where a proposed mechanism is operable).¹ The moderating effects of FDI characteristics, represented by the dashed arrows, enter for each of the causal channels identified in the general discussion above. Our discussion starts by outlining a number of potentially important such investment characteristics and considering how they affect various

proposed mechanisms underlying the institutions-FDI relationship. They are then linked to particular sectors: *Agriculture* (including forestry and fishing), and *Mining and petroleum*.

[FIGURE 2 ABOUT HERE]

3.1 FDI characteristics

Resource concentration. While some types of primary resources are restricted to just a few locations (e.g. certain minerals), others are so only to a lesser extent (e.g., forestry). In the latter case, MNEs may afford the luxury of seeking more favourable institutional contexts. Thus, the simple but powerful point remains that when the resource is heavily concentrated at certain locations, the role of any type of institution is less important.

Required investment commitment. Sectors differ in terms of the upfront investment that is needed. The economics of mining and petroleum are such that they generally require vast investments. Marshall (2001, p. 9) notes that “[l]ocating, developing and constructing a modern mine usually requires hundreds of millions of dollars in capital investment”, and that, “[u]nlike a manufacturing business, a modern mine does not have the option of starting small and, if things go well, expanding. To achieve the economies of scale required, a modern mine must start large with the associated large capital cost”. Much of the same can be said about petroleum extraction. Clearly, the larger the required investment commitment, the greater the role for institutions in safeguarding these investments.

Effective control rights to assets. This dimension is based on the property rights and incomplete contracts literature (Grossman & Hart, 1986). The notion of *sovereign risk* suggests that ultimately, the host state retains control rights to all assets in its territory, given that international contracts are generally ultimately unenforceable (Schnitzer, 1999). This is then an example of the classic hold-up problem whereby one actor cannot credibly commit not to exploit a superior bargaining position *ex post* (Klein et al, 1978; Williamson, 1985).

Given that the FDI has been sunk, the only real deterrent to expropriation is the negative reputational effect on future investments. However, this neglects the issue of who in fact has the effective control rights of FDI. In particular, to the extent that advanced technologies are involved and these are difficult to operate without the participation of the MNE, making FDI *inalienable* (Albuquerque, 2003; Schnitzer, 1999), the benefits from e.g. expropriation will be lower; although Vernon's (1971) famous "obsolescing bargain" argument assumed that over time, the host country would learn to operate the investment, progressively reducing the bargaining power of the MNE. An important part of the MNE's assets, over which the MNE will plausibly retain effective control rights, is human capital which can be withdrawn from the country. Something similar likely applies to intangible assets such as brand names. On the other hand, when the assets largely consist of physical assets embodying little technology, de facto control rights will be relatively weaker. Finally, MNEs may have other strategies available for reducing risk without fully refraining from investing. For example, MNEs can (inefficiently) scale down their operations to limit the amount of assets at risk (Eaton & Gersovitz, 1984; Jensen, 2008). The availability of such strategies might also be conceptualized as a form of effective control right. The relevance for institutions lies in the fact that the greater the effective control rights of the MNE over the investment, the lesser should be the need for protection of property rights in the investments.

Investment horizon. Marshall (2001, p. 9) notes that in the mining sector "[e]xploration often lasts five to ten years, with preliminary assessment, feasibility study preparation and ongoing stakeholder consultations leading to the necessary Government approvals, taking an additional two to three years." This is important in relation to policy commitment, for instance; while the MNE may have a good relationship with one government, there may be uncertainty about future governments will do and hence need for more

institutionalized protection e.g. of property rights. Hence, the longer the investment horizon, the more important are institutions that ensure protection of property rights, as well as those that promote policy stability.

Social sensitivity. MNEs operating in problematic countries with respect to democracy, human rights and labour rights face reputational risk and possible harm to brand value. While primary products are in general characterized by less contact with final consumers, making the reputation mechanism less relevant (Vogel, 2005), some primary sectors carry important social and symbolic importance. One example is the food sector, as suggested by the attention surrounding “land grabbing” (Borras Jr et al, 2011) and the rise of “ethical” trade initiatives such as Fairtrade (Milford, 2004). Thus, in sectors characterized by social sensitivity, the “spotlight regime” (Spar, 1998) may be relatively stronger, leading MNEs to seek out democratic countries with good human rights and labour rights protection.

Skill levels and relative capital/labour intensity. Many resource extraction activities involve large capital investments, and labour costs are then often of relatively little importance. Further, while worker skill levels are, on average, less important in the primary than in the manufacturing and service sectors, they may be more important in primary sectors requiring the operation of sophisticated capital equipment. Thus, the proposed mechanism whereby democracy and human rights promote investments in human capital may be more relevant here; which may help explain why Blanton and Blanton (2009) found a positive effect from worker rights in the petroleum sector. In contrast, e.g. most work in the agricultural sector requires low skill levels, and labour costs may be a more important concern for MNEs in this sector; which, according to some common arguments (see Blanton & Blanton, 2007 for further discussion) would suggest a role for repressive regimes in keeping labour costs down.

