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Institutional differences across resource-based economies

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Abstract: To predict economic success and failure, academics and policymakers alike are interested in the differences in institutional structures across natural resource-based economies. This paper uses a political economy framework to examine the effect of institutional variables on per capita Gross-Domestic-Product in resource-rich economies. After controlling for institutions, natural resource rents cease to have a negative impact on long-term growth. Institutions in resource-based economies foster economic growth when voice and accountability are in place; broad-based rule of law is enforced with secure property rights, and control of corruption; and when government effectiveness, regulatory quality, and political stability are positively perceived.

Keywords: institutions, growth, political power, rents, property rights, resource-based economies
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1 Introduction

The aim of this paper is to respond to the following five research questions: 1) How do institutional structures differ across resource-based economies? 2) Do institutional differences explain success and failure in resource-based economies? 3) Which institutions[1] matter the most empirically? 4) What is the effect of institutional variables, including democratization, political freedom, and corruption on per capita growth rate? 5) What are the implications for policy interventions, if any? To answer these specific questions, the paper applies an empirical analysis of the political economy institutional framework to the context of natural resource-rich economies.

Mainstream economic literature draws attention to the 'resource curse'—an empirical regularity pointing to many natural resource abundant countries that have poor economic growth. However, there is less of an agreement among economists as to the causes and the driving factors of this paradox. There are two big reasons associated with the resource curse. One is called the Dutch disease and is related to the economic aspect of the resource curse. To be specific, resource gains increase demand for domestic, non-traded goods, which takes resources away from other internationally traded sectors that otherwise would be competitive, for example the technologically advanced manufacturing or the agriculture sector.[2] The second one is the political aspect associated with rent seeking,[3] and military conflict as a result of the resource wealth. In addition, resource abundance can bring about social inequalities and environmental challenges. Acemoglu and Robinson (2013) argue that there is indeed a 'conditional resource curse' and a direct link between resource abundance and institutional quality. That is to say, resource-rich countries with good institutions will experience higher growth rates whereas those with bad institutions will see lower growth rates due to a bad institutional setup.

International organizations are often brought in to provide technical assistance to developing countries and emerging markets on designing appropriate policy mix and the right set of institutions to deal with country specific challenges. While it is widely understood that there is no one-size-fits-all policy prescription, the advice has often been rather uniform and inadequate. By pointing the spotlight on resource-rich countries and their development challenges, this paper aims to add further insights into the analysis of the institutional factors that help or hinder growth and development in political economy context. The conclusions of this paper are useful inter alia in strengthening the intellectual underpinnings of technical assistance.

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[1] North (1991: 97) defined institutions as '...the humanly devised constraints that structure political, economic and social interaction'. According to him, they consist of both formal rules (constitutions, laws, property rights) and informal constraints (sanctions, taboos, customs, traditions, codes of conduct). In its most concise definition, institutions have at their core social factors that influence, to some extent, human behaviour. Moreover, institutions are defined as a form of collective behaviour that achieves the 'control, liberation and expansion of individual action' (Commons 1931: 648). The emphasis is usually on social factors as opposed to natural resources or economic constraints.

[2] The term 'Dutch disease' describes the poor economic performance of the Dutch economy in 1959 when large gas reserves were discovered. The windfall revenues from natural resources gave rise to real exchange rate appreciation, which in turn reduced the competitiveness of the manufacturing sector.

[3] The resource rents are the difference between costs, including reasonable return on capital, and the total revenues that are generated from natural resources.

Furthermore, Sustainable Development Goals (SDGs), which the UN Member States have adopted in a landmark summit in New York in September 2015, assign to institutions a dedicated goal, namely SDG 16, which reads, 'to promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels' (General Assembly resolution 70/1 2015). Furthermore, of particular relevance for our study is that for the first time, this goal has provided for a number of sub-targets related to the functioning of institutions, such as Target 16.5 that aims to reduce corruption and bribery substantially in all their forms and Target 16.6 that specifically focuses on developing effective, accountable, and transparent institutions at all levels.[4]

Institutional deficiencies and shortcomings, such as rampant corruption, low quality of public services, and weak rule of law, particularly linked to formal state institutions, can lead to marginalization, especially among women and youth. While in some cases traditional and faith-based institutions may be able to serve as substitutes, more often than not such separation may lead to terrorism, violent extremism, and recurring conflicts. Such institutional setups are not only taxing on human development achievements, but also form a vicious cycle of further discrimination, inequity of income and opportunities. This leads to weakening of the socio-political cohesion as well as the foundations of robust institutions that underpin modern state-building. Moreover, windfall revenues from natural resources may result in a decline in growth due to inefficient allocation of resources, e.g. inefficient investments in public goods, such as infrastructure ('white elephant projects') or by restricting trade openness via import protection.

