Department of Economics

Economic Analysis Research Group (EARG)

University of Reading

Do natural resources and FDI tend to erode or support the development of national institutions?

by Grivas Chiyaba and Carl Singleton

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Department of Economics
University of Reading
Whiteknights
Reading
RG6 6EL
United Kingdom

www.reading.ac.uk

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Grivas Chiyaba
University of Reading

Carl Singleton*
University of Reading

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Abstract

This paper explores the relationships between natural resources, foreign direct investment (FDI) inflows, and the quality of national institutions, also known as "the rules of the game". Using a panel dataset of 69 developing countries over the period 1970–2015, we find negative and significant effects of natural resource use or extraction on the development of national institutions. We focus on legal and property rights, but these findings also apply to the quality of some other national institutions. Our results align with a theory that abundant natural resources lead to weakened institutions because of the potential for firms to secure monopoly rents. Further, we find that the effects of FDI inflows on institutional development are not robust to controlling for natural resource rents. This suggests that the latter tend to erode institutions regardless of whether those resources are exploited alongside increased foreign investment into the local economy.

Keywords: Foreign direct investment, Natural resource abundance, Institutional quality
JEL codes: F21, O13, O17, Q33

*g.s.chiyaba@pgr.reading.ac.uk (corresponding author) & c.a.singleton@reading.ac.uk: Department of Economics, University of Reading, Whiteknights Campus, RG6 6EL, UK.

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1 Introduction

A growing literature suggests that natural resources can be more of a curse than a blessing for some countries. Generally, countries with abundant natural resources are also among the poorest and slowest growing (e.g., Sachs and Warner, 1995). However, not all resource-rich economies are necessarily affected in this way (Butkiewicz and Yanikkaya, 2010; Mehlum et al., 2006b); the curse is more likely to be felt by countries with poor institutions – the "rules of the game in a society or, more formally, . . . the humanly devised constraints that shape human interaction" (North, 1990, p. 3).[1] It has been argued that natural resource owners can especially take advantage of weak institutions and trade openness to disadvantage the growth of other sectors (e.g., Bulte et al., 2005; Butkiewicz and Yanikkaya, 2010; Torvik, 2002).

Weak institutions are potentially responsible for a number of economic challenges in developing countries, such as slow productivity growth, reduced investment, and reduced per capita income (Jude and Levieuge, 2017). The institutions of a host country can affect a firm's profitability through the costs of doing business (North, 1990). This would imply that institutions are a key determinant of the location and investment choices of multinational enterprises (MNEs) (Kinoshita and Campos, 2003). One conjecture would be that the firms already in situ and able to extract monopoly rents may prefer particular institutions to be weak. For example, corruption can create barriers to entry for new investors by increasing the costs attached to foreign direct investment (FDI) (Bénassy-Quéré et al., 2007; Wei, 2000).

Several researchers have empirically explored the theory of a resource curse and the mechanism of institutional development. For instance, Demir (2016), De Rosa and Iootty (2012), and Mehlum et al. (2006a,b) all found that natural resources play a role in the development of institutions. Most countries with abundant resources are popular destinations for FDI, but their growth is nonetheless sluggish compared to countries with more limited natural resources (e.g., Sachs and Warner, 1995, 1999). Demir (2016) tested whether this interaction between FDI flows and natural resources tended to affect institutions, finding that FDI flows from developed countries to natural resource rich developing countries tended to improve institutions, while FDI flows between developing countries harmed institutional development.

Central to these issues is the fact that most resource-rich countries are dependent on a single sector or resource, which is also the dominant destination for FDI (Poelhekke and van der Ploeg, 2013). We suppose that firms operating in an economically important or intrinsic sector can exert the sort of societal power that is more commonly connected with sovereign states (Finér and Ylönen, 2017). The MNEs or very large local or state-backed enterprises that tend to make up such sectors can undermine the prevailing quality of domestic institutions, and any prospects of

[1] Institutions are referred to differently throughout the related literature. For instance, in Persson (2005) they are called *social infrastructure*, in Hall and Jones (1999) they are referred to as *structural policies*, while in Rodrik et al. (2004) the concept used is *institutions*, and in Acemoglu et al. (2005) they are referred to as *economic institutions*. In this work, we use the general term institutions in the same manner as Rodrik et al. (2004).

improving them, through lobbying and exerting undue pressure on policy makers in government (Long et al., 2015). This can be done through political elites and influential non-state actors, who advocate or criticise policies deemed to affect the profitability of the enterprises. For instance, there are several cases on the United States Department of Justice's website revealing that a number of European MNEs have been found guilty of engaging in corrupt practices in global South countries. A typical example is the case of a multinational financial services firm, Deutsche Bank Aktiengesellschaft (Deutsche Bank), headquartered in Frankfurt, Germany, agreeing to pay the United States $130 million for falsifying records to conceal bribes and other corrupt payments that were made to third-party intermediaries, as well as concerning a commodities scheme.[2]

In this paper, we empirically re-examine these viewpoints and relationships using a dataset of 69 countries over the period 1970–2015. First, we find negative and significant effects of natural resource use or extraction on the development of national institutions, focusing especially on legal and property rights. This aligns with a theory that abundant natural resources lead to the weakening of institutions because of greater potential for firms to invest in actions that help to secure and capitalise on monopoly rents. Second, we find no effect of net FDI inflows on institutions after conditioning on natural resource abundance, which suggests that the latter tends to result in eroded institutions regardless of whether the resources are exploited through increased foreign investment into the local economy. Third, we find that well-known national measures of government size, freedom to trade internationally, regulation, political stability, and the absence of violence and terrorism, all appear to respond negatively to an increased share of natural resources in a country's output.

We contribute to the existing literature in two main ways. First, we add to the resource curse debate by re-assessing the effect of natural resources on institutions, in an enlarged dataset compared to previous studies, and applying various estimations using both the Fraser Institute's indicators of Economic Freedom Index (EFI) and the World Bank's Worldwide Governance Indicators (WGI) as measures of institutions. Second, we estimate the effect of FDI on institutional development conditional on natural resource use or extraction.

The remainder of the paper is organised as follows: Section 2 highlights some relevant literature; Section 3 discusses our dataset; Section 4 presents the estimation methodology and results; and Section 5 concludes.

[2] A press release issued by the United States Department of Justice on Friday, January 8, 2021: "Deutsche Bank Agrees to Pay over $130 Million to Resolve Foreign Corrupt Practices Act and Fraud Case"; [External link].

2 Relevant Literature

In this section, we review the main results from previous empirical research on the relationships between FDI, natural resources, and institutional development. Table 1 provides a summary of some studies closely related to this one, in the order that they are described in the text below. For each study, the table highlights the authors, sample sizes and time periods covered, the institutional factors considered and their data sources, the main methodological approaches, and the key results.

2.1 FDI and Institutions

The relationship between FDI and institutions has received considerable attention by scholars (e.g., Alfaro et al., 2008; Ali et al., 2010; Asiedu, 2006; Benáček et al., 2014; Bénassy-Quéré et al., 2007; Bevan et al., 2004; Brunnschweiler and Bulte, 2008; Buchanan et al., 2012; Gastanaga et al., 1998; Jensen, 2003; Kinoshita and Campos, 2003; Yu and Walsh, 2010). However, most of the literature examining this relationship has focused on the direction of causality going from the institutions of destination countries to FDI. This is on the premise that good institutions are a predictor of FDI inflows. Our study is interested in exploring the reverse causality, that is, the effect of FDI on the institutions in recipient countries. The motivation for exploring this reverse causality is that foreign investors are an important vehicle for facilitating institutional reforms (Libman, 2006). In recent years, there has been an increasing amount of literature, albeit comparatively low in overall volume, exploring the dynamics of this other potential direction of the relationship. Most of these studies have focused on individual institutional factors, such as corruption, democracy, government effectiveness, labour rights, political institutions, property rights, and tax rates.

When investigating the impact of FDI on corruption, Larraín and Tavares (2004) and Kwok and Tadesse (2006) both found similar results despite applying somewhat different methodological approaches. Larraín and Tavares (2004) found that FDI is a robust determinant of corruption, with higher FDI inflows linked to lower corruption levels in the host country. They used ordinary least squares (OLS) and instrumental variables (IV) estimators for data covering the period 1970-1994, averaged into five-year periods for a broad cross section of countries. Likewise, Kwok and Tadesse (2006) looked at a cross-country sample of 140 countries for the period 1970-2004, using a multivariate empirical model and finding that FDI generally leads to lower levels of corruption. Kwok and Tadesse attempted to address the endogeneity problem from potential reverse causality in several ways, including regressing corruption on lagged FDI values, exploring the interaction effects of FDI with other variables, and employing an IV estimation approach.

Looking at a different institutional measure, Li and Reuveny (2003) assessed the effects of globalisation on the level of democracy for 127 countries covering the period 1970-1996, using a pooled time-series cross-sectional statistical model. They found that FDI flows have a positive and significant association with democracy, but this weakened over the sample period.

