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Saeed, Khalid Adnan

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6

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*Corresponding author Khalid Adnan Saeed, Department of Agricultural and Applied Economics, University of Missouri-Columbia, Columbia, MO. USA E-mail: k2a.saeed@gmail.com

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Determinants of institutional quality and per capita growth in natural resource-dependent countries

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Khalid Adnan Saeed^{1,2}*

Abstract: Institutional quality has both short-term and long-term impacts on economic growth. Its short-term impact comes from the quality of institutions ex ante while its long-term impact comes from the quality of institutions ex post. Ex post institutions are shaped by the direct impact of resource dependence on regime type. The goal of this paper is to identify the components of institutional quality that has the most impact on per capita growth in resource-rich developing countries. I investigate the relationship between resource wealth and institutions and their impact on per capita growth by deconstructing institutional quality in a panel of 58 developing countries in the period between 1996 and 2014. I ask if the effect of resource wealth on growth depends on the quality of institutions, then which underlying component(s) of institutional quality have the most effect on this relationship? Results show that voice and accountability have the most influence in shaping institutional quality in a sample of developing countries, and there is evidence that it has the most relevant and significant effect on growth compared to other components of institutional quality.

Subjects: Sustainable Development; Economics; Political Economy

Keywords: Economic growth; political resource curse; natural resource curse; institutions; MENA

1. Introduction

Institutions play a vital role in shaping economic outcomes in countries with large natural resource endowments. Many researchers have studied and analyzed the negative association between natural resource dependence (RD) and growth. Ross (2015) cites two broad categories of research on natural resources and institutions; how resource wealth may affect the conditions that lead to economic growth, and whether resource wealth can damage or stunt the beneficial evolution of institutions themselves. Traditional Dutch Disease explanations have been thoroughly investigated in an attempt to provide answers for this puzzling phenomenon in the data. Dutch Disease models emphasize the negative impact natural resource reliance have on the manufacturing sector in those countries where human capital is developed through learning-by-doing which only occurs in the manufacturing sector. Other research looks at the effects of natural resource wealth on regime type (RT), that is, whether resource wealth plays a role in countries becoming autocratic or democratic. Natural resource wealth can best be described as having both an "economic resource curse", and a "political resource curse".

The political resource curse is best described as the negative impact of resource wealth on regime type. This impact on regime type eventually shapes the quality of institutions in those





countries. In turn, these institutions affect economic outcomes. The intuitive way to think about the impact resource dependence have on growth is both in the short term and the long term. Its short-term impact on growth comes from the quality of institutions ex ante, and its long-term impact on growth comes from the quality of institutions ex post. Ex post institutions are shaped by the direct impact resource dependence have on regime type. Resource dependence shapes regime type which eventually shapes institutions and economic outcomes in those countries. This is the long-term path of resource dependence on growth. It begins with a political resource curse that eventually leads to an economic resource curse.

To conceptualize the short-term impact of resource dependence on growth, consider the following: economic outcomes do not occur in a vacuum. Upon the discovery of new natural resources, or in cases when we have a commodity price boom, the way a country deals with this new wealth happens in an environment—a political and social environment. This environment represents the ex ante institutions in those countries. Hence; the short-term effect of resource dependence on growth is a function of existing institutions. This short-term effect is the economic resource curse -the way countries deal with new found wealth depends on the existing governance structure and institutional quality they have prior to discovery of a natural resource. It is critical that we distinguish between a political resource curse and an economic resource curse. The former takes time to develop and translate into the latter. However, the latter can be completely mitigated by the ex ante institutions which are a function of the political system. The political resource curse shapes the path and trajectory of development and growth in natural resource-rich countries, while an economic resource curse is a consequence of poor institutional quality that developed over time and that can be remedied if we can identify the underlying mechanisms that caused the quality of institutions ex ante to be poor. This paper contributes to existing literature by investigating and identifying one of the critical sources of poor institutional quality that lead to an economic resource curse. I investigate the relationship between resource wealth and institutions and their impact on per capita growth by deconstructing institutional guality in a panel of 58 developing countries in the period between 1996 and 2014. In particular, I ask if the effect of resource wealth on growth depends on the quality of institutions, then which underlying component(s) of institutional quality have the most effect on this relationship? This study finds that Voice and Accountability (VA) has the most influence in shaping institutional quality and in mitigating the natural resource curse. Results show that a 10% increase in fuel and non-fuel exports as a percentage of GDP is associated with a 4.7% reduction in per capita growth, however, countries with high VA score are able to mitigate this negative effect. This paper contributes to existing literature by identifying the most critical component of institutional quality—as published by the World Bank-that can help natural resource-dependent developing countries identify the best strategies to avoid a resource curse.

This paper is structured as follows: section II surveys existing literature on the resource curse. Section III presents the conceptual framework and theoretical grounding of my study. In section IV I present my empirical model specification and data. Results of my model are presented in section V followed by a discussion of my results and the conclusion—sections VI and VII, respectively.

2. Literature review

Research in natural resource wealth began in the late 1950's and 1960's with the belief that natural resource abundance is a growth-promoting factor. Auty (1993) was the first one to coin the phrase "resource curse". However, It wasn't until the mid-1990's when Sachs and Warner wrote their seminal papers where they showed a negative relationship between natural resource abundance and growth. Since then, a very diverse body of research emerged using many different econometric techniques in either proving/disproving the natural resource curse hypothesis or attempting to provide an explanation for this phenomenon. Research in the resource curse hypothesis is mainly focused in two major areas: economic explanations for the emergence and

persistence of the curse, and political science/political economy explanations that looks at the political structures in countries experiencing negative or low growth.