This paper offers policy recommendations that explore the path to optimal institutional arrangements considering context-specific social, political, and economic settings. We propose novel empirical strategies for understanding the links between institutional change and economic growth. The analysis focuses on institutions that matter for growth such as voice and accountability, rule of law, and control of corruption. We demonstrate the inherent growth-enhancing impact of these specific institutional arrangements, as measured by the World Bank's Governance Data, and show that, as a consequence of controlling for the direct (and indirect) impact of institutions, natural resource rents cease to have a negative impact on long-term growth. This means that there would be no resource curse provided that the right types of institutions are in place. In other words, our results provide strong empirical support to the conditional resource curse argument proposed by Acemoglu and Robinson (2013). The rest of the paper is organized as follows: Section 2 presents a brief literature review. Section 3 discusses the conceptual framework and the specification of our empirical model. Section 4 presents the data in detail. Section 5 presents the empirical results and Section 6 concludes.

2 Literature review

Economic literature on institutions has raised a set of basic questions for countries whose economic performance has lagged despite endowments of natural resources. Mehlum et al. (2006) analyse the systemic differences in institutions among 42 resource-rich countries in explaining their average annual economic growth from 1965 to 1990. The authors start with the usual observation of a negative relationship between resource dependence and growth. However, once they split their sample into two on the basis of institutional quality, the negative relationship between resource dependence and growth disappears when controlled for good institutions. The authors conclude, therefore, that the variance in growth performance in the period under observation must be attributed primarily to how rents extracted from natural resources are

[4] The actual quantifiable targets attached to these goals will be finalized in early 2016.

distributed across the society via institutional arrangements. In following such an approach, the authors contribute to the strand of literature spearheaded by the likes of North and Thomas (1973), North (1990), Knack and Keefer (1995), Engerman and Sokoloff (2000), and Acemoglu et al. (2001) that make a compelling conceptual and empirical case in favour of the decisive role played by institutions in determining economic performance.

It is worth contrasting this approach to Sachs and Warner (1995), which considered a similar rent-seeking behaviour highlighting institutions, but concluded that this effect was not statistically significant, hence preferring economic factors such as Dutch disease and geography as determinants of poor economic performance in resource-rich countries. Yet, this approach does not stand up to close scrutiny even at the anecdotal level. For instance, if the geography hypothesis were to trump the institutional hypothesis, then we should not be seeing poor economic performance following oil windfall revenues in Mexico, which benefits from geographical proximity to one of the largest markets in the world, namely the United States (Tornell and Lane 1999). Neither should we observe growth champions like Botswana, which is abundant with diamond resources (accounting for 40 per cent of GDP), yet rather than experiencing a 'resource curse', it has been one of the world's best growth performers since 1965—mainly attributed to the role of good institutions (Acemoglu et al. 2002).

Gelb and Grasmann (2009) carry these hypotheses into the field of resource-rich countries and focus on identifying strategies that countries can follow to confront the resource curse. Based on a cross-sectional analysis, the authors conclude that first, the evidence for resource curse is very robust, especially in oil-rich countries, and that the impact of natural resources on exporters depends on the initial conditions. For example, countries with stronger institutions and better human capital are less likely to experience a resource curse. Furthermore, they conclude that oil exporters tend to be particularly vulnerable to governance deficits as well as considerable revenue volatility and uncertainty. The authors recommend strategies to create policies of restraints, checks, and balances, as well as promoting accountability to help countries better manage oil rents and spend them more effectively to benefit broader segments of their respective societies. Other related measures include setting up dedicated Sovereign Wealth Funds (SWFs) and/or direct transfer of resource rents to citizens along with lowered subsidies and increased taxes, as appropriate.[5]

To expand on this point, Mehlum et al. (2006) use an empirical strategy that builds upon the Sachs and Warner (1995, 1997a, 1997b) papers. Utilizing the same dataset and institutional variables, the paper pushes the envelope by testing the validity of the hypothesis that the quality of institutions determines whether a country will experience resource curse. The authors provide new insights by including an interaction term of resource abundance and institutional quality into the standard Sachs-Warner regression set up.

Mehlum et al. (2006) finds that this interaction term takes on a positive and significant coefficient meaning that resource abundance deters growth only when institutions are weak. The authors also calculate the marginal impact of the resource curse as a function of institutional quality and conclude that the impact weakens with better institutions and beyond certain—somewhat high—threshold, it vanishes completely. According to their calculations, some 17 per cent (15 out of 87 countries in their sample) are above this threshold of institutional quality so that they do not suffer from resource curse.

[5] The latter recommendation also finds support and further elaboration by Moss et al. (2015).