Extent of government regulation. Many resource sectors, especially strategically important sectors such as the petroleum sector, are characterized by strict governmental regulation. Marshall (2001) argues that the many points of regulation in the mining sector makes it particularly susceptible to corruption. *All else equal*, this would imply that firms in heavily regulated sectors have an interest in going to relatively less corrupt countries. Similarly, the higher the degree of regulation in a sector, the greater one might expect the importance of a well-functioning bureaucracy to be.

MNE production system vulnerability. Finally, we consider the degree to which disruption of the operations in the country would threaten the global production system of the MNE. As noted by Schulz (2009, p. 9), “[r]esource-seeking FDI typically involves vertically integrated production structures, in which raw materials sourced in the developing world are used as production inputs in the MNC’s home country”. While vertical FDI might indicate more trade dependence of the host country on the MNE, at the same time expropriation might also to a greater extent threaten the entire supply chain (Guerin & Manzocchi, 2007). There are theoretical arguments for why vertical FDI is more sensitive to political risk than horizontal FDI; due to greater substitutability of outputs produced in different countries in HFDI, “[t]he ability to diversify production when FDI is horizontal cuts the exposure to the political risk induced by the threat of nationalization or production stoppage” that is more serious in HFDI (Aizenman & Marion, 2004, p. 133). However, this vulnerability may differ even between primary sectors because resource availability, factor prices and trade costs, and hence the locational distribution of economic activities varies across them (Barba Navaretti & Venables, 2004).

Furthermore, there may be an indirect effect of institutions to the extent that they promote an efficient (physical) infrastructure (Blonigen, 2005), upon which many primary

sector operations are highly dependent. Mining firms are heavy users of roads, railroads and airports (Marshall, 2001), while transporting petroleum resources relies on pipelines etc.

3.2 Differences in the institutions-FDI relationship for the primary subsectors

While the discussion above has remained relatively abstract, we now apply these dimensions to two broad primary sectors to be investigated empirically below: The agricultural sector (including agriculture, forestry and fishing) and the mining and petroleum sector (mining, quarrying and petroleum). Table 1 below sums up our arguments on how the different sectors score in terms of the dimensions discussed above. Taking these together, we conclude with stating a set of hypotheses that will be tested in the next section. First, in general resource such as minerals and petroleum are likely to be characterized by a higher *resource concentration*. Regarding *resource commitment*, mining and petroleum require often large scale plants, while the upfront investments required in the agricultural sector are much less. *Effective control rights* may also differ across primary subsectors. In sectors such as agriculture and forestry the main investment is in land and the technological level required for operation is presumably generally low. The assets that an MNE will be able to recover if exiting in such cases are probably virtually zero. On the other hand, reducing risk by adjusting the scale of operations may be less viable in sectors such as mining that rest on economies of scale (Marshall, 2001). Third, while many agricultural products may take some time to grow (Milford, 2004), in general the *investment horizon* is likely to be longer for mining and petroleum investments, which may include extensive exploratory activities. Fourth, the *social sensitivity* of the agricultural sector is likely to be greater, leading to a relatively more important role of the spotlight regime.

[TABLE 1 ABOUT HERE]

Fifth, mining and petroleum are generally characterized both by *higher capital-intensity*, reducing the importance of labour costs, and by *higher skill requirements* (notably to operate machinery), suggesting a positive role for democracy and human rights in promoting human capital and that their possible effect in terms of raising labour costs is less important. Sixth, mining and petroleum, in general, are likely to be *more heavily regulated*, meaning that corruption and bureaucratic efficiency take on greater importance. Finally, the *vulnerability of the MNE global production system* to disruption of production is likely to be greater in the mining and petroleum sectors. One would expect the risk expropriation poses to the supply chain to depend on the type of product in question. For instance, it is probably more important in the case of rare earth minerals than in the case of forests or agricultural land.

As some of these mechanisms work in opposite directions, the net effect is not fully clear. Although control rights over FDI in the mining and petroleum sectors may be greater, the longer investment horizon and the greater resource commitment suggest a greater role for property rights. Above all, however, greater resource concentration may trump other concerns. We do not expect this to be the case, however, for the agricultural sector: Resources here are likely to be more widely available. Thus, although e.g. property rights protection might be relatively less essential here, we still believe that MNEs value it – and that they may be able to choose locations offering such benefits. Also for democracy and human rights, there are opposing effects: the social sensitivity of the agricultural sector may not be strong enough to mitigate the role of labour costs, meaning that the net effect is unclear. Moreover, the spotlight regime may be less relevant for MNEs originating in non-Western countries, many of which themselves have autocratic characteristics. The direct effect from democracy and human rights is therefore less obvious when considering a global sample as we do in our empirical analysis. When it comes to bureaucratic efficiency and corruption, while the greater

pervasiveness of government regulation would suggest that avoiding corruption is important, limited resource availability could well lead to a positive association. Weighting these factors thus involves a large degree of conjecture. Overall, we expect the following:²

Hypothesis 1. Total FDI inflows are (i) positively related to property rights protection; (ii) positively related to human rights; (iii) positively related to bureaucratic efficiency; (iv) positively related to policy stability.