Wright et al. (2013) look at the mechanisms linking oil wealth to autocracies regime survival. They find that oil wealth promotes autocratic survival by lowering the risk of government takeover by rival groups. Their study is rooted in rentier theory which says that governments relying on natural resource revenues can operate outside of societal interests since they rely heavily of revenues generated from the sale of natural resources to fund their operations. In other words, they don't need to tax their citizens and hence, be more accountable to them. In particular, they examine oil's impact on autocratic regime survival and find that increases in oil income stabilizes dictatorships by helping them become more resilient to change. They found evidence that higher oil wealth is associated with reduced chances of democratization. They interpret these results as the governments' way of staying in power by distributing some of the oil windfalls to their citizens —just enough to keep them quiet from asking for more accountability and just enough to keep them in power.

Ross (2001) used panel data of 113 countries between the period 1971–1997 to investigate the "oil impedes democracy" claim. He specifically asked whether oil have a negative influence on democracy once you account for other factors such as culture and colonial history. Accounting for these country-specific effects, he finds evidence that oil impedes democratization and that this effect is not limited to the Middle East oil-rich countries. He also finds evidence that non-fuel mineral wealth also impedes democratization and he provides an explanation for the possible mechanisms behind these findings:

- (i)Rentier effect: by lowering taxes and higher spending to dampen the pressure for democratization.
- (ii)Repression effect: by building up their internal security to repress any opposition.
- (iii)Modernization effect: represented by the failure of the population to move into industrial and service sector jobs which makes citizens less likely to push for democracy.

Sala-i-Martin & Subramanian find that some natural resources such as oil and minerals have a negative impact on growth through their impact on institutional quality in a case study from Nigeria. In this sub-National study, they conclude that oil and minerals have a detrimental impact on the quality of institutions, and through this channel, on long-run growth. Waste and poor institutional quality stemming has been responsible for poo long-run growth. (Mehlum et al., 2006) use Sachs and Warner's original dataset of 87 countries and run a cross-country model with an interaction between institutional quality and resource abundance. They argue that the quality of institutions are a determining factor on the effects of natural resource wealth on growth. In countries with higher quality institutions, natural resource wealth push aggregate incomes up, while they push them down in countries with lower institutional quality. They define institutions as "grabber friendly" and "producer friendly."

Grabber friendly institutions are a type of institutions that allow the elite in a country to use their power in order to extract as much rents as possible from the natural resource sector without much accountability or consequence. Producer friendly institutions are ones that channel natural resource windfalls to their appropriate use through an open process of transparency and accountability. Institutional quality is defined as the degree to which a country is either grabber friendly or producer friendly. One important difference between their study and mine is in the measure of institutional quality. They used Sachs and Warner's institutional quality indicator which consisted of five indexes based on data from Political Risk Services. This data is not available for not free for the time period in my study. In their study, they found that the growth impact of a marginal increase in resources depends on the quality of institutions in a country: the resource curse is weaker the higher the institutional quality.

It is noteworthy to point out that their study relied on data that included both developed and developing countries, and they estimated their model using a cross-country equation leaving out any country-specific or time-variant effects. Their study's powerful contribution was to shed light on the role institutions played in the eventual end-effect of a resource boom on per capita incomes in those countries. They provided an alternative explanation for the detrimental effect of resource wealth on growth not previously discussed in the literature. Until their study, research into the resource curse focused on Dutch disease explanations. Their threshold analysis of institutional quality was one of the basis for my study of the underlying foundation of institutional quality and its interaction with natural resource dependence and the eventual implications on growth.

Following that study, Kolstad, (2009) used the same Sachs and Warner dataset and divided institutions into ones that affect the private sector and others that affect the public sector. He used a similar approach as Mehlum et al. (2006) but added a democracy index and its interaction with a measure of natural resource wealth to model the effect of resource wealth through public institutions. Kolstad defines rent-seeking models as those governing the private sector, and patronage models as models of institutions governing the public sector. In his cross-country regression he only finds evidence that private sector institutions matter.

In another influential study, Collier & Hoeffler (2009) built a dataset of countries between the period 1970–2001 to examine the effect of democracy on economic performance in resource-rich countries. They find that in developing countries, high resource rents and democratic systems has been growth-reducing, however, "checks and balances" mitigate this negative affect. They define checks and balances as public goods which makes them subject to be in shortage in new democracies. They conclude that resource-rich developing economies need a special form of democracy with very strong system of checks and balances. Resource rents, tend to slowly and gradually erode those balances.

In another similar study, Arezki & Gylfason (2013) constructed a panel dataset of 29 Sub-Saharan African countries over between the period 1985–2007 to study the interaction between resource rents and democracy on corruption and internal conflict. Using a dynamic model with an interaction term between a measure of resource dependence and democracy, they report that higher resource rents lead to more corruption, and this effect is stronger in less democratic countries. Furthermore, they report that higher resource rents lead to fewer internal conflict. They attribute this result to the idea that the elite in those countries engage in rent distribution to maintain stability. Therefore, higher resource rents lead to more government spending in less democratic countries.

Prichard et al. (2014) define a political resource curse as a government reliance on non-tax revenue primarily from natural resources, which reduces the quality of democracy and lowers accountability by weakening state-society links and an expansion of the political influence over different sectors in the economy. They used data from the International Center for Tax and Development to test the connection between the composition of government revenue and democracy. They find that the composition of government's revenue is a highly influential determinant of governance outcomes, across countries. Their study also highlights the crucial role of natural resource dependence and how it affects political outcomes which in turn, affect the institutional quality in countries.

In another earlier study from political economy, Levine & Renelt (1992) argued that natural resource abundance creates opportunities for rent-seeking behavior and is an important factor in determining a country's level of corruption. The extent of that corruption depends on natural

resource abundance, government policy, and the concentration of bureaucratic power. One of their main results was that capital-intensive industries, such as the natural resource sector, is a major determinant of corruption. They conclude by highlighting how malfunctioning government institutions severely harm economic performance through a reduction in both incentives and the opportunities to invest and innovate.

Bhattacharyya & Hodler (2010) present both theoretical and empirical models to show how natural resources can feed corruption, and how this effect depends on the quality of democratic institutions. Using a game-theoretic model, they show that resource rents increase corruption if and only if (iff) the quality of institutions is below a certain threshold level. Empirically, using panel data of 124 countries covering the period between 1980 and 2004, they find evidence that resource rents lead to more corruption if the quality of institutions is poor. Their findings imply that resource-rich countries have a tendency to be corrupt because natural resource windfalls encourage their governments to engage in rent-seeking.

