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ANU Working Papers in Economics and Econometrics
694

September 2023

JEL Codes: C3, O1, O4, Q3

ISBN: 0 86831 694 6

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Abstract

This paper revisits the relationship between countries' natural resource abundance and economic development. We find that natural resources are supportive of pro-poor, inclusive, long-term economic growth. Cross-country regressions show that: (i) countries with greater natural resource abundance have on average significantly higher levels of GDP per capita; (ii) poverty rates are significantly lower in resource abundant countries; (iii) natural resource abundance has a significant positive effect on countries' Human Development Index. We show that state ownership is a significant transmission channel through which countries' natural resource abundance affects economic development. This is particularly true in countries that combine above-median state ownership and highly performing policies and institutions.

JEL codes: C3, O1, O4, Q3
Key words: Natural Resources, National Income, Poverty, Human Development, State Ownership

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1. Introduction

In 1995 Jeffrey Sachs and Andrew Warner (Sachs and Warner, 1995) made a surprising discovery: they found a statistically significant, negative association between natural resource dependence, as measured by the share of primary exports in GNP, and GDP per capita growth over the 1970-1990 period. This result, commonly referred to as the "resource curse" or "paradox of plenty" lead many economists to conclude that resource rich countries would be better off leaving their resource wealth in the ground than by leveraging these resources for development. Forwarding some fifteen years, research by Alexeev and Conrad (2009) (among others)[1] challenged the conclusion that natural resource wealth is a curse for countries' economic development: these authors showed that countries with higher natural resource wealth per capita have significantly higher *levels* of GDP per capita in the year 2000.[2]

This paper seeks to make three contributions to the debate on whether natural resource wealth is a curse or blessing. First, following a replication and discussion of the baseline results of Sachs and Warner (1995, 1997) and Alexeev and Conrad (2009), the paper examines the relationship between countries' natural resource wealth and GDP per capita using data for more recent years: i.e. for 2011, which is about one decade later than Alexeev and Conrad, and for 2020. The main finding when using more recent data is that there is no evidence that countries' natural resource abundance is a curse for economic development. To the contrary, cross-country regressions show that natural resource abundance has a significant[3] positive effect on the level of GDP per capita: this is true for the year 2011 and for the year 2020. The estimated coefficients suggest that on average a one percent increase in natural resource rents per capita leads to a GDP per capita higher by about 0.1 percent in the long run (Tables 4A, 4B, and alternative measures, in Tables 5A and 5B, respectively). There is also a significant positive effect on the level of GDP per capita if we focus on oil or mining output only, or use measures of natural resource dependence, i.e. scale by countries' GDP. On the other hand, and contrary to the conclusion of Sachs and Warner, when updating the dataset there is no evidence that natural abundance had a systematic effect on countries' (transitional) GDP per capita growth over the 1970-2020 period.

The paper's second contribution is to move the analysis beyond GDP per capita and examine the effects that natural resource abundance has on countries' income distribution, poverty rates, and Human Development Index scores. The main finding there is that natural resource abundance does not significantly affect inequality as measured through the Gini coefficient (Tables 6A, 6B and 6C). On the other hand, natural resource abundance is pro poor: it is associated with lower poverty rates and higher Human Development Index. For poverty, the estimated coefficients suggest that on average a one percent increase in natural

[1] Brunnschweiler and Bulte (2008) showed that, while natural resource dependence had a negative effect on GDP growth during 1970-2000, natural resource abundance had a positive effect. Surveys by van der Ploeg (2011) and Venables (2016) make clear that, theoretically, the effect of natural resources on economic development can be positive or negative.

[2] During the 2010s a number of empirical papers were published that found a significant positive effect of natural resource discoveries and commodity price windfalls on GDP growth in the short- and in the medium-run, -- i.e. over a time horizon of, say, 1-, 5- or 10-years. Arezki et al. (2016) showed that investment increases following the discovery of a major oil field, and that once oil production has started GDP growth increases. Positive short-run effects of commodity price windfalls on GDP growth have been documented in Collier and Goderis (2012), Arezki and Brueckner (2012), Araujo et al. (2016), and Ferandez et al. (2020), among others. The present paper mainly differs from these papers in that we wish to examine more longer-run effects of natural resources on economic development, while the papers cited in this footnote are concerned about short- to medium-run effects.

[3] For clarity, "significance" in this paper refers specifically to a statistical level of significance where the null hypothesis is rejected with at least a 90% level of confidence.

resource rents per capita reduces the share of the population living on less than $2.15 a day by around 1 percentage points in 2011 (Table 7C). For the Human Development Index, the estimated coefficients suggest that on average a one standard deviation increase in natural resource rents per capita increases the Human Development Index score by around 0.01 standard deviations in 2020 (Table 8). These results also hold if we focus on oil or mining output only, or control in the econometric model for measures of countries' institutional quality.

The paper's third contribution is to examine the effects of natural resource abundance on GDP per capita when controlling for state ownership. For many natural resource rich economies, resource rents provide most of the foreign exchange and are an important share of total government revenues. Control of natural resource rents by the state was historically considered as strategically important and continues to be so for both political and economic reasons. In addition, the finite nature of mineral and energy resources introduces a unique element into the analysis and formulation of mining and oil and gas policies, rendering the question of the role of state ownership of particular importance.

State ownership is an important transmission channel through which countries' natural resource abundance affects living standards. Our econometric model estimates show that: (i) controlling for state ownership leads to a significant reduction in the estimated coefficients on natural resource abundance (i.e. the conditional effects of natural resource abundance on GDP per capita are substantially smaller than the unconditional effects); (ii) in the model that includes state ownership as a control variable, the estimated coefficient on the log of natural resources per capita is not significantly different from zero. Similar results are obtained for mining or oil output.

We check under which conditions state ownership has the strongest positive impact on growth and development. In an econometric model that includes the rule of law and other geographic control variables for countries above median state ownership, the estimated coefficient on the log of natural resource rents per capita is 0.16 for the year 2020 (see tables 13 & 14). In sum, governance metrics of policy and institutions play a significant role in enhancing the positive impact of natural resources rent on GDP per capita, whether we use the indicators from Fraser Institute (Regulation and Freedom to Trade Internationally) or from Worldwide Governance Indicators (Rule of Law and Government Effectiveness). Consistent with previous results, we do not find any positive or negative impact on income inequality. However, we find some impact on poverty reduction with a significant role for Regulatory Quality (Tables 17 & 18) and strong improvement in HDI with significant role for Regulation, Legal System and Property Rights, Government Effectiveness, and Rule of Law (Tables 15 & 16).

The remainder of the paper is organized as follows. The main findings of Sachs and Warner (1997) and Alexeev and Conrad (2009) are discussed and replicated in Sections 2 and 3. Section 4 discusses results based on the latest available data and alternatives measures of natural resource wealth. Section 5 extends the analysis to poverty, income inequality, and the Human Development Index. Section 6 presents estimations that include a measure of state ownership in the econometric model. Section 7 contains discussions and Section 8 includes robustness checks. Section 9 focuses on country case studies with above-median State Ownership while Section 10 discusses countries with below-median State Ownership. Section 11 examines the specific case of IDA countries. Section 12 concludes.

2. Replication of Sachs and Warner (1997)

We begin the discussion of the empirical results by replicating and discussing the baseline estimates of Sachs and Warner (1997). The estimation strategy in Sachs and Warner (1997) was to relate the average

annual growth rate of real GDP per capita during the 1970-1990 period to the initial (1970) GNP share of primary exports:

$$(1)\ [(\ln GDPpc_c^{1990} - \ln GDPpc_c^{1970})/20] = \alpha + \varphi \ln GDPpc_c^{1970} + \beta SXP_c + \Gamma X_c + u_c$$

where SXP_c is the GNP share of primary exports; X_c is a vector of control variables; and u_c is an error term.

Because φ captures the per annum convergence rate, it is important to note that the estimation of the above model enables to answer the question of what the effect of a change in the GNP share of primary exports on transitional GDP per capita growth is.

We present the main results from the replication exercise in Table 1.[4] Column (1) shows that conditional on initial GDP per capita the estimated coefficient on the GNP share of primary exports in GNP is negative and significantly different from zero at the 1 percent level. In quantitative terms the coefficient of -9.4 should be interpreted as a one percentage point increase in the GNP share of primary exports being associated with a reduction of GDP per capita growth of almost 0.1 percent per annum. This captures, of course, an average relationship across the 87 countries during the 1970-1990 period. It does not, for example, account for the fact that some resource-rich countries with solid institutions, such as for example Norway and Great Britain, experienced relatively high growth rates of around 2 percent per annum (see also Mehlum et al., 2006).

Columns (2)-(5) of Table 1 document that the negative cross-country relationship between countries' dependence on natural resource exports and GDP per capita growth is robust to the control for variables that have been identified as determinants of economic growth in other studies. Column (2) of Table 1 reports estimates that include in addition to the initial level of countries' GDP per capita an indicator of countries' trade openness. Controlling for countries' openness to international trade reduces the coefficient on the GNP share of primary exports to about -6.9; however, we can still reject the hypothesis that the relationship between the GNP share of primary exports and GDP per capita growth is equal to zero at the 1 percent significance level. Including in the econometric model domestic investment, the rule of law, and the terms of trade also does not vitiate the negative correlation between natural resource dependence and GDP per capita growth; this is shown in columns (3)-(5) of Table 1. It is, therefore, not the case that the negative relationship between the GNP share of primary exports and GDP per capita growth is spurious due to a weak rule of law and low levels of investment causing a high dependence on natural resource exports.

While Sachs and Warner (1997) documented the robustness of their results to the inclusion of many other control variables, they did not report estimates from a model specification that relates the level of GDP per capita to the level of the GNP share of primary exports. Conceptually, such a model specification enables to answer the question of whether natural resource dependence is associated with a higher standard of living in the long run. Alexeev and Conrad (2009) argued that natural resource wealth may have already led to high growth rates before 1970 (i.e. in periods before those analysed in the regressions).[5] Hence, when GDP per capita growth of the post-1970 period is the dependent variable, the negative coefficient on natural resource dependence does not capture a curse of natural resources. Instead, it may simply reflect that GDP

[4] When using the replication rating system defined by Glandon (2011), we find that for those figures of interest in our study, replicability was practically perfect yielding a rating of 4 out of a possible 5.

[5] This argument is consistent with the time-series evidence that commodity price growth has a significant positive effect on GDP per capita growth of commodity exporting countries, see for example Deaton and Miller (1995), Brueckner and Ciccone (2010) or Arezki and Brueckner (2012).

per capita growth in these countries is lower due to high GDP per capita growth rates in previous periods. These high GDP per capita growth rates in previous periods will be reflected in the current *level* of GDP per capita and, as per Davis (2011), these countries will experience a *"Resource Drag"*, not a "curse". As predicted by standard neoclassical growth theory, there will be lower subsequent GDP per growth in transition to the steady state. What matters for welfare is the long-run effect on the level of GDP per capita, not the effect on transitional growth.

3. Replication of Alexeev and Conrad (2009)

Table 2 replicates the main findings in Alexeev and Conrad (2009).[6] The econometric model is:

$$(2)\ \ln GDPpc_c = \delta + \zeta \ln NatRes_c + \Theta Q_c + \varepsilon_c$$

where $NatRes_c$ is a measure of natural resource wealth and Q_c is a vector of control variables. In contrast to equation (1), the above model specification is designed to answer the question of how a change in a country's resource wealth affects the long-run level of GDP per capita.

In Panel A of Table 2 we report estimates of the relationship between the level of GDP per capita and various measures of natural resource wealth without controlling for countries' institutional quality which is proxied by the rule of law. The control variables in Panel A (estimates not reported) are the same as in Alexeev and Conrad (2009), i.e. countries' absolute latitude and dummy variables for Latin America, East Asia, and European population. In Panel B of Table 3 we report estimates that control for countries' institutional quality. For replication purposes, we use exactly the same instrumentation strategy as Alexeev and Conrad (2009), i.e. we instrument the institutional quality variable with absolute latitude, the share of English language speakers, and the share of European language speakers.[7]

An important point made by Alexeev and Conrad (2009) is that scaling natural resource wealth by GDP creates a negative simultaneity bias in the regression model where GDP per capita is the dependent variable. The reason is that any factor that increases GDP (for reasons other than natural resource wealth) will decrease the GDP share of natural resources. Alexeev and Conrad (2009) thus advocate the use of natural resource measures that are scaled by countries' population size. Scaling by population size means that the natural resource variables can be interpreted as the average wealth from natural resources available to the citizens of a country. However, as noted by Sachs and Warner (1997), the per capita measure does not capture the dependence of an economy on natural resource exports.

Table 2 shows that there is a statistically significant positive relationship between measures of countries' natural resource wealth and real GDP per capita. In column (1) the measure of natural resource wealth is hydrocarbon deposits per capita; column (2) the value of oil output per capita; column (3) the GDP ratio of oil output (or oil dependence of the economy); column (4) mining output per capita; and column (5) the GDP ratio of mining output. Quantitatively, the estimated coefficient on the log of hydrocarbon deposits implies that on average a one percent increase in hydrocarbon deposits per capita is associated with a higher GDP per capita of nearly 0.06 percent. For the value of oil (mining) output, the estimated elasticity effect

[6] Replicability again is rated as "practically perfect" in accordance with Glandon's (2011) replication accuracy rating system.

[7] Due to the comment by Albuoy (2013) on measurement error issues with the settler mortality data, we do not report here estimates of the alternative IV estimation strategy that uses settler mortality as an instrument for institutional quality.

goes up to nearly 0.1 (0.1) percent. When the GDP share of oil (mining) is used, the estimated coefficients imply that on average a one percentage points increase in the GDP share of oil (mining) is associated with a 1.5 (2.6) percent higher GDP per capita.

Panel B of Table 2 shows that the positive relationship between natural resource wealth and GDP per capita is not significantly affected by controlling for countries' institutional quality. The coefficients on the measures of natural resource wealth continue to be positive and significantly different from zero at the conventional significance levels. Quantitatively, they are also of similar size as in Panel A. The findings in Panel B thus suggest that natural resource wealth is unlikely to have adverse effects on GDP per capita through the deterioration of countries' institutional quality. In line with this finding Alexeev and Conrad (2009) document that the measures of natural resource wealth do not significantly correlate in the cross-section of countries with institutional quality once cross-country differences in initial GDP per capita that are due to cross-country differences in geographic conditions are controlled for. Within-country evidence provided by Haber and Menaldo (2011) and Brueckner et al. (2012) further underscores the finding that there is no institutional resource curse.

In Table 3 we show that in Alexeev and Conrad's (2009) dataset natural resource abundance has an insignificant effect on transitional GDP per capita growth. The estimated coefficients on hydrocarbon deposits per capita, the value of oil output per capita, and mining output per capita are quantitatively small and statistically insignificant. Only the coefficient on the GDP share of oil is significantly negative. However, as already noted, this negative correlation may simply be due to negative simultaneity bias (since GDP is in the denominator of the oil dependence measure), rather than reflecting a causal effect of oil dependence on transitional GDP per capita growth.

4. Results Using Updated Data and Alternative Measures of Natural Resource Rents

In Table 4A and 4B we document that the results of Alexeev and Conrad are robust to using updated data from the World Development Indicators (2011, 2022). We have estimated models that use data for the year 2011 (this allows us to examine whether the results of Alexeev and Conrad hold when using data one decade later); and models that use the most recent data for the year 2020 (i.e. about two decades later than Alexeev and Conrad’s analysis).

The model specification in Table 4A is exactly the same as in Table 2 except that the dependent variable in Table 4A is the log of constant price PPP GDP per capita in 2011. As in Table 2, where the dependent variable was constant price PPP GDP per capita in 2000, all the coefficients on the natural resource measures in Panel A of Table 4A are positive and significantly different from zero at the conventional significance levels. Quantitatively, the estimated coefficient on the log of hydrocarbon deposits implies that on average a one percent increase in hydrocarbon deposits per capita is associated with a higher GDP per capita of nearly 0.08 percent. For the value of oil (mining) output, the estimated elasticity effect goes up to nearly 0.14 (0.13) percent. When the GDP share of oil (mining) is used, the estimated coefficients imply that on average a one percentage points increase in the GDP share of oil (mining) is associated with a 2.8 (4.1) percent higher GDP per capita.

Panel B of Table 4A shows that there are no significant effects of Alexeev and Conrad's natural resource measures on 1970-2011 (transitional) GDP per capita growth. All the estimated coefficients on the natural resource measures are statistically insignificant. There is hence no evidence that resource-rich countries have grown slower during 1970-2011 than other countries.

Living standards, as measured by the level of PPP GDP per capita in the year 2020, are significantly higher in resource rich countries. This can be seen from the estimates shown in Panel A of Table 4B. In Table 4B the dependent variable is PPP GDP per capita in 2020. The estimates in Panel A of Table 4B show that, on average: (i) a one percent increase in hydrocarbon deposits per capita increases GDP per capita by over 0.07 percent (see column (1)); a one percent increase in the value of oil output per capita increases GDP per capita by 0.11 (see columns (2)); a one percent increase in the GDP share of oil increases GDP per capita by 2.2 percent (see columns (3)); a one percent increase in the value of mining output per capita increases GDP per capita by 0.11 (see columns (4)); a one percent increase in the GDP share of mining increases GDP per capita by 3.3 percent (see columns (5)). The size of the estimated effects in Table 4B is similar to that in Table 4A and Table 2, where the dependent variable was GDP per capita in 2011 and 2000, respectively. Overall, these results suggest that there is a remarkably stable cross-country relationship between natural resources and living standards: the level of PPP GDP per capita is significantly higher in countries with greater natural resources.

We now set out to test the robustness of this result to using alternative measures of natural resources (i.e. different measures of natural resources to those used in Alexeev and Conrad). We find no evidence of a resource curse when we use oil rents, or total natural resource rents as alternative measures of natural resources. See Tables 5A and 5B. We obtained data on oil rents and natural resource rents from the World Development Indicators (2011, 2022). The WDI provides data for a large cross-section of countries. According to WDI, rents are defined as the difference between the value of natural resource production at world prices and total costs of production. Total natural resources rents are defined as the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents.

Table 5A reports estimates of the relationship between resource rents and GDP per capita in 2011.[8] The explanatory variable in column (1) is the log of oil rents per capita; column (2) the GDP ratio of oil rents; column (3) the log of total natural resource rents per capita; and column (4) the GDP ratio of total natural resource rents. From Panel A of Table 5A, one can see that estimated coefficients on all of these measures of resource rents are positive and significantly different from zero at the conventional significance levels. Quantitatively, the estimated coefficient on the log of oil rents implies that on average a one percent increase in oil rents per capita is associated with a higher GDP per capita in the year 2011 of nearly 0.12 percent. For total natural resource rents, the estimated elasticity effect goes up to nearly 0.17 percent. When the GDP share of oil rents (total natural resource rents) is used, the estimated coefficient implies that on average a one percentage points increase in the GDP share of oil rents (total natural resource rents) is associated with a 1.84 (1.77) percent higher GDP per capita.

There are no significant effects of resource rents on GDP per capita growth during 1970-2011. This can be seen from the estimates in Panel B of Table 5A. Panel B reports estimates from an econometric model that includes as a control variable the initial (1970) level of GDP per capita. From Panel B of Table 5A, one can see that the estimated coefficients on all four measures of resources rents are positive, although none of these coefficients is significantly different from zero at the 5 percent level or higher.

Panel A of Table 5B shows that living standards in 2020 are significantly higher in countries with greater oil rents. In column (1) of Panel A in Table 5B one can see that a 1 percent increase in oil rents per capita was associated with a 0.12 higher GDP per capita in 2020. Column (2) of Panel A in Table 5B shows that a

[8] The control variables are the same as in Alexeev and Conrad (2009).

1 percentage point increase in the GDP share of oil rents increased GDP per capita in the year 2020 by around 3.8 percent. Panel B of Table 5B shows that there is no significant effect of oil rents on GDP per capita growth during 1970-2020 at the 5 percent level or higher. This is true regardless of whether the measure is oil rents per capita or the ratio of oil rents over GDP.

Total natural resource rents are, on average, not significantly associated with living standards in 2020. This can be seen from the estimates in columns (3) and (4) of Panel A in Table 5B. The estimated coefficient on the log of total natural resource rents per capita is positive but not significantly different from zero at the conventional significance levels. Similarly, the estimated coefficient on the GDP ratio of total natural resource rents is positive but not significantly different from zero at the conventional significance levels. We have examined the source of the insignificant results in Panel A of Table 5B and found that this is mostly due to sample size. If we include in the sample only those countries for which data are available in the year 2011, then this would yield significant positive effects of total natural resource rents on GDP per capita for the year 2020.

5. Effects on Income Inequality, Poverty, and the Human Development Index

In this section we extend the analysis to measures of income inequality, poverty, and the Human Development Index. The questions that this section thus seeks to answer are whether natural resource wealth is related to the distribution of income within countries, and whether natural resource wealth is a curse or blessing when the focus is on the Human Development Index that captures, in addition to income, other aspects of human development, such as, life expectancy and education.[9]

In Tables 6A, 6B, and 6C we report estimates of the relationship between measures of countries' natural resource abundance and the Gini income coefficient. In table 6C, we report estimates for the year 2020 using data from WDI (2022). For the majority of specifications, the estimated coefficients on the natural resource abundance measures are positive but not significantly different from zero. Only for mining output rents per capita is the estimated coefficient positive and different from zero at the 10 percent level (Column 3). In terms of magnitude, this coefficient suggests that a one percent (0.01 log point) increase in mining output per capita is associated with a 0.009 percentage points decrease in the Gini coefficient. However, given the small size of the sample (14 countries) the significance of the results is low. Controlling for countries' institutional quality, see Panel B, has little effect on the estimated coefficients on natural resource abundance. Table 6B for 2019 with a sample of 33 countries shows all coefficients positive but not significantly different from zero. Finally, Table 6A reports estimates for the year 2000 with a sample of 109 countries and shows that the majority of the estimated coefficients are negative but not significantly different from zero[10]. Only for oil output per capita is the estimated coefficient negative and significantly different from zero at the conventional significance levels. In terms of magnitude, the significant negative coefficient on the log of oil output per capita suggests that a one percent (0.01 log point) increase in oil rents per capita is associated with a 0.003 percentage points reduction in the Gini coefficient. The main result from Tables 6A, 6B, and 6C is hence that there is no evidence of natural resource abundance acting neither as a curse nor as a blessing in terms of impacting countries' income inequalities.[11]

[9] For a survey of the literature on the effects of natural resources on education and health, see Mousavi and Clark (2021).

[10] This is consistent with Davis and Vásquez Cordano (2013) who find no evidence to support the claims that extraction-led growth is either good or bad for the poor.

