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Abstract

We empirically examine the impact of oil wealth on property rights protection for a sample of 156 countries between 1960 and 2014. We find that higher levels of oil wealth result in weaker private property rights. This result is robust to different instrumental-variable approaches and operationalizations of oil wealth and economic institutions. We argue that oil wealth creates an oil elite that wields disproportionate economic and political power over society. The elite uses this power to buy support for weak property rights from their supporters (the selectorate), while also punishing the opposition (i.e., the non-selectorate). Indeed, we also provide evidence that oil wealth leads to more clientelistic policies (benefitting the selectorate) but also more punitive measures (e.g., in the form of exclusion from state jobs) likely administered to the non-selectorate. We argue that the elite favors weak property rights because this blocks potential economic challengers, allowing for the consolidation and perpetuation of the economic and political status quo.

Keywords: oil wealth; economic institutions; property rights; resource curse; selectorate theory

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1. Introduction

The question of the socio-political and economic effects of natural resource wealth, especially *oil wealth*, is hotly debated in the academic literature (for reviews, see, e.g., Torvik, 2009; van der Ploeg, 2011; Nillesen and Bulte, 2014; Ross, 2015; van der Ploeg and Poelhekke, 2017). For instance, a multitude of studies have examined the effects of natural resources on economic growth and development (e.g., Sachs and Warner, 1995; Rodríguez and Sachs, 1999; Gylfason, 2001; Atkinson and Hamilton, 2003; Mehlum et al., 2006; Frankel 2012; Cassidy, 2019), governance and democratic development (Jensen and Wantchekon, 2004; Isham et al., 2005; Haber and Menaldo, 2011; Pendergast et al., 2011; Ramsay, 2011; Tsui, 2011; Brooks and Kurtz, 2016), human capital formation (e.g., Cockx and Francken, 2014) and political instability (e.g., Cotet and Tsui, 2013; Nillesen and Bulte, 2014; Wright et al., 2015).

In this contribution, we contribute to this literature by studying the role of oil wealth on a hitherto unappreciated institutional factor: the *protection of property rights*. Building on the *theory of the hierarchy and persistence of institutions* by Acemoglu and co-authors (e.g., Acemoglu et al., 2005; Acemoglu and Robinson, 2012) and the *selectorate theory* of Bueno de Mesquita and Smith (e.g., Smith, 2008; Bueno de Mesquita and Smith, 2012), we argue that oil wealth will provide disproportionate economic and political power to those who control the income from oil (*oil elite*); in turn, the oil elite will use this power to buy support for weak property rights from their supporters (the selectorate), while also punishing the opposition (i.e., the non-selectorate). The elite ought to favor weak property rights because they allow for the consolidation of the existing distribution of economic and political power – which is favorable to the elite – by blocking potential challengers to the status quo, which would otherwise emerge due to competition and innovation under a strong property rights regime. Even though strong property rights (by facilitating trade, investment, innovation etc.) are fundamental to economic growth (e.g., Acemoglu et al., 2001; for a survey, see Asoni, 2008), the selectorate will consent

to slow economic growth due to weak property rights when it is adequately compensated for its support by the oil elites.

We empirically analyze the relationship between oil wealth and weak economic institutions for a large sample of 156 countries between 1960 and 2014. Consistent with our expectations, we find evidence that higher levels of oil wealth result in weaker private property rights. This result is robust to different operationalizations of oil wealth and economic institutions. It is also robust to the use of different instrumental-variable approaches, where oil wealth is instrumented by lagged oil reserves, natural disasters in other oil-producing countries and unexpected oil discoveries. Finally, we provide evidence that oil wealth leads to more clientelistic (e.g., in the form of corrupt exchanges) but also more punitive policy measures (e.g., in the form of exclusion from state jobs and business opportunities). Consistent with our theoretical framework, we argue that the elite implements their preferred property rights regime via these transmission channels, i.e., via clientelistic rewards provided to the selectorate and punishment administered to the non-selectorate.

The remainder of this paper is structured as follows. In Section 2, we discuss in more detail the linkages between oil wealth and weak property rights. We introduce the data and methodology to test the hypothesis that oil wealth translates into poor economic institutions in Section 3. In Section 4 we present our empirical findings. Section 5 concludes.