An interesting twist in institutional paradigm is to consider the type of natural resources in the same vein as we consider the type of institutions—good or bad. Boschini et al. (2007) considers the differences between types of natural resources explicitly to the extent that certain natural resources are more prone to rent-seeking and conflicts than others and that their negative effect must be countered by good institutions. Taking the traditional resource curse hypothesis one step further, Boschini et al. (2007) argues that the impact of natural resources on economic growth is non-monotonic in institutional quality; more so for some type of resources than others. For instance, countries rich in minerals experience resource curse only if their institutions are weak. The impact through this interaction between the type of resources and institutions is larger if the countries are rich in diamonds and precious metals.

In a theoretical assessment of the same set of questions, Robinson et al. (2006) explore the political foundations of the resource curse by looking in depth into the incentives of politicians in the face of resource booms and consequent windfall gains. They conclude that the overall impact depends critically on institutions as they provide the rules of the game that determine how political incentives are mapped into policies and outcomes. Accordingly, countries with strong institutions that promote accountability and state competence are less likely to suffer from resource curse, as these institutions will counter-balance the perverse incentives that such resource booms will create.

Jones-Luong and Weinthal (2010) argue, that although the Soviet successor states have all inherited similar weak institutions at the beginning of the transition period, they ended up in very different trajectories in spite of the fact that most of them were oil rich—Turkmenistan and Uzbekistan: classical resource curse scenario (state ownership and control of their resources); Azerbaijan (state ownership without control); Kazakhstan (private foreign ownership); and Russia (private domestic ownership).

While the former two expanded the size of the public sector and started building grandiose white elephant projects, the latter three actually shrunk the size of the public sector vis-à-vis the national income. This divergence is in fact due to differences in ownership structures of oil in these countries. This suggests that a crucial consideration for understanding the impact of natural resources wealth on growth is the form of property rights—in other words, whether property rights are dominated by the state. This argument goes one step beyond the standard institutions argument, which simply attributes the resource curse to insecure property rights, absence of checks and balances, and other manifestations of weak institutions.

A recent paper by Sanders and Sandvig (2015) presents another case study, namely that of Norway, which is often considered an outlier in the discussion of resource-rich countries in the sense that the country had long been an established democracy by the time it discovered oil reserves in the North Sea. Norway has since been able to avoid succumbing into a system of corruption, autocracy, and/or cronyism—a trajectory followed by many other resource-rich countries. In an attempt to explain how Norway turned a potential resource curse into a resource blessing, scholars have suggested factors, such as sound macroeconomic policies that invested oil and gas revenue wisely into a sovereign wealth fund, human capital related factors that may have allowed Norwegians to reap full benefits of the windfalls, and last but not least the importance of institutional factors, such as the fact that the country was already blessed with a democratic tradition and sound institutions that guaranteed secure property rights and incentivized economic activity. While not disagreeing with the importance of these explanations, especially regarding the positive role institutions have played, the authors also augment these arguments with an economic history perspective. They argue that high quality institutions alone will not be sufficient to produce good natural resource policies, and emphasize the fact that the Norwegian economy had relied on natural resources long before the North Sea oil was discovered. This

meant that Norwegian authorities had cumulative experience of more than half a century in comprehensive regulation of natural resources before the discovery of oil in 1969. This allowed Norway to handle some of the challenges that resource-rich economies have faced following the generation of large windfall revenues better. A critical consideration for the purposes of the present paper, however, is the importance of going beyond a simplistic view of institutions and investigating different aspects of institutions in more detail—regulatory quality being a case in point. There is broad agreement among economists that institutional weakness is central to explaining negative resource booms. Furthermore, as demonstrated by Polterovich et al. (2010), resource-rich countries tend to suffer from higher real exchange rates, slower accumulation of human capital, and weaker institutions, especially if the institutions were not strong initially. All of these factors have a negative impact on growth.

3 Conceptual framework

Building on the model-based political economy framework developed and expanded by Hall and Jones (1999), we analyse the empirical relationship between per capita income growth and a wide range of economic, financial, demographic, institutional, and political variables. In our dynamic panel context, the estimated equation takes the following form:

$$g_{i,t} = \lambda_i + \mu K_{i,t-1} + \rho L_{i,t-1} + \beta X_{i,t} + \gamma Z_{i,t} + \varepsilon_{i,t} \quad (1)$$

where $g_{(i,t)}$ is the per capita growth rate of GDP in country i at time t, λ_i is a country-specific intercept (fixed effect) accounting for heterogeneity, $K_{(i,t-1)}$ is the capital stock as a share of GDP in country i at time (t-1), $L_{(i,t-1)}$ is the labour stock as a share of GDP in country i at time (t-1), $X_{(i,t)}$ represents a vector of country-specific economic and financial variables. In particular, the model accounts for the concept of resource abundance by including a variable that captures natural resource rents (oil rents + mineral rents) as per cent of GDP. $Z_{(i,t)}$ denotes a matrix of institutional and political variables, including subjective/survey-based data sources such as the Corruption Perceptions Index of the Transparency International (2015) and World Bank's Governance Indicators (Kaufmann et al. 2010), and an assessment of democracy based on Polity IV database. The regression equation has been specified in a log-linear form, i.e. the per capita dependent variable is log transformed to limit the potential heteroskedasticity in the fitted model.