[11] Table 6B reports results for the year 2019 Gini using data from WDI (2022). As can be seen from Table 7B, none of the estimated coefficients are significantly different from zero. Hence, based on the most recent cross-country data,

Natural resource abundance is good for the poor. However, the change in poverty line over the examined period with its consequences on the sample size makes it difficult to capture this positive impact consistently. For instance, in Table 7A we report estimates for the year 2000 where the dependent variable is the share of the population living less than $1.25 per day with a sample of 79 to 83 observations. The estimated coefficients on the natural resource measures are negative and significantly different from zero for all four measure of natural resource abundance. The estimated elasticity coefficients on the measures of natural resource abundance range in Panel A between -0.8 to -2.1. In Panel B, where we add to the right-hand side of the regression a measure of countries' institutional quality, the estimated coefficients on the natural resource abundance measures range between -0.7 to -2.1. Quantitatively, the estimated coefficients suggest that a one percent (0.01 log point) increase in natural resource abundance is associated with a reduction in the share of the population living less than $1.25 per day by around 0.01 to 0.02 percentage points. However, for the same year 2000, if we use the US$2.15 per day adopted since 2022, the sample is reduced to 35-36 observations (see table 7B). Except for Hydrocarbon deposits per capita, all independent variables remain rightly signed. Yet, all variables become non-significant. Moving to 2011 (table 7C), the sample is larger with 47-48 observations and all independent variables are rightly signed but only Hydrocarbon deposits per capita and mining output per capita are significant. For 2020, the sample drops to 12-13 observations, hence making any inference of low validity (table 7D).

Table 8 shows that natural resource abundance has a positive effect on the Human Development Index.[12] The estimated coefficients on the natural resource measures are positive and significantly different from zero at the 1 and 5 percent levels for all four measures of natural resource abundance considered. Quantitatively, the estimated effects are also sizeable. For example, the estimated coefficient in column (4) of Panel A implies that on average a one standard deviation (2.15 units) increase in natural resource rents per capita is associated with a higher Human Development Index score of about 0.01 standard deviations in 2020. Panel B shows that adding to the right-hand side of the regression a measure of countries' institutional quality leads to a decrease in the estimated coefficients on natural resource abundance, hence suggesting that part of the natural resources impact is channelled through better institutions.

We conclude from these results that there is no evidence that natural resource abundance leads to greater income inequality or a lower level of human development. To the contrary, natural resource abundance is associated with a reduction in within-country poverty and a significant increase in the Human Development Index. Our finding that natural resource abundance is associated with higher GDP per capita and lower poverty rates is in line with Dollar and Kraay (2002) who showed that increases in countries' GDP per capita lead to significant reductions in poverty.

there is no evidence that income inequality is higher countries with greater natural resources.

[12] The Human Development Index (HDI) combines indicators of life expectancy, educational attainment and income. According to the United Nations (see http://hdr.undp.org/en/statistics/hdi/) "the HDI was created to emphasize that people and their capabilities should be the ultimate criteria for assessing the development of a country, not economic growth alone. The HDI can also be used to question national policy choices, asking how two countries with the same level of GNI per capita can end up with such different human development outcomes. For example, the Bahamas' GNI per capita is higher than New Zealand's (by 17%) but life expectancy at birth is about 5 years shorter, mean years of schooling is 4 years shorter and expected years of schooling differ greatly between the two countries, resulting in New Zealand having a much higher HDI value than the Bahamas. These striking contrasts can stimulate debate about government policy priorities. The HDI sets a minimum and a maximum for each dimension, called goalposts, and then shows where each country stands in relation to these goalposts, expressed as a value between 0 and 1."

6. Natural Resources and State Ownership

One of the transmission channels through which natural resource income affects countries' economic performance is state ownership. State-centred explanations of the resource curse, see Ross (1999) for a detailed discussion, focus on the fact that a large share of countries' natural resource wealth is owned by the government. A simple cross-country scatter plot between natural resource rents and the state ownership index demonstrates this strong positive relationship (see Figure 1). The index of state ownership measures the overall degree of state ownership in the economy. We have re-scaled the index so that it ranges between 0 to 1; higher values of the index denote a larger degree of state ownership in the economy.

The positive relationship between natural resources and state ownership emerges in 2011 and 2019, both for natural resource rents per capita, see Panels A and C of Figure 1, and for the GDP share of total natural resource rents, see Panels B and D of Figure 1. A bivariate regression of the state ownership index on the log of natural resource rents per capita in the year 2011 yields a coefficient (standard error) of 0.031 (0.012) and a R-squared of 0.065; for the GDP ratio of natural resource rents in the year 2011 the coefficient (standard error) is 0.005 (0.002) and the R-squared is 0.081. Hence, both natural resource abundance and natural resource dependence are positively associated with state ownership.

Given the positive association between natural resource abundance and state ownership that has also been noted in previous reports on the topic (see, for example, World Bank, 2011) an interesting question to ask is: what are the effects of natural resource abundance on countries' GDP per capita in the presence of state ownership? This question can be answered by including in the regression model a variable that measures state ownership:

$$(3)\ \ln GDPpc_c = \delta + \zeta \ln NatRes_c + \lambda StateOwnership + \Theta Q_c + \varepsilon_c$$

The above model provides an estimate of the residual (direct) effect that natural resource wealth has on GDP per capita after the transmission channel of state ownership is controlled for. As in the previous regressions, the vector Q_c includes ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population.

The potential endogeneity of state ownership in equation (3) complicates the identification of causal relationships. One concern is that low-income or resource dependent countries may need to rely more on state ownership, in particular, if poverty is due to market failures. Another concern is omitted variables related to countries' institutional environment. If state ownership emerges because of market failures that materialize in lower GDP per capita, then least squares estimation will produce downward biased estimates. This is what Table 9A shows. The least squares estimation on state ownership in Table 9A are negative and statistically insignificant. To address these endogeneity issues we need an instrument, i.e. a variable that is correlated with state ownership but uncorrelated with the error term, ε.

We exploit that countries with socialist legal origin have on average a higher degree of state ownership. The socialist legal origin of countries is a result of historic events, which in turn implies that the instrument is not a function of countries' current GDP per capita.

The main findings from the two-stage least squares estimation of equation (3) where socialist legal origin is employed as an instrument for state ownership are that: (i) natural resource abundance has an insignificant direct effect on GDP per capita; and (ii) state ownership has a significant positive effect on GDP per capita.

The estimated coefficients on the natural resource variables in Table 9B range between -0.022 to -0.063. They are thus quantitatively smaller than the corresponding estimates in Tables 4B and 5B that ranged between 0.065 to 3.76. The estimated coefficients on the state ownership index range between 3.98 to 4.64. Quantitatively, these estimates suggest that a one percentage point (0.01) increase in the state ownership index is associated with an increase in the level of GDP per capita of around 0.04 to 0.05 percent. In terms of instrument relevance, we note that socialist legal origin is a strong instrument for state ownership as the Kleibergen Paap F-statistics are always in excess of 10.

For socialist legal origin to be a valid instrument it should, in addition to being plausibly exogenous, only affect current GDP per capita through state ownership. This exclusion restriction might be violated due to the omission of institutional quality in equation (3). In order to address this concern, we will now present estimates that also include in the regression model the rule of law as a measure of countries' institutional quality:

$$(4)\ \ln GDPpc_c = \delta' + \zeta' \ln NatRes_c + \lambda' StateOwnership + \kappa' RuleofLaw + \Theta' Q_c + \varepsilon'_c$$

Because the rule of law is an endogenous variable, we follow Alexeev and Conrad (2009) and Hall and Jones (1999) and instrument this variable using distance to the equator and the fraction of the population that speaks English as their native language. The two-stage least squares estimation of equation (4) thus contains two endogenous variables (state ownership and the rule of law) and three instruments (socialist legal origin, distance to the equator and the fraction of the population that speaks English as their native language) thus our variables are appropriately identified. As an alternative to this approach, we will use instead of the rule of law the ease of doing business score without instrumentalization.

Tables 10A and 10B present the two-stage least squares estimation of equation (4). The dependent variable is the log of GDP per capita in 2020. The findings are as follows: (i) the estimated coefficients on natural resource abundance range between 0.08 to -0.04, and thus are slightly larger than in Table 9B but still insignificant; (ii) the estimated coefficients on state ownership are positive, they range between 1.8 to 2.3, and are significantly different from zero at the 5 percent significance level or higher for all specifications; (iii) the estimated coefficients on the rule of law are positive, they range between 1.1 to 1.25, and are significantly different from zero at the 1 percent significance level for all specifications. In terms of instrument validity, the p-values of the Hansen J-test are in excess of 0.1 for all of the specifications in Table 10A. Hence, we cannot reject the hypothesis that the instrumental variables regressions are based on valid instruments.

We obtain similar results with regard to direct effects of state ownership and natural resources when we control for the ease of doing business score. Table 10B shows results, for log GDP per capita in 2020. In these regressions we instrument state ownership with socialist legal origin as in the previous tables; the ease of doing business score is not instrumented. From Table 10B we see that natural resources have no significant direct effect on GDP per capita. The estimated coefficients on the measures of natural resources considered are quantitatively small and not significantly different from zero at the conventional levels. State ownership has a significant positive effect on GDP per capita as in the previous table. From Table 10B one can also see that the estimated effect of ease of doing business on GDP per capita is positive and significantly different from zero at the 1 percent level. Quantitatively, the estimates suggest that a one standard deviation (13.6 units) increase in the ease of doing business score increases GDP per capita by around 0.6 logs (87 percent)

To summarize, the findings in Tables 9B, 10A, and 10B suggest that an important transmission channel through which natural resources affect GDP per capita is through state ownership. State ownership has a significant positive effect on GDP per capita, regardless of whether we condition on countries' institutional quality.

7 Discussion

From a theoretical point of view, the effects of state ownership on countries' GDP per capita are ambiguous. Adverse effects of state ownership could arise due to lack of competition that stifles innovation.[13] State ownership is also often criticized for being associated with political agency problems that range from corruption to outright theft by the government.[14] State ownership is also associated with inefficient resource extraction (La Porta and López-De-Silanes 1999, Galiani et al. 2003 and Schmitz and Teixeira 2004) and inefficient redistribution policies (Robinson et al. 2006, 2008 and Luong and Weinthal 2010). However, the same political agency problems that lead to corruption and outright theft under state ownership may imply that privatization fares no better. The reason is that under full state ownership the government receives every year the entire amount of revenues that accrue from the harvesting of the natural resources; if the rights to harvest the natural resources are sold to private companies, then the government may receive, upon sale, a very large amount of money.[15] In both cases the money goes to the government's coffers, and is thus subject to political agency problems. A third explanation for inefficient resource extraction is that in many countries, SOEs are seen as an extension of the State, and in some cases, an extension that has higher capacity due to its ability to hire more qualified staff due to a higher wage offering than government. In these countries, SOEs are often pressured to support national objectives such as employment, use of local firms as suppliers, and the delivery of public services such as health care, education and utilities. These additional objectives dilute the focus of the SOE and add to costs, making them less efficient per unit of resource extracted, but this could be more than offset by productivity gains in the broader economy.

In Table 11 we show that proceeds from the privatization of the primary sector during the 1990-2008 period are not significantly correlated with transitional GDP per capita growth during that period. This is true regardless of whether we control for countries' institutional quality or for the proceeds from the privatization of other sectors. The finding that privatization during the 1990-2008 period is not significantly correlated with GDP per capita growth during these two decades is in line with other studies (Cook and Uchida, 2003; Moshiri and Abdou, 2010) who find the same result for shorter periods. We note that this finding is consistent with our result in Section 6 that state ownership has on average a positive effect on GDP per capita: a welfare maximizing government would privatize those enterprises where state ownership does not

[13] See, for example, Gylfason et al. (2001).

[14] La Porta et al. (2002) make this argument in the context of state ownership of banks. Their main finding is that state ownership of banks is negatively correlated with economic growth during the 1960-1995 period. However, Andrianova et al. (2012) show that La Porta et al.'s (2002) result is overturned when using an updated dataset. Andrianova et al. (2012) show that state ownership of banks in 2001 has a significant positive effect on GDP per capita growth during the 1995-2007 period. In a previous paper Andrianova et al. (2008) showed that, in the La Porta et al. (2002) dataset the finding of a negative correlation between state ownership and growth is not robust to controlling for institutional quality. More evidence even suggests a positive, stabilizing role of state-owned bank. Bertray et al. (2015) found that lending by state banks is less pro-cyclical than lending by private banks. Jimenez et al. (2022) find that state-owned banks have positive social returns.

[15] Using more than half of a century of US-state level data, James (2015) finds that an increase in government's revenues from natural resources leads to a reduction in non-resource taxes, an increase in government spending, and an increase in government saving.

matter and keep those enterprises state-owned where ownership by the state is optimal for the economy.

As the financial crisis of 2008-2009 has shown, competition in complex markets subject to moral hazard problems may also be associated with excessive risk taking that is harmful for growth and economic stability. The argument that state ownership is bad for countries' economic development due to lack of competition may not hold. Economies of scale and market failures that arise from externalities associated with resource depletion may imply that state ownership has socially desirable effects, provided one is willing to assume that state owned enterprise (acting as an agent of society) internalises these externalities and seeks to maximise aggregate social welfare.[16] An additional consideration is that certain commodities, in particular, petroleum products and metals, are of strategic importance because they are needed for a countries' military effectiveness (see Ding and Dafoe, 2021), which ultimately is a responsibility of the state.

An important point to note regarding the measurement of state ownership is that the government's influence on the natural resource sector can be substantial even if state ownership of the natural resource sector is limited but state ownership in other sectors is high. The reason is that economic activity in the natural resource sector is not independent of economic activity in other sectors. Consider, for example, state ownership of the energy, and transportation sectors. The natural resource sector requires energy infrastructure and transport services to get its products processed and transferred to markets. State ownership of peripheral sectors allow the government to exert influence on the natural resource sector by directly controlling the resources that the natural resource sector needs for its operations. Thus, answering the question of how natural resource abundance affects GDP per capita through state ownership requires using a measure of state ownership that captures the overall extent of state ownership in the economy. This is the reason why the estimates in Tables 9 and 10 are based on an index of state ownership that captures the overall degree of state ownership in the economy.

While Figure 1 and associated bivariate regressions showed that natural resource abundance is positively associated with state ownership, an unanswered question is whether state ownership itself leads to increased natural resource production and wealth. To answer this question, we replace in equation (4) the dependent variable GDP per capita with the measures of natural resource abundance. Using the same set of instruments as in Tables 10A and 10B, the instrumental variables regressions in Panel A of Table 12 show that state ownership has no significant effects on the level of natural resource abundance. This is true regardless of whether we use oil output, mining output, or total natural resource rents per capita. We also note that the rule of law has no significant effects on the level of natural resource wealth. On the other hand, there is some evidence in Panel B of Table 12 that state ownership was associated with a significantly lower growth rate of oil output and mining output during the 1970-2011 period (see columns (2) and (3)) indicating that state ownership may be associated with poorer sector performance in line with the results of La Porta et al. 1999 and Schmitz and Teixeira 2004. This raises an interesting question regarding the mechanism for the beneficial impacts of state ownership since as previously discussed, state ownership was found to be positively associated with economic growth. It may, however, also be the case that because state ownership is associated with high levels of resource wealth that this regression is only picking up the *"Resource Drag"* effect described by Alexeev and Conrad (2005) and Davis (2011). Alternatively, the slower depletion profile could be a socially optimal and efficient result since the social discount rate (or time preference) in many

[16] A recent study by the OECD (2020) found that, in countries where SOEs are subject to the same market pressures as their competitors and are insulated from political interference, the equity return of SOEs is about as large as for private firms

countries is lower than that of the private sector, leading to a slower (but still optimal) depletion profile for the state relative to the private sector.

8. Robustness Checks

1. **Economic Freedom Index.** We do robustness checks using another variable for state ownership: the State Ownership of Assets Index[17] from Economic Freedom Index in 2020. As shown in Figure 2, natural resource rents are positively correlated with the state ownership of assets. According to Appendix Table 1, a positive relationship between natural resource rents and state ownership of assets still exists after including in the econometric model the Alexeev and Conrad control variables.

In Appendix Tables 2 and 3, we display estimates of the effects that natural resources have on GDP per capita when including in the model the State Ownership of Assets Index. The top panel of Appendix Table 2 shows results when instrumenting state ownership with socialist legal origin; the bottom panel of Appendix Table 2 shows results when not instrumenting state ownership. One can see that the estimated coefficients on state ownership are positive in all specifications. Quantitatively, the estimated effects that state ownership has on GDP per capita are larger than in baseline (see e.g. Table 9B). However, standard errors are larger than for our baseline. Noteworthy is that in the top panel of Appendix Table 2 natural resources, conditional on the State Ownership of Assets Index, have no significant effect on GDP per capita. The estimated effects of natural resources on GDP per capita when holding state ownership fixed are quantitatively small. The results in Appendix Table 2 using State Ownership of Assets as an alternative measure of state ownership are thus qualitatively the same as the results in our baseline (see e.g. Table 9B). One issue with the 2SLS estimates in Appendix Table 2 is that the instrument is weak. 2SLS estimates based on weak instruments are associated with a size distortion, which is manifested in large standard errors on the estimated coefficient of the endogenous variable in the second stage.

Appendix Table 3 controls for institutional quality. One can see from Panel A that IV regressions yield a large positive effect of state ownership on GDP per capita. The conditional effect of natural resources on GDP per capita is small and statistically insignificant. For comparison to the IV estimates in Panel A, we show in Panel B estimates when state ownership is not instrumented. One can see that when not instrumenting this variable, state ownership has significant positive effects on GDP per capita; quantitatively the estimated effects are smaller than when instrumenting state ownership by socialist legal origin. Overall, the main result from this robustness check is that using State Ownership of Assets as an alternative variable for state ownership leaves the main findings in section 6 unchanged.

2. **Government Effectiveness Index and Regulatory Quality.**[18] We employ two alternative indices to measure the quality of governance instead of the rule of law: government effectiveness and regulatory quality. In Appendix Tables 4-10 we show results using these two indices as controls; the regressions in these appendix tables corresponds to the regressions we had shown in Tables 2-10 (with differences that in

[17] This index, published by the Fraser Institute, measures the degree to which the state owns and controls capital (including land) in the industrial, agricultural, and service sectors. We have re-scaled the index so that it ranges from 0 to 1; higher values of the index denote a larger degree of state ownership in the economy.

[18] The government effectiveness index 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. The regulatory quality index reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.

the Appendix Tables 4-10 government effectiveness and regulatory quality are used instead of the rule of law.) One can see that in Appendix Tables 4-10 results are very similar to Tables 2-10. For example, in Appendix Table 4 where we replicate Alexeev and Conrad (2009)'s results, the estimated coefficients on the measures of natural resources range between 0.049 to 2.36, while in Table 2 these estimated coefficients ranged between 0.051 to 2.60.

9. Natural Resources, Policies, and Economic Development in Countries with Above-Median State Ownership

9.1 Econometric Model and Data

In order to gain an understanding what policies are conducive for economic development in countries with a high degree of state ownership, we restrict the sample to those countries where according to the Fraser data state ownership of assets is above median. For this sub-sample of countries with above-median state ownership of assets, we estimate econometric models that have as dependent variable the log of PPP GDP per capita in 2020 (our baseline measure for economic development, though we will also consider other measures of economic development such as the HDI, the poverty rate, and the income Gini) and as right-hand side measures of natural resources and policies, all taken in the year 2020.

The econometric model that we estimate is described by equation (5):

$$(5)\ lnGDPpc_c = \upsilon + \tau NatRes_c + \Phi Policies + \Sigma Q_c + \varepsilon_c \quad if\ state\ ownership_c > state\ ownership_{median}$$

where *NatRes* is a measure of natural resource wealth; *Policies* is a measure of policies, to be discussed in the next paragraph; Q is a vector of control variables that includes dummies for Latin America and East Asia as well as the share of the population that speaks a European language; and ε is an error term. Data on various dimensions of policy are obtained from two datasets: Fraser (2022) and Worldwide Governance Indicators (2022).

From the Fraser (2022) dataset,[19] we use four index variables that capture various aspects of policies. The first variable is *regulation*. This variable measures regulation in three areas: labor market regulation (hiring regulations and minimum wage, hiring and firing regulations, centralized collective bargaining, hours regulations, mandated cost of worker dismissal, conscription); credit market regulation (percentage of bank deposits held in privately owned banks, government borrowing relative to private sector borrowing, interest rate controls); and business regulation (administrative requirements, bureaucracy costs, starting a business, impartial public administration, licensing restrictions). The second variable is *freedom to trade internationally*. This variable measures the extent to which countries put in place tariffs, regulatory trade barriers, black market exchange rates, and controls of the movement of capital and people. The third variable is *sound money*. This variable measures money growth, the standard deviation of inflation, inflation in the most recent year, and the freedom to own a foreign currency bank account. The fourth variable is *legal system and property rights.* This variable measures, judicial independence, impartiality of courts, protection of property rights, military interference in rule of law and politics, integrity of the legal system, legal enforcement of contracts, regulatory restrictions on the sale of real property, and reliability of the police.

[19] See https://www.fraserinstitute.org/sites/default/files/uploaded/2022/economic-freedom-of-the-world-2022-appendix.pdf for details

From the Worldwide Governance Indicators (2022) we use six variables. The six variables (definitions as per Kaufman, Kraay, and Mastruzzi, 2010)[20] are: *voice and accountability* (which measures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media); *political stability and absence of violence* (which measures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism), *government effectiveness* (which measures 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), *regulatory quality* (which measures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development), the *rule of law* (which measures 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), and *control of corruption* (which measures 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).

9.2 Results

9.2.1 Natural Resources, Policies, and GDP per capita in Countries with Above-median state Ownership

In countries with above-median state ownership, there is a significant positive effect of natural resources on GDP per capita. This can be seen from the estimates in Tables 13 and 14. Both of these tables show estimates of equation (5). In Table 13 the policy variables are from Fraser (2022). In Table 14 the governance variables are from WGI (2022). We first discuss the results for the Fraser variables, followed by a discussion of results for the WGI variables.

9.2.1.1 Fraser Variables

The estimates in Table 13 show that countries which have higher Fraser scores for regulation, freedom to trade internationally, and the legal system and property rights have significantly higher GDP per capita. There is no significant relationship between GDP per capita and Fraser's score for sound money. Across the four columns in Table 13, the quantitative interpretation of the estimated coefficients on the Fraser scores is as follows. A one standard deviation (about 1 unit) increase in the regulation score increases GDP per capita by about 19 to 35 percent. A one standard deviation (about 1.3 unit) increase in the freedom-to-trade-internationally score increases GDP per capita by about 28 to 38 percent. A one standard deviation (about 1.4 unit) increase in the legal-system-and-property-rights score increases GDP per capita by about 22 to 43 percent.