Looking at the effects of petroleum rents, in particular, Andersen & al (2013) investigate the question whether political institutions limit rent-seeking by politicians. Using data from the Locational Banking Statistics of the Bank for International Settlements, they study the transformation of petroleum rents into hidden wealth in the period between 1977 and 2011. They report that petroleum rents are associated with increases in hidden wealth, but only in countries where political institutions are weak. Bhattacharyya & Collier (2014) use another panel dataset to study the relationship between public capital and resource rents, and they find evidence that resource rents significantly reduce public capital and that this effect is mitigated by good institutions.

Robinson et al. (2006) present a theoretical two-period probabilistic voting model with a society of two parties. After formally presenting their model, one of their findings is that the overall impact of resource booms on the economy depends critically on institutions, since the political incentives borne from these resource endowments map into policy outcomes. They find that countries with institutions that promote accountability and state competence tend to benefit from these booms since their institutions block any perverse political incentives created by these booms. The connections between resource endowments and economic performance is clear: resource endowments generate political incentives that are key to whether these endowments become a curse or not. Strong institutions in those countries function as a check on these political incentives.

An interesting debate in political theory regarding the role resource wealth plays in shaping the regime type in countries rich in natural resources took place between 2011 and 2013 when Haber & Menaldo (2011) challenged the claim that there is a long-run relationship between resource abundance and regime type within countries overtime. They criticized the specifications of previous panel models and indicated that previous models suffered from endogeneity problems, and some of them assumed random effects in models with small time dimension. Using a dataset that dates back to 1800 (Polity2 Index) for regime type, they observed countries before they were resource reliant and evaluated whether increases in resource rents affected their political development. Foe resource rents, they measured the percentage of government revenues from oil, gas, and minerals. They called this measure "fiscal resilience". The Polity2 index consisted of three indexes that measured:

- (i) The competitiveness of political participation
- (ii) Openness and competitiveness of executive recruitment
- (iii) Constraints on the chief executive

Applying a time-series model, their results show that oil and minerals reliance does not promote dictatorship over time. Therefore, they attribute past results on the model specifications.

In 2013, Anderson & Ross revisit their data and methods and show that they might be correct for the period before the 1970s, but since the 1980s, there is evidence of a curse. Most of the body of literature involving the curse focused on the periods from 1970 and after, that is why there is evidence of natural resource curse. They're argument is as follows: countries rich in natural resources, particularly oil, experienced a major event that spread throughout those countries during the 1970s that even was the nationalization of the oil sector. In the past, giant foreign oil companies controlled most of oil discoveries, extraction, transportation, and sales in foreign markets. Countries rich with large endowments receive a fee from those giant oil companies and kept only a very small portion of their own countries oil windfalls. That all changed beginning in the 1970s. Ever since, governments were able to keep over 95% of their own oil windfalls which created the perfect conditions for rent-seeking behavior by the elites in those countries. Hence, oil wealth hindered the transition to democracy beginning around 1980.

In 2014, Wiens et al. contributed to this debate by investigating the claim that resource dependence should decrease autocracies likelihood of democratizing. They estimate a dynamic model of 166 countries between 1816 and 2006 and find that increases in natural resource dependence decreases an autocracy's likelihood of transitioning to democracy over both the short-run and the long-run.

Looking again at models of growth and resource dependence, Oyinlola et al. (2021) analyze the relationship between a measure of natural resource wealth and institutional quality for a sample of Sub-Saharan countries. They constructed a dataset of 47 Sub-Saharan countries for the period between 1996 and 2010. Using a dynamic system GMM model, and using the World Bank Governance Indicators as a measure of institutional quality, they examine how the interaction of resource wealth and institutions affect growth. They report that resource abundance is positively and significantly related to growth, hence, they provide evidence supporting the resource-led growth hypothesis and negating the resource curse literature. Furthermore, they report that all indexes of institutional quality are positively related to growth except for "control of corruption

In recent studies, Daganay, Deger (2021) examined the effect of institutions on economic growth using a GMM model in a sample of 62 developing countries from 2002–2017 and found significant and positive effect on economic growth from regulatory quality. In another study, (Adika, 2020) also used a GMM on a sample of 33 Sub-Saharan African countries for the period between 1996 and 2017 and divided them into two groups; resource-rich countries and resource-poor countries. Their findings also show a positive institutional quality effect on growth, however, using Control of Corruption as a measure of institutional quality produces no significant impact on economic growth. (Nzie, Pepeah, 2022) used an autoregressive model with linear interaction between institutional quality and natural resources in another sample of 37 African countries from 1996–2019 and weak institutions exacerbate the negative effects of resource dependence of growth in the long run. Finally, using an aggregate measure for institutional quality, Qasim et. al. (2021) found a significant and positive impact of institutions on economic growth in a sample of South-Asian countries from 1984 to 2018.

3. Conceptual framework

The resource curse hypothesis tells us that countries who are rich natural resources, and heavily depend on revenues from the sale of their natural resource, grow less than other countries who are resource-poor. Resource wealth have a negative effect on growth—as measured in per capita terms. Theory also tells us that this effect is mitigated by high quality institutions: the curse can turn into a blessing if the pre-existing structure and conditions in a country, prior to a natural resource boom, is conducive to growth and strong enough to offset any adverse effect of resource dependence. Therefore, if institutional quality is the key, then what causes institutional quality to be high?

Conceptually, the higher the institutional quality, the less negative effect resource dependence have on growth. The more we identify the forces behind higher institutional quality, the better resource-rich countries are able to deal with the adverse effects of resource dependence. Acemoglu (2009) discusses how economic institutions and policies have a direct effect on economic outcomes, that is, political institutions determine the political rules under which economic outcomes emerge. Different policies and economic institutions are likely to emerge in different political systems. Therefore, to fully understand the impact resource wealth have on growth, we must understand the conditions that shape the resulting outcomes and the environment where the interaction between resource wealth and institutions occur.