2. Theoretical Framework

2.1 The Hierarchy and Persistence of Institutions

We begin our discussion of the role of oil wealth in property rights by introducing the model of the hierarchy and persistence of institutions of, inter alia, Acemoglu et al. (2005) and Acemoglu and Robinson (2012). Following these authors, the arrangement of economic

institutions (e.g., the protection of property rights) at a certain point in time (*t*), is determined by the exercise of *de jure* and *de facto* political power, which in turn are rooted in a society's previous (*t-1*) formal political institutions and distribution of resources, respectively. Consequently, a specific choice of economic institutions determines a country's future (*t+1*) growth path and distribution of resources and political power. We also visualize this framework in Figure 1.

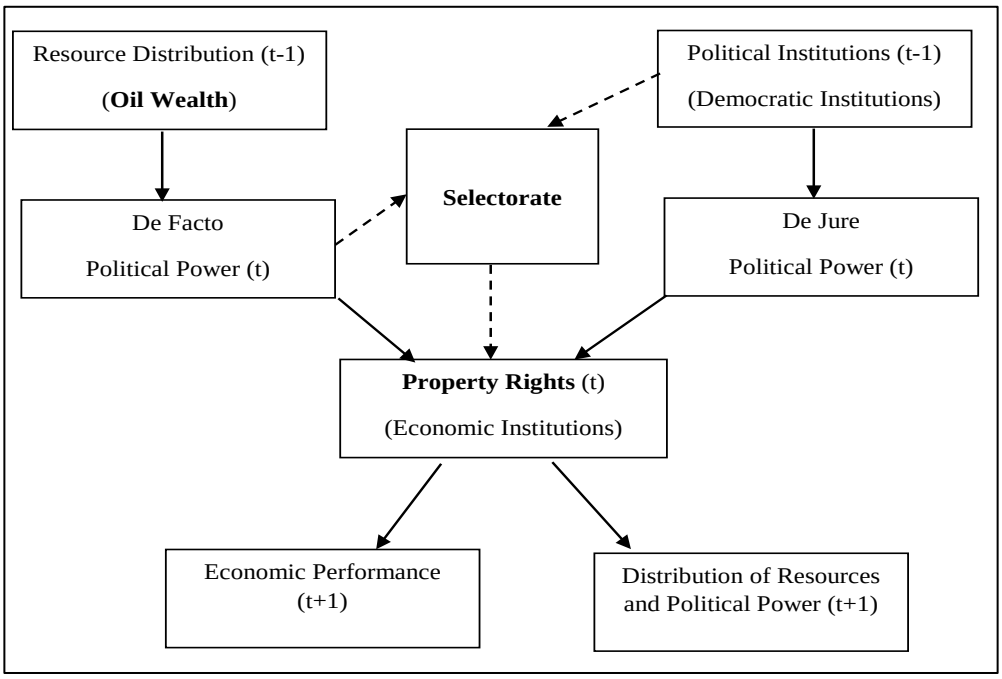

Figure 1: Theoretical Framework

First, this framework introduces a specific *hierarchy* of institutional development, where economic institutions are determined by political institutions and the distribution of resources within a society. Thus, any variable that affects a country's distribution of resources, such as its *oil wealth*, will have consequences for the form of its economic institutions such as the *protection of property rights*. Second, the framework posits a *persistence* of institutions: Those groups with more de jure and de facto political power will exercise this power to select present-day (*t*) economic institutions favorable to their interests. This will likely reproduce the initial (*t-1*) distribution of resources and political power in the future (*t+1*).

2.2. The Role of Oil Wealth

Oil wealth is one important factor determining a country's distribution of resources. For one, income generated from oil production will be substantial due to oil's paramount domestic and international economic importance as a critical input in industrial development and transportation.

What is more, the idiosyncrasies of oil production and markets facilitate the concentration of oil income – and thus of economic power – in relatively few hands. Oil is a "point resource", i.e., it is "extracted from a narrow geographic or economic base" (Isham et al., 2005: 143), meaning that areas of oil extraction will usually be geographically concentrated within a country and controlled by a small number of economic actors, e.g., privately-owned supermajors (e.g., *BP* and *Chevron*) and their large shareholders. That is, the oil sector is usually characterized by oligopolistic or even monopolistic markets, which by nature contributes to a concentration of economic power.