With the Fraser variables included and the model estimated on the sub-sample of countries with above-median state ownership, the effects that natural resources have on GDP per capita are quantitatively large and economically meaningful. This is the case when the measure of resource rents is limited to oil rents (columns (1) and (2)) as well as when a broader measure of resource rents is used that is computed as the

[20] See http://info.worldbank.org/governance/wgi/pdf/wgi.pdf

sum of oil rents, natural gas rents, coal rents, mineral rents, and forest rents (columns (3) and (4)).

Consider the estimates in column (1) of Table 13. The coefficient on the log of oil rents per capita is 0.19 and has a standard error of 0.05. One can reject the null that this estimated coefficient is equal to zero at the 1 percent significance level. Quantitatively, the coefficient can be interpreted as follows: a one standard deviation (3.1 unit) increase in the log of oil rents per capita increases GDP per capita by around 80 percent; a doubling of oil rents per capita (a 1-unit increase in the log of oil rents per capita) increases GDP per capita by approximately 21 percent.

In column (3) of Table 13, the estimated coefficient on the natural resource rents per capita is 0.16 and has a standard error of 0.07. One can reject the null that this coefficient is equal to zero at the 1 percent significance level. Quantitatively, the interpretation is that a one standard deviation (2.7 units) increase in the natural resources rents per capita increases GDP per capita by about 54 percent. A doubling of natural resource rents per capita (a 1 unit increase in the log of natural resource rents per capita) increases GDP per capita by approximately 18 percent.

Case Studies

Case Study 1: Norway vs. Tunisia - To put the above numbers into perspective, let's take Norway and Tunisia as a case study. Norway's GDP per capita is much higher than that of Tunisia. In the year 2020, Norway had a GDP per capita of US$63,776. Tunisia's GDP per capita in the year 2020 was US$10,040. With regard to GDP per capita, Tunisia is at the 40th percentile in the sub-sample of countries with above-median state ownership while Norway' is at the 97th percentile.

Norway also has more oil than Tunisia. In the year 2020, oil rents per capita in Norway were about US$268,000 while in Tunisia oil rents per capita were only about US$9,900. With regard to oil rents per capita, Tunisia is at about the median in the sub-sample of countries with above-median state ownership while Norway is at about the 90th percentile.

According to the estimates in column (1) of Table 14, if Tunisia would have oil rents per capita equivalent to Norway then Tunisia's GDP per capita would be about US$18,000. In other words, if Tunisia would have oil rents per capita equivalent to Norway this would reduce the difference in GDP per capita between these two countries from 84 percent to 72 percent.

Norway has significantly higher Fraser scores than Tunisia with regard regulation, freedom to trade internationally, and the legal system and property rights. For the year 2020, Norway's scores for regulation, freedom to trade internationally, and the legal system and property rights were 7.7, 7.6, and 8.6, respectively. For Tunisia, these scores were 6.5, 5.7, and 5.1, respectively. The differences between Norway and Tunisia with regard to the scores that Fraser assigns these countries to regulation, freedom to trade internationally, and the legal system and property rights are 1.2, 1.9, and 3.5.

According to the estimates in column (1) of Table 13 if in Tunisia regulation, freedom to trade internationally, and the legal system and property rights would be the same as in Norway then this would increase Tunisia's GDP per capita to about US$27,000. Such policy improvements would reduce the gap in GDP per capita between Tunisia and Norway to 57 percent.

The case study of Norway vs. Tunisia demonstrates that both higher oil rents per capita and sound economic

policies are good for economic development. The combination of the two would push Tunisia's GDP per capita to US$49,700 and reduce the gap with Norway to 22 percent.

Case Study 2: Saudi Arabia vs. Morocco - Another useful case study to illustrate the quantitative implications of the model estimates is Saudi Arabia vs. Morocco. This case study illustrates the importance of oil rents for economic development. According to the Fraser variables, Morocco and Saudi Arabia are quite similar in terms of policies -- but the latter country has a lot more oil rents per capita than the former.

In the sub-sample of countries with above-median state ownership, Saudi Arabia is the country with the highest oil rents per capita while Morocco is the country with the lowest oil rents per capita. In the year 2020, oil rents per capita in Saudi Arabia were about US$806,000 logs while in Morocco oil rents per capita were only about US$4.1.

Saudi Arabia's GDP per capita is much higher than that of Morocco. In the year 2020, Saudi Arabia had a GDP per capita of US$44,771. Morocco's GDP per capita in the year 2020 was US$7,546. In the sub-sample of countries with above-median state ownership, Morocco's GDP per capita is at about the 30th percentile while Saudi Arabia's GDP per capita is at about the 90th percentile.

According to the estimates in column (1) of Table 13, if Morocco would have oil rents per capita equivalent to Saudi Arabia then Morocco's GDP per capita would be US$78,524 instead of US$7,546. In other words, if Morocco's oil rents per capita were tantamount to Saudi Arabia's, then all else equal, the model predicts that the gap in GDP per capita between Morocco and Saudi Arabia would be more than closed; with the same amount of oil rents per capita, Morocco's GDP per capita would exceed that of Saudi Arabia.

Saudi Arabia and Morocco have similar scores in the Fraser dataset with regard to regulation and freedom to trade internationally. According to Fraser, Saudi Arabia's year 2020 regulation score is 7.0 while Morocco's regulation score is 6.8. With regard to freedom to trade internationally, Saudi Arabia has a score of 6.4 and Morocco has a score of 6.2.

Saudi Arabia scores better than Morocco with regard to the legal system and property rights. In this category, Saudi Arabia's year 2020 score is 6.8 while Morocco's score is 5.7. According to the estimates in column (1) of Table 13 if in Morocco the legal system and property were the same as in Saudi Arabia, then this would increase Morocco's GDP per capita by about 16 percent. The combination of better legal system and property and higher oil rent per capita would push Morocco's GDP per capita to US$89,322, hence reversing the gap in favor of Morocco.

Case Study 3: Norway vs. Saudi Arabia - Consider now the case study of Norway vs. Saudi Arabia. This case study illustrates the importance of good policies for economic development.

Both Norway and Saudi Arabia have very large oil rents per capita. In the year 2020, oil rents per capita in Saudi Arabia were about US$806,000. In Norway oil rents per capita in the year 2020 were about US$268,000. In the sub-sample of countries with above-median state ownership, Saudi Arabia is the country with the largest oil rents per capita while Norway is at about the 90th percentile. According to the model estimates in column (1) of Table 13, Saudi Arabia's GDP per capita should be about 16 percent above Norway's.

Despite larger oil rents per capita, Saudi Arabia's GDP per capita is less than that of Norway. In the year

2020, Saudi Arabia's GDP per capita was US$44,771 logs while Norway's GDP per capita was US$63,776. Norway's GDP per capita was thus 42.5 percent above Saudi Arabia's GDP per capita.

According to the model estimates in column (1) of Table 13, the reason why Saudi Arabia's GDP per capita is less than that of Norway is that Saudi Arabia does not have similarly good economic policies as Norway. For the year 2020, Norway's scores for regulation, freedom to trade internationally, and the legal system and property rights were 7.7, 7.6, and 8.6, respectively. Saudi Arabia's scores in these dimensions were 7.0, 6.4, and 6.8, respectively. The difference between Norway and Saudi Arabia with regard to the scores that Fraser assigns these countries to regulation, freedom to trade internationally, and the legal system and property rights are 0.7, 1.2, and 1.8.

According to the estimates in column (1) of Table 13 if in Saudi Arabia regulation, freedom to trade internationally, and the legal system and property rights would be the same as in Norway then this would substantially increase Saudi Arabia's GDP per capita. Policy improvements along these three dimensions would bring Saudi Arabia's GDP per capita up to US$80,821.

9.2.1.2 Worldwide Governance Indicators

The estimates in Table 14 show that in countries with above-median state ownership, there is a significant positive effect of regulatory quality, government effectiveness, and the rule of law on GDP per capita. There is no evidence of a significant positive relationship between GDP per capita and political stability and the absence of violence/terrorism. This is also the case for voice and accountability.

Across the four columns in Table 14, the quantitative interpretation of the estimated coefficients on the WGI scores is as follows. A one standard deviation (about 1 unit) increase in the WGI regulation score increases GDP per capita by about 11 percent to the double. A one standard deviation (about 1 unit) increase in the WGI rule of law score increases GDP per capita by about 65 percent to more than the double. A one standard deviation (about 1 unit) increase in the WGI government effectiveness score increases GDP per capita by about 13 percent to more than the double.

With the WGI variables included and the model estimated on the sub-sample of countries with above-median state ownership, the effects that natural resources have on GDP per capita are quantitatively large and economically meaningful. This is the case when the measure of resource rents is limited to oil rents (columns (1) and (2)) as well as when a broader measure of resource rents is used that is computed as the sum of oil rents, natural gas rents, coal rents, mineral rents, and forest rents (columns (3) and (4)).

Consider the estimates in column (1) of Table 14. The coefficient on the log of oil rents per capita is 0.16 and has a standard error of 0.04. One can reject the null that this estimated coefficient is equal to zero at the 1 percent significance level. Quantitatively, the coefficient can be interpreted as follows: a one standard deviation (3.3 units) increase in the log of oil rents per capita increases GDP per capita by around 70 percent; a doubling of oil rents per capita (a 1-unit increase in the log of oil rents per capita) increases GDP per capita by approximately 17 percent.

In column (3) of Table 14, the estimated coefficient on the log of natural resources rents per capita is 0.16 and has a standard error of 0.06. One can reject the null that this coefficient is equal to zero at the 1 percent significance level. Quantitatively, the interpretation is that a one standard deviation (0.07 units) increase in the GDP share of natural resources rents per capita increases GDP per capita by about 1.1 percent. A

doubling of natural resource rents per capita (a 1-unit increase in the log of natural resource rents per capita) increases GDP per capita by approximately 17 percent.

Case Studies

Case Study 1: Norway vs. Tunisia - To put the above estimates for the WGI variables into perspective, consider again the case study of Norway vs. Tunisia. Recall that Norway's GDP per capita is much higher than that of Tunisia, and that Norway also has more oil than Tunisia.

According to the estimates in column (1) of Table 14, if Tunisia would have oil rents per capita equivalent to Norway then Tunisia's GDP per capita would be 65 percent higher. In other words, if Tunisia would have oil rents per capita equivalent to Norway this would reduce the difference in GDP per capita between these two countries from 84 percent to 74 percent.

For all six WGI variables, Norway has higher scores than Tunisia. For the year 2020, Norway's scores for voice and accountability, political stability and absences of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption are 1.7, 1.2, 1.9, 1.7, 2.0, and 2.1, respectively. For Tunisia, these scores are 0.3, -0.6, -0.2, -0.3, 0.2, and -0.1, respectively. The differences between Norway and Tunisia with regard to these scores are 1.4, 1.8, 2.1, 2.0, 2.2, and 2.2, respectively.

According to the estimates in column (1) of Table 14 if in Tunisia there would be changes in governance so that voice and accountability, political stability and absences of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption would be the same as in Norway then Tunisia's GDP per capita would be US$33,300. Convergence in governance along the six WGI variables would reduce the difference in GDP per capita between Norway and Tunisia to about 48 percent. The combination of higher oil rents and better governance would push Tunisia's GDP per capita to US$54,900 and reduce the gap with Norway to 14 percent.

Case Study 2: Saudi Arabia vs. Morocco - Recall that Saudi Arabia is the country with the highest oil rents per capita while Morocco is the country with the lowest oil rents per capita. and that Saudi Arabia's GDP per capita is much higher than that of Morocco.

According to the estimates in column (1) of Table 14, if Morocco would have oil rents per capita equivalent to Saudi Arabia then Morocco's GDP per capita would be US$54,176 instead of US$7,546. In other words, if Morocco's oil rents per capita were tantamount to Saudi Arabia's, then all else equal, the model predicts that the -83 percent gap in GDP per capita between Morocco and Saudi Arabia would be more than closed. With the same amount of oil rents per capita Morocco's GDP per capita would exceed that of Saudi Arabia by about 19 percent.

Saudi Arabia and Morocco have similar WGI scores. For the year 2020, Saudi Arabia's scores for voice and accountability, political stability and absences of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption are -1.6, -0.6, 0.1, 0.3, 0.2, and 0.3, respectively. For Morocco, these scores are -0.6, -0.4, -0.1, 0, -0.2, and -0.4, respectively. The differences between Saudi Arabia and Morocco along these six dimensions are not very large: -1, -0.2, 0.2, 0.3, 0.5, and 0.6, respectively. If these differences were to be eliminated, i.e. governance in Morocco would the same as in Saudi Arabia along these six dimensions, then this would increase Morocco's GDP per capita by about 49 percent.

Case Study 3: Norway vs. Saudi Arabia - Norway and Saudi Arabia are similar in terms of oil rents per capita; but the former country has much higher WGI scores than the latter. Recall that both Norway and Saudi Arabia have very large oil rents per capita. According to the model estimates in column (1) of Table 14, Saudi Arabia's GDP per capita should be about 22 percent above Norway's GDP per capita due to Saudi Arabia having more oil rents per capita than Norway. However, despite larger oil rents per capita, Saudi Arabia's GDP per capita is less than that of Norway.

According to the model estimates in column (1) of Table 14, the reason why Saudi Arabia's GDP per capita is less than that of Norway is that Saudi Arabia does not have similarly good governance as Norway. For the year 2020, Norway's scores for voice and accountability, political stability and absences of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption are 1.7, 1.2, 1.9, 1.7, 2.0, and 2.1, respectively. Saudi Arabia's scores are -1.6, -0.6, 0.1, 0.3, 0.2, and 0.3, respectively. The differences in these WGI scores between Norway and Saudi Arabia are 3.3, 1.8, 1.8, 1.4, 1.8, and 1.8, respectively.

According to the estimates in column (1) of Table 14 if in Saudi Arabia voice and accountability, political stability and absences of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption would be the same as in Norway then Saudi Arabia's GDP per capita would be about US$73,000.

9.2.2 Natural Resources, Policies, and Human Development in Countries with Above-median state Ownership

9.2.2.1 Fraser Data

The estimates in Table 15 show that countries which have higher Fraser scores for regulation and the legal system and property rights have a significantly higher Human Development Index (HDI). There is no significant relationship between the HDI and the Fraser scores for freedom to trade internationally and sound money. Across the four columns in Table 15, the quantitative interpretation of the estimated coefficients is as follows. A one standard deviation (about 1.47 unit) increase in the regulation score increases the HDI by about 3 to 5 percentage points. A one standard deviation (1.42 unit) increase in the legal-system-and-property-rights score increases the HDI by about 4 to 7 percentage points. Recall that the HDI ranges between 0 to 100 percent. Given this range, these are quantitatively sizable effects.

With the Fraser variables included and the model estimated on the sub-sample of countries with above-median state ownership, natural resources have significant positive effects on the HDI. According to column (1) of Table 15, the coefficient on the log of hydrocarbon deposits per capita is 0.014, which implies that a one standard deviation (5.0 units) increase in the log of hydrocarbon deposits per capita increases the HDI by around 7 percentage points. In column (2), the estimated coefficient on the log value of oil output per capita is 0.016, which implies that a one standard deviation (3.21 units) increase in the log value of oil output per capita increases the HDI by about 5 percentage points. In column (3), the coefficient on the log of mining output per capita is 0.017, which implies that a one standard deviation (2.55 units) increase in the log of mining output per capita increases the HDI by around 4 percentage points. In column (4), the estimated coefficient on the log natural resource rents per capita is 0.035, which implies that a one standard deviation (2.01 units) increase in the log natural resource rents per capita increases the HDI by about 7 percentage points.

Case Studies

Case Study 1: Norway vs. Tunisia - To put the above numbers into perspective, consider again Norway and Tunisia as a case study. Norway's HDI is much higher than that of Tunisia, by a difference of about 20 percentage points. In the year 2020, Norway had a HDI of about 0.96. Tunisia's HDI in the year 2020 was about 0.74. With regard to the HDI, Tunisia is at about the 60th percentile in the sub-sample of countries with above-median state ownership. Norway is the country with the highest HDI.

According to the estimates in Table 15, if Tunisia's total natural resource rents per capita would be equivalent to Norway's then Tunisia's HDI would be about 0.83 (9 percentage points higher than the year 2020 value, which is 0.74).

With regard to regulation and the legal system and property rights: If in Tunisia regulation and the legal system and property rights would be the same as in Norway then Tunisia's HDI would be about 0.99 (25 percentage points higher than the year 2020 value, which is 0.74).

The case study of Norway vs. Tunisia demonstrates that both natural resources and sound economic policies are good for human development.

Case Study 2: Saudi Arabia vs. Morocco - Another useful case study to illustrate the quantitative implications of the model estimates is Saudi Arabia vs. Morocco. This case study illustrates the importance of natural resources for human development. Recall that Morocco and Saudi Arabia are quite similar in terms of policies; but the latter country has a lot more natural resources than the former.

Saudi Arabia's HDI is higher than that of Morocco's, by about 0.19. In the year 2020, Saudi Arabia had a HDI of about 0.87. Morocco's HDI in the year 2020 was about 0.68. In the sub-sample of countries with above-median state ownership, Morocco's HDI is at about the 46th percentile while Saudi Arabia's HDI is at about the 88th percentile.

According to the estimates in Table 15, if Morocco's total natural resource rents per capita would be equivalent to Saudi Arabia's then Morocco's HDI would be about 15 percentage points higher.

Case Study 3: Norway vs. Saudi Arabia - Consider now the case study of Norway vs. Saudi Arabia. This case study illustrates the importance of good policies for human development. Both Norway and Saudi Arabia have very large natural resource. Despite abundance in natural resources, Saudi Arabia's HDI is significantly below Norway's. In the year 2020, Saudi Arabia's HDI was 0.87 while Norway's HDI was 0.96.

According to the model estimates in Table 15, the reason why Saudi Arabia's HDI is less than that of Norway is that Saudi Arabia does not have similarly good economic policies as Norway. If in Saudi Arabia regulation and the legal system and property rights would be the same as in Norway, then this would increase Saudi Arabia's HDI by about 10 percentage points. Saudi Arabia's HDI would be about 0.97 if policies in Saudi Arabia were as good as in Norway.

9.2.2.2 Worldwide Governance Indicators

The estimates in Table 16 show that in countries with above-median state ownership, there are significant positive effects of government effectiveness and the rule of law on the HDI. There are no significant effects of regulatory quality and control of corruption on the HDI. Across the four columns in Table 16, the quantitative interpretation of the estimated coefficients on the WGI scores is as follows. A one standard deviation (about 0.76 unit) increase in the WGI government effectiveness score increases the HDI by about 2 to 9 percentage points. A one standard deviation (about 0.80 unit) increase in the WGI rule of law score increases the HDI by about 7 to 12 percentage points.

With the WGI variables included and the model estimated on the sub-sample of countries with above-median state ownership, natural resources have significant positive effects on the HDI. According to column (1) of Table 16, the coefficient on the log of hydrocarbon deposits per capita is 0.010, which implies that a one standard deviation (5.0 units) increase in the log of hydrocarbon deposits per capita increases the HDI by around 5 percentage points. In column (2), the estimated coefficient on the log value of oil output per capita is 0.010, which implies that a one standard deviation (3.21 units) increase in the log value of oil output per capita increases the HDI by about 3 percentage points. In column (3), the coefficient on the log of mining output per capita is 0.02, which implies that a one standard deviation (2.5 units) increase in the log of mining output per capita increases the HDI by around 4 percentage points. In column (4), the estimated coefficient on the log natural resource rents per capita is 0.03, which implies that a one standard deviation (2.01 units) increase in the log natural resource rents per capita increases the HDI by about 5 percentage points.

Case Studies

Case Study 1: Norway vs. Tunisia - According to the estimates in Table 16, if Tunisia's total natural resource rents per capita would equivalent to Norway's then Tunisia's HDI would be about 0.81 (7 percentage points higher). If in Tunisia there would be changes in governance so that voice and accountability, political stability and absences of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption would be the same as in Norway then Tunisia's HDI would be about 0.91 (17 percentage points higher).

*Case Study 2: Saudi Arabia vs. Morocco - A*ccording to the estimates in Table 16, if Morocco's total natural resource rents per capita would be equivalent to Saudi Arabia's then Morocco's HDI would be about 0.79 (11 percentage points higher). If along all six dimensions of the WGI governance in Morocco would the same as in Saudi Arabia then Morocco's HDI would be about 0.69 (1 percentage point higher.)

Case Study 3: Norway vs. Saudi Arabia
According to the model estimates in Table 16, if along all six dimensions of the WGI governance in Saudi Arabia would be the same as in Norway, then Saudi Arabia's HDI would be about 1.00 (13 percentage points higher than the year 2020 value, which is 0.87.)

9.2.3 Natural Resources, Policies, and Poverty in Countries with Above-median state Ownership

9.2.3.1 Fraser Data

In this section we discuss estimates of the effects that natural resources and economic policies have on poverty in countries with above-median state ownership. We present estimates of econometric models that have as dependent variable the 2010-2020 average poverty rate at $2.15. There are only a few observations

provided by the WDI (2022) for the year 2020 poverty rate at $2.15. Hence, the estimation of econometric models where the dependent variable is the year 2020 poverty rate at $2.15 is not feasible.

With the Fraser variables included and the model estimated on the sub-sample of countries with above-median state ownership, oil rents have significant negative effects on the poverty rate. According to column (1) of Table 17, the coefficient on the log of oil rents per capita is -4.08, which implies that a one standard deviation (2.75 units) increase in the log of oil rents per capita decreases the poverty headcount ratio by about 11 percentage points.

The estimates in Table 17 show that in countries with above-median state ownership, there is some evidence that regulation is significantly related to poverty. For example, according to the estimates in column (1) a one standard deviation (about 1 unit) increase in Fraser's regulation score decreases the poverty headcount ratio by about 9 percentage points.

According to the estimates in column (1), if Tunisia would have oil rents per capita equivalent to Norway (i.e. oil rents per capita increase in Tunisia by 2.4 logs) then Tunisia's poverty headcount ratio would be about 10 percentage points lower. The poverty headcount ratio is missing for Saudi Arabia. Hence, with regard to poverty, we cannot discuss the case of Saudi Arabia vs. Morocco (case study 2) and Saudi Arabia vs. Norway (case study 3).

9.2.3.2 Worldwide Governance Indicators

The estimates in Table 18 show that in countries with above-median state ownership, there is mostly an insignificant relationship between the WGI variables and poverty. Across all four columns there are no significant effects of voice and accountability, the political stability and absence of violence/terrorism, government effectiveness, and control of corruption on poverty headcount ratio. There is some evidence for a significant effect on poverty of the rule of law. A one standard deviation (about 0.87 unit) increase in the WGI rule of law score decreases poverty headcount ratio by about 17 to 34 percentage points.

Oil rents reduce poverty significantly. According to column (1), the coefficient on log of oil rents per capita is -4.14, which implies that a one standard deviation (2.75 units) increase in the log of oil rents per capita decreases poverty headcount ratio by around 11 percentage points.