The paper presents empirical evidence based on the feasible generalized least squares (FGLS) method as well as the dynamic GMM estimations based on Arellano-Bond estimator (Arellano and Bond 1991). Feasible GLS is based on finding an estimator, which has the same properties as the true GLS. First, we fit the regression obtaining a consistent but (inefficient estimator) and form the residuals. Then, we use the estimated residuals to build a consistent estimator of the errors covariance matrix. We perform estimations using heteroskedasticity-consistent standard errors across our panel.[6]

The paper provides further empirical evidence based on a one-step dynamic system GMM estimator, which corrects for potential bias associated with endogenous regressors and the persistence of the dependent variable. This estimation strategy uses three lags and calculates standard errors consistent with panel specific heteroscedasticity and autocorrelation. To ensure the soundness of this empirical strategy, we also test the validity of the GMM instruments with

[6] We assume that the disturbances are non-spherical rather than spherical. Because of this, the general linear regression model can be used to describe data generation processes characterized by heteroscedasticity and autocorrelation.

the Sargan test for over identifying restrictions as well as with Arellano-Bond tests, which provide no evidence of significant second order auto-correlation.

4 Data overview

One of the major challenges of conducting a study on resource-rich countries is to ascertain which countries are considered resource-rich and why. There are competing definitions, and based on our reading, the literature does not seem to have resolved this question conclusively.

In the absence of a well-established definition or a widely applied rule-of-thumb, we base our sample of 72 countries on a survey of recent studies, as described in detail in Table 1.

Table 1: Resource-rich countries sample

Afghanistan [a b]	Ghana [a b]	Papua New Guinea [a c]
Algeria [a b c]	Guinea [a b c]	Peru [a b c]
Angola [a b c]	Guinea-Bissau [d]	Philippines [a b]
Argentina [d]	Guyana [d]	Qatar [a b c]
Australia [a b]	India [a b]	Russia [a b c]
Azerbaijan [a b c]	Ivory Coast [d]	Saudi Arabia [a b c]
Bahrain [a b c]	Indonesia [a b c]	Sierra Leone [a b]
Bolivia [a b c]	Iran [a b c]	South Africa [a b]
Botswana [a b c]	Iraq [a b c]	Syria [d]
Brazil [a b]	Kazakhstan [a b c]	South Sudan [a b]
Brunei [d]	Kuwait [a b c]	Tanzania [a b]
Burkina Faso [a b]	Liberia [a b c]	Timor-Leste [a c]
Cambodia [a b]	Libya [a b c]	Trinidad and Tobago [a b c]
Cameroon [a b c]	Malaysia [a b c]	Tunisia [a b]
Canada [a b]	Mexico [a b c]	Turkmenistan [a b c]
Chile [a b c]	Mali [d]	Uganda [a]
China [a b]	Mongolia [a b c]	United Arab Emirates [d]
Colombia [a b]	Morocco [a b]	United Kingdom [a b]
Congo (DRC) [a b c]	Mozambique [a b]	United States [a b]
Ecuador [a b c]	Myanmar [a b]	Venezuela [a b c]
Egypt [a b]	Niger [a]	Viet Nam [a b c]
Equ. Guinea [a b c]	Nigeria [a b c]	Yemen [a b c]
Gabon [a b c]	Norway [a b c]	Zambia [a b c]
Gambia [d]	Oman [d]	Zimbabwe [a b]

Source: Table compiled by authors based on NRGI (2013, 2014),[a, b] IMF (2007),[c] and Crivelli and Gupta (2014)[d].

Among the 72 countries we include in the sample, 62 countries are monitored by the Natural Resource Governance Institute[7] and these are marked by the superscript a in Table 1. Among the countries marked with the superscript b, most, except Nigeria and Uganda, are part of the

[7] The Natural Resource Governance Index measures quality in oil, gas, and mining sector governance. Available online at: http://www.resourcegovernance.org/rgi/countries (accessed on 16 April 2016).

2014 Resource Governance Index.[8] The 2013 Resource Governance Index (RGI) included 58 countries (except Burkina Faso, Niger, Tunisia and Uganda) based on contributing 85 per cent of the world's petroleum, 90 per cent of the diamonds, and 80 per cent of world's copper. The remaining ten countries feature in the sample of resource-rich countries studied by Crivelli and Gupta (2014), and have consequently been included in our sample. They are marked by the superscript d in Table 1 and are the following: Argentina, Brunei, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Mali, Oman, Syria, and United Arab Emirates. It is worth noting that our subsample includes 37 countries, marked by the superscript c in Table 1, defined as resource-rich by the International Monetary Fund (2007), based on the criteria that their extractive sector contributes at least 25 per cent of total fiscal income, GDP, or export earnings. Subsequently these subsamples have been divided into mineral-rich and hydrocarbon-rich countries

[8] The index includes three dimensions of governance with two measurable indicators for a total of six governance indicators as follows: Political governance—voice and democratic accountability, and political stability and absence of violence and terrorism; Economic governance—one indicator is the government effectiveness, basically the efficiency of the bureaucracy of the public sector; and the other is the regulatory quality, the extent to which regulations are appropriate and work well. Institutional aspect—including also two measurable indicators, the quality of the rule of law and control of corruption.