Hypothesis 2. FDI inflows in the agricultural sector are (i) positively related to property rights protection; (ii) unrelated to human rights; (iii) unrelated to bureaucratic efficiency; (iv) positively related to policy stability.

Hypothesis 3. FDI inflows in the mining, quarrying and petroleum sectors are (i) positively related to property rights protection; (ii) unrelated to human rights; (iii) positively related to bureaucratic efficiency; (iv) positively related to policy stability.

4. DATA AND METHODS

4.1 Dependent variable: FDI with breakdown on primary subsectors

Our dependent variables are the annual inward FDI flows in million USD for total FDI (*TotalFDI*) (reported for 189 countries) as well as for primary sector FDI (reported for 88 countries) from 1996 to 2007.³ We consider the following primary subsectors as classified in the International Standard Industrial Classification (ISIC), Rev 4: (i) Agriculture, forestry and fishing (section A, divisions 01-03) (*AgroFDI*), and (ii) mining, quarrying and extraction of crude petroleum and natural gas (section B, divisions 05-09) (*MiningPetroFDI*).⁴

About half of the countries reporting total FDI also reported primary sector FDI during our sample period; for the other countries, these data enter as missing.⁵ An increasingly recognized issue in this type of studies is how to treat missing observations and observations of zero (Daude & Stein, 2007). Simply omitting observations of zero as done in some early

studies means that one risks throwing away important information: Zero FDI might reflect, for instance, an institutional environment sufficiently unfavourable to make the country “off bounds” for most MNEs (Vogel, 2005). There is also the related issue of negative FDI. The transformation $Y = \ln(x + \sqrt{x^2 + 1})$ (Busse & Hefeker, 2007, p. 404) allows us to make inferences both from observations with negative and with zero values. On the other hand, *missing data* for FDI may either reflect that there in fact was no FDI (and hence no need to report), or that the country is not able or willing to report. The latter may in turn be related to institutional quality: Countries with low bureaucratic efficiency may lack the capacity to collect and report relevant data, while lack of democracy could in some circumstances lead government to conceal data (Knutsen et al, 2013). Thus, the same factors may determine both whether a country is selected into the sample of countries with reported FDI, and the amount of FDI that the country receives, leading to a selection bias.

Following these considerations, two alternative overall assumptions can be made about the data structure. First, *one can assume that missing data simply means there was no FDI*, and replace missing data by zeros. With a large number of observations censored at zero, researchers often opt for a Tobit model (Guerin & Manzocchi, 2009; Tobin, 1958). Alternatively, *one can “respect” the fact that data are missing but allow for the possibility that there is a selection process*, in which case a Heckman (1979) model is a widely used option (Blanton & Blanton, 2006). Below, we test both as robustness checks.

4.2 Main independent variables: Institutional measures

Our hypotheses concern four important types of institutions related to property rights protection, spotlight regime, bureaucratic efficiency and policy stability.⁶ As our preferred measure of *Property Rights*, we use the Rule-of-Law index (RLI) from the World Governance Indicators (WGI) (Kaufmann et al, 2010). The RLI is based on a set of indicators relate to

private property protection and rule of law. Our main measure of human rights is the *Political Terror Scale* (PTS) (Wood & Gibney, 2010), following Amnesty International.⁷ This scale focuses on government's actual human rights abuses, rather than underlying political structures.⁸ Our measure of general quality of bureaucracy, *Government Effectiveness* is also taken from the WGI, measuring the quality of public service provision and the bureaucracy, the competence of civil servants and their independence from political pressures, and the policy credibility of the government (Teorell et al, 2011).⁹ Finally, for policy stability, we use Henisz' (2000, 2002) *Political constraints* (*Polcon*) index as our main measure.¹⁰ This index measures the extent to which a change in the preferences of a single political actor can cause a change in government policy (Teorell et al, 2011).

4.3 Control variables

The following controls suggested by the literature are included. Annual gross domestic product (GDP) growth (*LNGDPGrowth*) proxies for market growth and GDP (*LNGDP*) for market size, both expected to attract FDI. Both variables are taken from the World Bank's World Development Indicators (WDI) (2012),¹¹ and are logged to reduce high skewness and kurtosis (Blanton & Blanton, 2009).¹² GDP per capita (*GDPCAP*) can be interpreted both as wage level (i.e. labour cost) and as purchasing power; its sign is therefore a priori unclear (Bénassy-Quéré et al, 2007). Trade openness (*TradeOpenness*) as measured by the sum of imports and exports as a percentage of GDP (current prices) (Penn World Tables 2008) and human capital as captured by the gross tertiary enrolment rate (*TertiaryEnrol*) (WDI 2012), are both expected to attract FDI. We include two proxies for resource availability in the primary sectors: Forest rents as percentage of GDP for the agricultural sector (*ForestRents*), and the sum of oil rents, natural gas rents and mineral rents as percentage of GDP for the

mining and petroleum sector (*MineralPetroRents*). Finally, year dummies control for common shocks (Daude & Stein, 2007).¹³