For a smaller sample of 19 Organisation for Economic Co-operation and Development (OECD) countries covering the period 1981-2001, Garretsen and Peeters (2007) investigated the impact of FDI on corporate tax rates. Using a pooled two-stage least squares (2SLS) estimator, they found that FDI flows lead to lower corporate tax rates. Specifically, they found that the effective corporate tax rate decreased by 0.5% in response to a 1% increase in FDI flows. This result was confirmed by Long et al. (2015), who provided firm-level evidence suggesting that the presence of FDI was positively associated with lower levels of tax and fee burdens in the host regions of China. Long et al. established that a 100% rise in the FDI level led to 4.0% drop in the tax rate applicable to domestic firms. They also estimated that the number of fee items that firms paid to different governments dropped significantly in response to an increased level of FDI inflows.

Using property rights as a measure of institutional development, Ali et al. (2011) tested the effects of FDI on institutions within a panel dataset of 70 developing countries for the period 1981–2005, using an array of estimation methods. Ali et al. lagged all potentially endogenous variables in their dynamic panel models by one period, or 5 years, and used system generalized method of moments (GMM) estimation. Their results provided evidence that FDI tends to have a robust positive effect on property rights, while varying control variables and estimation methods across different model specifications. Ali et al. (2011) concluded that their findings were consistent with foreign investors having the incentive to influence institutional development when experiencing poor property rights and a poor business environment. In a study specifically focused on workers' rights, Mosley and Uno (2007) investigated the impact of FDI on this more particular measure of institutions in 90 developing countries, for the period 1986-2002, using OLS estimation and panel-corrected standard errors. They found that FDI was positively and significantly associated with the rights of workers, but increased trade competition tended to have the opposite effect.

In all the studies discussed thus far, across the use of different model specifications, different dimensions and measures of institutions, different samples of countries, and different estimation periods, FDI was recognised as having a positive effect on institutions. In contrast, Demir (2016) suggested that high FDI flows could weaken institutions by expanding the pool of funds available for bribery. This was similarly argued by Pinto and Zhu (2016), who explored the effect of FDI on corruption. Using a 2SLS estimator on a sample of 95 countries, covering the period 2000-2004, they found that FDI is linked with increased corruption levels in less developed countries. Moreover, the relationship between institutions and FDI may not be straightforward. There are some methodological challenges when attempting to model and empirically estimate the impacts of FDI on institutions. Institutions persist, such that past levels and development strongly influence current levels (North, 1990). Reverse causality is one potential source of endogeneity, whereby FDI flows and the institutions of a host country may influence each other. To address this, Ali et al. (2011), used an IV approach and lagged the dependent variable, in a dynamic panel setting with system GMM estimators, which we will also do in our own analysis. Including the lag

of the dependant variable in the model helps to capture the persistence of institutions (Acemoglu et al., 2008; Pan et al., 2020).

2.2 Natural resources and institutions

There is a growing literature examining the effects of natural resource dependence on institutions (e.g., Brunnschweiler and Bulte, 2008; Demir, 2016; De Rosa and Iootty, 2012; Di Tella and Ades, 1999; Feulefack and Ngassam, 2020; Pan et al., 2020). Alonso and Garcimartín (2013) have argued that natural resource richness may affect institutions through facilitating rent-seeking behaviour and the switching of tax revenues for less transparent revenue sources associated with minimal accountability. This is supported by Di Tella and Ades (1999), who investigated the proposition that the level of corruption in an economy is generally determined by the level of rents. Based on varying cross-country samples covering the period 1980-1990, they found that higher corruption levels tend to exist in countries where firms enjoy higher rents.

De Rosa and Iootty (2012) explored whether natural resource dependence poses a negative influence on various factors of institutional strength. They tested this over 110 countries in the period 1996-2010, finding that resource dependence leads to poor government effectiveness, coupled with lower competition levels within a country. This was supported by Demir (2016), who examined the effects of FDI flows on bilateral gaps in institutional development across countries and whether such effects were dependent on the direction of the flows. Demir confirmed the presence of a natural resource curse. From studying five African countries over the period 1996-2017, Feulefack and Ngassam (2020) also found that "in the presence of abundant resources, the quality of institutions shatters" (Feulefack and Ngassam, 2020, p. 148).

Although the studies mentioned above and conventional wisdom predict negative effects of natural resource abundance on institutions, there are other studies that predict otherwise. For instance, through a sample of 60 countries for the period 1970-2000, Brunnschweiler and Bulte (2008) showed that institutional quality is positively affected by resource abundance. Brunnschweiler and Bulte used geographic latitude as an instrument for institutional quality, under the assumption that a country's latitude has a zero direct effect on its economic performance, and any observed effects of latitude only arise through institutions (see also Hall and Jones, 1999). Pan et al. (2020) also found positive effects of natural resource abundance on institutions within a sample of 63 countries for the period 2003-2016, using fixed effects and difference GMM estimators. Pan et al. further found that FDI from China tended to improve the rule of law and regulatory quality in a recipient country. However, this study may have suffered from a methodological weakness associated with difference GMM (see for example Baum, 2006. We address this by adopting a system GMM estimator. Our study also looks not only at the WGI measures of institutions but also those compiled by the Fraser Institute.

TABLE 1: Summary of related studies on the effects of FDI and natural resources on institutions

Authors	Sample and period	Institutional factors considered	Data sources	Methodological approach and key results
Larraín and Tavares (2004)	20 largest countries in 1990, 1970-1994	Corruption	ICRG[1] and Mauro (1998)	Instrumental Variables (IV) approach. FDI is significantly associated with lower corruption levels.
Kwok and Tadesse (2006)	140 countries, 1970-2004	CPI[2]	Transparency International	"Multivariate empirical models". FDI leads to lower corruption.
Pinto and Zhu (2016)	95 countries, 2000-2004	CPI[2]	Transparency International	Two-stage least squares (2SLS). FDI is linked with increased corruption levels in less developed countries, but the opposite in developed countries.
Li and Reuveny (2003)	127 countries, 1970-1996	Democracy	Polity III data	Estimates "pooled time-series cross-sectional" models. FDI inflows have a positive and significant effect on democracy, but this weakens over time.
Garretsen and Peeters (2007)	19 OECD countries, 1981-2001	Corporate taxes	Devereux et al. (2002)	Pooled 2SLS estimator. FDI flows lead to lower corporate tax rates.
Mosley and Uno (2007)	90 developing countries, 1986-2002	Labor rights	DoS, ILO and ICFTU[3]	Follows Beck and Katz (1995), using OLS with panel-corrected standard errors. FDI is associated with better collective labor rights.
Ali et al. (2011)	70 developing countries, 1981-2005	Property rights	Cal. from ICRG Data[4]	Cross-sectional analysis of La Porta et al. (1999) Beck et al. (2003) and Levine (2005), using OLS, random effects (RE), fixed effects (FE), and system GMM. FDI inflows have a positive and significant effect on property rights.

Notes.- [1] ICRG stands for International Country Risk Guide constructed by Political Risk Services (PRS). [2] CPI stands for Corruption Perception Index. [3] The data is collected from the United States Department of State's Annual Reports on Human Rights Practices; the International Labor Organization (ILO) Committee of Experts on the Applications of Conventions and Recommendations, and Committee on Freedom of Association reports; and the International Confederation of Free Trade Unions (ICFTU) Annual Survey of Violations of Trade Union Rights. [4] The index is calculated from the ICRG.

TABLE 1: Summary of related studies on the effects of FDI and natural resources on institutions (cont.)

Authors	Sample and period	Institutional factors considered	Data sources	Methodological approach and key results
Di Tella and Ades (1999)	52 countries, 1980-1983; 31 countries, 1989-1990	Corruption	BI, EIU & EMF Foundation[5]	OLS and FE estimates. A positive and significant effect of natural resources (fuel and minerals) on corruption.
Brunnschweiler and Bulte (2008)	60 countries, 1970–1994	Political institutions	Beck et al. (2001)	Follows Bulte et al. (2005) and Isham et al. (2005), using 2SLS and three-stage least squares (3SLS) regressions. Institutional quality is positively affected by resource abundance. The data on institutions is supplemented with Persson and Tabellini (2004).
De Rosa and Iootty (2012)	110 countries, 1996-2010	WGIs & GCI	World Bank and WEF[6]	Pooled OLS, FEs and system GMM. A high degree of dependence on natural resources leads to worse government effectiveness and lower levels of competition across the economy.
Demir (2016)	134 countries, 1990-2009	Latitude	Cal. from ICRG data[7]	FE estimates. FDI flows have a negative and significant effect on host country institutions. Natural resources have a negative effect on institutions.
Feulefack and Ngassam (2020)	5 Africa countries, 1996-2017	WGIs	World Bank	Follows Dumitrescu and Hurlin (2012), causality tests and a pooled mean group (PMG) approach. Resource abundance weakens institutions.
Pan et al. (2020)	63 countries, 2003-2016	WGIs	World Bank	Uses FEs and difference GMM. FDI improves the quality of institutions (rule of law and regulatory quality) in the host countries.