In studying a sample of resource-rich developing countries, I part from traditional growth literature which focuses on country-level dimensions and their effects on growth. The growth literature discusses the importance of factors such as religion, colonial origins, culture, norms, etc., in having a determining effect on growth, especially through institutions borne from those factors. They construct datasets and run models using advanced techniques and address various issues of the resource curse, however, most of these models involve datasets of both developing and developed countries. I suspect that due to a shortage of available reliable data on developing countries advanced nations where added in the datasets in most of the studies to give them a larger dimension. Inferring from these models is still very valid and robust as they show, but the fact remains that they still contain a large number of developed countries.

What previous growth literature fails to recognize—especially for developing countries—is that all of these countries are small open economies. Important variable that have a big impact on growth in those countries such as Interest rates and terms-of-trade are determined exogenously, since most prices are also determined exogenously. These factors outweigh any country-specific effects on growth. What happens on the world stage in terms of interest rates and other factors affecting world trade have an enveloping effect on growth than factor such as colonial history or culture. Conceptually, these factors are already controlled for through the institutional quality index. Hence, when analyzing the effect of natural resource dependence on growth, it is more appropriate to conduct the analysis in a framework that allows for factors that are constant across countries but vary over time, especially when modelling developing countries.

4. Methods and procedures

To investigate the interaction between institutional quality and resource wealth and the underlying mechanisms that shape institutional quality, I constructed a panel of 58 developing countries between the period 1996 and 2014. This period of analysis was chosen due to the availability of data for the variables in our model. Data on per capita growth and initial income were collected and computed from the Penn World Table (PWT9.0), while the World Bank Governance Indicators were used in constructing an unweighted aggregate index of institutional quality. This aggregate index of institutional quality (IQ) consisted of six governance indicators: control of corruption (CC), government effectiveness (GE), political stability and absence of violence (PS), regulatory quality (RQ), role of law (RL), and voice and accountability (VA). Each indicator ranges from -2.5 to 2.5 with higher values indicating a more favorable measure. An index of fuels and non-fuels exports as a percentage of GDP was used as a measure of resource dependence. The measure was constructed from the World Bank Development Indicators dataset and consisted of: fuel exports, ores and metals exports, food exports, and agricultural raw materials exports. All of the indicators are published as a percentage of merchandise exports, so data on merchandise exports (current \$) and GDP (current \$) were also collected for the time period in my study in order to compute the measure of resource dependence (RD)-fuels and non-fuels exports as a percentage of GDP, henceforth, (RD).

My main model specification is as follows: $GPC_{it} = \alpha_i + \beta_t + \gamma_1 Ln(RD_{it}) + \gamma_2(IQ_{it-5}) + \gamma_3[Ln(RD_{it})x(IQ_{it-5})] + Z_{it} + \epsilon_{it}$ Where GPC_{it} is growth of per capita income and was computed as [Ln(GDPpc_{it}/GDPpc_{it-1})]/T. (α_i) are time-invariant country effects, and (β_t) are country-common effects that vary over time. (Z) is a vector of controls that include the log of initial income [Ln(II_{it})], log of investment as a percentage of GDP [Ln(INV_{it})], the log of the sum of exports and imports (trade) as a percentage of GDP [Ln(TO_{it})], and the log of foreign direct investment as a percentage of GDP [Ln(TO_{it})], and the log of foreign direct investment as a percentage of GDP [Ln(TO_{it})]. Some recent studies in empirical growth highlight the role of foreign direct investment in promoting growth in developing countries. Studies such as Hamdi et al. (2017), Adu et al. (2013), & Samargandi et al. (2015) all discuss the role of FDI in promoting growth through direct investment projects in those countries and the transfer of knowledge that occurs in the process.

One of the main criticisms regarding the resource curse in growth literature involve problems of endogeneity and omitted variable bias (OVB). To deal with any endogeneity issues arising from my measure of resource dependence, institutional quality, and their interaction term, a 5-year lag for institutional quality was constructed and applied to the model. The interaction term implies that resource dependence and institutional quality depend on each other. Taking the 5-year lag of institutional quality and interacting it with resource dependence implies that resource dependence at period (t) depends on institutional quality at period (t-5), while by construction, institutional quality at period (t-5) cannot depend on resource dependence at period (t). Constructing the model that way not only ensures endogeneity is not a problem, but also ensures causality is pointing in the right direction. It is also theoretically consistent with the idea that the effects of resource wealth on growth depends on the quality of institutions. While constructing the lagged (IQ) variable in my panel, cross-country averages were computed for missing values to ensure a balanced final dataset. To deal with any OVB issues, country and year dummies were included in my original specification to account for any country-specific unobserved effects and to test my hypothesis of small open economies.

Using time fixed-effects model, which is conceptually consistent with the idea of small-open developing economies, I begin my estimations with a baseline model that includes only resource dependence, institutional quality, and their interaction term. In the baseline model, I expect the sign of γ_1 to be negative and significant, and γ_3 to be positive and significant. These signs would be consistent with theory about the curse and how it is mitigated in countries with good quality institutions.

IVAR (interaction)	(1)	(2)	(3)	(4)	(5)			
Ln(RD _{it})x(IQ _{it-5})	-0.113(0.180)	-0.132(0.179)	-0.0926(0.171)	-0.022(0.083)	0.202**(0.083)			
Ln(RD _{it})xCC _{it-5}	-0.027*** (0.007)	-0.023*** (0.007)	-0.019*** (0.007)	-0.015** (0.006)	-0.011*(0.006)			
Ln(RD _{it})xGE _{it-5}	-0.170(0.159)	-0.250(0.159)	-	-	-			
Ln(RD _{it})xPS _{it-5}	-0.416*** (0.138)	-0.359**(0.140)	-0.289**(0.134)	-0.100* (0.058)	0.085(0.059)			
Ln(RD _{it})xRQ _{it-5}	-0.044(0.157)	-0.061(0.157)	0.074(0.077)	-0.097 (0.076)	_			
Ln(RD _{it})xRL _{it-5}	-0.222(0.154)	-0.210(0.154)	-0.170(0.150)	-0.060 (0.075)	0.146*(0.007)			
Ln(RD _{it})xVA _{it-5}	0.699***(0.159)	0.645***(0.164)	0.542***(0.157)	0.245(0.063)	0.194***(0.063)			
*** ** * Significant	*** ** * Significant at the 99%, 95%, 90% significance level, respectively.							