5. RESULTS

5.1 Baseline estimations: Random effects on reported FDI

The baseline results, using the Busse-Hefeker (2007) transformation of annual FDI inflows in million USD as the dependent variable, are presented in Tables 2-5 below. In these regressions, we use only those observations where FDI is reported, which as mentioned above may be a source of biases. In each table, column (1) shows the results for the total FDI inflows regression; column (2) displays aggregate primary sector FDI (i.e., the sum of the two subsectors); column (3) shows FDI in agriculture, forestry and fishing; and column (4) shows FDI in mining and quarrying and petroleum. Each institutional variable is entered separately, to avoid multicollinearity problems as institutions are highly correlated (Bénassy-Quéré et al, 2007).¹⁴ The most striking feature of these regressions is that total FDI is attracted by all types of “good institutions” (notably, except for Human rights), while primary sector FDI is essentially unrelated to institutions (except for a weakly statistically significant effect (10%) for Government effectiveness for total primary sector FDI; this effect is however not evident from any of the sub-sectors). As we will see below, these results change substantially when Tobit regression is used, but so far we have thus clearly confirmed the story according to which there is a fundamental difference between primary sector FDI and other FDI, and fewer significant differences between primary sub-sectors.

The results for the control variables appear reasonable and in line with previous studies. GDP (measuring market size) consistently attracts all types of FDI. Tertiary enrolment and trade openness also attract total FDI, but appear to deter mining and petroleum FDI. The first result apparently contradicts our argument above on the relatively greater

importance of human capital in the mining and petroleum sector (e.g., to operate machinery). As expected, there is also a positive effect of the resource availability variable in the mining and petroleum sector (but no such effect in the agriculture, forestry and fishing sector).

[TABLES 2-5 ABOUT HERE]

5.2 Tobit regression: Zero observed FDI

As discussed, the above regressions may be problematic since they only include countries that have reported FDI (at the various levels of aggregation). We now instead assume that non-reporting of FDI reflects that there was indeed no FDI, and set missing values to zero. To exploit information from the substantial number of observations of zero FDI, we employ a random effects Tobit model, which is appropriate for censored variables. Strictly speaking, since FDI flows may be negative, FDI is not censored at zero, but working with flows it can be argued that negative FDI reflects the same as zero FDI, i.e. a lack of willingness to invest (more) in the relevant country (Guerin & Manzocchi, 2009). Thus, for these analyses, we set entries of negative FDI at zero FDI. The results, reported in Tables 6-11 below, differ substantially from the Random effects results for just the sample with observed FDI.¹⁵ While institutions remain significant for total FDI (and there is now also the expected negative effect from human rights abuses as measured by the PTS), *Government effectiveness*, *Rule of law* and *Control of corruption* now turn positively significant for both primary sub-sectors. The only difference between the sub-sectors is that Polcon is weakly positively significant (10%) for agricultural FDI, but insignificant and negatively signed for mining and petroleum FDI. Thus, the Tobit analysis suggests that Policy stability is more important for agricultural FDI. However, the main picture from the Tobit analysis remains that the primary sectors are rather similar among themselves, and even similar with total FDI when it comes to institutions.

[TABLES 6-9 ABOUT HERE]

5.3 Heckman selection regressions: Accounting for missing data

An alternative approach is to “accept” that data are missing, but consider the selection of countries into reporting. We investigate a two-stage Heckman (1979) model with a *selection stage* whereby countries are selected for investment (and, possibly, there is also a selection on reporting) and an *amount stage* where the amount of FDI is decided (Blanton & Blanton, 2006). As it turns out, Mills’ lambda is nowhere near significance in any of the regressions, suggesting that selection is not a problem; or, that the selection equation is inadequate). To save space we do not report these results.¹⁶ In most regressions, only the variables at the selection stage were significant, while those at the amount stage were generally insignificant, with often very large standard errors. In principle, Heckman models can be estimated with the same variables in both stages. However, absent an exclusion restriction, identification rests on distributional assumptions (specifically, the non-linearity of the inverse Mills ratio calculation) (see Kennedy, 2003; Sartori, 2003). We tested some possible exclusion restrictions, but are still searching for an adequate one.¹⁷ Also, while Stata® packages exist to allow estimation of two-stage models with a dichotomous dependent variable in the second stage and without exclusion restrictions (Sartori, 2003) we are not aware of corresponding packages for outcome equations with continuous dependent variables.