Table 2: Variables and sources

Variable	Description	Source
GDP per capita	GDP per capita, constant, PPP, 2011 international dollars	World Bank (2015)
Capital	Gross fixed capital formation as per cent of GDP	World Bank (2015)
Labour	Growth rate of total labour force (calculated following Mankiw et al. 1992)	World Bank (2015)
FDI	Foreign direct investment, net inflows, per cent of GDP	World Bank (2015)
Natural resource rents	Total natural resources rents are the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents.	World Bank (2015)
Political regime	Type of political regime ranging from -10 (strongly autocratic) to +10 (strongly democratic)	Marshall (2014)
Corruption Perceptions Index (CPI)	An index ranging from 0 to 10 that measures the absence of corruption with higher scores indicating less corruption	Transparency International (2015)
Control of Corruption	A variable ranging from -2.5 to +2.5 that reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as 'capture' of the state by elites and private interests.	Kaufmann et al. (2010); World Bank (2015)
Government Effectiveness	A variable ranging from -2.5 to +2.5 that reflects perceptions of the quality of public services, the quality of the civil service, and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.	Kaufmann et al. (2010); World Bank (2015)
Political Stability	A variable ranging from -2.5 to +2.5 that reflects perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism.	Kaufmann et al. (2010); World Bank (2015)
Regulatory Quality	A variable ranging from -2.5 to +2.5 that reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.	Kaufmann et al. (2010); World Bank (2015)
Rule of Law	A variable ranging from -2.5 to +2.5 that reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	Kaufmann et al. (2010); World Bank (2015)
Voice and Accountability	A variable ranging from -2.5 to +2.5 that reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as 'capture' of the state by elites and private interests.	Kaufmann et al. (2010); World Bank (2015)

Source: See 'Source' column in the table.

The variables we used in the regressions—GDP per capita, capital, labour, FDI, natural resource rents, political regime, Corruption Perceptions Index, control of corruption, government effectiveness, political stability, regulatory quality, rule of law, and voice and accountability—are explained in detail in Table 2. At this interim stage, we have limited ourselves to three main sources for the institutional indicators, namely the Polity IV database (Marshall 2014), World Bank's Governance Indicators, formerly known as the 'Governance Matters' database (Kaufmann 2010), and the Corruption Perceptions Index of the Transparency International (2015). The macroeconomic data, e.g. the per capita GDP, labour, capital, natural resource rents, and FDI, all come from the World Development Indicators Database (World Bank 2015), and

are described in Table 2. We will explore a broader set of institutional variables in subsequent stages of our research.

5 Empirical results

Using the broadest sample possible, we start with a parsimonious specification for the FGLS regressions. The first regression we report in Table 3, column 1, is equivalent to estimating a Cobb-Douglass type production in an unbalanced panel set-up. We have included capital and labour in lags and the dependent variable is log-transformed. In this and subsequent specifications, both capital and labour maintain their expected positive signs and significance. Interestingly, the magnitude of the impact through the labour channel appears to be much stronger, which can be explained by the arrival of temporary foreign workers and migrant labour from elsewhere to possibly mitigate the negative effects of the regional resource boom (Beine et al. 2015)

We then augment our specification by adding natural resource rents as a percentage of the GDP, net FDI inflows, and a political regime variable from the Polity IV database in the next three columns. Natural resource rents remain negative and strongly significant in specifications reported in columns 2 to 4. In column 4, we also control for the type of political regime that ranges from -10 (strongly authoritarian) to +10 (strongly democratic).