Notes.- [5] The data on corruption is from two different sources – the Business International Corporation (BI), a private company which is now incorporated into The Economist Intelligence Unit (EIU) and the second source is from the Geneva based EMF Foundation's publication, the World Competitiveness Report (WCR). [6] The Worldwide Governance Indicators (WGI) are compiled by the World Bank and the Global Competitiveness Index (GCI) is compiled by the World Economic Forum (WEF). [7] The study uses the ICRG political risk rating constructed by PRS as proxy for all the different aspects of institutional development.

2.3 Summary

The studies reviewed in Table 1 have used several estimation techniques to investigate the potential relationships between FDI, natural resources and institutions. Similarly, those studies have used different measures of institutions, different data sources, and different samples of countries and time periods. Like most of the the studies discussed above that have focused on individual institutional factors, we will mainly focus on testing whether a single measure of institutional development, property rights, tends to be affected by FDI and natural resources use or extraction. However, we will also broaden our analysis and present model estimates using several other institutional factors as dependent variables. In this way, we will add comparable evidence over a range of institutional factors, using the same methodological approach, the same sample of countries, and the same sample period. We will also address the concern that focusing on only one institutional factor, with the measure of this factor collected from a single data source, could lead to selective conclusions about the general relationships between FDI, natural resources, and institutional development. Our study is most closely related to Ali et al. (2011). Compared with their study, we slightly modify the sample of countries, extend the sample period, study multiple institutional measures as the dependent variables, and test the role of natural resources abundance in institutional development.

3 Data

In this section, we describe the key variables of our empirical analysis and the creation of the estimation sample. Our choice of variables is guided by the existing literature on the determinants of institutions. The variables included are selected in line with the different theories that can explain determinants of institutions, namely: economic, political, and cultural (Ali et al., 2011; La Porta et al., 1999) and endowments (Brunnschweiler and Bulte, 2008; Levine, 2005). Descriptions of all the variables and the countries included in our sample are provided in Appendix Tables A1 and A2. We arrived at our final estimation of 69 developing countries over the period 1975-2015 based on the availability of data for our three main variables: FDI flows, natural resource rents, and institutional factors.[3]

We obtained the aggregate net FDI inflows data from the World Bank, World Development Indicators database, covering the period 1970-2015.[4] The FDI data are expressed as a percentage of GDP to account for country size (Ali et al., 2010). We obtained data on GDP per capita and total natural resource rents from the same source.[5] GDP per capita is expressed in current United States dollars and natural resource rents are measured as percentages of domestic GDP.

[3] We restricted our sample selection to developing countries with at least data for the key variables: FDI flows, natural resource rents, and institutional factors in every study period. The list of developing countries was accessed from the United Nations website on 30 April 2021; [External link].

[4] Accessed from the World Bank website on 25 April 2021; [External link].

[5] Accessed from the World Bank website on 25 April 2021; [External link].

The main data on institutional factors are obtained from the Fraser Institute.[6] These components collectively are summarised into a composite index, of which the key ingredients are freedom of choice, the protection of private property, and the autonomy of the individual (Gwartney et al., 1996; Gwartney and Lawson, 2003), with sub-parts measuring the following:[7]

(i) Legal system and the security of property rights — a government's function of protecting persons and private property rightfully acquired. This indicator is associated with sub-components such as impartiality of courts, judicial independence, military interference in the rule of law and politics, the protection of property rights, legal enforcement of contracts, the integrity of the legal system, and reliability of police. A higher value implies greater protection of private property.

(ii) Size of government — reflects how countries depend on the government to distribute resources, goods, and services. It includes indicators such as tax rates, transfers and subsidies, government consumption, and government enterprises and investment. A higher score means that the government is effective in distributing resources, goods, and services.

(iii) Sound money — includes components such as money growth, freedom to own foreign currency bank accounts, and inflation.

(iv) Freedom to trade internationally — designed to measure a wide variety of limitations that affect international exchange. It includes components such as tariffs, regulatory trade barriers, black-market exchange rates, and controls of the movement of capital and people. A higher value indicates higher freedom to trade internationally.

(v) Regulation — focuses on regulatory limitations that restrain the freedom of exchange in labour, credit, bureaucracy costs, and product markets.

Despite concerns about data measurement and validity that may be associated with the Fraser Institute dataset, it is widely used (e.g., Berggren and Jordahl, 2005; Ali et al., 2010; Dawson, 1998; Gwartney et al., 1999, 2006; Norton, 2003), and we contend that it is both a useful and generally robust source, as others have also argued (e.g., De Haan et al., 2006). Nonetheless, we also collected data for World Governance Indicators (WGI) from the World Bank, covering the narrower available period of 1996-2016.[8] The WGI comprise six composite measures of different dimensions of governance (Kaufmann et al., 2005, 2010):

(i) Control of corruption — summarises perceptions of the extent to which public power is applied for private gain, including all forms of corruption, and state "capture" by private interests and elites.

[6] Accessed from the Fraser Institute website on 2 May 2021; [External link].

[7] The Fraser Institute data is available in 5 year intervals from 1970, 1975, 1980, . . . , 2000, and annually thereafter through to 2015.

[8] Accessed from the World Bank website on 15 September 2021; [External link].

(ii) Rule of law — measures perceptions of the extent to which agents have trust in and follow the rules of society, particularly, the police, property rights, the quality of contract enforcement, and the courts, as well as the possibility of violence and crime.

(iii) Government effectiveness — captures perceptions of the quality of the civil service, quality of public services and the level of its independence from political influence, the degree of policy formulation and implementation, and the integrity of the government's commitment to such policies.

(iv) Regulatory quality — measures perceptions of the capacity of the government to formulate and implement sound policies and regulations that allow and encourage private sector development.

(v) Political stability and absence of violence/terrorism — measures perceptions of the possibility of political instability and/or politically induced violence, including terrorism.

(vi) Voice and accountability — captures perceptions of the extent to which a country's citizens can participate in electing their government, including freedom of association, freedom of expression, and a free media.

3.1 Descriptive statistics

Our analysis will look at the institutional development within countries over the period 1975–2015, using some lagged values of variables when estimating our models. Like Barro (1999) and Glaeser et al. (2004), we will focus on 5-year periods, dropping the observations for years that are not multiples of five or ten, and thus we will not be concerned with very short-run dynamics.

Summary statistics of the main variables used in our analysis are reported in Table 2. Our main estimation sample will contain 558 country-year observations, but this sample size will be reduced when we consider sub-categories of natural resource rents and particular measures of institutions, due to small numbers of missing values. We list the variables in Table 2 as used in our model estimations, including the variables that are lagged by 5-years. Since our models will later be estimating the dynamic effects of FDI and natural resource use or extraction on institutional development within countries, we also present in Table 2 the descriptive statistics of 5-year changes for all variables, providing a reference point for the amount of variation that countries tend to experience in these variables over 5-year periods.

One of our key independent variables is net FDI inflows measured as a percentage of GDP, which is substantially different across countries. The median extent of net FDI inflows in the analysis dataset is 1.4%, and the standard deviation is 2.7 percentage points (ppts). The median 5-year change in net FDI inflows is 0.1 ppts of GDP, while the standard deviation is 3.6 ppts. Our other key independent variable is natural resource abundance. As its proxy, we use total natural resource rents as a percentage of GDP. We will lag this variable in our models by 5 years, or one period, to account for delayed effects. The maximum lagged value of total natural resource rents as

a percentage of GDP is 56.9% (Republic of Congo in 2000), the median is 4.1%, and the standard deviation is 8.1%. The maximum 5-year change in natural resources rents is 33.8 ppts of GDP (Uganda in 1985), with a median of 0.0 and a standard deviation of 6.1 ppts. Our key dependant variable serving as a proxy of institutional quality is the Fraser Institute's index of a country's legal system and property rights (henceforth referred to only as 'property rights'). The maximum level of this index in the estimation sample, over the period 1975-2015, is 8.0 (Singapore in 2000), with a median of 4.4 and a standard deviation of 1.2.