According to the estimates in column (1), if Tunisia would have oil rents per capita equivalent to Norway then Tunisia's poverty rate would decrease by about 10 percentage points. If in Tunisia voice and accountability, political stability and absences of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption would be the same as in Norway, then this would decrease Tunisia's poverty headcount ratio by about 15 percentage points.

The poverty headcount ratio is missing for Saudi Arabia. Hence, with regard to poverty, we cannot discuss the case of Saudi Arabia vs. Morocco (case study 2) and Saudi Arabia vs. Norway (case study 3).

9.2.4 Natural Resources, Policies, and Inequality in Countries with Above-median state Ownership

9.2.4.1 Fraser Data

In this section we discuss estimates of the effects that natural resources and economic policies have on the

income Gini in countries with above-median state ownership. We present estimates of econometric models that have as dependent variable the 2010-2020 average income Gini. There are only a few observations for the year 2020 Gini. Estimation of econometric models where the dependent variable is the year 2020 Gini is not feasible.

The estimates in Table 19 show that there is mostly an insignificant relationship between the Fraser scores and the Gini. For all four columns the effects that the Fraser scores for sound money and freedom to trade internationally are insignificant. There is some evidence that regulation has a significant effect on inequality. For example, according to column (1) a one standard deviation (about 1 unit) increase in Fraser's regulation score decreases the Gini by about 4 percentage points.

With the Fraser variables included and the model estimated on the sub-sample of countries with above-median state ownership, natural resources have negative but statistically insignificant effects on Gini. There is no support for the hypothesis that more natural resources are associated with more income inequality.

Since there are no significant effects of natural resources on the Gini, we will not discuss how differences in resource rents affect income inequality in Norway vs. Tunisia (case study 1), Saudi Arabia vs. Morocco (case study 2), and Saudi Arabia vs. Norway (case study 3).

9.2.4.2 Worldwide Governance Indicators

The estimates in Table 20 show that in countries with above-median state ownership. There are no significant effects of voice and accountability, government effectiveness, regulatory quality, rule of law, and control of corruption on the Gini.

Natural resources have negative but statistically insignificant effects on Gini. There is no support for the hypothesis that more natural resources are associated with more income inequality.

Since there are no significant effects of natural resources on the Gini, we will not discuss how difference in oil and natural resource rents per capita affect income inequality differentially in Norway vs. Tunisia (case study 1), Saudi Arabia vs. Morocco (case study 2), and Saudi Arabia vs. Norway (case study 3).

10. Natural Resources, Policies, and Economic Development in Countries with Below-Median State Ownership

Appendix Tables 11-18 show estimation results for countries with below-median state ownership. The structure of Appendix Tables 11-18 is the same as in Tables 13-20 with the only difference that the results shown in Appendix Tables 11-18 are for econometric models estimated on the sub-sample of countries with below-median state ownership.

The estimates in Appendix Table 11 show that in countries with below-median state ownership, the Fraser legal system and property rights score has a significant positive effect on GDP per capita. Quantitatively, a one standard deviation (about 1.61 unit) increase in the legal system and property rights score increases GDP per capita by about 71 percent to the double. Unlike in the sample of countries with above-median state ownership of assets, the effects of natural resources on GDP per capita are not significantly positive in countries with below-median state ownership.

The estimates in Appendix Table 12 show that in countries with below-median state ownership, the WGI regulatory quality score has a significant positive effect on GDP per capita. Quantitatively, a one standard deviation (about 0.93 unit) increase in the WGI regulatory quality score increases GDP per capita by about 82 percent to more than the double. There are no significant effects of natural resources on GDP per capita in countries with below-median state ownership.

The estimates in Appendix Table 13 show that in countries with below-median state ownership, the Fraser legal system and property rights score has a significant positive effect on the HDI. Quantitatively, a one standard deviation (about 2 unit) increase in the legal system and property rights score increases the HDI by about 8 to 9 percentage points. The effects of natural resources on the HDI in countries with below-median state ownership are not significantly different from zero.

The estimates in Appendix Table 14 show that in countries with below-median state ownership, the WGI regulatory quality score has a significant positive effect on the HDI. Quantitatively, a one standard deviation (about 0.89 unit) increase in the WGI regulatory quality score increases the HDI by about 7 to 9 percentage points. The effects of natural resources on the HDI in countries with below-median state ownership are quantitatively small and statistically indistinguishable from zero.

The estimates in Appendix Table 15 show that in countries with below-median state ownership, the relationship between the Fraser scores and poverty is mostly insignificant. The relationship between natural resources and poverty is also insignificant. Insignificant estimates are also obtained for most of the specifications when the right-hand side variables are the WGI scores (Appendix Table 16) and when the dependent variable is the income Gini (see Appendix Tables 17 and 18).

11. A Focus on IDA Countries.[21]

IDA countries include are all Low-Income Countries some of the Middle-Income Countries, and much of FCV countries. It also happens that much of unexploited and even unexplored reserves of natural resources, including petroleum and mining in particular green minerals, are in IDA countries. Appendix Tables B13-B28 show estimates for the sub-sample of IDA countries. Tables 21-34 correspond to the estimations of Tables 1-12 with the focus on the group of IDA countries.

When replicating Sachs and Warner's results during 1970-1990, for the IDA countries, initial natural resources have smaller negative effects on the growth of GDP per capita (Table 21) compared to the whole sample. When replicating Alexeev and Conrad we find a stronger positive effects on the level of GDP per capita in 2000 (Table 22) compared to the whole sample. For economic development in more recent years, e.g. 2000 (Table 23), 2011 (Table 24), and 2020 (Table 25), the abundance in hydrocarbon deposits and oil have significant positive effects on both the growth of GDP per capita rates and the level of GDP per capita. Alternative measures of natural resources (Tables 26 and 27) do not alter the results for 2011 but give weaker results for 2020.

However, the beneficial effects of resource wealth on income distribution, poverty reduction, and human development (Tables 28-30) are slightly smaller than for the average country in the world (Tables 6-8). We also provide for the sub-set of IDA countries least squares estimates of the direct effects of natural resources

[21] International Development Association (IDA) borrowing countries are identified as per the World Bank definition. There were 74 IDA countries in total in 2020.

on GDP per capita after controlling for state ownership in Tables 31-33.[22] The least squares estimates of the relationship between state ownership and GDP per capita is positive but not significantly different from 0 (Table 31). Hence, while there is no evidence of a negative impact of state ownership and GDP per capita levels in IDA countries, the positive relation is not significant. The existence of state ownership increases the level of natural resources wealth in IDA countries (Table 32), and the relationship is significant when natural resources wealth is measured through hydrocarbon deposits per capita and natural resources rent per capita.

12. Conclusion

This paper re-examined the relationship between countries' natural resource abundance and economic prosperity. Using the latest available data, we found that countries' with higher natural resource rents per capita have significantly higher levels of GDP per capita, significantly lower poverty rates, and significantly higher Human Development Index scores. These results emerged regardless of whether we focused on oil, mining, or total natural resource rents per capita. They were also mostly unaffected by the control for countries' institutional quality. The first main conclusion from our research is hence that natural resource abundance is a blessing for countries' economic development.

The second main conclusion from our research is that state ownership is an important channel through which countries' natural resource abundance affects economic prosperity. Once state ownership is included in the econometric model, the residual (direct) effects of natural resource abundance on countries' GDP per capita are quantitatively smaller and statistically indistinguishable from zero. Importantly, the instrumental variables estimation showed that state ownership has on average a significant positive effect on the level of countries' GDP per capita. The findings from this analysis thus reject the hypothesis that state ownership is detrimental for economic development. Yet, key for maximizing the positive impact of state ownership on GDP per capita, human development, and poverty reduction are the quality of policies and institutions. The latter play a major role in countries with above-median state ownership. Case experiments confirm this finding.

The above-mentioned results hold in general in the case of IDA countries, with an overall positive impact on GDP per capita, human development, and poverty reduction. State ownership has a positive but non-significant impact.

[22] The previous instrument for state ownership, the socialist legal origin, is all 0 for IDA countries, hence it can't be used as instrument in the estimations for IDA countries.

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TECHNICAL APPENDIX: IV Estimates Using Natural Capital

Brunnschweiler and Bulte (2008) argued that natural capital wealth per capita is a more plausibly exogenous measure of countries' natural resource abundance than natural resource dependence as measured by the GDP share of primary exports. Focusing on the link between natural resources and conflict, these authors present instrumental variables estimates that use countries' natural capital wealth as an instrument for natural resource dependence. The main finding from their instrumental variables analysis is that natural abundance does not have an adverse effect on civil conflict risk and growth.

In Appendix Table 19 we present two-stage least squares estimations that use the World Bank's (1997, 2022) estimates of the stock of natural capital per capita as an instrument for total natural resource rents per capita. The bottom panel presents the first-stage estimates of the link between natural capital and natural resource rents. Natural capital has a highly significant positive effect on natural resource rents. In columns (1) and (2) the first stage relationship is shown between natural capital from the World Bank database and total natural resources rents in 2011. Columns (3) and (4) show the first stage relationship between natural capital from the World Bank's (2022) Wealth Accounts database and natural resources rents in 2019. The Kleibergen Paap F-statistic is in excess of 10 so we conclude that the stock of natural capital is a relevant instrument for natural resource rents.

The top panel of Appendix Table 19 presents the second-state estimates of the relationship between natural resource rents and various outcomes of interest. Column (1) shows that natural resource rents in 2011 have a significant positive effect on the level of GDP per capita in 2011. The estimated second-stage coefficient is around 0.21 with a standard error of 0.07. We can reject the hypothesis that this estimated coefficient is equal to zero at the 1 percent level. Comparing the IV estimate in column (1) of Appendix Table 19 to the corresponding least squares estimate in column (3) of Panel A in Tables 5A and 5B, we note that the IV coefficient is slightly larger than the LS coefficient. This would be consistent with attenuation bias arising from classical measurement error in natural resource rents. On the other hand, we note that this difference in coefficients is not significant: the p-value on the Hausman test is 0.19 so we cannot reject at the conventional significance levels the hypothesis that the IV and LS coefficient are equal.

In column (2) of Appendix Table 3 we present instrumental variables estimates that include the initial (1970) level of countries' GDP per capita. This econometric model specification allows to examine whether natural resource rents have a causal effect on transitional GDP per capita growth. The main result, similar to the least squares regressions, is that there is no evidence that natural resource rents are associated with a reduction in transitional GDP per capita growth. The estimated second-stage coefficient is positive, around 0.09, and has a standard error of 0.06. We cannot reject the hypothesis that this estimated coefficient is equal to zero at the conventional significance levels. Comparing the IV estimate in column (2) of Appendix Table 19 to the corresponding least squares estimate in column (3) of Panel B in Table 6, we note that the IV coefficient is slightly larger than the LS coefficient. However, the difference in coefficients is not significant (p-value 0.79).

Columns (3) and (4) of Appendix Table 19 show that results are similar for the year 2019.

DATA APPENDIX: Description of Variables and Sources

Variable	Description and Source
GNP share of primary exports	Share of exports of primary products in GNP in 1970. The data source is Sachs and Warner (1997).
Log value of hydrocarbon deposits, p.c.	Logarithm of hydrocarbon deposits per capita in year 1993. The data source is Alexeev and Conrad (2009).
Log value of oil output, p.c.	Logarithm of the value of oil output per capita in 2000. The data source is Alexeev and Conrad (2009).
Oil/GDP ratio	Logarithm of the value of oil output in 2000 divided by GDP. The data source is Alexeev and Conrad (2009).
Log value of mining output, p.c.	Logarithm of mining output per capita. The data source is Alexeev and Conrad (2009).
Mining output/GDP ratio	Logarithm of one plus the share of mining in the country's GDP in current prices in 1992. The data source is Alexeev and Conrad (2009).
Log Total Natural Resource Rents, p.c	Log of total natural resource rents per capita in 2011. Total natural resources rents are the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents. The data source is WDI (2011) and WDI (2022).
Total Natural Resource Rents/GDP	GDP ratio of total natural resource rents. The data source is WDI (2011) and WDI (2022).
Log Oil Rents, p.c.	Logarithm of oil rents per capita. Oil rents are the difference between the value of crude oil production at world prices and total costs of production. The data source is WDI (2011) and WDI (2022).
Oil Rents/GDP	GDP ratio of oil rents. The data source is WDI (2011) and WDI (2022).
Fraction of Population English Language	Fraction of population speaking English. The data source is Alexeev and Conrad (2009).
Absolute latitude	The absolute value of countries' latitude. The data source is Alexeev and Conrad (2009).
Rule of Law	Rule of law index for 2000. The data source is Alexeev and Conrad (2009).
Government Effect Index	Estimates for 2000 is used in this paper. The data is obtained from Worldwide governance indicators (2022).
Regulatory Quality.	Estimates for 2000 is used in this paper. The data is obtained from Worldwide governance indicators (2022).
Socialist Origin	Indicator variable that is unity for countries with socialist legal origin. The data are obtained from La Porta et al. (2002).
SOEs in the Economy Index	State ownership of enterprises in the economy index measures the relative output importance of state owned enterprises. The index is computed as an average over the 1975-1995 period. The data are obtained from La Porta et al. (2002).
State Ownership of Assets Index	State ownership of assets index gauges the degree to which the state owns and controls capital (including land) in the industrial, agricultural, and service sectors. The data used in the paper are for year 2020, obtained from Economic Freedom Index by the Fraser Institute (2022).
Log GDP p.c.,	Logarithm of per capita PPP GDP. For the year 1970 and 2000 the data source is Alexeev and Conrad (2009), for the year 2011 the data source is WDI (2011), for 2020 and 2019 the data source is WDI (2022).
GINI index	The Gini index measures the degree of income inequality in an economy. The data source is WDI (2011) and WDI (2022).
Poverty Headcount $1.25 per Day	Share of the population that lives below $1.25 a day. The data source is WDI (2011).
Poverty Headcount $1.9 per Day	Share of the population that lives below $1.9 a day. The data source is WDI (2022).
Poverty Headcount $2.15 per Day	Share of the population that lives below $1.9 a day. The data source is WDI (2022).
Human Development Index	The Human Development Index ranges between 0 and 1 with higher values denoting a higher level of human development. The data source is WDI (2011), UNDP(2022).
Proceeds from Privatization Primary Sector	Logarithm of total proceeds per capita from privatization of primary sector during the 1990-

	2008 period. Source World Bank (2008).
Proceeds from Privatization Other Sectors	Logarithm of total proceeds per capita from all sectors other than the primary sector during the 1990-2008 period. Source World Bank (2008).
Ease of Doing Business	Overall country score on the ease of doing business in the year 2019. Source WDI (2022).

DATA APPENDIX

List of Countries

Country	Log Value of oil output, p.c.	Oil/GDP	Mining/GDP	Log Mining output, p.c.	SOE Index	Rule of Law	Log GDP p.c.	Country	Log Value of oil output, p.c.	Oil/GDP	Mining/GDP	Log Mining output, p.c.	SOE Index	Rule of Law	Log GDP p.c.
algeria	6.34	0.18	0.19	6.38	0.60	-0.80	7.96	madagascar	4.06	0.08	0.00	0.00	0.40	-0.67	6.56
angola	5.41	0.24	0.72	6.69		-1.47	6.64	malawi	3.86	0.09	0.00	0.00	0.60	-0.46	6.49
argentina	5.02	0.02	0.03	5.51	0.52	0.17	9.05	malaysia	6.37	0.10	0.05	6.02	0.48	0.53	9.01
australia	6.54	0.04	0.02	6.17	0.40	1.98	9.98	mali	2.16	0.01	0.00	0.00	0.60	-0.71	6.79
austria	0.00	0.00	0.00	0.00	0.80	2.08	9.94	mauritania	4.16	0.07	0.00	0.00		-0.53	6.92
bahrain	6.55	0.15	0.00	0.00		0.77	8.53	mauritius	0.00	0.00	0.00	0.00	0.40	0.86	9.27
bangladesh	0.00	0.00	0.00	0.00	0.40	-0.65	6.76	mexico	5.25	0.03	0.05	5.97	0.68	-0.38	8.89
belgium	0.00	0.00	0.00	0.00	0.40	1.62	9.93	morocco	4.35	0.03	0.00	0.00	0.72	0.30	7.89
benin	2.54	0.01	0.00	0.00	0.60	-0.39	7.16	mozambique	4.43	0.08	0.00	0.00		-0.65	7.22
bolivia	5.20	0.08	0.00	0.00	0.52	-0.52	7.85	nepal	0.00	0.00	0.00	0.00	0.48	-0.36	6.91
botswana	7.49	0.43	0.00	0.00	0.28	0.67	8.36	netherlands	6.28	0.03	0.00	0.00	0.40	1.95	9.98
brazil	4.58	0.02	0.01	4.41	0.72	-0.16	8.62	new zealand	4.92	0.01	0.00	0.00	0.36	1.97	9.69
burkina faso	0.00	0.00	0.00	0.00		-0.54	6.83	nicaragua	3.99	0.04	0.00	0.00	0.76	-0.91	7.33
burundi	2.09	0.01	0.00	0.00	0.60	-0.93	6.21	niger	3.69	0.08	0.00	0.00	0.52	-0.82	6.19
cameroon	4.58	0.09	0.06	4.19	0.60	-1.06	6.99	nigeria	5.58	0.19	0.15	5.34	0.76	-0.99	7.13
canada	6.30	0.03	0.04	6.89	0.40	1.99	10.02	norway	7.36	0.08	0.29	9.04	0.80	1.99	10.13
cape verde	2.00	0.01	0.00	0.00		0.47	7.48	oman	7.95	0.34	0.48	8.36		1.24	8.84
central african republic	2.89	0.03	0.00	0.00	0.40	-0.66	6.36	pakistan	2.90	0.01	0.00	0.00	0.72	-0.62	7.50
chad	0.00	0.00	0.00	0.00	0.60	-0.81	6.06	panama	0.00	0.00	0.00	0.00	0.36	-0.04	8.64
chile	7.09	0.15	0.00	0.00	0.24	1.31	9.24	paraguay	0.00	0.00	0.00	0.00	0.20	-0.83	8.01
china	4.76	0.05	0.01	3.40		-0.33	8.12	peru	4.09	0.02	0.01	3.83	0.56	-0.53	8.25
colombia	5.69	0.06	0.04	5.32	0.56	-0.65	8.54	philippines	3.77	0.02	0.00	0.00	0.60	-0.51	7.79
comoros	3.99	0.08	0.00	0.00		-1.19	6.36	poland	5.27	0.04	0.00	0.00	0.96	0.62	8.88
congo, rep.	5.99	0.16	0.41	6.91	1.00	-1.19	7.60	portugal	5.84	0.03	0.00	0.00	0.80	1.14	9.53
costa rica	5.29	0.04	0.00	0.00	0.20	0.78	8.73	rwanda	0.00	0.00	0.00	0.00	0.40	-0.83	6.71
cote d'ivoire	3.67	0.03	0.00	0.00	0.60	-0.57	7.21	saudi arabia	7.65	0.20	0.47	8.42		0.62	8.94
denmark	5.25	0.01	0.03	6.65	0.60	1.95	10.04	senegal	0.00	0.00	0.00	0.00	0.52	-0.34	7.21
dominican republic	3.95	0.02	0.00	0.00	0.40	-0.20	8.20	seychelles	0.00	0.00	0.00	0.00		-0.44	8.76
ecuador	6.01	0.10	0.11	5.92	0.40	-0.67	8.07	sierra leone	3.95	0.06	0.00	0.00	0.40	-0.90	6.02
egypt	4.29	0.03	0.04	4.84	0.76	0.21	7.98	singapore	0.00	0.00	0.00	0.00	0.20	2.10	10.02
el salvador	0.00	0.00	0.00	0.00	0.20	-0.45	7.91	solomon islands			0.00	0.00		-1.34	9.02
ethiopia	0.00	0.00	0.00	0.00		-0.38	6.41	somalia	0.00	0.00	0.00	0.00	0.60	-1.72	6.76
finland	0.00	0.00	0.00	0.00	0.40	2.11	9.88	south africa	5.98	0.10	0.00	0.00	0.60	0.28	8.29
france	0.00	0.00	0.00	0.00	0.52	1.47	9.97	spain	4.83	0.01	0.00	0.00	0.60	1.36	9.66
gabon	6.94	0.20	0.58	8.00	0.40	-0.57	8.26	sri lanka	3.30	0.01	0.00	0.00	0.64	-0.17	8.20
gambia	0.00	0.00	0.00	0.00		-0.34	6.80	sudan	0.00	0.00	0.06	4.04		-1.10	6.90
germany	0.00	0.00	0.00	0.00	0.40	1.89	9.85	swaziland	3.19	0.01	0.00	0.00		-0.08	7.87
ghana	3.14	0.02	0.00	0.00	0.92	-0.08	7.15	sweden	0.00	0.00	0.00	0.00	0.60	1.96	9.94
greece	5.32	0.02	0.00	0.00	0.80	0.73	9.40	switzerland	6.44	0.03	0.00	0.00	0.20	2.20	10.02
guatemala	0.00	0.00	0.00	0.00	0.20	-0.77	8.32	syria	6.20	0.08	0.05	5.95	0.68	-0.33	8.92
guinea	3.72	0.08	0.00	0.00		-0.96	6.35	taiwan	5.42	0.02	0.00	0.00		0.86	9.73
guinea-bissau	0.00	0.00	0.00	0.00		-1.27	6.52	tanzania	0.00	0.00	0.00	0.00	0.92	-0.28	6.28
haiti	0.00	0.00	0.00	0.00	0.44	-1.50	6.68	thailand	4.67	0.02	0.00	3.43	0.40	0.41	8.76
honduras	3.00	0.01	0.00	0.00	0.20	-0.89	7.56	togo	4.18	0.09	0.00	0.00	0.60	-0.93	6.42
hong kong	0.00	0.00	0.00	0.00	0.00	1.64	10.06	trinidad and tobago	7.34	0.15	0.10	7.24	0.80	0.47	9.52
hungary	5.40	0.04	0.00	0.00	0.96	0.84	8.87	tunisia	5.67	0.08	0.02	4.53	0.72	0.44	8.42
india	3.33	0.02	0.00	2.28	0.96	0.22	7.54	turkey	4.73	0.02	0.00	0.00	0.60	0.05	8.80
indonesia	5.83	0.11	0.02	4.39	0.76	-0.93	8.09	uganda	0.00	0.00	0.00	0.00	0.80	-0.58	6.68
iran	5.27	0.05	0.13	6.49	0.76	-0.44	8.47	united arab emirates	8.38	0.29	0.54	9.39		1.41	9.71
iraq	6.20	0.34	0.72	7.16		-1.50	7.11	united kingdom	5.78	0.02	0.02	6.23	0.48	1.91	9.91
ireland	4.82	0.01	0.00	0.00	0.60	1.84	9.99	united states	6.15	0.02	0.01	5.74	0.20	1.90	10.25
israel	4.90	0.01	0.00	0.00	0.80	1.07	9.69	uruguay	0.00	0.00	0.00	0.00	0.40	0.65	8.97
italy	0.00	0.00	0.00	2.90	0.80	0.93	9.84	venezuela	6.94	0.10	0.17	7.37	0.64	-0.82	9.04
jamaica	5.85	0.09	0.00	0.00	0.72	-0.15	8.19	yemen	3.14	0.01	0.11	5.68		-0.90	7.86
japan	0.00	0.00	0.00	0.00	0.20	1.80	9.95	zaire	3.03	0.05	0.00	0.00	0.80	-1.86	5.38
jordan	5.04	0.04	0.00	0.00		0.55	8.31	zambia	5.02	0.18	0.00	0.00	1.00	-0.44	6.47
kenya	0.00	0.00	0.00	0.00	0.60	-0.94	6.94	zimbabwe	4.32	0.06	0.00	0.00	0.60	-0.74	7.19