Summary Table of the Interaction IVAR with different IQ measures:

5. Results

I begin my estimation with the baseline model using measures of resource dependence, institutional quality, and their interaction. Regression 1 in Table 1 reports the results for the baseline model with only resource dependence (RD) having the correct expected sign and statistical significance.

I add initial income (II) in regression 2 and observe that (RD), (II), and (IQ) are all statistically significant and carry the expected signs. The interaction term still does not enter the regression with any significance. The negative sign of resource dependence shows evidence of the resource curse.

As the ratio of primary exports to GDP increases, per capita growth rate decreases. Growth, resource dependence, and initial income are measured in logs to make the results of the regressions easier to interpret. Any changes in the coefficients of the control variables are interpreted as elasticities. The lagged institutional quality measure however is now statistically significant and have the correct expected sign. The interaction term remains not significant. Regression 2 in Table 1 shows evidence of a curse, conditional convergence, and a positive effect of institutions on growth, all as expected.

In regression 3, I added the investment rate and FDI (both in logs) to test changes in the baseline model. Results show that the new variables are positive as expected and statistically significant, however, institutional quality loses significance after we control for the investment rate and foreign direct investment.

To gain a better perspective on the results thus far let's examine the change in (IQ) from regression 3. Recall that institutional quality was lagged five years to avoid problems of endogeneity. What regression 3 results tell us is that after controlling for natural resource wealth, initial income, the investment rate, and foreign direct investment, all at period t, institutional quality at period t—5 is no longer relevant. This result is very important to our understanding of the mechanisms and theoretical construct behind my model. As we will see in other regressions, this point will play a vital role in our understanding of the role of institutions and how resource dependence is affected by them.

To illustrate further what the coefficient on lagged institutional quality means, consider the interaction term. This interaction term tells us the extent to which the effect of resource dependence that depends on the quality of institutions in a country affect growth. Higher quality institutions dampen the negative effect of natural resource wealth and work as a growth

Table 1. Dependent Variable: Growth of Per Capita GDP (GPC _{it})								
	(1)	(2)	(3)	(4)	(5)			
Ln(RD _{il})	-0.557*** (0.122)	-0.452*** (0.125)	-0.247**(0.123)	-0.236*(0.121)	-0.403*** (0.123)			
IQ _{it-5}	0.499(0.490)	1.084** (0.517)	0.238(0.506)	_	—			
Ln(RD _{it})x(IQ _{it-5})	-0.113(0.180)	-0.132(0.179)	-0.0926(0.171)	-0.022(0.083)	0.202**(0.083)			
Ln(II _{it})		-0.450*** (0.130)	-0.525*** (0.128)	-0.505*** (0.120)	-0.356*** (0.123)			
Ln(INV _{it})			3.105***(0.337)	3.116***(0.336)	—			
Ln(FDI _{it})			0.340***(0.867)	0.347***(0.085)	—			
Fixed Effects (T) Constant	3.595(0.579)	7.510 (1.282)	-2.633 (1.652)	-2.909 (1.544)	6.468 (1.184)			

*** ** * Significant at the 99%, 95%, 90% significance level, respectively. Robust STD errors in parenthesis

accelerator in those countries. The interaction term thus far tells us that the marginal effect of resource wealth at period t through (IQ) from period t—5 is not a factor to growth, especially after controlling for other determinants. We will re-visit this result later in this paper.

In regression 4, I drop institutional quality and run the same model from 3 to see if any changes happen to resource dependence and the interaction term. Resource dependence remains significant but decreases slightly in its effect. The interaction term remains statistically not significant. In regression 5 I focus mainly on the interaction by dropping the investment rate and FDI in order to isolate the marginal effect of resource dependence. As can be seen in Table 1, RD increases significantly and the interaction terms is now statistically significant and have the right sign. Conditional convergence remains unchanged. Regression 5 results indicates that the effect of resource dependence on growth is negative (curse) and this effect is dampened in countries with high quality institutions. Good institutions, limit rent-seeking and ensures proper management of the natural resource sector. From regression 5, consider the effect of a 1% increase in RD on growth at time (t):

 $\frac{\Delta GPC}{\Delta RD} = -0.403RD + 0.202RDxIQ$ evaluated at RD = 1: $\frac{\Delta GPC}{\Delta RD} = -0.403 + 0.202IQ$

Setting this expression to zero yields the following: $-0.403 + 0.202IQ = 0 \gg IQ = 1.995$

This value represents the threshold level of institutional quality as discussed previously in the literature. It implies a level of institutional quality where resource dependence is no longer a curse, that is, for countries, in my sample, with an aggregate IQ score \geq 1.995, resource wealth turns into a blessing. Countries with IQ score < 1.995 will experience a curse, that is, IQ = 1.995 is the threshold level for how resource dependence affect growth—through countries' institutional quality. This result is consistent with existing literature about the role of institutions in natural resource-rich countries. It confirms the previous studies by Kolstad (2009) & Mehlum et al. (2006) who first introduced and demonstrated how the effects of natural resource wealth on growth depends on the quality of institutions. The next stage in this research analyzes the components of institutional quality in order to identify the main factor(s) that drive institutional quality and mitigate the negative effect on growth. From a broader perspective, if we can identify the factor(s) that cause institutions to be strongest in developing countries with natural resource wealth, we can then work on re-inforcing those factors) and ultimately turn the curse into a blessing. An important fact to point out in this study, before moving forward, is that whatever analysis we conduct and results we obtain depends on our choice of the institutional quality variable. As fellow