TABLE 2: Descriptive statistics, all years and countries in the estimation sample, 1975-2015

	Obs.	Std. Dev.	Mean	Min.	Median	Max.
GDP per capita (US$000s)	558	3.04	5.41	0.10	1.25	55.65
5-year change GDP per capita	558	1.67	0.70	-2.60	0.25	17.28
Economic growth (5-year, %)	558	0.27	0.38	-1.09	0.26	1.80
5-year change economic growth	509	0.56	-0.06	-1.83	-0.06	2.39
Net FDI (% of GDP)	558	2.65	4.80	-4.09	1.37	58.52
5-year change net FDI	556	3.58	0.50	-18.50	0.10	36.77
Lag nat. res. (total % of GDP)	558	8.06	9.81	0.00	4.14	56.94
5-year change nat. res.	558	6.05	0.06	-35.72	0.00	33.75
Lag coal rents (% of GDP)	493	0.12	0.49	0.00	0.00	6.09
5-year change coal rents	493	0.27	-0.01	-3.30	0.00	2.71
Lag forest rents (% of GDP)	558	2.65	4.43	0.00	0.79	44.60
5-year change forest rents	558	3.24	-0.03	-35.66	-0.01	33.92
Lag gas rents (% of GDP)	520	0.16	0.53	0.00	0.00	6.65
5-year change gas rents	520	0.36	0.06	-1.87	0.00	5.50
Lag mineral rents (% of GDP)	558	1.42	3.63	0.00	0.08	35.20
5-year change mineral rents	558	2.20	0.00	-25.30	0.00	11.44
Lag oil rents (% of GDP)	522	4.00	8.68	0.00	0.01	53.21
5-year change oil rents	522	4.89	0.03	-28.56	0.00	28.91
Lag freedom to trade	541	5.45	2.12	0.00	5.69	9.97
5-year change freedom to trade	537	1.36	0.28	-6.20	0.15	5.18
Lag government size	558	6.47	1.43	1.46	6.60	9.46
5-year change government size	558	1.00	0.09	-3.65	0.07	3.63
Property rights	558	1.23	4.45	1.71	4.38	8.04
Lag property rights	558	1.24	4.38	1.71	4.29	8.04
5-year change Property rights	558	0.47	0.08	-1.45	0.02	2.78
Lag sound money	558	6.43	2.17	0.00	6.60	9.79
5-year change sound money	558	1.64	0.20	-5.98	0.15	6.50
Lag regulation	541	5.78	1.20	2.94	5.71	9.43
5-year change in regulation	540	0.64	0.19	-2.18	0.13	3.27

Notes.- The data were compiled from the World Bank, World Development Indicators, The Fraser Institute and Authors' calculations. Observations for each country are all separated by 5 years, i.e., 1970 (for lagged values), 1975, 1980, ... , 2010, 2015.

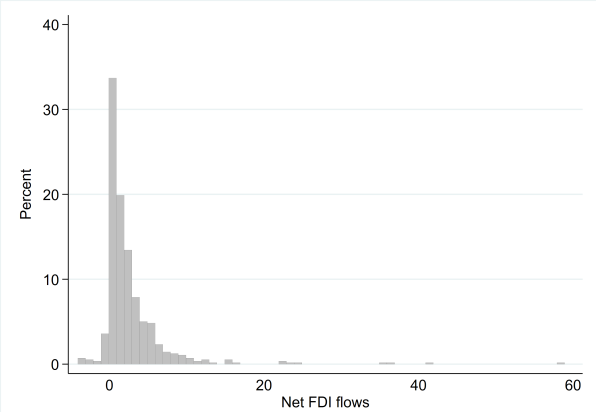
To demonstrate the variation in the key variables, Figure 1 shows histograms of the empirical distribution of levels and 5-year changes in net FDI inflows, natural resource rents, and the property rights index. Each histogram pools all 69 countries and years, transformed into 5-year intervals, representing our main estimation sample. Figure 1(A) shows the distribution of pooled net FDI inflows for all countries for the period 1975-2015. The peak is concentrated around the 0-2% range, with the majority of countries in the sample and period having reported positive net FDI inflows. Figure 1(B) shows that the peak in 5-year changes of pooled net FDI inflows is concentrated around zero. Nonetheless, the majority of countries recorded a positive change in net FDI inflows for the 5-year periods in the sample.

Figure 1(C) shows that a nontrivial number of countries and periods in the estimation sample reflected large shares of natural resource rents in GDP. However, Figure 1(D) shows that about half of the country-years in the sample had relatively small 5-year changes of $\leq \pm 3\%$ in the contribution of natural resource rents to GDP. Figure 1(E) displays the pooled property rights levels for all 69 countries for the period 1975-2015, but, more importantly, Figure 1(F) demonstrates that there is considerable variation within the pooled estimation sample for 5-year changes in the property rights measure.

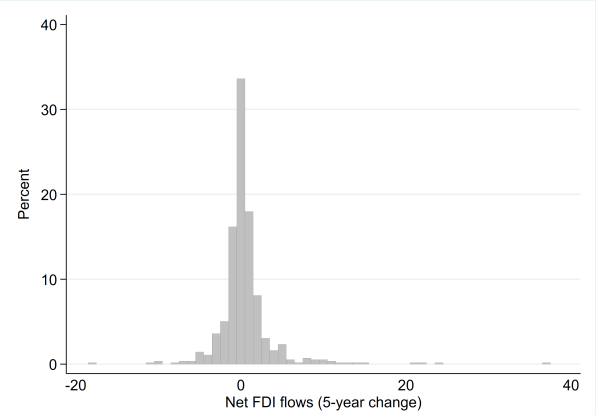
Figure 2 displays scatter plots for the property rights measure against net FDI inflows and natural resource rents. As in the case of the histograms, we show two plots for each pair of variables: one for levels and one for 5-year changes, over all countries and periods in the estimation sample. Figure 2(A) shows a positive correlation between net FDI inflows and property rights in the dataset, driven by a small number of cases with very high net FDI inflows as a share of GDP that also correspond to high values of the property rights index. However, Figure 2(B) shows that this correlation disappears when instead comparing 5-year changes of these two variables. Figures 2(C) and 2(E) show negative correlations between the property rights index and both contemporaneous and 5-year lagged natural resource rents as a share of GDP. In both cases, this correlation diminishes in Figures 2(D) and 2(F) when instead comparing 5-year changes in these variables, and in the latter case, the correlation between the change in property rights and the change in natural resource rents becomes marginally positive.

FIGURE 1: Distributions of levels and 5-year changes in net FDI inflows, natural resource rents, and property rights, pooled, all years and countries in the estimation sample

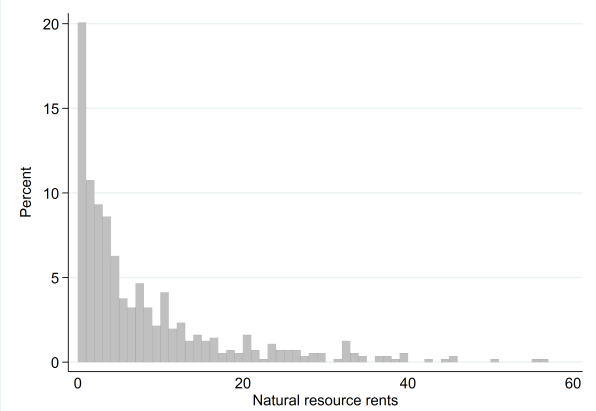
(A) Net FDI inflows (% of GDP), 1975-2015



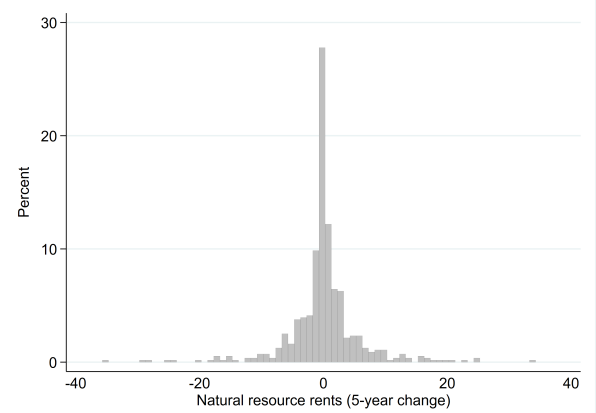
(B) 5-year change in net FDI inflows, 1975-2015



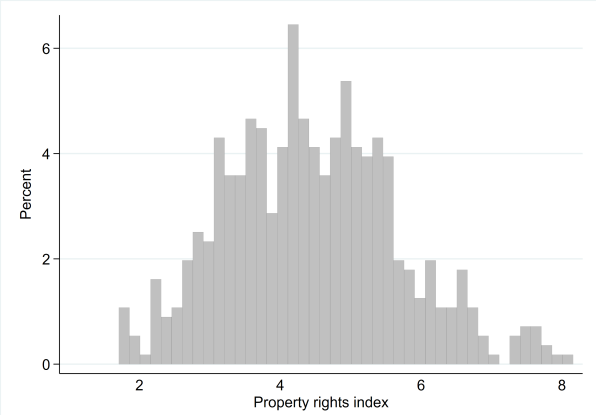
(C) Nat. res. (total % of GDP), 1970-2010



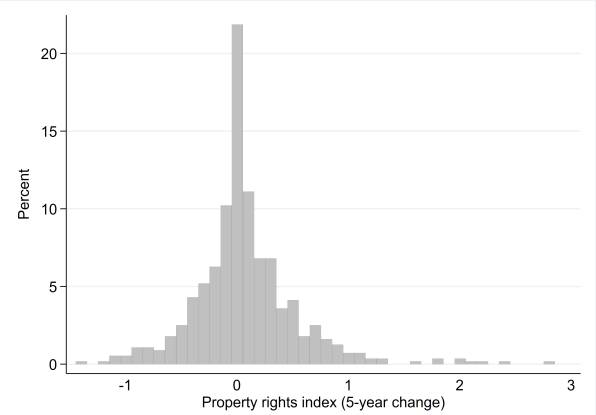
(D) 5-year change in nat. res., 1975-2015