Table 1. Replication Sachs and Warner (1997)

Dependent Variable is GDP per capita Growth During 1970-1990					
	(1)	(2)	(3)	(4)	(5)
	LS	LS	LS	LS	LS
Share of Primary Exports in GNP in 1970	-9.433*** (1.988)	-6.955*** (1.530)	-7.293*** (1.309)	-10.566*** (1.507)	-10.264*** (1.489)***
Initial GDP per capita	-0.111 (0.203)	-0.958*** (0.186)	-1.342*** (0.173)	-1.761*** (0.206)	-1.786*** (0.203)
Openness		3.059*** (0.380)	2.424*** (0.344)	1.329*** (0.397)	1.340*** (0.390)
Investment			1.245*** (0.221)	1.017*** (0.295)	0.814** (0.310)
Rule of Law				0.358*** (0.101)	0.404*** (0.102)
Terms of Trade					0.086* (0.047)
No. Observations	87	87	87	71	71

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 2. Replication Alexeev Conrad (2009)

Dependent Variable is Log GDP p.c. in 2000					
	(1)	(2)	(3)	(4)	(5)
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Oil/GDP ratio	Log Mining output, p.c.	Mining/GDP ratio
	Panel A: Without controlling for Institutional Quality				
Natural Resource Wealth	0.059*** (0.016)	0.096*** (0.023)	1.507*** (0.693)	0.095*** (0.028)	2.603** (1.111)
Observations	111	118	118	117	117
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes	Yes
	Panel B: Controlling for Institutional Quality				
Natural Resource Wealth	0.051*** (0.010)	0.086*** (0.015)	1.255*** (0.313)	0.062*** (0.020)	1.444* (0.846)
Rule of Law (Instrumented)	1.137*** (0.150)	1.020*** (0.150)	1.094*** (0.165)	1.042*** (0.173)	1.120*** (0.180)
Kleibergen Paap F-Stat	12.124	13.893	12.794	10.709	11.930
Hansen J, p-value	0.122	0.114	0.667	0.222	0.494
Observations	111	118	118	117	117
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes	Yes

Note: The method of estimation in Panel A is least squares; Panel B two-stage least squares. The instruments in Panel B for the Rule of Law variables are absolute latitude, the share of English language speakers, and the share of European language speakers. The control variables (not shown) in Panel A are absolute latitude and dummy variables for Latin America, East Asia, and European population. The control variables (not shown) in Panel B are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 3. Controlling for Initial GDP in the Alexeev and Conrad (2009) Dataset

Dependent Variable is Log GDP p.c. in 2000					
	(1)	(2)	(3)	(4)	(5)
	LS	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Oil/GDP ratio	Log Mining output, p.c.	Mining/GDP ratio
Natural Resource Wealth	-0.003 (0.012)	0.003 (0.017)	-0.921** (0.407)	0.003 (0.022)	-0.499 (1.462)
Initial (1970) GDP p.c.	0.825*** (0.082)	0.820*** (0.083)	0.940*** (0.079)	0.821*** (0.093)	0.848*** (0.113)
Observations	111	118	118	117	117
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. The control variables (not shown) are absolute latitude and dummy variables for Latin America, East Asia, and European population. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 4A. Alexeev and Conrad's Measures of Natural Resources and GDP per capita in 2011

Dependent Variable is Log GDP p.c. in 2011					
	(1)	(2)	(3)	(4)	(5)
	LS	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Oil/GDP ratio	Log Mining output, p.c.	Mining/GDP ratio
	Panel A: Without controlling for initial GDP				
Natural Resource Wealth	0.079*** (0.021)	0.143*** (0.029)	2.809*** (0.716)	0.125*** (0.036)	4.052*** (1.279)
Observations	105	110	110	109	118
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes	Yes
	Panel B: Controlling for initial GDP				
Natural Resource Wealth	0.011 (0.014)	0.033 (0.021)	0.325 (0.568)	0.020 (0.030)	1.268 (1.545)
Initial (1970) GDP p.c.	0.934*** (0.087)	0.917*** (0.101)	0.943*** (0.115)	0.956*** (0.111)	0.927*** (0.124)
Observations	104	109	109	109	109
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. The control variables (not shown) are absolute latitude and dummy variables for Latin America, East Asia, and European population. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 4B. Alexeev and Conrad's Measures of Natural Resources and GDP per capita in 2020

Dependent Variable is Log GDP p.c. in 2020					
	(1)	(2)	(3)	(4)	(5)
	LS	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Oil/GDP ratio	Log Mining output, p.c.	Mining/GDP ratio
	Panel A: Without controlling for initial GDP				
Natural Resource Wealth	0.065*** (0.017)	0.109*** (0.025)	2.154*** (0.580)	0.110*** (0.030)	3.304*** (1.048)
Observations	109	114	114	113	124
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes	Yes
	Panel B: Controlling for initial GDP				
Natural Resource Wealth	0.014 (0.013)	0.014 (0.019)	0.019 (0.404)	0.023 (0.025)	0.965 (1.113)
Initial (1970) GDP p.c.	0.767*** (0.086)	0.808*** (0.093)	0.834*** (0.098)	0.802*** (0.098)	0.792 (0.103)
Observations	108	113	113	113	113
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. The control variables (not shown) are absolute latitude and dummy variables for Latin America, East Asia, and European population. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 5A. Alternative Measures of Natural Resources and GDP per capita in 2011

	Dependent Variable is Log GDP p.c. in 2011			
	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Oil Rents, p.c. in 2011	Oil Rents/GDP in 2011	Log Natural Resource Rents, p.c. in 2011	Natural Resource Rents/GDP in 2011
	Panel A: Without controlling for initial GDP			
Natural Resource Wealth	0.121**	1.835*	0.166**	1.767***
	(0.051)	(1.088)	(0.052)	(0.723)
Observations	58	58	117	117
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes
	Panel B: Controlling for initial GDP			
Natural Resource Wealth	0.044	0.325	0.077*	0.297
	(0.028)	(0.737)	(0.043)	(0.474)
Initial (1970) GDP p.c.	0.831***	0.858***	0.819***	0.895***
	(0.073)	(0.081)	(0.100)	(0.081)
Observations	58	58	106	106
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. The control variables (not shown) are absolute latitude and dummy variables for Latin America, East Asia, and European population. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 5B. Alternative Measures of Natural Resources and GDP per capita in 2020

Dependent Variable is Log GDP p.c. in 2020				
	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Oil Rents, p.c. in 2020	Oil Rents/GDP in 2020	Log Natural Resource Rents, p.c. in 2020	Natural Resource Rents/GDP in 2020
		Panel A: Without controlling for initial GDP		
Natural Resource Wealth	0.116***	3.760**	0.054	0.667
	(0.026)	(1.522)	(0.052)	(1.333)
Observations	71	71	130	130
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes
		Panel B: Controlling for initial GDP		
Natural Resource Wealth	0.046**	-0.169	-0.014	-2.471***
	(0.019)	(0.916)	(0.032)	(0.812)
Initial (1970) GDP p.c.	0.695***	0.800***	0.851***	0.924***
	(0.083)	(0.082)	(0.085)	(0.077)
Observations	67	67	114	114
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. The control variables (not shown) are absolute latitude and dummy variables for Latin America, East Asia, and European population. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 6A. Effects of Natural Resources on Income Inequality

Dependent Variable is Gini Coefficient in 2000

	(1)	(2)	(3)	(4)
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
Natural Resource Wealth	-0.145 (0.134)	-0.316* (0.193)	0.141 (0.271)	-0.268 (0.425)
Observations	105	109	109	105
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares; The control variables (not shown) in Panel A are absolute latitude and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 6B. Effects of Natural Resources on Income Inequality

Dependent Variable is Gini Coefficient in 2019

	(1)	(2)	(3)	(4)
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
Natural Resource Wealth	0.065 (0.155)	0.297 (0.250)	0.306 (0.255)	0.666 (0.453)
Observations	33	33	33	36
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 6C. Effects of Natural Resources on Income Inequality

Dependent Variable is Gini Coefficient in 2020

	(1)	(2)	(3)	(4)
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
Natural Resource Wealth	0.399 (0.310)	0.667 (0.458)	0.901* (0.405)	0.899 (0.929)
Observations	14	14	14	13
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation in Panel A is least squares. The control variables (not shown) in Panel A are absolute latitude and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 7A. Effects of Natural Resources on Poverty

Dependent Variable is Poverty Headcount Ratio at $1.25 per Day in 2000

	(1)	(2)	(3)	(4)
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
		Panel A: Without Controlling for Rule of Law		
Natural Resource Wealth	-0.844*** (0.252)	-1.512*** (0.360)	-1.071*** (0.484)	-2.080*** (0.757)
Observations	79	83	83	81
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes
		Panel B: Controlling for Rule of Law		
Natural Resource Wealth	-0.979*** (0.290)	-2.125*** (0.524)	-0.723 (0.556)	-1.895*** (0.684)
Rule of Law (Instrumented)	-17.134*** (4.584)	-16.637*** (4.755)	-15.553*** (5.417)	-14.172*** (4.670)
Kleibergen Paap F-Stat	9.566	9.748	7.905	22.409
Hansen J, p-value	0.669	0.563	0.440	0.218
Observations	79	83	83	81
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation in Panel A is least squares; Panel B two-stage least squares. The instruments in Panel B for the Rule of Law variables are absolute latitude, the share of English language speakers, and the share of European language speakers. The control variables (not shown) in Panel A are absolute latitude and dummy variables for Latin America, East Asia, and European population. The control variables (not shown) in Panel B are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 7B. Effects of Natural Resources on Poverty

Dependent Variable is Poverty Headcount Ratio at $2.15 per Day in 2000

	(1)	(2)	(3)	(4)
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
		Panel A: Without Controlling for Rule of Law		
Natural Resource Wealth	0.597 (0.498)	-0.591 (0.798)	-1.068 (0.753)	-0.237 (1.218)
Observations	35	36	36	36
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes
		Panel B: Controlling for Rule of Law		
Natural Resource Wealth	0.131 (0.561)	-0.901 (0.945)	-0.520 (1.093)	-0.736 (1.670)
Rule of Law (Instrumented)	-22.127** (9.279)	-20.286** (8.548)	-20.748** (8.962)	-20.792** (9.694)
Kleibergen Paap F-Stat	10.560	10.658	7.981	10.679
Hansen J, p-value	0.116	0.071	0.096	0.115
Observations	35	36	36	35
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation in Panel A is least squares; Panel B two-stage least squares. The instruments in Panel B for the Rule of Law variables are absolute latitude, the share of English language speakers, and the share of European language speakers. The control variables (not shown) in Panel A are absolute latitude and dummy variables for Latin America, East Asia, and European population. The control variables (not shown) in Panel B are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 7C. Effects of Natural Resources on Poverty

Dependent Variable is Poverty Headcount Ratio at $2.15 per Day in 2011

	(1)	(2)	(3)	(4)
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
		Panel A: Without Controlling for Rule of Law		
Natural Resource Wealth	-0.717**	-0.666	-1.076**	-1.441
	(0.330)	(0.583)	(0.447)	(1.015)
Observations	48	48	48	47
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes
		Panel B: Controlling for Rule of Law		
Natural Resource Wealth	-0.596	-0.972	-0.489	-1.226
	(0.407)	(0.756)	(0.688)	(1.298)
Rule of Law (Instrumented)	-17.428**	-17.743**	-19.145**	-18.590**
	(7.284)	(7.186)	(7.732)	(8.140)
Kleibergen Paap F-Stat	5.128	5.863	5.345	4.671
Hansen J, p-value	0.145	0.133	0.149	0.177
Observations	48	48	48	47
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation in Panel A is least squares; Panel B two-stage least squares. The instruments in Panel B for the Rule of Law variables are absolute latitude, the share of English language speakers, and the share of European language speakers. The control variables (not shown) in Panel A are absolute latitude and dummy variables for Latin America, East Asia, and European population. The control variables (not shown) in Panel B are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 7D. Effects of Natural Resources on Poverty

Dependent Variable is Poverty Headcount Ratio at $2.15 per Day in 2020

	(1)	(2)	(3)	(4)
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
		Panel A: Without Controlling for Rule of Law		
Natural Resource Wealth	0.238**	0.398*	0.164	0.661**
	(0.096)	(0.184)	(0.127)	(0.231)
Observations	13	13	13	12
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes
		Panel B: Controlling for Rule of Law		
Natural Resource Wealth	0.290*	0.057	0.726**	0.951**
	(0.162)	(0.390)	(0.305)	(0.446)
Rule of Law (Instrumented)	-4.210**	-5.584**	-4.754***	-3.406**
	(1.637)	(2.494)	(1.360)	(1.337)
Kleibergen Paap F-Stat	12.573	6.596	43.409	29.497
Observations	13	13	13	12
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation in Panel A is least squares; Panel B two-stage least squares. The instruments in Panel B for the Rule of Law variables are absolute latitude, the share of English language speakers, and the share of European language speakers. The control variables (not shown) in Panel A are absolute latitude and dummy variables for Latin America, East Asia, and European population. The control variables (not shown) in Panel B are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 8. Effects of Natural Resource Wealth on the Human Development Index

Dependent Variable is Human Development Index in 2020

	(1)	(2)	(3)	(4)
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
		Panel A: Without Controlling for Rule of Law		
Natural Resource Wealth	0.008***	0.011***	0.016***	0.014**
	(0.002)	(0.003)	(0.004)	(0.007)
Observations	112	117	116	114
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes
		Panel B: Controlling for Rule of Law		
Natural Resource Wealth	0.006***	0.008***	0.008***	0.008**
	(0.002)	(0.003)	(0.003)	(0.004)
Rule of Law (Instrumented)	0.158***	0.167***	0.160***	0.169***
Kleibergen Paap F-Stat	14.697	15.272	14.300	16.426
Hansen J, p-value	0.306	0.483	0.547	0.470
Observations	111	116	116	113
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation in Panel A is least squares; Panel B two-stage least squares. The instruments in Panel B for the Rule of Law variables are absolute latitude, the share of English language speakers, and the share of European language speakers. The control variables (not shown) in Panel A are absolute latitude and dummy variables for Latin America, East Asia, and European population. The control variables (not shown) in Panel B are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 9A. Effects of Natural Resource Wealth and State Ownership on GDP per capita

(Least Squares Estimation)

Panel A: Dependent Variable is Log GDP per capita in 2011

	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
Natural Resource Wealth	0.056***	0.088***	0.104***	0.145**
	(0.021)	(0.028)	(0.034)	(0.073)
SOEs in the Economy Index	-0.335	-0.216	-0.232	-0.280
	(0.520)	(0.506)	(0.468)	(0.476)
Observations	86	86	86	86
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Panel B: Dependent Variable is Log GDP per capita in 2020

	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
Natural Resource Wealth	0.050***	0.061***	0.084***	0.084
	(0.017)	(0.023)	(0.029)	(0.060)
SOEs in the Economy Index	-0.147	-0.001	-0.066	-0.020
	(0.428)	(0.447)	(0.411)	(0.430)
Observations	89	89	89	84
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. The control variables (not shown) are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 9B. Effects of Natural Resource Wealth and State Ownership on GDP per capita in 2020

Dependent Variable is Log GDP per capita in 2020

	(1)	(2)	(3)	(4)
	2SLS	2SLS	2SLS	2SLS
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
Natural Resource Wealth	-0.022 (0.035)	-0.019 (0.045)	-0.004 (0.064)	-0.063 (0.097)
SOEs in the Economy Index	4.644*** (0.977)	4.390*** (0.831)	4.457*** (1.038)	3.984*** (0.963)
Endogeneity Test, p-value	0.0956	0.090	0.094	0.097
Kleibergen Paap F-stat	47.553	89.399	47.289	54.231
		First Stage for SOEs in the Economy Index		
Socialist Legal Origin	0.332*** (0.048)	0.399*** (0.042)	0.342*** (0.050)	0.349*** (0.047)
Observations	89	89	89	84
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is two-stage least squares. The control variables (not shown) are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 10A. Effects of Natural Resource Wealth and State Ownership on GDP per capita in 2020 – Impact of Rule of Law

Dependent Variable is Log GDP per capita in 2020

	(1)	(2)	(3)	(4)
	2SLS	2SLS	2SLS	2SLS
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
Natural Resource Wealth	0.019 (0.022)	0.030 (0.032)	0.008 (0.035)	-0.047 (0.051)
SOEs in the Economy Index (Instrumented)	2.040** (0.857)	2.317*** (0.767)	2.159** (0.843)	1.827*** (0.635)
Rule of Law (Instrumented)	1.098*** (0.207)	1.106*** (0.228)	1.124*** (0.225)	1.252*** (0.209)
Kleibergen Paap F-Stat	5.185	5.410	5.747	14.125
Hansen J, p-value	0.297	0.2966	0.348	0.812
Observations	89	89	89	84
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is two-stage least squares. The excluded instruments (first stage estimates not shown) are absolute latitude, the fraction of the population that speaks English as the native language, and socialist legal origin. The control variables (estimates not shown) are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 10B. Effects of Natural Resource Wealth and State Ownership on GDP per capita in 2020 – Impact of Ease of Doing Business

Dependent Variable is Log GDP per capita in 2020

	(1)	(2)	(3)	(4)
	2SLS	2SLS	2SLS	2SLS
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
Natural Resource Wealth	0.010 (0.026)	0.019 (0.034)	0.011 (0.041)	-0.002 (0.066)
SOEs in the Economy Index (Instrumented)	2.450*** (0.857)	2.584*** (0.733)	2.494*** (0.802)	2.371*** (0.812)
Ease of Doing Business Overall Score	0.046*** (0.008)	0.046*** (0.008)	0.046*** (0.009)	0.048*** (0.010)
Kleibergen Paap F-Stat	33.28	49.97	35.92	42.44
Observations	89	89	89	84
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is two-stage least squares. The excluded instrument (first stage estimates not shown) is socialist legal origin. The control variables (estimates not shown) are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 11. Privatization of the Primary Sector and GDP per capita Growth

Dependent Variable is Log GDP per capita in 2011

	(1)	(2)	(3)	(4)
Proceeds from Privatization Primary Sector	-0.119 (0.545)	-0.246 (0.426)	-0.029 (0.561)	-0.145 (0.453)
Proceeds from Privatization Other Sectors		0.397 (0.294)		0.385 (0.257)
Initial (1970) Log GDP p.c.	0.919*** (0.049)	0.904*** (0.050)	0.656*** (0.121)	0.671*** (0.108)
Rule of Law (instrumented)			0.570*** (0.207)	0.493*** (0.186)
Kleibergen Paap F-Stat			9.475	9.239
Hansen J, p-value			0.635	0.725
Observations	107	107	103	103
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation in columns (1) and (2) is least squares; columns (3) and (4) two-stage least squares. The instruments in columns (3) and (4) for the Rule of Law variable are absolute latitude and the share of English language speakers. The control variables (not shown) in columns (1) and (2) are absolute latitude and dummy variables for Latin America, East Asia, and European population. The control variables (not shown) in columns (3) and (4) are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 12. Effects of State Ownership on Natural Resource Wealth

	(1)	(2)	(3)	(4)
	2SLS	2SLS	2SLS	2SLS
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
	Panel A: Dependent Variable is Level of Natural Resource Wealth			
SOEs in the Economy Index (Instrumented)	3.402	-5.031	1.189	0.639
	(3.921)	(3.346)	(2.368)	(2.001)
Rule of Law (Instrumented)	1.530	0.081	1.320	0.596
	(1.414)	(1.079)	(0.833)	(0.505)
Kleibergen Paap F-Stat	8.939	8.939	8.939	17.065
Observations	86	86	86	86
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes
	Panel B: Dependent Variable is Growth Rate of Natural Resource Wealth			
SOEs in the Economy Index (Instrumented)	1.862	-13.882*	-9.731**	-3.418
	(3.612)	(7.118)	(3.796)	(2.225)
Rule of Law (Instrumented)	-0.043	-1.934	-0.200	0.146
	(0.689)	(1.729)	(1.128)	(0.505)
Initial (1970) Natural Resource Wealth	-0.505***	-0.770***	-0.424***	-0.140
	(0.126)	(0.218)	(0.136)	(0.143)
Kleibergen Paap F-Stat	3.937	3.937	9.619	12.670
Observations	32	32	51	78
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is two-stage least squares. The control variables (not shown) are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. The instruments are absolute latitude, the fraction of the population that speaks English as the native language, and socialist legal origin *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 13. Policies, Natural Resources, and GDP per capita in Countries with Above-Median State Ownership of Assets

(Model Estimates with Variables from Fraser Institute)

Dependent Variable is Log GDP p.c. in 2020				
	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Oil Rents, p.c. in 2020	Oil Rents/GDP in 2020	Log Natural Resource Rents, p.c. in 2020	Natural Resource Rents/GDP in 2020
Natural Resource Wealth	0.192***	4.878***	0.163**	3.143***
	(0.047)	(1.046)	(0.070)	(0.947)
Regulation	0.176	0.236*	0.251*	0.302**
	(0.139)	(0.136)	(0.143)	(0.145)
Freedom to trade internationally	0.197**	0.246**	0.195	0.240*
	(0.071)	(0.108)	(0.123)	(0.127)
Sound money	0.013	0.022	0.024	0.036
	(0.046)	(0.062)	(0.064)	(0.069)
Legal system and property rights	0.136	0.214	0.260*	0.199
	(0.143)	(0.129)	(0.146)	(0.143)
Observations	37	57	56	57
Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. The sample includes only those countries with above-median state ownership of assets in 2020. The control variables (estimates not shown) are absolute latitude, dummy variables for Latin America and East Asia, and the share of the population that speaks a European language. Data on regulation, freedom to trade internationally, sound money, legal system and property rights are measured in the year 2020 and are from Fraser Institute (2022). *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 14. Policies, Natural Resources, and GDP per capita in Countries with Above-Median State Ownership of Assets