Table 3: Cross-sectional time-series FGLS regressions (Dependent variable: log GDP per capita (PPP, constant 2011 international $))

	(1)		(2)		(3)		(4)		(5)	
Capital (t-1)	**0.008**	***	**0.008**	***	**0.008**	***	**0.009**	***	**0.011**	***
	0.002		*0.002*		*0.002*		*0.002*		*0.002*	
Labour (t-1)	**3.155**	***	**3.288**	***	**3.697**	***	**4.307**	***	**3.124**	***
	0.976		*0.994*		*1.099*		*1.120*		*0.838*	
Natural resource rents			**-0.004**	***	**-0.006**	***	**-0.005**	***	**0.009**	***
(per cent GDP)			*0.001*		*0.001*		*0.001*		*0.001*	
Net FDI Inflows (per cent GDP)					**0.002**		**0.001**		**0.002**	
					0.004		*0.003*		*0.002*	
Political Regime (Polity IV)							**0.000**		**-0.033**	***
							0.003		*0.004*	
Institutions (Corruption)									**0.415**	***
									0.009	
Wald Chi2	25.33		47.14		50.25		49.42		3056.3	
Number of observations	964		929		921		888		724	
Number of groups	64		62		62		60		60	

Notes: ***, **, *: significance at 1, 5, and 10 per cent respectively. All regressions include a constant; not reported. All standard errors (in italics) are heteroscedasticity consistent.

Source: Authors' estimations based on empirical research.

Finally, we augment this specification in column 5 with the Transparency International's Corruption Perceptions Index (CPI) (2015), which we interpret as a proxy for institutions. The CPI ranges from 0 to 10 and assigns the highest scores to the least corrupt countries. Consequently, as expected, this variable enters the regressions with a positive and significant coefficient. Perhaps, more importantly, the inclusion of this variable qualitatively changes the sign and significance of some of the other regressors. For instance, natural resource rents turn from negative to positive and the type of political regime turns from positive to negative. Hence,

when we control for institutions, natural resource rents cease to have a negative impact on long-term growth. This is one of the most important results of this paper. It is not the mere natural resource rents per se that may help or hinder long-term growth, but whether the institutional set-up is conducive to capitalizing on these natural resource rents to make a country more prosperous. However, surprisingly democracy fails to deliver a positive impact. It may well be that controlling for institutions also takes into account some of the positive attributes we would expect to see in democratic systems. In any case, the magnitude of the impact is small and, in aggregate, seems to be more than cancelled by the positive impact coming through the institutions channel.

We take this final specification (5) in Table 3, as the starting point for the next set of equations. Table 4 presents various different aspects of institutions, as captured by the World Bank's Governance Indicators Database. Continuing with the same specification and empirical strategy as in the previous table, this time we replace the institutions variable, previously proxied by the Corruption Perceptions Index, with the indicators from the World Bank Governance Database.

In all of the specifications reported in Table 4, the World Bank Governance indicators are significant with the correct signs. Moreover, the magnitude of their impact seems to be larger than that of the Corruption Perceptions Index variable. For instance, replacing the Corruption Perceptions Index with the Control of Corruption variable results in a coefficient, which is more than twice as big as the former. Magnitude-wise, the strongest impact comes through the Voice and Accountability variable, followed by Government Effectiveness, and Regulatory Quality, whereas the smallest, but still positive and significant, impact is registered by the Political Stability variable. The latter might be due to the fact that the Political Regime variable of the Polity IV database is also included in the specifications.

Table 4: Cross-sectional time-series FGLS regressions (Dependent variable: log GDP per capita (PPP, constant 2011 international $))

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
Capital (t-1)	**0.011**	***	**0.013**	***	**0.016**	***	**0.007**	***	**0.011**	***	**0.006**	***	**0.015**	***
	0.002		*0.003*		*0.002*		*0.002*		*0.002*		*0.002*		*0.003*	
Labour (t-1)	**3.124**	***	**2.054**	**	**1.142**		**5.708**	***	**0.168**		**1.569**	**	**4.461**	***
	0.838		*0.844*		*0.736*		*1.130*		*0.793*		*0.799*		*0.961*	
Natural resource rents	**0.009**	***	**0.008**	***	**0.009**	***	**0.002**	**	**0.011**	***	**0.007**	***	**0.003**	***
(per cent GDP)	*0.001*		*0.001*		*0.001*		*0.001*		*0.001*		*0.001*		*0.001*	
Net FDI Inflows (per cent GDF	**0.002**		**0.005**	*	**0.001**		**0.012**	***	**0.003**		**0.004**		**0.003**	
	0.002		*0.003*		*0.002*		*0.003*		*0.003*		*0.003*		*0.003*	
Political Regime	**-0.033**	***	**-0.058**	***	**-0.071**	***	**-0.010**	***	**-0.073**	***	**-0.063**	***	**-0.159**	***
(Polity IV)	*0.004*		*0.004*		*0.003*		*0.003*		*0.003*		*0.004*		*0.007*	
Institutions (Corruption)	**0.415**	***												
	0.009													
Control of Corruption			**0.975**	***										
			0.019											
Government Effectiveness					**1.144**	***								
					0.018									
Political Stability							**0.673**	***						
							0.027							
Regulatory Quality									**1.141**	***				
									0.022					
Rule of Law											**1.048**	***		
											0.019			
Voice and Accountability													**1.427**	***
													0.043	
Wald Chi2	3056.3		3311.5		4830		726.5		3095		3954.1		1486.6	
Number of observations	724		728		728		728		728		728		728	
Number of groups	60		60		60		60		60		60		60	

Notes: ***, **, *: significance at 1, 5, and 10 per cent respectively. All regressions include a constant; not reported. All standard errors (in italics) are heteroscedasticity consistent.