(E) Property rights, 1975-2015



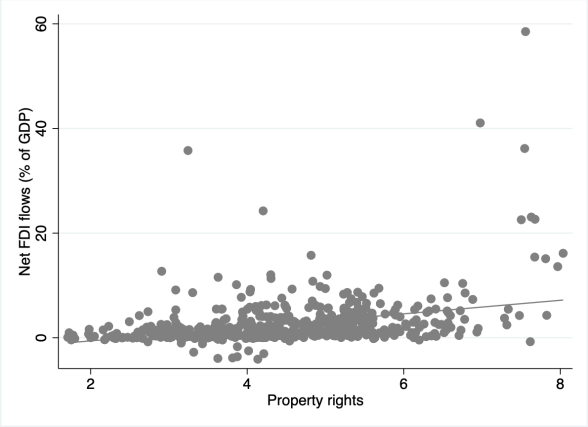
(F) 5-yr change in property rights, 1975-2015



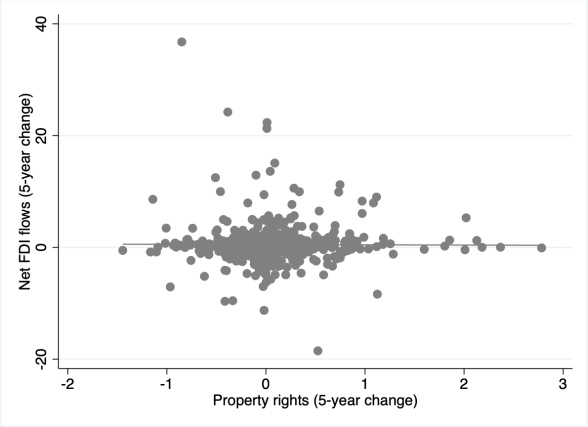
Notes.- author calculations using data from the World Bank, World Development Indicators and The Fraser Institute. Sub-Figures (A), (C) & (E) show respectively the pooled distributions for all sample countries at 5-year intervals of: net FDI inflows measured as a percentage of GDP, natural resources rents measured as a percentage of GDP, and a measure of property rights taking values between 0 and 10. The Sub-Figures (B), (D) & (F) show pooled distributions over the sample countries and period for 5-year changes in the aforementioned variables.
The bin sizes are 1 for Sub-Figures (A)-(D), with the bin to the right of zero containing values which are positive but not greater than 1. The bin size is 0.15 for Sub-Figure (E), and is 0.1 for Sub-Figure (F).

FIGURE 2: Correlations of net FDI inflows and natural resource rents with a measure of property rights, levels and 5-year changes, all years and countries in the estimation sample, 1975-2015

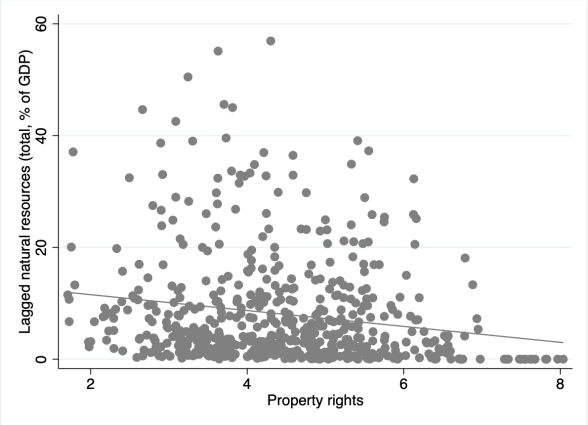
(A) Net FDI inflows (% of GDP) and prop. rights



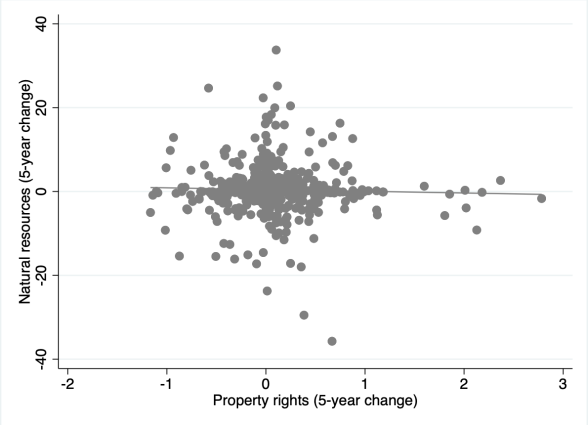
(B) 5-year change in net FDI inflows and prop. rights



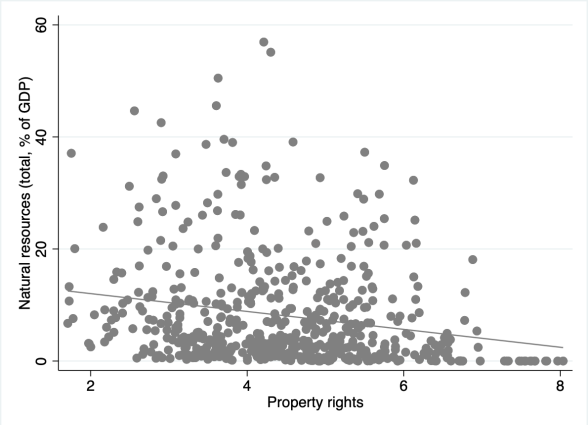
(C) Lag nat. res. (% of GDP) and prop. rights



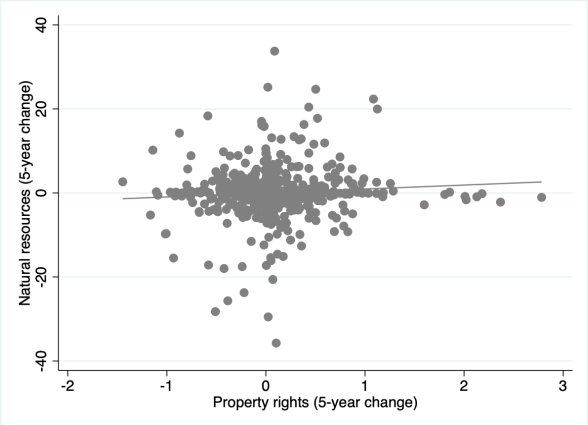
(D) Lag 5-year change in nat. res. and prop. rights



(E) Nat. res. (total % of GDP) and prop. rights



(F) 5-year change in nat. res. and prop. rights



Notes.- author calculations (see Table 2 for sample descriptives). Sub-Figure (A) shows the corresponding values for all country-year observations in our sample of the levels of net FDI inflows and the property rights measure. Likewise, Sub-Figure (C) shows the corresponding values of lagged natural resource rents and the property rights measure. Sub-Figure (E) shows the corresponding contemporaneous levels of natural resource rents and the property rights measure. Sub-Figures (B), (D) and (F) show corresponding values of 5-year changes in the respective variables shown in (A), (C) and (E). The estimated line of best fit is displayed in each sub-figure.

4 Estimation & Results

Our regression models and estimation methods somewhat follow and extend those used by Ali et al. (2011), Demir (2016), and La Porta et al. (1999). We estimate models of the following form:

$$\begin{aligned} Inst_{i,t} = &\alpha + \beta_1 Inst_{i,t-1} + \beta_2 GDPperCap_{i,t} + \beta_3 Growth_{i,t} + \beta_4 NetFDI_{i,t} \\ &+ \beta_5 NatRes_{i,t-1} + \beta_6 (NetFDI_{i,t} \times NatRes_{i,t-1}) + \phi_i + \lambda_t + \psi_{R(i,t)} + \varepsilon_{i,t} \quad , \end{aligned} \tag{1}$$

where $Inst_{i,t}$ denotes a measure of institutions as the dependent variable, given by one of the five components of the Fraser Institute index or one of the six WGI measures discussed in Section 3. The subscripts i and t denote countries (e.g., $i = 1, 2, \ldots, 69$) and periods (e.g., $t = 1975, 1980, \ldots, 2015$), respectively. We also incorporate a lagged institutions term, $Inst_{i,t-1}$, to address the persistence of institutional change, as recommended by North (1990). α and $\beta_{1,2,\ldots,6}$ are parameters to be estimated. $GDPperCap$ represents the level of GDP per capita, expressed in current United States dollars, and is included to account for the different levels of economic development within and across countries over time; increasing levels of income have been shown to lead to better quality institutions (e.g., Demir, 2016). We also include GDP growth over the previous five years, denoted by $Growth$, to capture the particular effects of recent economic development on institutions.

$NetFDI$ represents net FDI inflows, measured as a percentage of GDP to account for country size (Ali et al., 2010). $NatRes_{i,t-1}$ denotes natural resource abundance lagged by 5 years, measured by natural resource rents as a percentage of GDP. We consider two variants of this measure. First, we consider the total sum of coal rents ($CoaRen$), forest rents ($ForRen$), mineral rents ($MinRen$), natural gas rents ($GasRen$), and oil rents ($OilRen$). Second, we consider the maximum percentage of GDP attributed to one of these sectors. In this way, we distinguish the effects of single-sector natural resource dependence on institutions, in line with the theory described above. $NetFDI_{i,t} \times NatRes_{i,t-1}$ models the potential interaction effects between contemporaneous net FDI inflows and lagged total natural resource rents, to admit the possibility that FDI flows in resource dependent countries could impact institutions differently. ϕ_i and λ_t denote host country and period fixed effects, respectively. To address any region-specific trends in institutional development, $\psi_{R(i,t)}$ captures region-year fixed effects, where $r = R(i,t)$ is an indicator function denoting that country i and period t relate to region-year r (see Appendix Table A1 for the six region groupings of countries in the estimation sample). The remaining unobserved heterogeneity in the quality of institutions is in the residual, $\varepsilon_{i,t}$.