6. DISCUSSION AND CONCLUSIONS

This study contributes to the institutions-FDI literature by considering whether the effect varies between sub-sectors in the primary sector. Our analysis and findings complement, in particular, those of Kolstad and Villanger (2008) using UNCTAD’s data to study different service sub-sectors; as well as those of Blanton and Blanton (2009), studying US FDI in ten industries from both the primary (mining and petroleum), secondary and tertiary sectors.

Theoretically, we identify a number of relevant characteristics of FDI that could affect the general institutions-FDI-relationship. We also take a first step towards integrating insights from the largely empirically based institutions-FDI literature and the predominantly theoretical literature on political risk by economists, based on the property rights literature (Schnitzer, 1999), by discussing notions such as effective control rights over FDI. Empirically, we re-investigate the proposed differences between total FDI and primary sector FDI, and look for differences between two broad primary sectors: Agriculture, forestry and fishing; and mining, quarrying and petroleum. We implement methods addressing the issues of zero FDI (Tobit) and sample selection (Heckman).

Overall, we confirm the important role of institutions for aggregate FDI inflows. Interestingly, however, in the Tobit regressions we also find a positive effect for many types of institutions in both of the primary sectors. The Heckman model, on its hand, suggests that selection is not an important issue (or, that our selection model is not adequate). In all models, there are fewer differences among the primary sub-sectors than expected from the theoretical discussion. There are some weak indications that agricultural FDI is more attracted by policy stability, but these results are not robust to using different methods, and no strong conclusions are warranted at this point. The main message from the Tobit regressions seems to be that the primary sectors are rather like each other, *and* like total FDI, in terms of the institutions-FDI relationship. This result may suggest that previous explanations of the changing institutions-FDI relationship over time need to be complemented. Although the declining share of primary sector FDI in total FDI remains one plausible reason for the increasingly important role of “good” institutions (Busse, 2004; Schulz, 2009), our results could also be taken to suggest that the institutions-FDI relationship has changed for FDI *in general*, including primary sector FDI; for example, because technology has generally become more important in all sectors.

Possibly, access to even more disaggregated data would give more differentiated results. For example, there could be differences between onshore and offshore oil which have different technological requirements, or between minerals which have different *technological appropriability* (Boschini et al, 2007).

Finally, most, if not all, of our identified dimensions of FDI are also applicable to FDI in the secondary and tertiary sectors and could be employed to consider a differentiated institutions-FDI relationship also within these sectors.

ENDNOTES

¹ In this study, the concept of “moderating effect” is thus used partly in a metaphorical sense in order to denote a differentiated effect across various sectors of the economy.

² As the primary sector FDI (*PrimaryFDI*) is the sum of the two other sectors, we do not set up specific hypotheses here. However, results will be included in the tables to facilitate comparison with earlier studies.

³ Downloaded from UNCTAD at <http://unctadstat.unctad.org/TableView/tableView.aspx?ReportId=88..> Primary sector data were obtained from UNCTAD for a fee.

⁴ While considering also lower levels of aggregation would have been very interesting, coverage here was much lower, and many countries reported only at, for instance, the *MiningPetroFDI* level, even though they are known to have petroleum production and are also very likely to have inward FDI, indicating that studying e.g. petroleum FDI in isolation will give misleading results.

⁵ Since these data are not publicly available, we cannot list the countries reporting or not reporting.

⁶ Data for institutions were taken from the 6 April 2011 Version of the Quality of Government Dataset provided by the Quality of Government Institute at the University of Gothenburg (Teorell et al, 2011)

⁷ See <http://www.politicalterroryscale.org/>.

⁸ As an alternative measure, we tested the CIRC Physical integrity index (Cingranelli & Richards, 2010). This measure however has somewhat lower coverage in terms of countries. The only significant result found was a positive effect of human rights at the ten per cent level for agricultural FDI. Results are available upon request.

⁹ Virtually identical results (available on request) were obtained when using Control of corruption (also from WGI) as a related, though conceptually distinct, measure of government and bureaucratic effectiveness.

¹⁰ In robustness checks (available on request), we used the *polity2* measure from Polity IV, which is a composite of three indicators (executive recruitment, executive constraints, and political competition). In our analyses, the measure was significantly positively related to total FDI (in the random effects and Tobit regressions) and agricultural FDI (only in Tobit regressions); generally supporting the results for our main measure.

¹¹ Downloaded from <http://data.worldbank.org/data-catalog/world-development-indicators>.

¹² Since growth may be negative, we use the Busse-Hefeker transformation $Y = \ln(x + \sqrt{x^2 + 1})$ also here.

¹³ Arguably, some of these controls actually control for indirect channels of institutional variables (for instance, human capital), and we may hence underestimate the total effect of institutions.

¹⁴ In particular, given that our preferred measures from the WGI all have correlations among themselves exceeding 0.9, including all of them in one regression is not feasible.

¹⁵ Following Knutsen et al (2011), we first run a preliminary analysis, using only *LNGDP* as independent variable, to obtain initial values for a more efficient estimation of the main model. We run 15000 iterations of this preliminary model. The main models are then estimated by running 20000 iterations for each model.