(Model Estimates with Variables from Worldwide Governance Indicators)

	Dependent Variable is Log GDP p.c. in 2020			
	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Oil Rents, p.c. in 2020	Oil Rents/GDP in 2020	Log Natural Resource Rents, p.c. in 2020	Natural Resource Rents/GDP in 2020
Natural Resource Wealth	0.159***	4.629***	0.159***	3.790***
	(0.036)	(0.848)	(0.057)	(0.839)
Voice and accountability	-0.202*	-0.050	-0.128	-0.102
	(0.116)	(0.161)	(0.175)	(0.174)
Political stability and absences of violence/terrorism	0.004	0.006	-0.016	0.017
	(0.191)	(0.181)	(0.215)	(0.209)
Government effectiveness	0.122	0.803**	0.620	0.935**
	(0.235)	(0.398)	(0.404)	(0.439)
Regulatory quality	0.672**	0.153	0.106	0.102
	(0.254)	(0.332)	(0.352)	(0.358)
Rule of law	0.515*	0.645**	0.765**	0.747**
	(0.266)	(0.316)	(0.378)	(0.360)
Control of corruption	-0.495**	-0.492*	-0.301	-0.571*
	(0.213)	(0.284)	(0.339)	(0.315)
Observations	37	57	56	57
Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. The sample includes only those countries with above-median state ownership of assets in 2020. The control variables (estimates not shown) are absolute latitude, dummy variables for Latin America and East Asia, and the share of the population that speaks a European language. Indicators for voice and accountability, political stability and absences of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption are for the year 2020; data source is WGI (2022). *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 15. Policies, Natural Resources, and Human Development in Countries with Above-Median State Ownership of Assets

(Model Estimates with Variables from Fraser Institute)

Dependent Variable is Human Development Index in 2020				
	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
Natural Resource Wealth	0.014***	0.016***	0.017**	0.035***
	(0.003)	(0.005)	(0.006)	(0.008)
Regulation	0.022*	0.031*	0.030*	0.030**
	(0.013)	(0.015)	(0.018)	(0.011)
Freedom to trade internationally	0.002	0.003	0.000	-0.005
	(0.008)	(0.009)	(0.009)	(0.008)
Sound money	-0.004	-0.003	0.002	-0.001
	(0.006)	(0.007)	(0.008)	(0.007)
Legal system and property rights	0.049***	0.036**	0.032**	0.031
	(0.014)	(0.014)	(0.015)	(0.022)
Observations	35	36	36	30
Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. The sample includes only those countries with above-median state ownership of assets in 1990. The control variables (estimates not shown) are absolute latitude, dummy variables for Latin America and East Asia, and the share of the population that speaks a European language. Data on regulation, freedom to trade internationally, sound money, legal system and property rights are measured in the year 1990 and are from Fraser Institute (2022). *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 16. Policies, Natural Resources, and Human Development in Countries with Above-Median State Ownership of Assets

(Model Estimates with Variables from Worldwide Governance Indicators)

Dependent Variable is Human Development Index in 2020				
	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
Natural Resource Wealth	0.010***	0.010***	0.015***	0.027***
	(0.002)	(0.003)	(0.004)	(0.005)
Voice and accountability	-0.047	-0.067**	-0.070***	-0.050
	(0.028)	(0.028)	(0.024)	(0.030)
Political stability and absences of violence/terrorism	-0.039	-0.040*	-0.039*	-0.045*
	(0.026)	(0.023)	(0.022)	(0.024)
Government effectiveness	0.044	0.080*	0.112***	0.023
	(0.050)	(0.043)	(0.039)	(0.050)
Regulatory quality	0.026	-0.004	-0.030	0.013
	(0.039)	(0.033)	(0.029)	(0.038)
Rule of law	0.083	0.119**	0.108**	0.148***
	(0.059)	(0.053)	(0.047)	(0.051)
Control of corruption	0.025	0.013	0.020	-0.020
	(0.035)	(0.035)	(0.035)	(0.036)
Observations	43	47	47	41
Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. The sample includes only those countries with above-median state ownership of assets in 1990. The control variables (estimates not shown) are absolute latitude, dummy variables for Latin America and East Asia, and the share of the population that speaks a European language. Indicators for voice and accountability, political stability and absences of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption are for the year 2000; data source is WGI (2022). *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 17. Policies, Natural Resources, and Poverty in Countries with Above-Median State Ownership of Assets

(Model Estimates with Variables from Fraser Institute)

Dependent Variable is Average Poverty Headcount Ratio at $2.15 in 2010-2020				
	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Oil Rents, p.c. in 2010-2020	Oil Rents/GDP in 2010-2020	Log Natural Resource Rents, p.c. in 2010-2020	Natural Resource Rents/GDP in 2010-2020
Natural Resource Wealth	-4.081**	-59.751**	-2.524	-0.001
	(1.786)	(25.693)	(2.036)	(30.495)
Regulation	-8.719**	-2.311	-2.671	-2.383
	(3.644)	(3.067)	(3.701)	(3.440)
Freedom to trade internationally	-3.068	-3.942	-2.263	-2.247
	(5.265)	(4.059)	(4.690)	(4.950)
Sound money	4.948*	2.407	2.488	1.721
	(2.647)	(2.877)	(2.907)	(3.266)
Legal system and property rights	10.349	0.959	-0.098	2.032
	(6.908)	(3.251)	(3.593)	(3.446)
Observations	26	50	48	50
Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. The sample includes only those countries where state ownership of assets is above the median of the 2010-2020 average. The control variables (estimates not shown) are absolute latitude, dummy variables for Latin America and East Asia, and the share of the population that speaks a European language. Data on regulation, freedom to trade internationally, sound money, legal system and property rights are average values in 2010-2020 and are from Fraser Institute (2022). *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 18. Policies, Natural Resources, and Poverty in Countries with Above-Median State Ownership of Assets

(Model Estimates with Variables from Worldwide Governance Indicators)

Dependent Variable is Average Poverty Headcount Ratio at $2.15 in 2010-2020				
	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Oil Rents, p.c. in 2010-2020	Oil Rents/GDP in 2010-2020	Log Natural Resource Rents, p.c. in 2010-2020	Natural Resource Rents/GDP in 2010-2020
Natural Resource Wealth	-4.140* (1.986)	-54.522* (29.162)	-1.864 (2.147)	2.180 (34.772)
Voice and accountability	3.558 (5.692)	-3.411 (4.729)	-4.682 (5.204)	-2.013 (5.604)
Political stability and absences of violence/terrorism	3.713 (6.074)	0.670 (3.770)	-0.535 (4.302)	-0.450 (4.399)
Government effectiveness	26.503 (32.603)	-8.987 (10.891)	-14.929 (11.404)	-15.963 (10.370)
Regulatory quality	0.670 (10.067)	18.284** (8.786)	23.290** (10.336)	19.428* (9.742)
Rule of law	-33.618* (16.969)	-23.813 (17.588)	-19.649 (18.665)	-17.178 (18.842)
Control of corruption	-6.048 (31.106)	8.287 (8.203)	7.313 (9.155)	10.182 (8.747)
Observations	26	50	48	50
Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. The sample includes only those countries where state ownership of assets is above the median of the 2010-2020 average. The control variables (estimates not shown) are absolute latitude, dummy variables for Latin America and East Asia, and the share of the population that speaks a European language. Indicators for voice and accountability, political stability and absences of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption are average values over the period 2010-2020; data source is WGI (2022). *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 19. Policies, Natural Resources, and Income Inequality in Countries with Above-Median State Ownership of Assets

(Model Estimates with Variables from Fraser Institute)

Dependent Variable is Average Gini Coefficient in 2010-2020				
	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Oil Rents, p.c. in 2010-2020	Oil Rents/GDP in 2010-2020	Log Natural Resource Rents, p.c. in 2010-2020	Natural Resource Rents/GDP in 2010-2020
Natural Resource Wealth	-0.810 (0.639)	-2.932 (13.579)	-0.363 (0.889)	-0.396 (15.220)
Regulation	-4.045* (1.977)	-0.388 (1.628)	-0.637 (1.727)	-0.394 (1.605)
Freedom to trade internationally	-0.872 (2.814)	1.488 (1.524)	1.736 (1.579)	1.556 (1.706)
Sound money	0.707 (1.680)	-0.922 (1.108)	-0.780 (1.082)	-0.949 (1.155)
Legal system and property rights	6.103* (2.883)	0.297 (1.549)	-0.073 (1.683)	0.343 (1.574)
Observations	26	50	48	50
Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. The sample includes only those countries where state ownership of assets is above the median of the 2010-2020 average. The control variables (estimates not shown) are absolute latitude, dummy variables for Latin America and East Asia, and the share of the population that speaks a European language. Data on regulation, freedom to trade internationally, sound money, legal system and property rights are average values in 2010-2020 and are from Fraser Institute (2022). *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 20. Policies, Natural Resources, and Income Inequality in Countries with Above-Median State Ownership of Assets

(Model Estimates with Variables from Worldwide Governance Indicators)

Dependent Variable is Average Gini Coefficient in 2010-2020				
	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Oil Rents, p.c. in 2010-2020	Oil Rents/GDP in 2010-2020	Log Natural Resource Rents, p.c. in 2010-2020	Natural Resource Rents/GDP in 2010-2020
Natural Resource Wealth	-1.306 (0.955)	-7.954 (12.412)	-0.741 (0.728)	-8.085 (12.912)
Voice and accountability	-1.128 (2.766)	-2.313 (2.773)	-2.792 (2.671)	-2.301 (2.819)
Political stability and absences of violence/terrorism	5.296* (2.492)	4.647*** (1.679)	5.111*** (1.791)	4.604*** (1.674)
Government effectiveness	18.972 (10.900)	-1.254 (3.836)	-0.697 (3.740)	-1.359 (3.625)
Regulatory quality	0.260 (7.555)	4.569 (4.524)	5.002 (4.705)	4.792 (4.585)
Rule of law	-9.479 (7.641)	-5.301 (6.887)	-5.270 (6.395)	-5.777 (6.874)
Control of corruption	-17.297 (10.332)	-1.065 (3.312)	-2.268 (3.728)	-0.861 (3.349)
Observations	26	50	48	50
Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. The sample includes only those countries where state ownership of assets is above the median of the 2010-2020 average. The control variables (estimates not shown) are absolute latitude, dummy variables for Latin America and East Asia, and the share of the population that speaks a European language. Indicators for voice and accountability, political stability and absences of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption are average values in 2010-2020; data source is WGI (2022). *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 21. Replication Sachs and Warner (1997) for IDA countries

Dependent Variable is GDP per capita Growth During 1970-1990					
	(1)	(2)	(3)	(4)	(5)
	LS	LS	LS	LS	LS
Share of Primary Exports in GNP in 1970	-4.277* (2.195)	-4.627* (2.246)	-7.297*** (1.859)	-11.358*** (2.950)	-9.243** (2.891)
Initial GDP per capita	-1.308** (0.507)	-1.242** (0.516)	-1.234*** (0.400)	-1.017 (0.645)	-1.056 (0.580)
Openness		3.807 (4.505)	5.032 (3.507)	4.513 (4.672)	1.586 (4.493)
Investment			1.254*** (0.305)	0.739 (0.507)	0.251 (0.527)
Rule of Law				0.950 (0.530)	1.069* (0.481)
Terms of Trade					0.190* (0.104)
No. Observations	28	28	28	16	16

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 22. Replication Alexeev Conrad (2009) for IDA countries

Dependent Variable is Log GDP p.c. in 2000					
	(1)	(2)	(3)	(4)	(5)
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Oil/GDP ratio	Log Mining output, p.c.	Mining/GDP ratio
			Panel A: Without controlling for Institutional Quality		
Natural Resource Wealth	0.063***	0.160***	3.660***	0.069*	0.931
	(0.021)	(0.029)	(0.861)	(0.039)	(1.727)
Observations	41	45	45	44	44
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes	Yes
			Panel B: Controlling for Institutional Quality		
Natural Resource Wealth	0.077***	0.206***	5.311***	0.120**	4.378
	(0.027)	(0.033)	(1.611)	(0.052)	(2.831)
Rule of Law (Instrumented)	1.322**	0.993***	1.613**	1.407**	1.554**
	(0.594)	(0.343)	(0.705)	(0.573)	(0.655)
Kleibergen Paap F-Stat	3.079	3.672	2.649	3.248	3.105
Hansen J, p-value	0.129	0.185	0.279	0.413	0.299
Observations	41	44	44	44	44
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes	Yes

Note: The method of estimation in Panel A is least squares; Panel B two-stage least squares. The instruments in Panel B for the Rule of Law variables are absolute latitude, the share of English language speakers, and the share of European language speakers. The control variables (not shown) in Panel A are absolute latitude and dummy variables for Latin America, East Asia, and European population. The control variables (not shown) in Panel B are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 23. Controlling for Initial GDP in the Alexeev and Conrad (2009) Dataset for IDA countries

Dependent Variable is Log GDP p.c. in 2000					
	(1)	(2)	(3)	(4)	(5)
	LS	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Oil/GDP ratio	Log Mining output, p.c.	Mining/GDP ratio
Natural Resource Wealth	0.032**	0.106***	2.323***	-0.031	-1.880
	(0.015)	(0.022)	(0.649)	(0.029)	(1.402)
Initial (1970) GDP p.c.	0.692***	0.563***	0.646***	0.849***	0.848***
	(0.113)	(0.107)	(0.121)	(0.145)	(0.127)
Observations	41	44	44	44	44
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. The control variables (not shown) are absolute latitude and dummy variables for Latin America, East Asia, and European population. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 24. Alexeev and Conrad's Measures of Natural Resources and GDP per capita in 2011 for IDA countries

	Dependent Variable is Log GDP p.c. in 2011				
	(1)	(2)	(3)	(4)	(5)
	LS	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Oil/GDP ratio	Log Mining output, p.c.	Mining/GDP ratio
	Panel A: Without controlling for initial GDP				
Natural Resource Wealth	0.058**	0.150***	3.798***	0.019	0.205
	(0.021)	(0.027)	(0.570)	(0.042)	(1.774)
Observations	39	42	42	41	45
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes	Yes
	Panel B: Controlling for initial GDP				
Natural Resource Wealth	0.046**	0.134***	3.365***	-0.035	-0.636
	(0.021)	(0.029)	(0.655)	(0.036)	(1.616)
Initial (1970) GDP p.c.	0.369	0.253	0.249	0.534**	0.470**
	(0.222)	(0.209)	(0.213)	(0.215)	(0.204)
Observations	38	41	41	41	41
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. The control variables (not shown) are absolute latitude and dummy variables for Latin America, East Asia, and European population. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 25. Alexeev and Conrad's Measures of Natural Resources and GDP per capita in 2020 for IDA countries

Dependent Variable is Log GDP p.c. in 2020					
	(1)	(2)	(3)	(4)	(5)
	LS	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Oil/GDP ratio	Log Mining output, p.c.	Mining/GDP ratio
			Panel A: Without controlling for initial GDP		
Natural Resource Wealth	0.059***	0.102***	1.826**	0.023	0.499
	(0.020)	(0.029)	(0.859)	(0.036)	(1.550)
Observations	41	43	43	42	47
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes	Yes
			Panel B: Controlling for initial GDP		
Natural Resource Wealth	0.054***	0.090**	1.480	-0.006	-0.226
	(0.019)	(0.035)	(0.948)	(0.042)	(1.663)
Initial (1970) GDP p.c.	0.217	0.204	0.221	0.307	0.303
	(0.222)	(0.254)	(0.259)	(0.277)	(0.254)
Observations	40	42	42	42	42
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. The control variables (not shown) are absolute latitude and dummy variables for Latin America, East Asia, and European population. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 26. Alternative Measures of Natural Resources and GDP per capita in 2011 for IDA countries

Dependent Variable is Log GDP p.c. in 2011				
	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Oil Rents, p.c. in 2011	Oil Rents/GDP in 2011	Log Natural Resource Rents, p.c. in 2011	Natural Resource Rents/GDP in 2011
		Panel A: Without controlling for initial GDP		
Natural Resource Wealth	0.299**	1.844*	0.075	0.847
	(0.097)	(0.830)	(0.067)	(0.568)
Observations	10	10	48	48
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes
		Panel B: Controlling for initial GDP		
Natural Resource Wealth	0.275***	1.756**	0.141*	0.891*
	(0.043)	(0.517)	(0.080)	(0.493)
Initial (1970) GDP p.c.	0.812***	0.903**	0.292	0.375*
	(0.135)	(0.277)	(0.188)	(0.211)
Observations	10	10	41	41
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. The control variables (not shown) are absolute latitude and dummy variables for Latin America, East Asia, and European population. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 27. Alternative Measures of Natural Resources and GDP per capita in 2020 for IDA countries

Dependent Variable is Log GDP p.c. in 2020				
	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Oil Rents, p.c. in 2020	Oil Rents/GDP in 2020	Log Natural Resource Rents, p.c. in 2020	Natural Resource Rents/GDP in 2020
		Panel A: Without controlling for initial GDP		
Natural Resource Wealth	0.027	2.486**	0.058	-1.366
	(0.064)	(1.147)	(0.067)	(1.634)
Observations	17	53	53	54
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes
		Panel B: Controlling for initial GDP		
Natural Resource Wealth	0.027	1.531*	0.118	-2.325
	(0.069)	(0.870)	(0.113)	(1.948)
Initial (1970) GDP p.c.	-0.044	0.154	0.215	0.358
	(0.627)	(0.258)	(0.254)	(0.227)
Observations	15	42	43	43
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. The control variables (not shown) are absolute latitude and dummy variables for Latin America, East Asia, and European population. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 28. Effects of Natural Resources on Income Inequality for IDA countries

Dependent Variable is Gini Coefficient in 2000				
	(1)	(2)	(3)	(4)
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
		Panel A: Without Controlling for Rule of Law		
Natural Resource Wealth	-0.477*	-0.485	0.252	-1.341
	(0.267)	(0.474)	(0.534)	(0.927)
Observations	41	43	43	43
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes
		Panel B: Controlling for Rule of Law		
Natural Resource Wealth	-0.508*	-0.492	0.071	-0.943
	(0.263)	(0.460)	(0.489)	(0.797)
Rule of Law (Instrumented)	-4.749	-2.037	-2.645	5.155
	(8.590)	(6.218)	(7.226)	(4.724)
Kleibergen Paap F-Stat	2.906	3.435	3.275	7.038
Hansen J, p-value	0.567	0.881	0.833	0.432
Observations	41	43	43	43
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation in Panel A is least squares; Panel B two-stage least squares. The instruments in Panel B for the Rule of Law variables are absolute latitude, the share of English language speakers, and the share of European language speakers. The control variables (not shown) in Panel A are absolute latitude and dummy variables for Latin America, East Asia, and European population. The control variables (not shown) in Panel B are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table B29. Effects of Natural Resources on Poverty for IDA countries

Dependent Variable is Poverty Headcount Ratio at $1.25 per Day in 2000

	(1)	(2)	(3)	(4)
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
		Panel A: Without Controlling for Rule of Law		
Natural Resource Wealth	-0.831*	-2.166**	-0.067	-1.262
	(0.470)	(0.842)	(0.824)	(1.374)
Observations	40	42	42	43
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes
		Panel B: Controlling for Rule of Law		
Natural Resource Wealth	-1.075**	-3.420***	-1.051	-2.327*
	(0.543)	(0.963)	(1.083)	(1.332)
Rule of Law (Instrumented)	-21.689***	-20.908***	-24.013***	-21.879***
	(6.556)	(6.702)	(8.970)	(7.306)
Kleibergen Paap F-Stat	10.889	10.803	9.432	8.069
Hansen J, p-value	0.293	0.467	0.857	0.622
Observations	40	42	42	43
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation in Panel A is least squares; Panel B two-stage least squares. The instruments in Panel B for the Rule of Law variables are absolute latitude, the share of English language speakers, and the share of European language speakers. The control variables (not shown) in Panel A are absolute latitude and dummy variables for Latin America, East Asia, and European population. The control variables (not shown) in Panel B are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 30. Effects of Natural Resource Wealth on the Human Development Index for IDA countries

Dependent Variable is Human Development Index in 2011

	(1)	(2)	(3)	(4)
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
		Panel A: Without Controlling for Rule of Law		
Natural Resource Wealth	0.007*	0.006	0.002	0.004
	(0.004)	(0.008)	(0.006)	(0.011)
Observations	41	41	41	40
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes
		Panel B: Controlling for Rule of Law		
Natural Resource Wealth	0.009***	0.013*	0.007	0.010
	(0.003)	(0.008)	(0.006)	(0.009)
Rule of Law (Instrumented)	0.165**	0.158*	0.154*	0.155*
	(0.079)	(0.092)	(0.090)	(0.090)
Kleibergen Paap F-Stat	4.369	4.078	4.727	3.472
Hansen J, p-value	0.293	0.272	0.241	0.622
Observations	41	41	41	40
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation in Panel A is least squares; Panel B two-stage least squares. The instruments in Panel B for the Rule of Law variables are absolute latitude, the share of English language speakers, and the share of European language speakers. The control variables (not shown) in Panel A are absolute latitude and dummy variables for Latin America, East Asia, and European population. The control variables (not shown) in Panel B are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 31. Effects of Natural Resource Wealth and State Ownership on GDP per capita for IDA countries

Panel A: Dependent Variable is Log GDP per capita in 2011

	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
Natural Resource Wealth	0.070***	0.150***	0.035	0.286***
	(0.019)	(0.031)	(0.045)	(0.074)
SOEs in the Economy Index	0.240	0.315	0.670	-0.356
	(0.442)	(0.465)	(0.548)	(0.481)
Observations	28	28	28	29
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Panel B: Dependent Variable is Log GDP per capita in 2020

	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
Natural Resource Wealth	0.076***	0.053	-0.002	0.115
	(0.022)	(0.035)	(0.043)	(0.094)
SOEs in the Economy Index	0.159	0.548	0.713	0.349
	(0.501)	(0.557)	(0.543)	(0.656)
Observations	29	29	29	28
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. The control variables (not shown) are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 32. Effects of Natural Resource Wealth and State Ownership on GDP per capita for IDA countries

Panel A: Dependent Variable is Log GDP per capita in 2011

	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
Natural Resource Wealth	0.084***	0.228***	0.058	0.317***
	(0.020)	(0.028)	(0.052)	(0.085)
SOEs in the Economy Index	0.104	0.041	0.587	-0.512
	(0.493)	(0.318)	(0.623)	(0.458)
Rule of Law	0.687*	0.944***	0.591	0.649**
	(0.386)	(0.143)	(0.381)	(0.284)
Observations	28	28	28	29
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Panel B: Dependent Variable is Log GDP per capita in 2020