We start by estimating Equation (1) using least squares and computing standard errors robust to country-level clusters, with different combinations of the stated levels of fixed effects. However, these estimates will surely suffer from endogeneity bias in a dynamic panel model setup such as Equation (1). To address this, we apply the two-step system GMM estimator, where the instruments are all possible lags of the levels and differences of the variables treated as endogenous, $\{Inst_{i,t-1}, GDPperCap_{i,t}, Growth_{i,t}, NetFDI_{i,t}, NatRes_{i,t-1}, (NetFDI_{i,t} \times$

$NatRes_{i,t-1}$)}, and the year fixed effects are treated as exogenous. This corrects for weaknesses that can arise when using only the lagged levels of the first-differences of variables as instruments, i.e., when instead applying difference GMM (Baum, 2006).

4.1 Main Results - Property Rights

Focusing on the property rights index as a measure of institutional quality, the first set of estimates for Equation (1) are presented in Table 3. Ensuring the protection of private property and enforcement of contracts is one of the fundamental functions of government in an economically free society (De Haan et al., 2006). One justification for focusing on the property rights index over the WGI rule of law measure is that the former has a longer consistent time series of 1970-2015, compared to the latter's shorter series of 1996-2016. Columns (I)-(III) of Table 3 report least squares estimates, adding in, from left to right, three sets of fixed effects and the lagged dependent variable. In columns (IV)-(VI), we report system GMM estimates while varying how natural resource abundance enters the model.

The estimates of the pooled cross-section variant of Equation (1) show a negative and statistically significant coefficient for lagged natural resource rents, suggesting that there is a general association of natural resource abundance with weak or lower quality property rights in the estimation sample and period, conditional on the level and speed of a country's economic development. Net FDI inflows and economic growth have the expected positive coefficients in the pooled cross-section model, but they are both statistically insignificant. Controlling also for year and country fixed effects in column (II), the parameter estimates for all other variables in the model are statistically insignificant at standard levels. Column (III) adds lagged property rights to account for unobservable heterogeneity through past institutional development (Kotschy and Sunde, 2017), as well as the region-year fixed effects. The effect of natural resource abundance in this model specification is negative and significant at the 5% level; an increase in the use or extraction of natural resources by 10 percentage points of GDP leads to a decline of 0.011 in the measure of property rights five years later, which is equivalent to about one-quarter of a standard deviation in the 5-year change in the property rights measure within the estimation sample (see also Table 2 and Figure 1).

To address the endogeneity of the least squares parameter estimates of Equation (1), columns (IV)-(VI) of Table 3 show results using the system GMM estimator described above. For each model estimated, we report p-values for the Hansen test of overidentifying restrictions and for the Arellano-Bond AR(2) test of the differenced residuals, in both cases not rejecting the null hypothesis for all models at standard levels of statistical significance. In column (IV), with the total 5-year lagged natural resource rents as an explanatory variable, the estimates suggests a substantial degree of persistence in property rights quality within countries. The estimated effect of natural resource rents on institutional development is negative and significant at the 5% level; an increase in the use or extraction of natural resources by 10 percentage points of GDP leads to a decline of 0.07 in the measure of property rights five years later, which is equivalent to about

TABLE 3: Estimated effects of FDI and natural resource rents on property rights, 5-year periods in 1975-2015

Dep. variable: property rights	(I)	(II)	(III)	(IV)	(V)	(VI)
Lagged property rights			0.682***	0.928***	0.930***	0.927***
			(0.045)	(0.040)	(0.042)	(0.044)
GDP per capita (US$000s)	0.101***	-0.003	-0.005	0.002	0.001	0.002
	(0.018)	(0.013)	(0.007)	(0.005)	(0.006)	(0.007)
Economic growth (5-year, %)	0.141	0.078	0.211**	0.141**	0.152**	0.136**
	(0.111)	(0.067)	(0.071)	(0.066)	(0.066)	(0.065)
Net FDI inflows (% of GDP)	0.029	0.002	-0.003	0.002	0.003	0.002
	(0.023)	(0.010)	(0.004)	(0.005)	(0.005)	(0.006)
Lag nat. res. (total % of GDP)	-0.017**	-0.008	-0.011**	-0.007**		
	(0.008)	(0.007)	(0.004)	(0.003)		
Lag nat. res. (max. sector, % of GDP)					-0.009**	-0.007*
					(0.004)	(0.004)
FDI × nat. res. (×100)						-0.014
						(0.026)
Constant	4.170***	4.503***	1.521***	0.380**	0.370**	0.371*
	(0.138)	(0.065)	(0.189)	(0.165)	(0.167)	(0.189)
5-year FEs	No	Yes	Yes	Yes	Yes	Yes
Country FEs	No	Yes	Yes			
Year × region FEs	No	No	Yes	No	No	No
N of countries	69	69	69	69	69	69
N of country-5-year obs.	558	558	549	558	558	558
R^2	0.302	0.810	0.907			
Arellano-Bond AR(2) test, *p*-value				0.299	0.280	0.395
Hansen test of overid., *p*-value				0.231	0.210	0.256
Number of instruments				56	56	65

Notes.- The table reports the results for varying estimates of Equation (1) for the period 1970-2015, in 5-year intervals, where the dependent variable is the the property rights measure (see Table 2 and Figure 1 for sample descriptives, including for levels and 5-year changes).
Columns (I)-(III): least squares estimates, standard errors robust to country-level clusters.
Columns (IV)-(VI): system GMM estimates with lagged differences and levels of endogenous variables (all except the 5-year fixed effects) used as instruments.
***, ** and * denote statistically significant differences from zero at the 1%, 5% and 10% levels, respectively, two-sided sided tests, with (cluster) robust standard errors reported in parentheses.

one-seventh of a standard deviation in the 5-year change in the property rights measure within the estimation sample. This is a smaller effect than the least squares estimates provided in column (III), suggesting that omitted variables correlated with natural resource richness tend to bias the effects of this variable downward when using OLS to model property rights development, even after accounting for country and region-year fixed effects.

Column (V) of Table 3 shows estimates of a similar model to column (IV), only changing the natural resource variable to be the maximum percentage of GDP attributed to one of the natural resource sectors within a country and period, thus addressing the potential effects of single-sector economic dependence on institutional development. We find that the effect of a change in the maximum percentage of GDP focused within a single natural resource sector has a marginally

greater negative effect on property rights development within countries than the overall amount of GDP derived from natural resource sectors. Column (VI) shows further results after including the term in the model for the the interaction of contemporaneous FDI and lagged total natural resources $(NetFDI_{i,t} \times NatRes_{i,t-1})$. Demir (2016) argued that there is a high likelihood that foreign investors treat resource rich countries differently in order to access resources. Although the estimates of this interaction effect are negative for property rights, they are not statistically significant. The system GMM estimates of Equation (1) also show that net FDI inflows on their own have no significant effects on property rights across all our model specifications. It is also notable that the coefficient of at least 0.9 for the 5-year lagged dependent variable in the GMM model estimates implies that the effects of changes in natural resource richness on property rights within a country are very persistent.

These results for property rights generally support the endowments view of institutional development of Engerman and Sokoloff (2002), among others. Moreover, the results align with a theory that the presence of natural resources generates incentives for investments that facilitate increased extraction of monopoly rents by a few state or private actors. In other words, there is motivation for actors involved in the use or extraction of natural resources to affect the weakening of institutions (e.g., through corruption, Malesky et al., 2015), to drive up monopoly rents regardless of whether those resources are increasingly exploited alongside foreign investment into the local economy.

Appendix Table A3 reports equivalent results to Column (VI) of Table 3, in turn replacing the maximum sector-specific percentage contribution of natural resource rents to GDP with the contributions from only gas, forestry, coal, minerals, and oil. Although imprecisely estimated and not generally statistically significant, the magnitudes and directions of the effects of natural resource rents from each of these sectors on the development of property rights are consistent with the main results. Only oil rents have a statistically significant effect on property rights at the 10% level (column (V), Appendix Table A3), suggesting that the use or extraction of oil especially tends to lead to the erosion of national institutions. This is consistent with some evidence from Andersen and Aslaksen (2013) and Omgba (2009) that only oil dependence, and not other extractive resources, tends to erodes political institutions in Africa.