¹⁶ The results are available from the authors upon request.

¹⁷ For example, a possible variable such as *Government Effectiveness*, proxying reporting abilities, also is significant in the amount equation. Other variables tested include country area in square kilometres (motivated, for instance, by UNCTAD possibly prioritizing their resources on larger countries), but the same result was found here.

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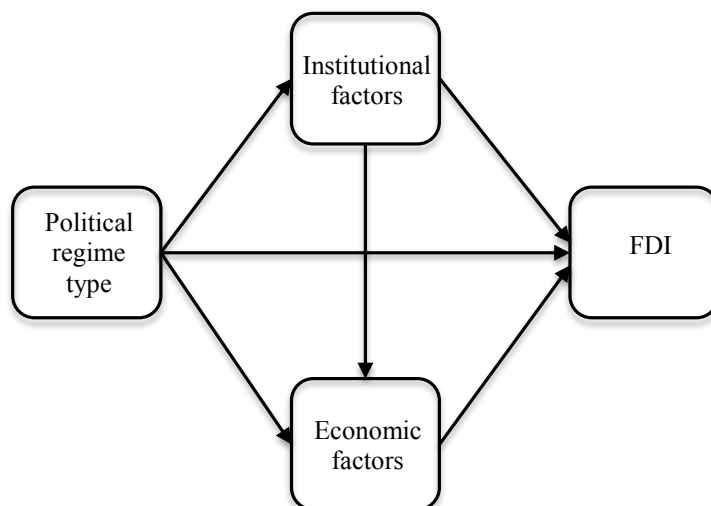


Figure 1. The institutions-FDI relationship

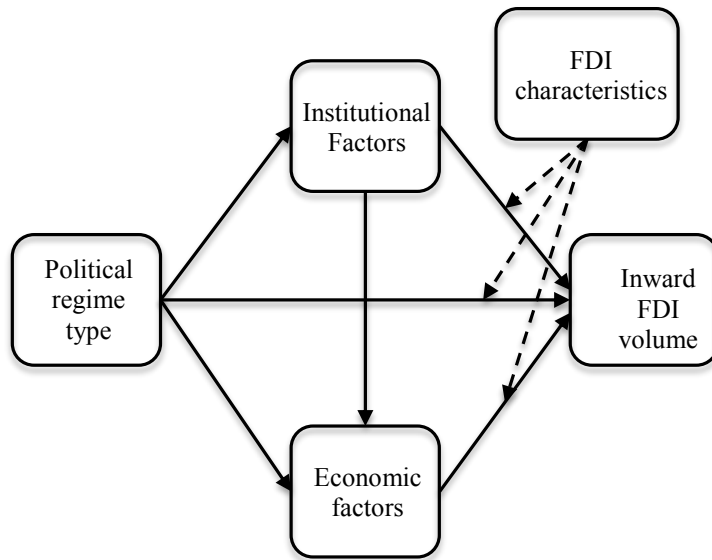


Figure 2. Moderating effects of FDI characteristics on the institutions-FDI relationship

Table 1. Overview of proposed sectorial differences on FDI characteristics

<i>FDI characteristic</i>	<i>Relevant theoretical mechanisms</i>	<i>Agriculture, forestry and fishing</i>	<i>Mining, quarrying and petroleum</i>
Effective control rights to assets	Security of property rights	*	**
Resource commitment	Security of property rights	*	***
Natural resource concentration	All	***	*
Investment horizon	Security of property rights	**	***
Social sensitivity	Reputational risk	***	*
Skill levels and relative capital/labour intensity	Democracy and human rights promote human capital and raise labour costs	*	**
Extent of government regulation	Exposure to corruption; Importance of bureaucratic efficiency;	*	***
MNE production system vulnerability	Security of property rights; Importance of infrastructure;	*	***

Note: * = weak; ** = moderate; *** = strong; where these scores relate to the FDI characteristic.

Table 2: Random effects regressions, Rule of law index

	(1) TotalFDI	(2) PrimaryFDI	(3) AgroFDI	(4) MiningPetroFDI
RuleofLaw	0.58* (0.22)	0.0055 (0.65)	0.55 (0.45)	-0.29 (0.76)
LNGDPGrowth	-0.029 (0.058)	-0.17 (0.14)	0.059 (0.16)	-0.23 (0.16)
LNGDP	0.95*** (0.068)	0.32+ (0.17)	0.48** (0.18)	0.36* (0.15)
GDPCAP	-0.000043 (0.000031)	-0.000024 (0.000061)	-0.00014*** (0.000042)	0.000028 (0.000064)
TradeOpenness	0.012*** (0.0028)	-0.020* (0.0090)	-0.0023 (0.0061)	-0.019* (0.0093)
TertiaryEnrol	0.014+ (0.0069)	-0.020 (0.015)	0.00027 (0.012)	-0.031+ (0.017)
ForestRents	-0.019 (0.063)	-0.099 (0.15)	-0.0028 (0.100)	
MineralPetroRents	-0.0024 (0.0086)	0.056** (0.021)		0.055* (0.022)
<i>N</i>	979	501	384	451
<i>R</i> ²	0.4457	0.1465	0.1374	0.1648

Note: Standard errors in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Constant and year dummies are included in regressions but not reported in the table.