Due to oil's economic and strategic value as well as production and market structure, the oil sector will also often see government influence over resource extraction, e.g., in the form of substantial government share-holding of oil-producing companies (e.g., the Russian *Gazprom*) or outright nationalization of the oil sector, leading to state-owned oil companies (e.g., the Saudi-Arabian *Aramco* and the Venezuelan *PDVSA*). This government influence is expected to further facilitate the concentration of economic power in relatively few hands, at the same time weakening government incentives to exercise efficient oversight over the oil-producing sector and the concentration of economic resources within it.

Consequently, consistent with our theoretical framework (Figure 1), we expect – given the likely influence of oil wealth on a country's distribution of economic resources – the relatively

small and disproportionately powerful societal group controlling the oil wealth (the *oil elite*) to influence a country's property rights regime in their favor.

2.3 The Interests of the Elite and the Selectorate

What level of property rights protection will be chosen by those that control the oil wealth? On the one hand, strong property rights are fundamental to economic growth. For instance, sound property rights are expected to encourage investments in physical capital and the efficient organization of markets, which in turn ought to promote economic growth (e.g., Asoni, 2008). Thus, advocating for strong property rights may be beneficial to the oil elite by increasing the total economic pie.

On the other hand, however, precisely by facilitating domestic competition, technological innovation and international market entry, strong property rights may undermine the *future* economic position of the oil elite. This is because competition and innovation may allow for the development of competing elites with (i) potentially divergent politico-commercial interests and (ii) the economic means to push their agenda. For instance, competition and innovation may promote the emergence of a renewable energy industry; powerful interests associated with this new industry (as a rival elite) may convert their economic success into political power, challenging the fossil fuel industry and its old elite.

Consequently, the development and persistence of institutions might create perverse incentives for the oil elite. That is, the elite may consciously protect their survival by introducing economic institutions that allow them to thrive and, more importantly, to block potential challengers to the status quo. In other words, the logic of economic and political survival dictates that the elite will use its oil income to push institutional arrangements favorable to remaining in a position of power, delaying economic modernization and diversification (e.g., the development of new energy industries) and entrenching political and economic inequalities

(e.g., Isham et al., 2005; Acemoglu et al., 2005; Acemoglu and Robinson, 2012; Smith, 2008; Bueno de Mesquita and Smith, 2011). Indeed, a fairly large literature on *rentier states* claims that resource-wealthy rulers use their wealth in ways that allow them to remain in office (e.g., Mahdavy, 1970; Beblawi, 1987; Smith, 2004; Wright et al., 2015).

Crucially, the possibility to implement weak property rights is also shaped by non-elite segments of society. For instance, in democracies the exercise of de jure political power by market-friendly parts of the population may counter the market-unfriendly impulses of the elite, given that for many segments of society poor economic growth due to weak economic institutions will not be preferable. To explain how the elite may nevertheless push weak property rights, we resort to the *selectorate theory* of, inter alia, Bueno de Mesquita and Smith (2012). Consistent with our reasoning so far, selectorate theory argues that the primary goal of leaders (i.e., the elite) is to stay in power. To remain in power (i.e., to perpetuate political and economic institutions favorable to them), elites have to form a winning coalition, the *selectorate*, and satisfy their demands. Here, the size of the winning coalition depends on a country's political institutions, being rather small in autocracies (the royal household, the army, the nobility, members of the ruling party in a one-party state etc.) and being larger in democracies (e.g., a majority of all voters).

We argue that the selectorate will consent to poor economic growth due to weak economic institutions when it is adequately compensated for by the elite. This compensation occurs when the elite exercises de facto political power stemming from their disproportionate access to a country's resource base. Indeed, there are a number of pathways through which oil wealth can be used to "buy" weak economic institutions from the selectorate, including systems of *patronage* (e.g., by providing the selectorate with preferential subsidy policies, government

employment, “white elephant” investments contracts etc.) and *corruption* (i.e., by outright bribing important public officials).

At the same time, the elite may also use its economic power to suppress the *non-selectorate*, i.e., those parts of the population that are hostile to the elite, e.g., due to economic or cultural antagonisms. Here, the elite may convert economic into de facto political power by financing violence and repression directed against influential political opponents (e.g., opposition parties, critical journalists) to impose their wishes regarding the arrangement of property rights also on non-cooperative segments of society (e.g., Acemoglu et al., 2005).