	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
Natural Resource Wealth	0.084***	0.134***	0.009	0.152
	(0.022)	(0.045)	(0.046)	(0.105)
SOEs in the Economy Index	0.063	0.257	0.665	0.092
	(0.426)	(0.483)	(0.527)	(0.675)
Rule of Law	0.612***	0.820***	0.484**	0.566*
	(0.217)	(0.268)	(0.228)	(0.310)
Observations	29	29	29	28
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. The control variables (not shown) are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 33. Effects of State Ownership on Natural Resource Wealth for IDA countries

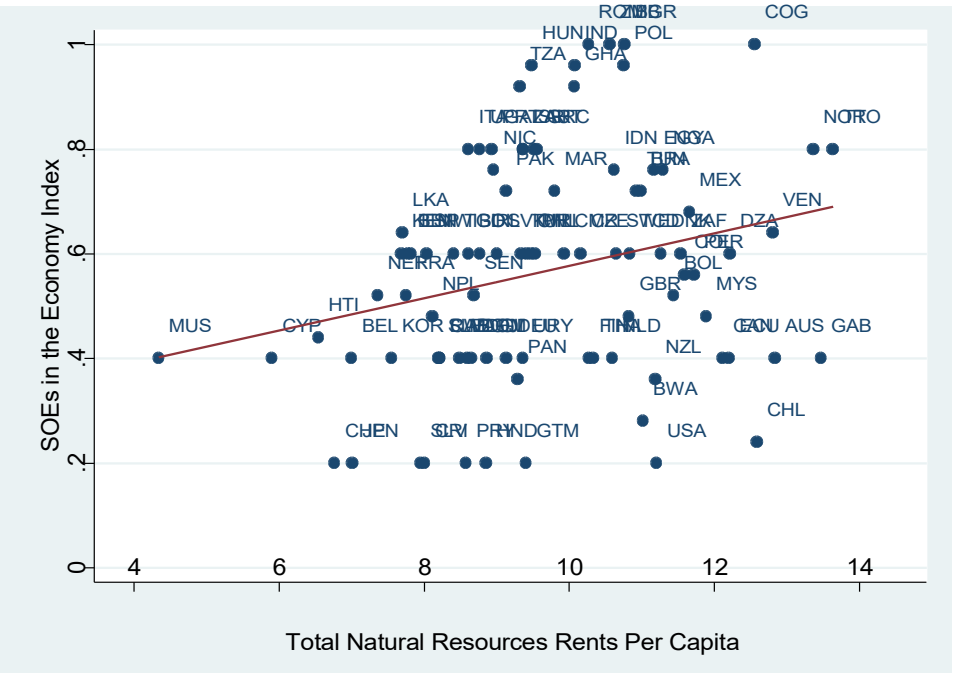
Dependent Variable is Level of Natural Resource Wealth

	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
SOEs in the Economy Index	7.458*	3.012	2.431	3.906***
	(3.756)	(2.372)	(2.016)	(1.269)
Rule of Law	-1.885	-1.819	-1.070	-0.378
	(1.536)	(1.491)	(1.010)	(0.574)
Observations	28	28	28	29
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

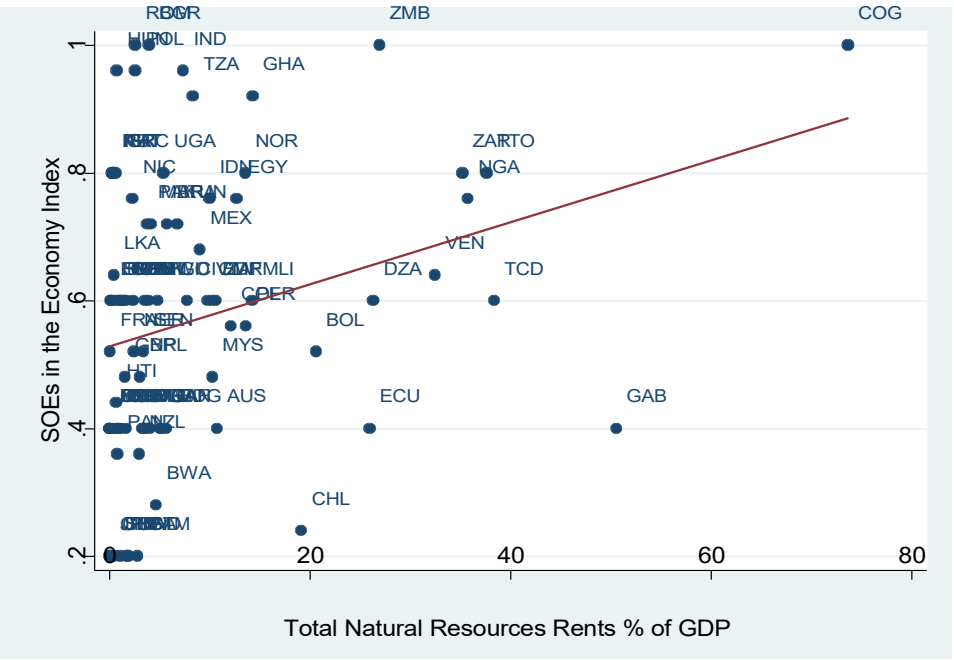
Note: The method of estimation is least squares. The control variables (not shown) are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. The instruments are absolute latitude, the fraction of the population that speaks English as the native language, and socialist legal origin *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Figure 1. Natural Resource Wealth and State Owned Enterprises

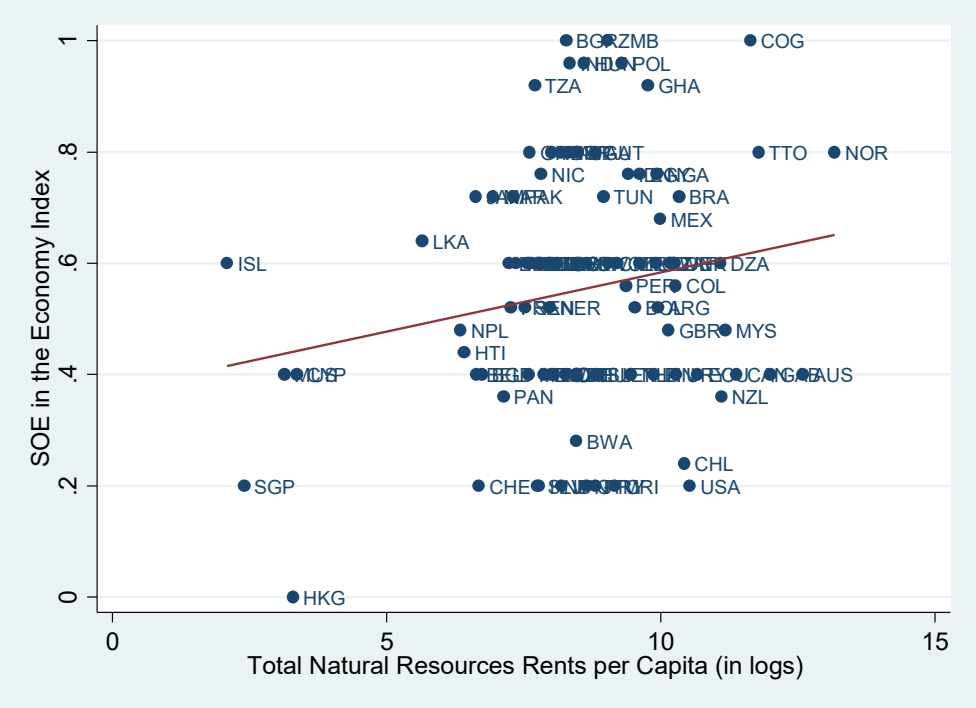
Panel A: Natural Resource Rents Per Capita in 2011



Panel B: Natural Resource Rents GDP Share in 2011



Panel C: Natural Resource Rents Per Capita in 2019



Panel D: Natural Resource Rents GDP Share in 2019

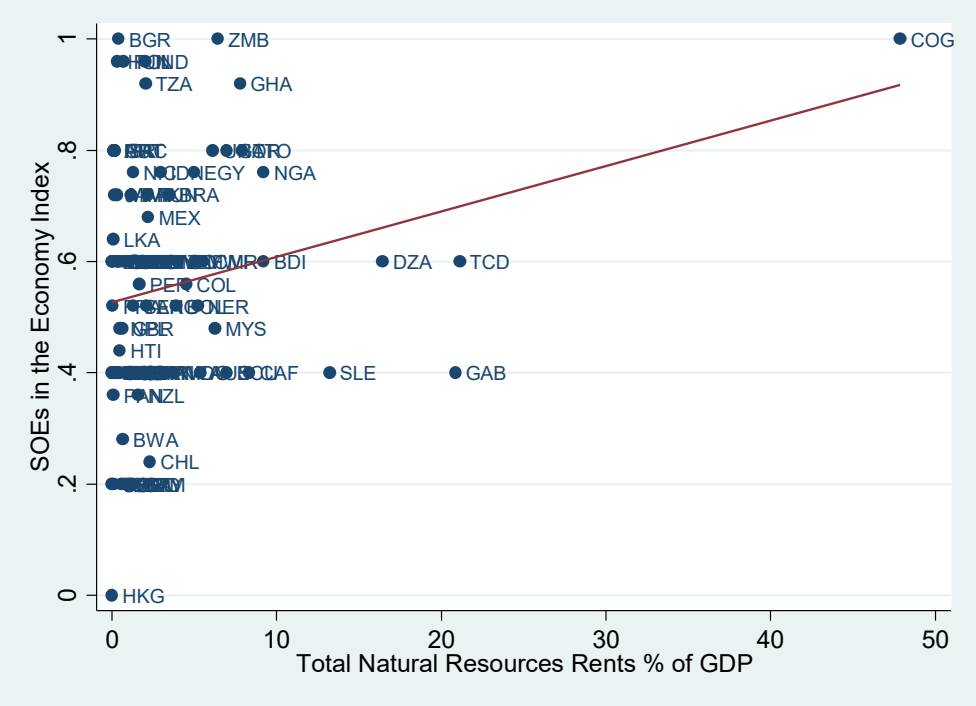
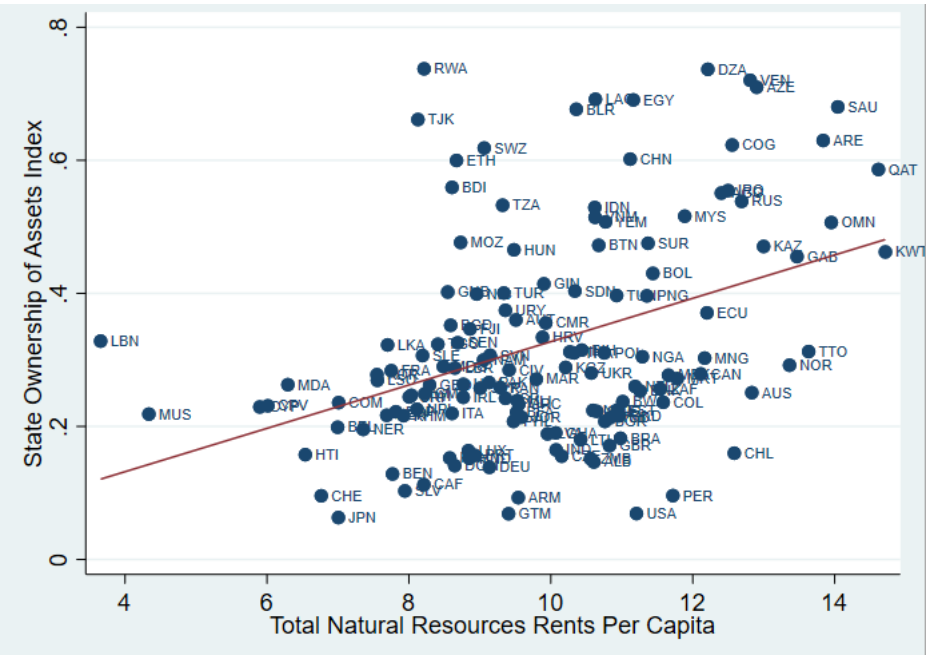
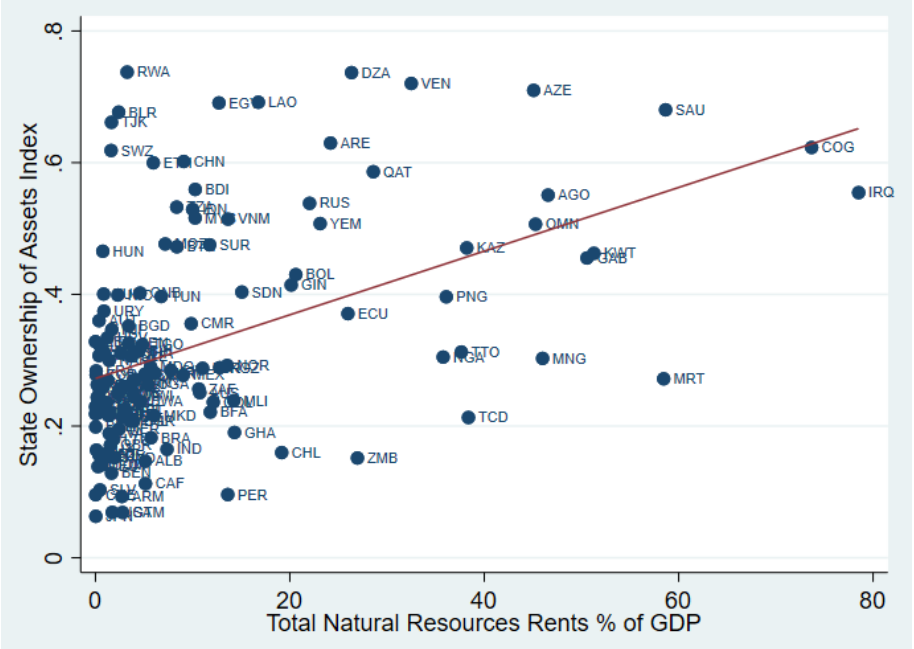


Figure 2. Natural Resource Wealth and State Ownership of Assets Index

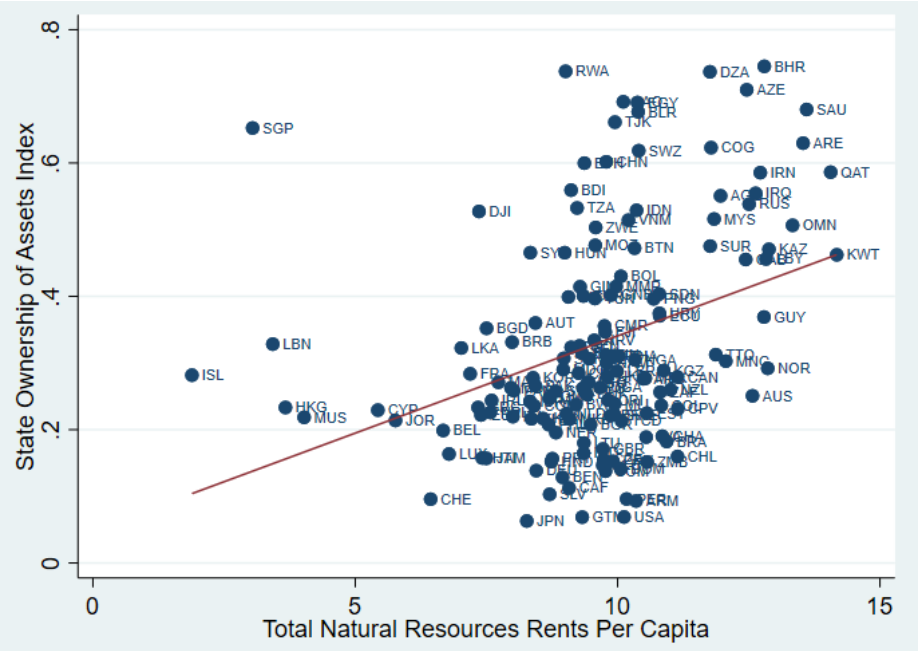
Panel A: Natural Resource Rents Per Capita in 2011



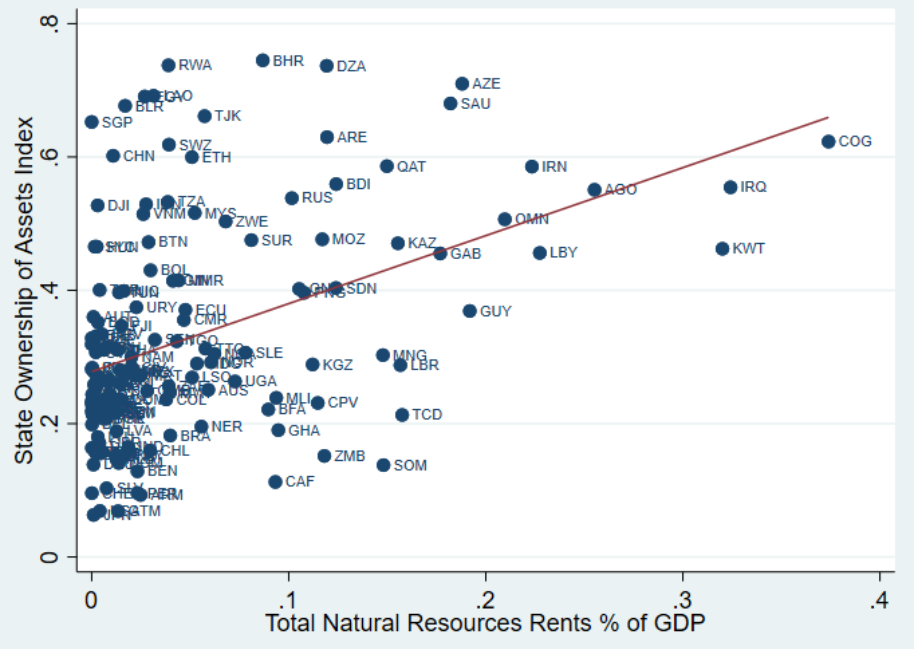
Panel B: Natural Resource Rents GDP Share in 2011



Panel C: Natural Resource Rents Per Capita in 2020



Panel D: Natural Resource Rents GDP Share in 2020



Appendix. Robustness Checks

Appendix Table 1. Effects of Natural Resource Wealth and Socialist Legal Origin on State Ownership

Dependent Variable is State Ownership of Assets Index

	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
Natural Resource Wealth	0.016***	0.024***	0.016***	0.036***
	(0.003)	(0.004)	(0.006)	(0.006)
Socialist Legal Origin	0.018	0.066	0.024	0.032
	(0.066)	(0.056)	(0.069)	(0.084)
Observations	112	117	117	111
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. The control variables (not shown) are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Appendix Table 2. Effects of Natural Resource Wealth and State Ownership on GDP per capita

Dependent Variable is Log GDP per capita in 2020

	(1)	(2)	(3)	(4)
		2SLS		
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
Natural Resource Wealth	-0.106	-0.065	0.005	-0.415
	(0.589)	(0.285)	(0.379)	(1.421)
State Ownership of Assets Index (Instrumented)	12.775	8.254	8.998	16.875
	(41.264)	(12.960)	(26.894)	(42.128)
Endogeneity Test, p-value	0.097	0.088	0.088	0.101
Kleibergen Paap F-stat	0.170	1.331	0.252	0.228
		LS		
Natural Resource Wealth	0.074***	0.104***	0.120***	0.174***
	(0.022)	(0.031)	(0.031)	(0.061)
State Ownership of Assets Index	0.149	0.598	0.962	-0.404
	(0.769)	(0.756)	(0.621)	(0.627)
Observations	109	113	113	108
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is two-stage least squares in the first panel, least squares in the second panel. The instrument used in the first panel is socialist legal origin. The control variables (not shown) are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Appendix Table 3. Effects of Natural Resource Wealth and State Ownership on GDP per capita

Dependent Variable is Log GDP per capita in 2020

	(1)	(2)	(3)	(4)
	Panel A: State Ownership of Assets Index is instrumented			
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
Natural Resource Wealth	-0.249	-0.207	-0.188	-0.305
	(0.636)	(0.262)	(0.328)	(0.339)
State Ownership of Assets Index (Instrumented)	19.372	12.677	13.937	10.148
	(39.809)	(10.789)	(17.005)	(8.340)
Rule of Law (Instrumented)	2.691	1.959	2.046	2.269*
	(3.972)	(1.225)	(1.687)	(1.161)
Kleibergen Paap F-Stat	0.078	0.431	0.206	0.526
Hansen J, p-value	0.680	0.867	0.611	0.960
	Panel B: State Ownership of Assets Index is not instrumented			
Natural Resource Wealth	0.046***	0.066***	0.047*	0.044
	(0.012)	(0.022)	(0.026)	(0.041)
State Ownership of Assets Index	0.745*	0.943**	1.288***	1.348**
	(0.435)	(0.414)	(0.426)	(0.605)
Rule of Law (Instrumented)	1.232***	1.308***	1.314***	1.375***
	(0.219)	(0.238)	(0.256)	(0.272)
Kleibergen Paap F-Stat	11.338	11.777	9.322	11.027
Hansen J, p-value	0.037	0.030	0.031	0.078
Observations	108	110	110	106
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is two-stage least squares. The excluded instruments (first stage estimates not shown) are absolute latitude, the fraction of the population that speaks English as the native language, and socialist legal origin in panel A; absolute latitude, the fraction of the population that speaks English as the native language in panel B. The control variables (estimates not shown) are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Appendix Table 4. Replication Alexeev Conrad (2009)

Dependent Variable is Log GDP p.c. in 2000					
	(1)	(2)	(3)	(4)	(5)
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Oil/GDP ratio	Log Mining output, p.c.	Mining/GDP ratio
	Panel A: Controlling institutional quality using Government Effect Index				
Natural Resource Wealth	0.056***	0.099***	1.818***	0.070***	2.361**
	(0.011)	(0.016)	(0.329)	(0.021)	(0.969)
Government Effect Index (Instrumented)	1.311***	1.279***	1.356***	1.314***	1.375***
	(0.201)	(0.177)	(0.199)	(0.228)	(0.231)
Kleibergen Paap F-Stat	8.782	6.828	6.536	6.121	6.243
Hansen J, p-value	0.181	0.150	0.787	0.193	0.455
Observations	110	115	115	115	115
	Panel B: Controlling institutional quality using Regulatory Quality				
Natural Resource Wealth	0.073***	0.128***	2.286***	0.049*	2.220
	(0.015)	(0.021)	(0.383)	(0.029)	(1.478)
Regulatory Quality (Instrumented)	1.462***	1.321***	1.539***	1.598***	1.608***
	(0.261)	(0.211)	(0.295)	(0.388)	(0.379)
Kleibergen Paap F-Stat	7.446	7.370	7.563	5.213	6.591
Hansen J, p-value	0.032	0.016	0.165	0.064	0.093
Observations	110	116	116	116	116
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes	Yes