Source: Authors' estimations based on empirical research.

As before, capital maintains a significant but small coefficient in all specifications. The magnitude of the labour variable remains bigger, but it narrowly misses conventional levels of significance in two specifications when the government effectiveness and regulatory quality variables are included as a proxy for institutions. Natural resource rents coefficients remain positive and significant throughout all the regressions. Net FDI remains positive in all specifications having significant impact on the dependent variable only in columns 2 and 4. By contrast, the political regime variable appears to have always a negative and significant impact in this set of regressions.

Table 5: Cross-sectional time-series FGLS regressions (with interactions) (Dependent variable: log GDP per capita (PPP, constant 2011 international$))

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
Capital (t-1)	**0.014**	***	**0.014**	***	**0.014**	***	**0.007**	***	**0.012**	***	**0.008**	***	**0.015**	***
	0.002		*0.003*		*0.002*		*0.002*		*0.002*		*0.002*		*0.003*	
Labour (t-1)	**3.745**	***	**2.792**	***	**1.703**	**	**6.302**	***	**0.889**		**2.462**	***	**4.265**	***
	0.871		*0.856*		*0.755*		*1.168*		*0.752*		*0.795*		*0.939*	
Net FDI Inflows (per cent GDF	**0.002**		**0.005**	*	**0.001**		**0.012**	***	**0.006**	**	**0.004**		**0.005**	*
	0.002		*0.003*		*0.002*		*0.003*		*0.003*		*0.002*		*0.003*	
Political Regime	**-0.034**	***	**-0.058**	***	**-0.073**	***	**-0.010**	***	**-0.072**	***	**-0.062**	***	**-0.160**	***
(Polity IV)	*0.004*		*0.004*		*0.003*		*0.004*		*0.003*		*0.004*		*0.007*	
Natural resource rents	**0.015**	***	**0.006**	***	**0.007**	***	**0.001**		**0.008**	***	**0.006**	***	**0.003**	**
(per cent GDP)	*0.002*		*0.001*		*0.001*		*0.001*		*0.001*		*0.001*		*0.001*	
Interaction Term	**-0.002**	***	**-0.004**	***	**-0.005**	***	**-0.002**	***	**-0.008**	***	**-0.004**	***	**-0.003**	***
(inst x natural res rents)	*0.000*		*0.001*		*0.001*		*0.001*		*0.001*		*0.001*		*0.001*	
Institutions (Corruption)	**0.451**	***												
	0.012													
Control of Corruption			**1.044**	***										
			0.025											
Government Effectiveness					**1.240**	***								
					0.023									
Political Stability							**0.726**	***						
							0.042							
Regulatory Quality									**1.320**	***				
									0.027					
Rule of Law											**1.128**	***		
											0.023			
Voice and Accountability													**1.491**	***
													0.051	
Wald Chi2	3079.2		3053.2		4840.5		661.4		4586.5		6591.7		1362.6	
Number of observations	724		728		728		728		728		728		728	
Number of groups	60		60		60		60		60		60		60	

Notes: ***, **, *: significance at 1, 5, and 10 per cent respectively. All regressions include a constant; not reported. All standard errors (in italics) are heteroscedasticity consistent.
Source: Authors' estimations based on empirical research.

The next step in our empirical strategy is to control for the interaction between natural resource rents and institutions. As expected, the various proxies that we use to control for the impact of institutions on per capita GDP continue to be positive and strongly significant and their relative magnitudes are unchanged qualitatively, which highlights the robustness of the results produced in Tables 4 and 5. The immediate effect of the interaction term on the dependent variable is negative and significant in most specifications, which is likely due to the effect of better institutional capacity, which reduces the incentives for rent seeking and results in lower short-term growth.[9]

[9] In any case, this negative effect is qualitatively very small and is more than compensated for with the large magnitudes of the strong positive and direct effects of the institutions' variables. It is also highly likely that this contemporaneous negative effect will disappear over time in a dynamic setting, as the impact of institutional improvements is likely to manifest itself gradually in the long run. This topic merits further research in the future.