2.4. Hypothesis

In sum, relying on the theory of the hierarchy and persistence of political and economic institutions by Acemoglu and co-authors (e.g., Acemoglu et al., 2005; Acemoglu and Robinson, 2012) and the selectorate theory of Bueno de Mesquita and Smith (2012), we argue that oil wealth will provide disproportionate economic and political power to oil elites. The elite is expected to use this power to push for weak property rights because they allow for the consolidation of the existing status quo favorable to elite, blocking potential challengers (which would emerge due to competition and innovation under a strong property rights regime). Our main hypothesis is thus:

> *Hypothesis: Higher levels of oil wealth lead to lower levels of property rights protection.*

3. Data and Methods

To investigate the role of oil wealth in property rights, we collect panel data for 156 countries between 1960 and 2014. The beginning and end of our observation are dictated by data availability; in particular, oil data is only available up to 2014. As for the cross-sectional

dimension, we exclude a number of small-island nation states and micro-states due to a lack of data. A list of countries is provided in the appendix. The summary statistics are reported in Table 1.

TABLE 1

3.1 Dependent Variable

Our main dependent variable measuring a country's economic institutions is an *index of private property rights* drawn from the *Varieties of Democracy Project* (*VDEM*) (VDEM, 2019). Higher values of the index correspond to higher levels of property rights protection. Relying on both country-based and subject-based experts, VDEM asks whether and to what extent private property rights (i.e., the right to acquire, possess, inherit and sell private property) are constrained, where limits to this right will be primarily set by the state.[1] In detail, expert opinion may range from stating that virtually nobody enjoys private property rights of any kind to stating that virtually everybody enjoys virtually all kinds of property rights. VDEM then uses the raw expert opinion data to provide one representative value of property rights protection per country-year observation, applying item response theory and other forms of rigorous statistical scrutiny to minimize uncertainty and bias (VDEM, 2019).[2]

Figure 2 visualizes general trends in property rights protection between 1960 and 2014 in oil- and non-oil-producing countries. While property rights become stronger in both types of countries over time, property rights protection is on average always weaker in oil-producing

[1] Additionally, limits to property rights may also be due to customary laws or religious and social norms (e.g., consider limits to property rights for women because of religious customs). In many cases, however, such norms and customs will also be reflected in official law.

[2] See https://www.v-dem.net/en/ for detailed explanation of the methodology.

countries, giving first – albeit highly tentative – evidence that oil production may indeed correlate negatively with economic institutions.

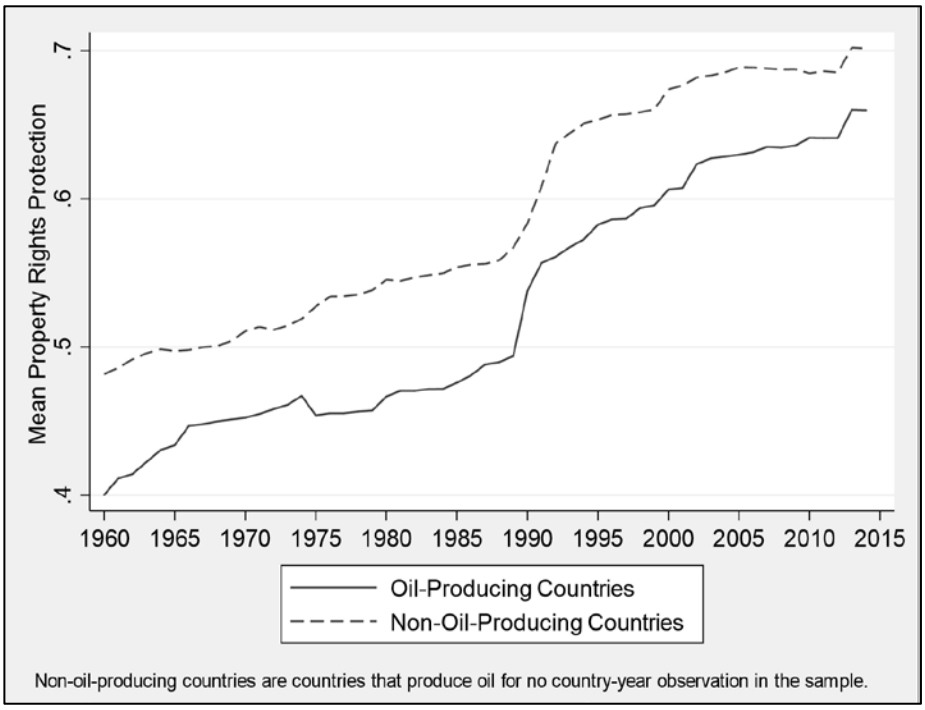

Figure 2: Property Rights Protection in Oil- and Non-Oil-Producing Countries

3.2 Main Independent Variable

To measure oil wealth, we use the *value of oil production per capita*. In detail, this variable measures the country-level production of the number of barrels of oil in a specific year and uses the world-market price of a barrel of oil in 2000 US-$ to provide a production value that is comparable over time. This variable is subsequently divided by a country's population size to derive a per capita value of oil production. The variable is logged to reduce the influence of extreme values, with unity being added to allow for zero-observations. The oil data are drawn from the dataset of Ross and Madhavy (2015).