Table 2. ~TC~								
Dep Var (GPC _{it})	(1)	(2)	(3)	(4)	(5)			
Ln(RD _{il})	-0.21 (0.175)	-0.031 (0.175)	0.119 (0.171)	0.029 (0.156)	-0.268* (0.162)			
CC _{it-5}	0.625*** (0.208)	0.781*** (0.227)	0.308 (0.223)					
Ln(RD _{it})xCC _{it-5}	-0.027*** (0.007)	-0.023*** (0.007)	-0.019*** (0.007)	-0.015** (0.006)	-0.011* (0.006)			
Ln(II _{it})		-0.229* (0.134)	-0.416*** (0.130)	-0.348*** (0.121)	-0.043 (0.123)			
Ln(INV _{it})			3.120*** (0.333)	3.154*** (0.332)				
Ln(FDI _{it})			0.309*** (0.085)	0.335*** (0.083)	_			
Constant	2.094 (0.666)	3.917 (1.258)	-4.443 (1.564)	-4.714 (1.552)				

Robust STD errors in parenthesis. * ** *** indicate significance at the 90%, 95%, 99% levels, respectively.

researchers in empirical growth realize that reliable data for developing countries are hard to obtain or simply not available. Sachs & Warner (1997a) and Mehlum et al. (2006) both used a measure of institutional quality from *Political Risk Services* for the time period in their studies. These indexes from PRS are well constructed and reported, however, data is not readily available for most researchers. So, whatever inferences any researcher makes regarding any model must not only be grounded in theory but also constrained by available data. In this study, I've constructed an index of institutional quality based on published World Governance Indicators from the World Bank. Other researchers may obtain different results based on different measures of institutional quality. The lack of a uniform standard for how to measure and model institutional quality in empirical growth research is a fact that every researcher must be aware of and careful about when interpreting results. General and sweeping conclusions based on any model's results should be avoided.

Next, I model the components of institutional quality and interact each one with resource dependence to see which ones enter the models significantly and stronger than others. These components¹ are control of corruption (CC), government effectiveness (GE), political stability (PS), regulatory quality (RQ), role of law (RL), and voice & accountability (VA).² I begin with the baseline specification with control of corruption (CC_{it-5}) replacing (IQ_{it-5}) from the original models in Table 1 and interacting (CC_{it-5}) with resource dependence. Regressions 1–4 in Table 2 show control of corruption having a negative sign. This implies that the more countries control corruption the more intense the curse becomes. This obviously contradicts logic and theory. After few iterations with (CC_{it-5}) I conclude that no meaningful results can be concluded from this variable and its interaction with resource dependence. In Table 3, I replace control of corruption with government effectiveness. Government effectiveness captures the quality of public and civil services in a country.

Beginning with the baseline model and including initial income in regressions 1&2 in Table 3, resource dependence and its interaction with lagged government effectiveness is not statistically significant. The economic meaning behind these results from Table 3 is straightforward; GE is a measure of public and civil services. They may play a role in the quality of existing infrastructure; however, they reflect government spending of public money. In democratic countries, public funds are subject to more scrutiny since citizens of those countries pay taxes to their governments and expect them in turn to provide good quality public and civil services. GE alone, as described and published by the World Bank, have no effect on per capita growth for the developing countries in my sample.

Next, I examine political stability (PS_{it-5}) in my model to see if it has any significant effect on growth. This indicator measures perceptions of the likelihood of political instability and/or politically-motivated violence and terrorism in a country. This indicator can be very relevant to growth

Table 3. ~TC~		
Dep Var (GPC _{it})	(1)	(2)
Ln(RD _{il})	-0.210 (0.319)	0.111 (0.327)
GE _{it-5}	0.612 (0.439)	1.496*** (0.489)
Ln(RD _{it})xGE _{it-5}	-0.170 (0.159)	-0.250 (0.159)
Ln(II _{it})		-0.579*** (0.145)
Ln(INV _{it})	_	—
Ln(FDI _{it})		—
Constant	2.351 (0.972)	5.634 (1.270)

since it signals to investors both domestic and foreign that their investments are safe from expropriation or destruction.

In my specification, and after controlling for the investment rate and FDI, I do not expect this indicator to play any role in the model. In Table 4, I present my results for the regressions with political stability and as can be seen in regressions 1&2. (PS_{it-5}) enters the model with a positive sign and statistical significance. The interaction with resource dependence produces negative coefficients implying more stability is associated with less growth. Furthermore, resource dependence enters the equations with a positive sign (except for regression 5) leading to me to conclude that political stability, for the countries in my sample, does not play a role in growth—as expected.

Table 5 shows my regressions results using regulatory quality as a proxy for institutional quality. RQ measures the perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.

In regression 1, none of the variables are statistically significant. In regression 2, I added initial income and tested the model again. Only initial income has the correct sign and statistically significant. I ran regressions 3&4 to further test RQ and learn more about its interaction with RD; initial income, investment rate, and FDI all have the correct signs and are statistically significant, but resource dependence and its interaction with RQ are not.

Thus far, institutional quality as an aggregate index is significant to growth with a threshold level that countries must attain in order for the curse to turn into a blessing. None of the components

Table 4. ~TC~								
Dep Var (GPC _{it})	(1)	(2)	(3)	(4)	(5)			
Ln(RD _{il})	0.371 (0.343)	0.284 (0.345)	0.460 (0.330)	0.053 (0.204)	-0.690*** (0.202)			
PS _{it-5}	1.283*** (0.370)	1.281*** (0.347)	0.565 (0.360)	_	_			
Ln(RD _{it})xPS _{it-5}	-0.416*** (0.138)	-0.359** (0.140)	-0.289** (0.134)	-0.100* (0.058)	0.085 (0.059)			
Ln(II _{it})		-0.243** (0.109)	-0.450*** (0.106)	-0.454*** (0.106)	-0.244** (0.109)			
Ln(INV _{it})			3.154*** (0.342)	3.222*** (0.340)				
Ln(FDI _{it})			0.340*** (0.085)	0.362*** (0.084)				
Constant	0.782 (0.959)	2.854 (1.333)	-4.774 (1.598)	-3.809 (1.476)	5.545 (1.090)			