Table 3: Random effects regressions, Political Terror Scale

	(1) TotalFDI	(2) PrimaryFDI	(3) AgroFDI	(4) MiningPetroFDI
PolTerScale	-0.14 (0.13)	0.029 (0.24)	-0.15 (0.16)	-0.064 (0.26)
LNGDPGrowth	-0.0079 (0.056)	-0.12 (0.17)	0.088 (0.12)	-0.24 (0.18)
LNGDP	1.08*** (0.089)	0.40* (0.18)	0.57*** (0.17)	0.43* (0.18)
GDPCAP	-0.000046 (0.000034)	-0.000050 (0.000044)	-0.00011*** (0.000028)	-0.000024 (0.000044)
TradeOpenness	0.013*** (0.0030)	-0.015+ (0.0093)	0.00027 (0.0059)	-0.018+ (0.0097)
TertiaryEnrol	0.022* (0.0093)	-0.027 (0.017)	-0.0074 (0.013)	-0.037* (0.018)
ForestRents	0.023 (0.061)	-0.13 (0.13)	0.0040 (0.085)	
MineralPetroRents	-0.0063 (0.0089)	0.052** (0.019)		0.059** (0.018)
<i>N</i>	1056	568	444	514
<i>R</i> ²	0.4456	0.1575	0.1583	0.1833

Note: Standard errors in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Constant and year dummies are included in regressions but not reported in the table.

Table 4: Random effects regressions, Government Effectiveness

	(1) TotalFDI	(2) PrimaryFDI	(3) AgroFDI	(4) MiningPetroFDI
GovEff	0.73** (0.24)	1.26+ (0.74)	0.61 (0.47)	1.38 (0.85)
LNGDPGrowth	-0.048 (0.058)	-0.23 (0.14)	0.042 (0.16)	-0.31+ (0.16)
LNGDP	0.91*** (0.067)	0.27 (0.17)	0.45* (0.18)	0.30+ (0.16)
GDPCAP	-0.000049 (0.000031)	-0.00011+ (0.000066)	-0.00015*** (0.000041)	-0.000094 (0.000072)
TradeOpenness	0.011*** (0.0029)	-0.024** (0.0088)	-0.0032 (0.0064)	-0.025** (0.0090)
TertiaryEnrol	0.011+ (0.0064)	-0.020 (0.015)	-0.00038 (0.012)	-0.030+ (0.016)
ForestRents	-0.022 (0.062)	-0.069 (0.14)	-0.0032 (0.097)	
MineralPetroRents	-0.00094 (0.0087)	0.075*** (0.020)		0.080*** (0.022)
<i>N</i>	980	501	384	451
<i>R</i> ²	0.4543	0.1567	0.1389	0.1723

Note: Standard errors in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Constant and year dummies are included in regressions but not reported in the table.

Table 5: Random effects regressions, Political constraints

	(1) TotalFDI	(2) PrimaryFDI	(3) AgroFDI	(4) MiningPetroFDI
PolCon	0.88+ (0.51)	-1.12 (1.33)	0.50 (0.80)	-1.06 (1.50)
LNGDPGrowth	0.048 (0.060)	-0.11 (0.16)	0.094 (0.12)	-0.20 (0.17)
LNGDP	0.98*** (0.074)	0.39* (0.16)	0.52** (0.16)	0.42** (0.15)
GDPCAP	-0.000018 (0.000024)	-0.000018 (0.000038)	-0.000090** (0.000030)	0.000013 (0.000037)
TradeOpenness	0.014*** (0.0028)	-0.014+ (0.0086)	0.0019 (0.0061)	-0.015+ (0.0087)
TertiaryEnrol	0.016+ (0.0080)	-0.025+ (0.015)	-0.0087 (0.013)	-0.035* (0.017)
ForestRents	0.0016 (0.061)	-0.085 (0.13)	-0.0056 (0.088)	
MineralPetroRents	-0.0068 (0.010)	0.048* (0.022)		0.051* (0.022)
<i>N</i>	1277	637	493	573
<i>R</i> ²	0.4721	0.1445	0.1372	0.1616

Note: Standard errors in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Constant and year dummies are included in regressions but not reported in the table.