Table 6: Arellano-Bond dynamic panel estimation, one-step system GMM (Dependent variable: log GDP per capita (PPP, constant 2011 international$))

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
Capital (t-1)	**0.026**	***	**0.020**	***	**0.020**	***	**0.012**	**	**0.021**	***	**0.016**	***	**0.018**	***
	0.009		*0.005*		*0.004*		*0.006*		*0.005*		*0.004*		*0.007*	
Labour (t-1)	**1.245**		**-1.084**		**1.282**		**2.981**		**0.586**		**-0.563**		**0.238**	
	2.311		*2.979*		*2.914*		*3.280*		*3.027*		*3.199*		*2.901*	
Natural resource rents	**0.007**	*	**0.011**	**	**0.011**	**	**0.007**		**0.013**	***	**0.011**	**	**0.009**	
(per cent GDP)	*0.004*		*0.005*		*0.005*		*0.006*		*0.004*		*0.005*		*0.006*	
Net FDI Inflows (per cent GDP)	**0.002**		**0.014**		**0.006**		**0.024**	**	**0.007**		**0.013**		**0.018**	**
	0.007		*0.009*		*0.008*		*0.012*		*0.009*		*0.008*		*0.008*	
Political Regime	**-0.056**	***	**-0.099**	***	**-0.093**	***	**-0.041**		**-0.100**	***	**-0.098**	***	**-0.237**	***
(Polity IV)	*0.021*		*0.028*		*0.026*		*0.027*		*0.030*		*0.030*		*0.040*	
Institutions (Corruption)	**0.368**	***												
	0.060													
Control of Corruption			**0.873**	***										
			0.165											
Gov't Effectiveness					**0.887**	***								
					0.158									
Political Stability							**0.738**	***						
							0.187							
Regulatory Quality									**0.899**	***				
									0.166					
Rule of Law											**0.871**	***		
											0.162			
Voice and Accountability													**1.262**	***
													0.307	
F-stat	15.66		15.28		26.76		10.28		21.64		16.6		13.31	
Number of instruments	168		127		127		127		127		127		127	
Number of groups	724		728		728		728		728		728		728	
Specification tests (p-values)														
Arellano-Bond test AR(1)	0.704		0.052		0.099		0.042		0.042		0.088		0.027	
Arellano-Bond test AR(2)	0.797		0.767		0.788		0.885		0.291		0.985		0.287	
Sargan test (overid. res.)	0.000		0.000		0.000		0.000		0.000		0.000		0.000	

Notes: The table reports one-step system GMM dynamic panel estimations carried out using the 'xtabond2' package in Stata. The one-step estimation uses three lags with robust standard errors in brackets, consistent to panel specific heteroscedasticity and autocorrelation. The AR(1) and AR(2) tests report the p-values for the first and second order residual autocorrelation in the first differenced equation, providing no evidence for significant second order autocorrelation. Sargan test for over identifying restrictions provides the probability value for H0: joint validity of the instruments. ***, **, *: significance at 1, 5, and 10 per cent respectively. All regressions include a constant; not reported.

Source: Data compiled by authors', see Arellano and Bond (1991) for more information on specification for panel data.

Finally, we present the results from an Arellano-Bond type dynamic GMM model. Arellano and Bover (1995) and Blundell and Bond (1998) augmented the difference GMM estimator by combining the original set of equations in levels, (instrumented by lagged first differences) with the equations in first differences. The latter use suitably lagged levels as instruments, thus creating additional moment conditions in a system in which the two equations are separately instrumented. Results from this estimation method help ascertain that the direction of causality that we have inferred in our regressions is correct.

As expected, Table 6 by and large confirms the qualitative results of Table 4. Most importantly, the positive and significant impact of natural resource rents pertains in all but one specification, and the positive and significant impact of our institutional proxies is observed in all the specifications. We take these results as evidence for the robustness of our empirical model.

We have also explored the robustness of the results and checked whether these results would hold in different subsamples. Our results have remained qualitatively unchanged when we restricted our sample to countries that are rich in hydrocarbon resources. It is possible that some natural resources—oil and minerals in particular—may exert nonlinear impacts on growth via their impact on institutional quality. Furthermore, they are likely influencing the negative sign of the political regime variable. While a thorough exploration of such non-linear impacts is beyond the scope of this paper, this could be a fruitful direction for future research on this topic.

6 Conclusion

By analysing the impact of institutional settings and incentive structures, the paper aims to expand our understanding of the role institutions play in resource-rich countries and the constraints under which resource-based economies operate. The ultimate objective in gaining a better understanding is to identify policy recommendations on a broad range of issues, including how to reduce poverty and inequality under the set of opportunities and challenges faced by resource-rich countries, and will contribute to the efforts of the international community that will need to address these issues comprehensively under the UN's 2030 Agenda for Sustainable Development.

We have shown that an enabling institutional environment will have a strong positive effect on the wealth of a resource-rich nation. Our results indicate that institutions in natural resource-based economies foster economic growth when broad-based rule of law with secure property rights are enforced. Controlling corruption and pursuing progressive and inclusive policies will also ensure that profits from natural resources are used in ways that empower poor and marginalized people. Hence, there are strong reasons to recommend a particular focus on building such institutions in resource-rich countries. Among other things, this means a strong emphasis in achieving SDG 16, which will focus the attention of the global policy makers in one worthy direction.

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