Note: The method of estimation is two-stage least squares. Panel A Government Effect Index is used to measure institutional quality; Panel B Regulatory Quality is used to measure institutional quality. The instruments for institutional quality variables are absolute latitude, the share of English language speakers, and the share of European language speakers. The control variables (not shown) in Panel A and B are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Appendix Table 5. Effects of Natural Resources on Income Inequality

Dependent Variable is Gini Coefficient in 2000				
	(1)	(2)	(3)	(4)
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
	Panel A: Controlling institutional quality using Government Effect Index			
Natural Resource Wealth	-0.182 (0.137)	-0.401* (0.239)	0.147 (0.320)	-0.025 (0.419)
Government Effect Index (Instrumented)	-2.941 (2.709)	-4.668 (3.651)	-6.309 (4.062)	-3.364 (2.744)
Kleibergen Paap F-Stat	6.464	4.565	4.667	7.016
Hansen J, p-value	0.273	0.235	0.574	0.406
Observations	105	108	108	104
	Panel B: Controlling institutional quality using Regulatory Quality			
Natural Resource Wealth	-0.221 (0.147)	-0.469* (0.276)	0.195 (0.360)	-0.234 (0.414)
Regulatory Quality (Instrumented)	-2.664 (3.207)	-3.278 (3.563)	-6.932 (4.997)	-2.851 (2.976)
Kleibergen Paap F-Stat	5.469	4.815	4.425	8.823
Hansen J, p-value	0.252	0.134	0.398	0.255
Observations	105	109	109	105
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is two-stage least squares. Panel A Government Effect Index is used to measure institutional quality; Panel B Regulatory Quality is used to measure institutional quality. The instruments for institutional quality variables are absolute latitude, the share of English language speakers, and the share of European language speakers. The control variables (not shown) in Panel A and B are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Appendix Table 6. Effects of Natural Resources on Poverty

Dependent Variable is Poverty Headcount Ratio at $1.25 per Day in 2000

	(1)	(2)	(3)	(4)
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
	Panel A: Controlling institutional quality using Government Effect Index			
Natural Resource Wealth	-0.808***	-1.953***	-0.818	-1.429*
	(0.291)	(0.558)	(0.552)	(0.748)
Government Effect Index (Instrumented)	-17.348***	-18.707***	-17.134***	-15.098***
	(4.552)	(4.921)	(5.417)	(4.554)
Kleibergen Paap F-Stat	8.091	5.032	5.381	12.045
Hansen J, p-value	0.513	0.366	0.234	0.218
Observations	79	82	82	80
	Panel B: Controlling institutional quality using Regulatory Quality			
Natural Resource Wealth	-1.229***	-2.837***	-0.410	-1.674**
	(0.445)	(1.047)	(0.840)	(0.759)
Regulatory Quality (Instrumented)	-21.765***	-23.697**	-24.661**	-16.142***
	(7.784)	(9.732)	(12.231)	(5.325)
Kleibergen Paap F-Stat	3.362	2.315	2.208	9.701
Hansen J, p-value	0.580	0.386	0.350	0.206
Observations	79	83	83	81
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is two-stage least squares. Panel A Government Effect Index is used to measure institutional quality; Panel B Regulatory Quality is used to measure institutional quality. The instruments for institutional quality variables are absolute latitude, the share of English language speakers, and the share of European language speakers. The control variables (not shown) in Panel A and B are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Appendix Table 7. Effects of Natural Resource Wealth and State Ownership on GDP per capita in 2011

Dependent Variable is Log GDP per capita in 2011

	(1)	(2)	(3)	(4)
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
	Panel A: Controlling institutional quality using Government Effect Index			
Natural Resource Wealth	0.029	0.065**	0.062**	0.064
	(0.022)	(0.030)	(0.031)	(0.054)
SOEs in the Economy Index (Instrumented)	0.715	1.082*	0.670	0.684
	(0.742)	(0.599)	(0.676)	(0.643)
Government Effect Index	1.076***	1.101***	1.063***	1.089***
	(0.104)	(0.101)	(0.103)	(0.118)
Kleibergen Paap F-Stat	30.42	46.73	30.31	34.07
Observations	86	86	86	86
	Panel B: Controlling institutional quality using Regulatory Quality			
Natural Resource Wealth	0.043**	0.079***	0.043	0.074
	(0.020)	(0.024)	(0.029)	(0.051)
SOEs in the Economy Index (Instrumented)	0.405	0.902*	0.638	0.477
	(0.678)	(0.520)	(0.593)	(0.587)
Regulatory Quality	1.068***	1.107***	1.046***	1.080***
	(0.100)	(0.098)	(0.105)	(0.117)
Kleibergen Paap F-Stat	31.43	48.07	34.75	33.74
Observations	86	86	86	86
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is two-stage least squares. Panel A Government Effect Index is used to measure institutional quality; Panel B Regulatory Quality is used to measure institutional quality. The instrument for state ownership is socialist legal origin. The control variables (not shown) in Panel A and B are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Appendix Table 8. Effects of Natural Resource Wealth and State Ownership on GDP per capita in 2020

Dependent Variable is Log GDP per capita in 2020

	(1)	(2)	(3)	(4)
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
	Panel A: Controlling institutional quality using Government Effect Index			
Natural Resource Wealth	0.017	0.031	0.022	-0.011
	(0.019)	(0.027)	(0.031)	(0.050)
SOEs in the Economy Index (Instrumented)	1.230*	1.432**	1.269*	1.272*
	(0.717)	(0.595)	(0.698)	(0.677)
Government Effect Index	0.993***	1.003***	0.990***	1.025***
	(0.083)	(0.085)	(0.086)	(0.109)
Kleibergen Paap F-Stat	29.12	41.35	27.99	33.10
Observations	89	89	89	84
	Panel B: Controlling institutional quality using Regulatory Quality			
Natural Resource Wealth	0.032*	0.050**	0.012	0.000
	(0.019)	(0.025)	(0.029)	(0.045)
SOEs in the Economy Index (Instrumented)	1.045	1.396**	1.302**	0.985
	(0.658)	(0.557)	(0.613)	(0.610)
Regulatory Quality	0.913***	0.936***	0.909***	1.045***
	(0.100)	(0.100)	(0.111)	(0.111)
Kleibergen Paap F-Stat	29.53	43.08	31.75	31.99
Observations	89	89	89	84
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is two-stage least squares. Panel A Government Effect Index is used to measure institutional quality; Panel B Regulatory Quality is used to measure institutional quality. The instrument for state ownership is socialist legal origin. The control variables (not shown) in Panel A and B are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Appendix Table 9. Effects of State Ownership on Natural Resource Wealth

Dependent Variable is Level of Natural Resource Wealth

	(1)	(2)	(3)	(4)
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
	Panel A: Controlling institutional quality using Government Effect Index			
SOEs in the Economy Index (Instrumented)	2.053	-5.003	-0.010	0.122
	(4.639)	(4.051)	(2.938)	(2.250)
Government Effect Index (Instrumented)	1.405	-0.052	1.257	0.481
	(1.473)	(1.115)	(0.885)	(0.510)
Kleibergen Paap F-Stat	5.835	5.835	5.835	12.64
Observations	86	86	86	86
	Panel B: Controlling institutional quality using Regulatory Quality			
SOEs in the Economy Index (Instrumented)	0.912	-5.642	-0.790	-0.062
	(4.688)	(4.236)	(2.851)	(2.289)
Regulatory Quality (Instrumented)	2.451	0.651	1.930**	0.883
	(1.553)	(1.268)	(0.898)	(0.552)
Kleibergen Paap F-Stat	3.942	3.942	3.942	8.712
Observations	86	86	86	86
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is two-stage least squares. Panel A Government Effect Index is used to measure institutional quality; Panel B Regulatory Quality is used to measure institutional quality. The instrument for state ownership is socialist legal origin. The instruments for institutional quality variables are absolute latitude, the share of English language speakers, and the share of European language speakers. The control variables (not shown) in Panel A and B are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Appendix Table 10. Effects of State Ownership on Natural Resource Wealth

Dependent Variable is Level of Natural Resource Wealth

	(1)	(2)	(3)	(4)
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
	Panel A: Controlling institutional quality using Government Effect Index			
SOEs in the Economy Index (Instrumented)	1.626	-11.320	-6.009	-6.336*
	(4.190)	(8.788)	(4.187)	(3.765)
Government Effect Index (Instrumented)	-0.328	-2.687*	0.953	-0.499
	(0.672)	(1.601)	(0.810)	(0.713)
Initial (1970) Natural Resource Wealth	0.498***	0.404**	0.188*	0.210***
	(0.124)	(0.200)	(0.110)	(0.079)
Kleibergen Paap F-Stat	2.120	2.120	2.120	2.120
Observations	32	32	32	32
	Panel B: Controlling institutional quality using Regulatory Quality			
SOEs in the Economy Index (Instrumented)	1.867	-10.761	-5.563	-6.058*
	(4.080)	(7.746)	(3.563)	(3.302)
Regulatory Quality (Instrumented)	-0.101	-2.065	1.295	-0.230
	(0.674)	(1.544)	(0.806)	(0.677)
Initial (1970) Natural Resource Wealth	0.498***	0.414**	0.178	0.210***
	(0.130)	(0.199)	(0.115)	(0.076)
Kleibergen Paap F-Stat	1.649	1.649	1.649	1.649
Observations	32	32	32	32
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is two-stage least squares. Panel A Government Effect Index is used to measure institutional quality; Panel B Regulatory Quality is used to measure institutional quality. The instrument for state ownership is socialist legal origin. The instruments for institutional quality variables are absolute latitude, the share of English language speakers, and the share of European language speakers. The control variables (not shown) in Panel A and B are ethnolinguistic fractionalization and dummy variables for Latin America, East Asia, and European population. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Appendix Table 11. Policies, Natural Resources, and GDP per capita in Countries with Below-Median State Ownership of Assets

(Model Estimates with Variables from Fraser Institute)

	Dependent Variable is Log GDP p.c. in 2020			
	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Oil Rents, p.c. in 2020	Oil Rents/GDP in 2020	Log Natural Resource Rents, p.c. in 2020	Natural Resource Rents/GDP in 2020
Natural Resource Wealth	0.037	4.670	-0.020	-5.819***
	(0.027)	(3.242)	(0.039)	(1.780)
Regulation	0.011	-0.039	-0.060	-0.157*
	(0.109)	(0.088)	(0.092)	(0.092)
Freedom to trade internationally	0.059	0.187*	0.150	0.172*
	(0.124)	(0.101)	(0.105)	(0.098)
Sound money	0.061	0.014	-0.001	-0.029
	(0.098)	(0.085)	(0.084)	(0.086)
Legal system and property rights	0.332***	0.418***	0.433***	0.438***
	(0.093)	(0.076)	(0.076)	(0.074)
Observations	34	65	66	66
Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. The sample includes only those countries with below-median state ownership of assets in 2020. The control variables (estimates not shown) are absolute latitude, dummy variables for Latin America and East Asia, and the share of the population that speaks a European language. Data on regulation, freedom to trade internationally, sound money, legal system and property rights are measured in the year 2020 and are from Fraser Institute (2022). *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Appendix Table 12. Policies, Natural Resources, and GDP per capita in Countries with Below-Median State Ownership of Assets

(Model Estimates with Variables from Worldwide Governance Indicators)

	Dependent Variable is Log GDP p.c. in 2020			
	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Oil Rents, p.c. in 2020	Oil Rents/GDP in 2020	Log Natural Resource Rents, p.c. in 2020	Natural Resource Rents/GDP in 2020
Natural Resource Wealth	0.016 (0.021)	-0.732 (1.826)	-0.010 (0.026)	-1.965 (1.289)
Voice and accountability	0.409* (0.201)	0.201 (0.168)	0.213 (0.166)	0.203 (0.161)
Political stability and absences of violence/terrorism	0.140 (0.246)	0.082 (0.107)	0.068 (0.110)	0.055 (0.101)
Government effectiveness	0.593 (0.510)	0.286 (0.223)	0.288 (0.225)	0.247 (0.225)
Regulatory quality	0.648 (0.410)	1.017*** (0.298)	1.017*** (0.305)	1.016*** (0.300)
Rule of law	0.014 (0.375)	-0.180 (0.260)	-0.195 (0.262)	-0.210 (0.262)
Control of corruption	-0.794*** (0.272)	-0.469*** (0.142)	-0.446*** (0.146)	-0.393*** (0.140)
Observations	34	65	66	66
Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. The sample includes only those countries with below-median state ownership of assets in 2020. The control variables (estimates not shown) are absolute latitude, dummy variables for Latin America and East Asia, and the share of the population that speaks a European language. Indicators for voice and accountability, political stability and absences of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption are for the year 2020; data source is WGI (2022). *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Appendix Table 13. Policies, Natural Resources, and Human Development in Countries with Below-Median State Ownership of Assets

(Model Estimates with Variables from Fraser Institute)

Dependent Variable is Human Development Index in 2020				
	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
Natural Resource Wealth	0.001 (0.002)	0.002 (0.003)	0.007* (0.003)	-0.004 (0.005)
Regulation	0.008 (0.010)	0.003 (0.009)	0.000 (0.009)	0.009 (0.009)
Freedom to trade internationally	0.012 (0.009)	0.012 (0.009)	0.011 (0.009)	0.011 (0.010)
Sound money	-0.009* (0.005)	-0.009 (0.005)	-0.005 (0.005)	-0.010* (0.006)
Legal system and property rights	0.039*** (0.010)	0.041*** (0.010)	0.041*** (0.009)	0.043*** (0.010)
Observations	62	61	61	62
Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. The sample includes only those countries with below-median state ownership of assets in 1990. The control variables (estimates not shown) are absolute latitude, dummy variables for Latin America and East Asia, and the share of the population that speaks a European language. Data on regulation, freedom to trade internationally, sound money, legal system and property rights are measured in the year 1990 and are from Fraser Institute (2022). *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Appendix Table 14. Policies, Natural Resources, and Human Development in Countries with Below-Median State Ownership of Assets

(Model Estimates with Variables from Worldwide Governance Indicators)

Dependent Variable is Human Development Index in 2020				
	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Hydrocarbon deposits, p.c.	Log Value of oil output, p.c.	Log Mining output, p.c.	Log Natural Resource Rents, p.c.
Natural Resource Wealth	0.001 (0.002)	0.006** (0.002)	0.005* (0.003)	-0.000 (0.005)
Voice and accountability	-0.003 (0.025)	0.010 (0.024)	0.000 (0.026)	0.004 (0.030)
Political stability and absences of violence/terrorism	-0.031* (0.015)	-0.029** (0.014)	-0.028* (0.015)	-0.032** (0.015)
Government effectiveness	0.053 (0.046)	0.050 (0.046)	0.067 (0.045)	0.058 (0.049)
Regulatory quality	0.100** (0.039)	0.103** (0.039)	0.086** (0.039)	0.077* (0.044)
Rule of law	0.073* (0.043)	0.058 (0.042)	0.064 (0.043)	0.062 (0.046)
Control of corruption	-0.061** (0.024)	-0.061*** (0.023)	-0.065*** (0.023)	-0.036 (0.027)
Observations	68	67	67	68
Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. The sample includes only those countries with below-median state ownership of assets in 1990. The control variables (estimates not shown) are absolute latitude, dummy variables for Latin America and East Asia, and the share of the population that speaks a European language. Indicators for voice and accountability, political stability and absences of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption are for the year 2000; data source is WGI (2022). *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Appendix Table 15. Policies, Natural Resources, and Poverty in Countries with Below-Median State Ownership of Assets

(Model Estimates with Variables from Fraser Institute)

Dependent Variable is Average Poverty Headcount Ratio at $2.15 in 2010-2020				
	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Oil Rents, p.c. in 2010-2020	Oil Rents/GDP in 2010-2020	Log Natural Resource Rents, p.c. in 2010-2020	Natural Resource Rents/GDP in 2010-2020
Natural Resource Wealth	-0.571 (0.624)	-113.088* (64.809)	0.025 (0.895)	52.325 (54.430)
Regulation	-7.002 (4.510)	-6.448* (3.571)	-5.771 (3.501)	-4.396 (3.473)
Freedom to trade internationally	-3.427 (4.311)	1.819 (3.344)	2.491 (3.589)	2.532 (3.137)
Sound money	3.001 (4.700)	-3.272 (3.666)	-3.032 (3.758)	-2.999 (3.701)
Legal system and property rights	-0.499 (3.946)	-2.972 (2.997)	-2.998 (3.101)	-3.241 (3.117)
Observations	37	60	60	60
Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. The sample includes only those countries where state ownership of assets is below the median of the 2010-2020 average. The control variables (estimates not shown) are absolute latitude, dummy variables for Latin America and East Asia, and the share of the population that speaks a European language. Data on regulation, freedom to trade internationally, sound money, legal system and property rights are average values in 2010-2020 and are from Fraser Institute (2022). *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Appendix Table 16. Policies, Natural Resources, and Poverty in Countries with Below-Median State Ownership of Assets

(Model Estimates with Variables from Worldwide Governance Indicators)

Dependent Variable is Average Poverty Headcount Ratio at $2.15 in 2010-2020				
	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Oil Rents, p.c. in 2010-2020	Oil Rents/GDP in 2010-2020	Log Natural Resource Rents, p.c. in 2010-2020	Natural Resource Rents/GDP in 2010-2020
Natural Resource Wealth	-0.918 (0.641)	-34.542 (52.071)	-0.086 (0.824)	0.854 (59.647)
Voice and accountability	17.807** (7.889)	-3.759 (9.500)	-3.027 (8.791)	-3.038 (8.766)
Political stability and absences of violence/terrorism	-2.984 (4.998)	4.734 (4.800)	4.635 (5.061)	4.686 (4.744)
Government effectiveness	-41.722 (25.446)	-14.043 (9.589)	-14.339 (9.967)	-14.199 (10.311)
Regulatory quality	-2.482 (7.878)	-6.889 (10.462)	-6.867 (10.958)	-6.951 (10.213)
Rule of law	5.979 (12.275)	1.711 (11.697)	1.409 (11.993)	1.522 (11.691)
Control of corruption	18.910 (12.063)	7.653 (8.615)	7.932 (8.894)	7.702 (8.172)
Observations	37	60	60	60
Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. The sample includes only those countries where state ownership of assets is below the median of the 2010-2020 average. The control variables (estimates not shown) are absolute latitude, dummy variables for Latin America and East Asia, and the share of the population that speaks a European language. Indicators for voice and accountability, political stability and absences of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption are average values over the period 2010-2020; data source is WGI (2022). *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Appendix Table 17. Policies, Natural Resources, and Income Inequality in Countries with Below-Median State Ownership of Assets

(Model Estimates with Variables from Fraser Institute)

Dependent Variable is Average Gini Coefficient in 2010-2020				
	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Oil Rents, p.c. in 2010-2020	Oil Rents/GDP in 2010-2020	Log Natural Resource Rents, p.c. in 2010-2020	Natural Resource Rents/GDP in 2010-2020
Natural Resource Wealth	-0.009 (0.214)	1.722 (15.163)	0.651* (0.329)	-4.006 (17.486)
Regulation	-1.007 (0.898)	-0.620 (1.230)	-0.652 (1.167)	-0.735 (1.079)
Freedom to trade internationally	-3.869 (3.570)	-1.205 (1.292)	-0.949 (1.163)	-1.219 (1.230)
Sound money	3.827 (2.909)	1.353 (1.217)	1.288 (1.212)	1.347 (1.233)
Legal system and property rights	2.182 (1.786)	1.595* (0.813)	1.451* (0.789)	1.615* (0.807)
Observations	37	60	60	60
Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. The sample includes only those countries where state ownership of assets is below the median of the 2010-2020 average. The control variables (estimates not shown) are absolute latitude, dummy variables for Latin America and East Asia, and the share of the population that speaks a European language. Data on regulation, freedom to trade internationally, sound money, legal system and property rights are average values in 2010-2020 and are from Fraser Institute (2022). *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Appendix Table 18. Policies, Natural Resources, and Income Inequality in Countries with Below-Median State Ownership of Assets

(Model Estimates with Variables from Worldwide Governance Indicators)

	Dependent Variable is Average Gini Coefficient in 2010-2020			
	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
Measure of Natural Resource Wealth is:	Log Oil Rents, p.c. in 2010-2020	Oil Rents/GDP in 2010-2020	Log Natural Resource Rents, p.c. in 2010-2020	Natural Resource Rents/GDP in 2010-2020
Natural Resource Wealth	-0.215 (0.214)	6.624 (14.561)	0.992** (0.467)	7.201 (18.798)
Voice and accountability	4.849 (4.595)	2.524 (3.981)	2.125 (3.590)	2.486 (3.876)
Political stability and absences of violence/terrorism	1.195 (1.912)	1.820 (1.856)	2.464 (1.777)	1.788 (1.793)
Government effectiveness	3.032 (5.942)	1.364 (2.922)	2.661 (3.173)	1.655 (2.842)
Regulatory quality	3.278 (4.546)	0.711 (2.849)	-0.397 (3.355)	0.840 (2.927)
Rule of law	-6.115 (8.370)	-2.006 (5.329)	-0.950 (4.743)	-1.745 (5.323)
Control of corruption	-2.495 (3.828)	-2.206 (2.259)	-4.118 (2.485)	-2.789 (2.935)
Observations	37	60	60	60
Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is least squares. Standard errors (shown in parentheses) are Huber robust. The sample includes only those countries where state ownership of assets is below the median of the 2010-2020 average. The control variables (estimates not shown) are absolute latitude, dummy vriables for Latin America and East Asia, and the share of the population that speaks a European language. Indicators for voice and accountability, political stability and absences of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption are average values in 2010-2020; data source is WGI (2022). *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Appendix Table 19. Instrumenting Natural Resource Rents with Natural Capital

	Log GDP p.c.			
	(1)	(2)	(3)	(4)
	Year 2011	Year 2011	Year 2019	Year 2019
Log Natural Resource Rents p.c.	0.209***	0.085	0.179**	0.002
	(0.074)	(0.059)	(0.090)	(0.056)
Initial (1970) Log GDP p.c.		0.792***		0.820***
		(0.146)		(0.123)
Kleibergen Paap F-Stat	60.414	31.713	338.367	150.52
Endogeneity Test, p-value	0.194	0.794	0.618	0.826
	First Stage Natural Resource Rents			
Natural Capital	1.353***	1.276***	1.502***	1.543***
	(0.174)	(0.227)	(0.082)	(0.126)
Observations	87	86	108	96
Alexeev Conrad Control Variables	Yes	Yes	Yes	Yes

Note: The method of estimation is two-stage least squares. The control variables (not shown) are absolute latitude and dummy variables for Latin America, East Asia, and European population. The dependent variable in columns (1) and (2) is the log of GDP per capita in 2011; in columns (3) and (4) the dependent variable is log GDP per capita in 2019. Standard errors (shown in parentheses) are Huber robust. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.