Table 6: Tobit regressions, Rule of law index

	(1) TotalFDI	(2) PrimaryFDI	(3) AgroFDI	(4) MiningPetroFDI
RuleofLaw	0.61*** (0.15)	1.90** (0.72)	2.13*** (0.57)	1.57* (0.74)
LNGDPGrowth	-0.011 (0.051)	0.082 (0.14)	0.20 (0.14)	0.19 (0.15)
LNGDP	0.95*** (0.055)	2.11*** (0.32)	1.58*** (0.23)	2.31*** (0.34)
GDPCAP	-0.000043*** (0.000013)	-0.00029*** (0.000074)	-0.00034*** (0.000063)	-0.00027*** (0.000077)
TradeOpenness	0.0099*** (0.0022)	0.0022 (0.010)	0.015+ (0.0080)	-0.0061 (0.011)
TertiaryEnrol	0.014** (0.0048)	0.023 (0.020)	0.047** (0.017)	0.025 (0.022)
ForestRents	-0.019 (0.042)	-0.11 (0.22)	0.12 (0.16)	
MineralPetroRents	0.0028 (0.0048)	0.0033 (0.024)		-0.0034 (0.025)
<i>N</i>	982	982	982	1002

Note: Standard errors in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Constant and year dummies are included in regressions but not reported in the table.

Table 7: Tobit regressions, Political Terror Scale

	(1) TotalFDI	(2) PrimaryFDI	(3) AgroFDI	(4) MiningPetroFDI
PolTerScale	-0.12+ (0.073)	-0.13 (0.22)	-0.23 (0.20)	-0.12 (0.23)
LNGDPGrowth	-0.0060 (0.043)	0.14 (0.12)	0.27* (0.11)	0.18 (0.12)
LNGDP	1.05*** (0.068)	2.12*** (0.34)	1.53*** (0.24)	2.16*** (0.35)
GDPCAP	-0.000023+ (0.000013)	-0.00018** (0.000060)	-0.00018*** (0.000047)	-0.00018** (0.000063)
TradeOpenness	0.014*** (0.0025)	0.0078 (0.010)	0.016* (0.0079)	-0.00073 (0.011)
TertiaryEnrol	0.016** (0.0055)	0.026 (0.020)	0.041* (0.017)	0.035 (0.022)
ForestRents	0.019 (0.043)	0.040 (0.20)	0.13 (0.15)	
MineralPetroRents	-0.00031 (0.0046)	-0.014 (0.022)		-0.027 (0.023)
<i>N</i>	1056	1056	1056	1066

Note: Standard errors in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Constant and year dummies are included in regressions but not reported in the table.

Table 8: Tobit regressions, Government Effectiveness

	(1) TotalFDI	(2) PrimaryFDI	(3) AgroFDI	(4) MiningPetroFDI
GovEff	0.67*** (0.16)	2.45*** (0.65)	1.92*** (0.53)	2.65*** (0.68)
LNGDPGrowth	-0.028 (0.051)	0.014 (0.14)	0.14 (0.14)	0.12 (0.15)
LNGDP	0.92*** (0.054)	1.95*** (0.31)	1.46*** (0.22)	2.11*** (0.33)
GDPCAP	-0.000045*** (0.000012)	-0.00031*** (0.000067)	-0.00031*** (0.000058)	-0.00032*** (0.000072)
TradeOpenness	0.0091*** (0.0021)	-0.00042 (0.010)	0.013 ⁺ (0.0079)	-0.0099 (0.011)
TertiaryEnrol	0.012* (0.0047)	0.015 (0.020)	0.041* (0.017)	0.017 (0.022)
ForestRents	-0.027 (0.040)	-0.11 (0.22)	0.10 (0.16)	
MineralPetroRents	0.0033 (0.0047)	0.0086 (0.022)		0.0072 (0.024)
<i>N</i>	983	983	983	1004

Note: Standard errors in parentheses. ⁺ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Constant and year dummies are included in regressions but not reported in the table.

Table 9: Tobit regressions, Political constraints

	(1) TotalFDI	(2) PrimaryFDI	(3) AgroFDI	(4) MiningPetroFDI
PolCon	0.68 ⁺ (0.36)	-0.025 (1.25)	1.99 ⁺ (1.06)	-0.49 (1.35)
LNGDPGrowth	0.021 (0.040)	0.14 (0.11)	0.28** (0.11)	0.20 (0.12)
LNGDP	0.98*** (0.060)	2.29*** (0.32)	1.58*** (0.23)	2.46*** (0.34)
GDPCAP	-0.000018 ⁺ (0.000010)	-0.00018*** (0.000054)	-0.00019*** (0.000043)	-0.00019** (0.000059)
TradeOpenness	0.011*** (0.0023)	0.0067 (0.0097)	0.018* (0.0076)	-0.0013 (0.011)
TertiaryEnrol	0.016** (0.0051)	0.025 (0.019)	0.040* (0.016)	0.028 (0.020)
ForestRents	-0.011 (0.041)	0.035 (0.19)	0.12 (0.15)	
MineralPetroRents	-0.0012 (0.0045)	-0.014 (0.021)		-0.023 (0.023)
<i>N</i>	1283	1283	1283	1309

Note: Standard errors in parentheses. ⁺ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Constant and year dummies are included in regressions but not reported in the table.