Table 5. ~TC~				
Dep Var (GPC _{it})	(1)	(2)	(3)	(4)
Ln(RD _{il})	-0.441(0.286)	-0.340(0.288)	-0.570***(0.170)	-0.079(0.169)
RQ _{it-5}	0.065(0.434)	0.461(0.470)	—	—
Ln(RD _{it})xRQ _{it-5}	-0.044(0.157)	-0.061(0.157)	0.074(0.077)	-0.097(0.076)
Ln(II _{it})		-0.302**(0.137)	-0.250**(0.126)	-0.431***(0.123)
Ln(INV _{it})				3.140***(0.334)
Ln(FDI _{it})				0.370***(0.085)
Constant	3.316(0.888)	5.250(1.246)	5.540(1.210)	-3.657(1.528)

that are used to construct IQ exhibited any relevance in the different models. In Table 6, I test the role of law and its interaction with RD. The role of law measures the extent to which citizens have confidence in and abide by the rules of society including the contract enforcement and the protections of property rights. I expected this variable to have a role on growth, independently, and through its interaction with resource wealth.

Rule of law (RL) should mitigate the effects of the resource curse on growth. To test this hypothesis, I included RL in my model and report the results in Table 6. In the baseline model, resource dependence and the role of law have the correct signs but only RL is statistically significant at the 90% level. In regression 2, RL and initial income enter significantly and with the expected signs. Regression 4 adds investment and FDI—both significant with initial income.

In regressions 4&5, I drop the lagged role of law variable and test the interactions. Dropping the role of law implies that when controlling for other factors such as initial income, investment rate, and foreign direct investment; role of law at period t—5 is no longer significant for growth at period t. However, the lingering effects of the role of law from previous period affect the way resource wealth impact growth. To see this, in regression 5 I drop INV & FDI and run the model again without the role of law. All coefficients have the correct signs and are statistically significant. As reposted from regression 5 results in Table 6, I conclude that role of law shows some signs of mitigating the negative effect of the natural resource curse. Though minimal, the role of law might mitigate some of the effects of resource dependence on growth.

Next, I examine voice and accountability in my model and report my final results in Table 7 below.

In the baseline model in regression 1, all of my variables are statistically significant and enter the model with the correct expected signs.

The interaction term in the baseline model indicates that the effects of resource dependence on growth through voice and accountability mitigates the negative effect of the curse. I further tested this finding in my other regressions as reported in Table 7. In regression 2, I added initial income, however, it was not statistically significant. In regression 3, I added investment and FDI. All variables are statistically significant except for lagged VA. To isolate the effect of the interaction between resource dependence and VA I dropped the lagged VA variable and regressed my model again. Regression 5 results in Table 7 show my final model specification and estimation. All variable in the final model have the correct expected signs and are statistically significant.

Table 6. ~TC~								
Dep Var (GPC _{it})	(1)	(2)	(3)	(4)	(5)			
Ln(RD _{il})	-0.152 (0.287)	-0.052 (0.288)	0.060 (0.276)	-0.138 (0.169)	-0.675*** (0.167)			
RL _{it-5}	0.711* (0.422)	1.180*** (0.443)	0.375 (0.430)		_			
Ln(RD _{it})xRL _{it-5}	-0.222 (0.154)	-0.210 (0.154)	-0.170 (0.150)	-0.060 (0.075)	0.146* (0.007)			
Ln(II _{it})		-0.447*** (0.135)	-0.501*** (0.131)	-0.464*** (0.124)	-0.332*** (0.128)			
Ln(INV _{it})			3.125*** (0.341)	3.155*** (0.339)	_			
Ln(FDI _{it})			0.337*** (0.085)	0.348*** (0.083)	_			
Constant	2.299 (0.886)	5.340 (1.273)	-3.590 (1.619)	-3.410 (1.610)	6.270 (1.228)			

Table 7. ~TC~					
Dep Var (GPC _{it})	(1)	(2)	(3)	(4)	(5)
Ln(RD _{il})	-1.584*** (0.274)	-1.444*** (0.293)	-1.062*** (0.281)	-0.770*** (0.146)	-0.476*** (0.143)
VA _{it-5}	1.353*** (0.416)	0.162*** (0.439)	-1.00 (0.816)		—
Ln(RD _{it})xVA _{it-5}	0.699*** (0.159)	0.645*** (0.164)	0.542*** (0.157)	0.245 (0.063)	0.194*** (0.063)
Ln(II _{it})		-0.141 (0.104)	-0.483*** (0.104)	-0.230 (0.098)	-0.562*** (0.099)
Ln(INV _{it})			3.103*** (0.331)	—	3.131*** (0.331)
Ln(FDI _{it})			0.279*** (0.085)	_	0.280*** (0.085)
Constant	5.439 (0.871)	6.280 (1.070)	-1.513 (1.392)	5.140 (0.982)	-2.568 (1.324)

The coefficient on the interaction term has a value of (0.194) which implies that there is a threshold level for voice and accountability where the negative effects of the curse can be offset or even vanish if the voice and accountability indicator is high enough.