To test the geographical stability of our estimates, Appendix Table A4 shows further model estimates equivalent to the main results in column (VI) of Table 3, dropping in turn one of the six regional groupings of countries from the estimation sample. The effect of a change in the maximum contribution of a single natural resource sector to GDP on property rights is negative in each case. However, when excluding the six Middle East & North African (MENA) countries from the sample, this effect is not statistically significant at standard levels. When instead excluding the eight East Asia & Pacific countries, net FDI inflows tend to have a significant positive effect on property rights unless moderated by high natural resource richness. Taken together, these results suggest that although the effects of increased natural resource rents within a country are likely

to be negative for property rights, the estimated average effects are sensitive to the sample of countries or regions studied.

4.2 Other aspects of institutional development

In this section, we explore whether other aspects of the Fraser Institute's measures of institutional quality and the WGI dimensions of governance are affected by net FDI inflows or natural resource rents. Table 4 reports the system GMM estimator results of Equation (1) comparable to those shown in column (VI) of Table 3, replacing the previous dependent variable, property rights (prop. rights - repeated for comparison in column (I) of Table 4), with each of the other four Fraser Institute measures: size of government (gov. size), column (II); sound money (money), column (III); freedom to trade internationally (free. trade), column (IV); and business regulation (reg.), column (V). The model estimates show that these other institutional measures are substantially less persistent within countries than property rights. Net FDI inflows tend to have more positive effects on other aspects of institutional quality compared with property rights, but these effects are only statistically significant at standard levels for government size and regulation. The effect of a change in natural resource richness on institutional development five years later has the smallest magnitude effect for property rights out of the five different measures, although the effect on sound money is not statistically significant. The largest negative effects of natural resource rents are estimated for the freedom to trade internationally; an increase in the maximum single-sector use or extraction of natural resources by 10 percentage points of GDP leads to a decline of 0.33 in the freedom to trade internationally measure five years later, which is equivalent to about one-quarter of a standard deviation in the 5-year change in this measure within the estimation sample. Across all Fraser Institute measures of institutional quality, we find no significant evidence that net FDI inflows moderate or exacerbate the extent to which natural resource richness tends to erode institutional development.

Finally, we broaden our analysis and present model estimates using the WGI dimensions of governance as dependent variables. Table 5 displays system GMM estimates of Equation (1), which repeat the analysis in the previous sections by replacing the dependent variable with: control of corruption (con. corr.), column (I); rule of law (rule/law), column (II); government effectiveness (gov. eff.), column (III); regulatory quality (regul.), column (IV); political stability and absence of violence/terrorism (stab. vio.), column (V); and voice and accountability (voice), column (VI). The effect of net FDI inflows is only positive and significant at the 10% level on regulatory quality, which aligns with the findings of Pan et al. (2020). Dependence on a single natural resource sector has a significant negative effect on political stability and absence of violence/terrorism. This is consistent with the notion that the wealth derived from natural resources provides an incentive for political survival (e.g., Andersen and Aslaksen, 2013). Overall, due to the more limited sample period, our tests of whether natural resources affect the WGI dimensions of governance are underpowered.

TABLE 4: Estimated effects of FDI and natural resource rents on individual institutional factors, 5-year periods in 19750-2015

Dep. variables:	prop. rights (I)	gov. size (II)	money (III)	free. trad. (IV)	reg. (V)
Lagged institutional factors	0.927***	0.566***	0.671***	0.593***	0.544***
	(0.044)	(0.064)	(0.055)	(0.078)	(0.060)
GDP per capita (US$000s)	0.002	-0.009	0.015	0.024*	0.016**
	(0.007)	(0.006)	(0.011)	(0.013)	(0.007)
Economic growth (US$000s)	0.136**	0.383***	1.070***	0.400*	0.543***
	(0.065)	(0.141)	(0.229)	(0.225)	(0.101)
Net FDI inflows (% of GDP)	0.002	0.016*	0.018	0.013	0.017**
	(0.006)	(0.009)	(0.019)	(0.011)	(0.007)
Lag nat. res. (max. sector, % of GDP)	-0.007*	-0.027***	-0.013	-0.033**	-0.012**
	(0.004)	(0.010)	(0.012)	(0.013)	(0.005)
FDI $\times$ nat. res. ($\times$ 100)	-0.014	0.066	0.062	0.041	-0.016
	(0.026)	(0.087)	(0.093)	(0.079)	(0.032)
Constant	0.371*	3.108***	2.053***	2.737***	2.909***
	(0.189)	(0.477)	(0.427)	(0.475)	(0.410)
5-year FEs	Yes	Yes	Yes	Yes	Yes
N of countries	69	69	69	69	69
N of country-5-year obs.	558	558	558	537	540
Arellano-Bond AR(2) test, *p*-value	0.395	0.744	0.072	0.880	0.176
Hansen test of overid., *p*-value	0.197	0.580	0.744	0.425	0.817
Number of instruments	65	65	65	65	65

Notes.- Two-step system GMM estimates of Equation (1) for the period 1975-2015, in 5-year intervals, where the dependent variables are Property Rights (prop. rights), government size (gov. size); sound money (money), freedom to trade Internationally (free. trad.), and regulation (reg.) (see Table 2 and Figure 1 for sample descriptives, including for levels and 5-year changes).
Model estimates with lagged differences and levels of endogenous variables (all except 5-year fixed effects) used as instruments.
***, ** and * denote statistically significant differences from zero at the 1%, 5% and 10% levels, respectively, two-sided tests, with robust standard errors reported in parentheses.

TABLE 5: Estimated effects of FDI and natural resource rents on WGI institutional factors, 4-year periods in 2000-2016

Dependent variables:	con. corr. (I)	rule/law (II)	gov. eff. (III)	regul. (IV)	stab. vio. (V)	voice (VI)
Lagged institutional factors	0.912***	0.951***	1.021***	0.877***	0.930***	0.842***
	(0.140)	(0.114)	(0.131)	(0.082)	(0.115)	(0.096)
GDP per capita (US$000s)	0.002	0.003	0.003	0.007*	0.009	0.004
	(0.009)	(0.006)	(0.007)	(0.004)	(0.006)	(0.005)
Economic growth (%)	0.043	0.102	0.073	0.074	0.330***	0.120**
	(0.065)	(0.077)	(0.108)	(0.063)	(0.123)	(0.053)
Net FDI inflows (% of GDP)	0.005	0.002	-0.006	0.008*	-0.013	-0.003
	(0.006)	(0.005)	(0.005)	(0.005)	(0.009)	(0.004)
Lag nat. res. (max. sector, % of GDP)	0.001	-0.004	-0.001	-0.004	-0.011**	0.004
	(0.004)	(0.005)	(0.008)	(0.004)	(0.005)	(0.005)
Constant	-0.580	-0.086	0.033	-0.062	0.001	-0.094
	(0.102)	(0.062)	(0.071)	(0.053)	(0.123)	(0.063)
4-year FEs	Yes	Yes	Yes	Yes	Yes	Yes
N of countries	67	67	67	67	67	67
N of country-4-year obs.	258	258	258	258	258	258
Arellano-Bond AR(2) test, *p*-value	0.452	0.763	0.749	0.448	0.591	0.204
Hansen test of overid., *p*-value	0.319	0.451	0.215	0.069	0.563	0.625
Number of instruments	32	32	32	32	32	32

Notes.- Two-step system GMM estimates of Equation (1) for the period 2000-2016, in 4-year intervals, where the dependent variables are WGI: control of corruption (con. corr.), rule of law (rule/law), government effectiveness (gov. eff.), regulatory quality (regul.), political stability and absence of violence/terrorism (stab. vio.), and voice and accountability (voice).

***, ** and * denote statistically significant differences from zero at the 1%, 5% and 10% levels, respectively, two-sided sided tests, with robust standard errors reported in parentheses.

5 Conclusion

In this paper, we explored the relationships between natural resources, FDI inflows, and institutions. When focusing on legal property rights, we found negative and significant effects of natural resource use or extraction on the development of these particular national institutions. This aligns with a theory that abundant natural resources generally lead to the weakening of institutions because of the potential to secure and capitalise on monopoly rents. Further, we found that the effect of FDI inflows on institutions is not robust to controlling for natural resource abundance. This suggests that the latter tends to result in eroded institutions regardless of whether those resources are exploited through increased foreign investment into the local economy. Looking more widely, we found some evidence that not only a country's property rights but also the size of its government, the freedom it gives to trade internationally, regulation, political stability, and the absence of violence/terrorism, are all other institutional factors that appear to respond negatively to the increased share of natural resources in a country's output.

Our results for the development of property rights were generally robust to dropping specific regions from the estimation sample, except when we excluded the EAP and MENA regions from the regression models. This suggests that the effects of natural resources are stronger in these parts of the world, which is an important issue for future exploration and case study. While our estimates appear to be quite robust to the different model specifications and estimation samples that we considered, it does not imply that the selected variables are the only important predictors of institutions. Similarly, there are several other factors that can be used to proxy institutions. In this paper, we used several composite indices, because unlike Eicher and Roehn (2007) we are not convinced that it is possible to form a single factor that could adequately explain a country's whole institutional environment.