Following the same threshold analysis done earlier with the aggregate IQ index:

 $\frac{\Delta GPC}{\Delta RD} = -0.476 \text{RD} + 0.194 \text{RD}x(\text{VA})$ evaluated at RD = 1: $\frac{\Delta GPC}{\Delta RD} = -0.476 + 0.194(\text{VA})$

VA = 2.45

6. Discussion

To put the final results in perspective, the coefficient on resource dependence is (-0.476) implying a 10% increase in fuels and non-fuels exports as a percent of GDP will result in a reduction in per capita growth of 4.76%. However, countries with strong systems of voice and accountability are able to mitigate this reduction in growth. Countries can either mitigate or exacerbate the curse of resource wealth depending on the quality of their institutions. To further illustrate this finding, consider Uruguay and Saudi Arabia in 2010 with voice and accountability score of 1.147 & -1.788, respectively. An increase in resource dependence of 10% without accounting for the role of institutions in either country would result in a reduction in growth of 4.76% in both countries equally. Now consider the role of institutions in each country on growth: in Uruguay, a 10% increase in resource dependence would result only in 2.53% reduction in growth (-4.76 + 1.94*1.147 = -2.53%). A 2.23% difference (less) than the original scenario without considering the role of institutions. The same 10% increase in RD in Saudi Arabia would result in 8.23% reduction in growth (-4.76 + 1.94*-1.788 = -8.23%). 3.47% worse than the effect of resource dependence alone on growth. The higher the institutional quality in a country represented as a better system for voice and accountability in a country, the better able they are to mitigate the negative effects of resource dependence. In this sample of developing countries, increasing voice and accountability is the most effective approach for mitigating the resource curse. Countries with high enough scores in voice and accountability are able to completely reverse the effect of the curse. Consistent with Adika (2021), control of corruption (CC) has no significant impact on growth, however, the interaction term between CC and resource dependence is negative and significant. My results show that controlling corruption alone may not be enough to fully mitigate the adverse effect of resource dependence on growth; that is why my CC term in the full model loses significance while the coefficient on the interaction term decreases in intensity. This shows that controlling corruption does not have a direct

Table 8. ~TC~								
Country	Control of Corruption	Government Effectiveness	Political Stability	Regulatory Quality	Rule of Law	Voice & Accountability		
Bahrain	0.34	0.53	-0.28	0.74	0.41	-0.93		
Kuwait	0.42	0.05	0.34	0.17	0.53	-0.45		
Oman	0.50	0.36	0.84	0.43	0.49	-0.92		
Saudi Arabia	-0.10	-0.16	-0.21	-0.02	0.05	-1.69		
United Arab Emirates	0.76	0.90	0.90	0.70	0.55	-0.76		

impact on growth, but it does have an indirect positive by reducing the resource curse. Voice and Accountability (VA), as measure of institutional quality, has both direct and indirect positive impact on growth. Contrary to Deganay & Deger (2021), I find no positive or significant impact on growth from regulatory quality (RQ). The fact that voice and accountability is the one component of institutional quality with statistical significance after controlling for other determinants of growth is quite remarkable. Consider the Gulf Cooperative Council (GCC) countries for example. These countries are some if the world's richest oil-producing countries and previous research shows that they have also suffered from a resource curse. The next table shows the average scores of the components of institutional quality for each GCC country between 1996 and 2014, the period in study (Table 8).

Voice and accountability average scores for GCC countries are the lowest of any other component of institutional quality. With voice and accountability showing strong statistical evidence of being a major factor in how resource wealth affects growth, GCC countries' poor performance in that category points us in the right direction to identifying one of the root-causes behind their resource curse.

7. Conclusion

Institutional quality in any country—especially resource-rich countries—plays an important role in determining the effects of high resource dependence on growth. Previous studies highlighted the role of institutions as a determinant of growth (Sachs, Warner, 1997) while other studies such as (Mehlem et al., 1992) provided evidence that the effect of resource wealth on growth depends on the quality of institutions. This study set out to examine the underlying forces behind institutional quality—as measured by an aggregate index of IQ constructed using World Bank Governance Indicators—in order to identify the components of institutional quality that has the most mitigating effect on the resource curse. Results show that voice and accountability have the most influence in shaping institutional quality for the sample of countries in the study, and there is evidence that it has the most relevant and significant effect on growth compared to other components of institutional quality. One natural limitation to this current study is that it's been shown in the literature that there are over fifty determinants to growth which may have an impact when estimating any empirical model of growth. This study set out to minimize such effect by using the appropriate econometric techniques.

Voice and accountability is defined as the people's perception of the extent to which they're able to participate in selecting their government, freedom of expression and association, and a free media. These are all traits of healthy and vibrant democracies. This is where economic theory, political economy, and policy converge. To have strong voice and accountability in a country means having a strong system of checks and balances on government and the elite in those countries—those with connections to people in government. Such system is the foundation of a democracy. Developing countries that move away from being an autocracy and become a democracy, by the definition of democracy as outlined above, are better able to manage and grow their natural resource sector with little adverse effects. Over time, those countries are better positioned to completely reverse the curse and turn it into a blessing. Hence, regime type determines the structure of the political and social interaction between citizens and their governments, which determines the quality of institutions that eventually affects the country's development and growth trajectory resulting from its dependence on natural resources. One fruitful area of potential future research could be to investigate other linkages of voice and accountability to growth. We have established both a direct effect and an indirect effect to growth through natural resource dependence. Voice and accountability ensures a system of checks and balances and reinforces citizens trust in the system. Lack of voice and accountability may provide disincentives for the country's citizens to invest in their education and human capital since a system of meritocracy cannot be sustained without voice and accountability. Investigating the impact of resource dependence on people's incentives to build human capital is a promising area for future research.

This study provided evidence of what drives institutional quality to be higher in a sample of developing countries. Better data is always a key and a challenge to researchers in empirical growth. Future research can examine further underlying determinants of institutional quality to gain more in-depth insights into what shapes it in order to identify some policy prescriptions and to provide recommendations to decision makers in developing countries to better manage their natural resource sector and promote overall growth.

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Author details

Khalid Adnan Saeed^{1,2} E-mail: k2a.saeed@gmail.com

- ORCID ID: http://orcid.org/0000-0002-0015-4726
- ¹ Department of Agricultural and Applied Economics, University of Missouri-Columbia Columbia, MO. USA.
- ² Department of Economics American University of Kuwait Salmiya, Kuwait, Middle East.

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Notes

- All components were lagged five years and crosscountry averages were computed to maintain a balanced sample.
- 2. Complete description of all governance indicators is provided by the World Bank in the Worldwide Governance Indicators Database.

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