Our findings add new evidence on the average relationships across countries between natural resources, FDI, and institutions, which could be helpful for future policy formulation in resource rich countries. For instance, our results suggest that policymakers whose objectives are to strengthen domestic institutions should be wary (and possibly renew their resolve) when their countries develop new opportunities to extract rents from natural resources. In other words, they would be advised to discourage, dismantle or robustly regulate natural monopoly industries, which have strong incentives to invest in political pressure or other measures that can secure and ensure monopoly rents. In this light, Botswana is an example of a developing country that has successfully managed to regulate its natural resource sectors to avert excessive monopoly rents. The country's remarkable story in mining and the trade of diamonds has been made possible through the creation of strong institutions and state management that stands against corruption (Acemoglu et al., 2015; Ghebremusse, 2018).

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Appendix A. Additional tables

TABLE A1: List of countries included in the analysis

East Asia & Pacific	Europe & Central Asia	Latin America & Caribbean	Middle East & North Africa	South Asia	Sub-Saharan Africa
Hong Kong	Turkey	Argentina	Egypt	Bangladesh	Angola
Indonesia		Bolivia	Iran	India	Benin
Korea, Rep.		Brazil	Jordan	Pakistan	Botswana
Malaysia		Chile	Morocco	Sri Lanka	Burkina Faso
Papua New Guinea		Colombia	Syria		Cameroon
Philippines		Costa Rica	Tunisia		Congo, DR
Singapore		Dominican Rep.			Congo, Rep.
Thailand		Ecuador			Cote d'Ivoire
		El Salvador			Ethiopia
		Guatemala			Gabon
		Guyana			Ghana
		Haiti			Kenya
		Honduras			Lesotho
		Jamaica			Madagascar
		Mexico			Malawi
		Nicaragua			Mali
		Panama			Mauritius
		Paraguay			Mozambique
		Peru			Namibia
		Trinidad and Tobago			Niger
		Uruguay			Nigeria
		Venezuela, RB			Senegal
					Sierra Leone
					South Africa
					Tanzania
					Uganda
					Zambia
					Zimbabwe

TABLE A2: Definitions of variables

Variable	Definition	Source
Net FDI flows (% of GDP)	Net FDI inflows as percentage of GDP	World Bank, World Development Indicators
Economic growth (5-year %)	Percentage change in GDP	Calculated from World Bank data, World Development Indicators
Forest rents (% of GDP)	Forest rents as percentage of GDP	World Bank, World Development Indicators
Gas rents (% of GDP)	Mineral rents as percentage of GDP	World Bank, World Development Indicators
GDP per capita (US$000s)	GDP per capita expressed in current United States dollars	World Bank, World Development Indicators
Government size	Measure of size of government, scale 0 - 10	Fraser Institute
Legal system and property rights	Measure of legal system and property rights, scale 0 - 10	Fraser Institute
Coal rents (% of GDP)	Coal rents as percentage of GDP	World Bank, World Development Indicators
Minerals rents (% of GDP)	Oil rents as percentage of GDP	World Bank, World Development Indicators
Oil rents (% of GDP)	Mineral rents as percentage of GDP	World Bank, World Development Indicators
Natural resources rents (total, % of GDP)	Total natural resources rents as percentage of GDP	World Bank, World Development Indicators
Sound money	Measure of sound money, scale 0 - 10	Fraser Institute
Freedom to trade internationally	Measure of freedom to trade internationally, scale 0 - 10	Fraser Institute
Regulation	Measure of economic freedom present in regulation, scale 0 - 10	Fraser Institute
Voice and Accountability	Measures perceptions of the extent to which a country's citizens are able to participate in selecting their government.	World Bank, Worldwide Governance Indicators
Political Stability and Absence of Violence/Terrorism	Measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism.	World Bank, Worldwide Governance Indicators
Government Effectiveness	Captures perceptions of the quality of public services and civil service and the degree of its independence from political pressures.	World Bank, Worldwide Governance Indicators
Regulatory Quality	Captures perceptions of the ability of the government to formulate and implement sound policies.	World Bank, Worldwide Governance Indicators
Rule of Law	Captures perceptions of the extent to which agents have confidence in and abide by the rules of society.	World Bank, Worldwide Governance Indicators
Control of Corruption	Captures perceptions of the extent to which public power is used for private gain.	World Bank, Worldwide Governance Indicators

TABLE A3: Estimated effects of sector-specific natural resource rents on property rights, 5-year periods in 1975-2015

Dep. variable: Property Rights	(I)	(II)	(III)	(IV)	(V)
Lag Property rights	0.931***	0.943***	0.956***	0.934***	0.938***
	(0.042)	(0.051)	(0.039)	(0.043)	(0.037)
GDP per capita (US$000s)	0.002	-0.001	0.000	0.001	0.002
	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)
Economic growth (%)	0.107	0.154*	0.099	0.123	0.109*
	(0.070)	(0.079)	(0.077)	(0.074)	(0.061)
Net FDI flows (% of GDP)	0.003	0.003	0.000	0.002	0.003
	(0.007)	(0.008)	(0.006)	(0.007)	(0.006)
Lag gas rents (% of GDP)	-0.011				
	(0.018)				
Lag forest rents (% of GDP)		-0.005			
		(0.009)			
Lag coal rents (% of GDP)			-0.070		
			(0.127)		
Lag mineral rents (% of GDP)				-0.016	
				(0.016)	
Lag oil rents (% of GDP)					-0.005*
					(0.003)
FDI × nat. res. (×100)	-0.037*	-0.045*	-0.029	-0.043*	-0.017
	(0.022)	(0.026)	(0.020)	(0.025)	(0.023)
Constant	0.315*	0.292	0.228	0.370**	0.300
	(0.173)	(0.242)	(0.180)	(0.181)	(0.153)
5-year FEs	Yes	Yes	Yes	Yes	Yes
N of countries	69	69	69	69	69
N of country-5-year obs.	520	558	493	558	522
Arellano-Bond AR(2) test, *p*-value	0.847	0.404	0.596	0.408	0.852
Hansen test of overid., *p*-value	0.164	0.119	0.329	0.331	0.244
Number of instruments	65	65	63	65	65

Notes.- Two-step system GMM estimates of Equation (1) for the period 1975-2015, in 5-year intervals, where the dependent variable is the Property Rights (see Table 2 and Figure 1 for sample descriptives, including for levels and 5-year changes).
Model estimates with lagged differences and levels of endogenous variables (all except 5-year fixed effects) used as instruments.
***, ** and * denote statistically significant differences from zero at the 1%, 5% and 10% levels, respectively, two-sided tests, with robust standard errors reported in parentheses.

TABLE A4: Estimated effects of FDI and natural resources on property rights, 5-year periods in 1975-2015, excluding one region in turn from the estimation sample

Excluding:	EAP (I)	ECA (II)	LAC (III)	MENA (IV)	SA (V)	SSA (VI)
Lag Property rights	0.874***	0.936***	0.902***	0.937***	0.927***	0.957***
	(0.053)	(0.045)	(0.040)	(0.047)	(0.047)	(0.045)
GDP per capita (US$000s)	0.007	0.002	0.006	0.002	0.002	0.008
	(0.013)	(0.007)	(0.006)	(0.007)	(0.007)	(0.007)
Economic growth (%)	0.080	0.125*	0.266***	0.154**	0.144**	0.179
	(0.063)	(0.066)	(0.091)	(0.073)	(0.068)	(0.106)
Net FDI (% of GDP)	0.020**	0.001	0.000	0.001	0.001	-0.016
	(0.009)	(0.005)	(0.006)	(0.006)	(0.005)	(0.011)
Lag nat. res. (max. sector, % of GDP)	-0.007	-0.006*	-0.011**	-0.005	-0.008*	-0.011*
	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)	(0.006)
FDI × nat. res. (× 100)	-0.062*	-0.016	0.005	-0.024	-0.010	-0.158
	(0.035)	(0.026)	(0.039)	(0.027)	(0.025)	(0.199)
Constant	0.550***	0.356*	0.451**	0.310	0.370*	0.175
	(0.205)	(0.197)	(0.192)	(0.198)	(0.199)	(0.207)
5-year dummies	Yes	Yes	Yes	Yes	Yes	Yes
N of countries	61	68	47	63	65	41
N of country-5-year obs.	487	549	366	507	523	358
Arellano-Bond AR(2) test, *p*-value	0.808	0.471	0.174	0.339	0.537	0.359
Hansen test of overid., *p*-value	0.450	0.278	0.976	0.358	0.368	0.998
Number of instruments	65	65	65	65	65	65

Notes.- Two-step system GMM estimates of Equation (1) for the period 1975-2015, in 5-year intervals, where the dependent variable is Property Rights (see Table 2 and Figure 1 for sample descriptives, including for levels and 5-year changes).
Model estimates with lagged differences and levels of endogenous variables (all except 5-year fixed effects) used as instruments.
Variable definitions: EAP = East Asia and Pacific, ECA = Europe and Central Asia, LAC = Latin America and Caribbean, MENA = Middle East and North Africa, SA = South Asia, and SSA = Sub-Saharan Africa.
***, ** and * denote statistically significant differences from zero at the 1%, 5% and 10% levels, respectively, two-sided tests, with robust standard errors reported in parentheses.