3.3 Empirical Model and Controls

3.3.1 Model

To examine the effect of oil wealth on property rights protection, we run a series of OLS regressions of the following form:

$$pr\_rights_{it} = \beta * oil_{it} + \gamma' * X'_{it} + \varepsilon_{it} \quad (1)$$

In equation (1), *pr_rights* is the VDEM private property rights index for country *i* at year *t*. It is explained by *oil*, i.e., a country's (logged) per capita oil production value. Besides a well-behaved error term (ε), we also include a vector of additional controls (*X'*) that we introduce below.

Panel data can exhibit many dependencies across space and time; not accounting for these dependencies may lead to invalid statistical inference. Indeed, pre-tests show that the data is plagued by serial correlation. Furthermore, using the test for cross-sectional dependence of Pesaran (2004), we find that cross-sectional dependence is present for almost all variables employed in our analysis (Supplementary Table 1); for instance, interdependencies of variables across countries (cross-sectional dependence) at a specific point in time may be due to spill-over effects, e.g., the cross-border diffusion of property rights. To accommodate serial and cross-sectional dependence, we consequently use standard errors developed by Driscoll and Kraay (1998) to make statistical inferences. These standard errors are not only robust to serial correlation but also to general forms of cross-sectional dependence. Furthermore, they are robust to heteroskedasticity which also routinely affects panel analyses.

3.3.2 Control Variables

As for the vector of controls (*X'*), depending on the exact specification we consider the following variables.

First, we always include *country-fixed effects* and *year-fixed effects*, which account for unobserved (time-invariant) heterogeneity as well as common shocks and trends, respectively. In the *parsimonious model*, we furthermore consider the influence of *infant mortality* to control

for the level of economic development, expecting more developed countries to have stronger property rights.[3] The data on infant mortality comes from the *World Development Indicators* (*WDI*) (World Bank, 2019). We also control for *population size*; the variable is logged to reduce the influence of skewness and also drawn from the WDI. For instance, more populous countries can more strongly rely on large internal markets and may thus be able to afford weaker property rights. Finally, we control for *democracy*, using a binary indicator variable drawn from Bjornskov and Rode (forthcoming). Inter alia, we include this covariate because oil wealth tends to correlate with authoritarianism (e.g., Ross, 2012).

In our more extensive *baseline model*, we additionally control for *region-specific trends* by interacting the year-fixed effects with a set of regional dummies.[4] For instance, fluctuations in oil prices may be particularly influential in oil-rich parts of the world such as the MENA region. We also control incidences of *civil war*, given the potentially strong association between oil and civil unrest (e.g., Cotet and Tsui, 2013). The data are from the *Uppsala Conflict Data Program*, which defines a civil war as an armed contest between an organized group and a government where external actors may or may not be involved and where at least 25 battle related deaths in a single year have occurred (Gleditsch et al., 2002). Finally, we control for

[3] Alternatively, we replace infant mortality with (logged) per capita income. These variables are strongly negatively correlated (r=-0.73, p<0.01). Using GDP per capita yields findings that are similar to our baseline results (results available upon request). However, we prefer infant mortality over GDP p.c. as a measure of economic development because the former allows us to maximize the number of observations.

[4] The regional dummies come from the WDI and are for East Asia and the Pacific; Europe and Central Asia; the Americas; the Middle East and Northern Africa (MENA); Sub-Saharan Africa; and South Asia.

the *incumbency of left-wing governments*. We expect left-wing governments to favor lower levels of property rights protection, given their preference of economic planning and collectivism over market-economics and individualism. The data on left-wing incumbency comes from the VDEM dataset.

As part of a first robustness check, in some specifications we also consider the influence of *economic growth* (given a potential relationship between economic crises and market reforms resulting in stronger property rights) and *development aid* (to assess a potential influence of foreign politico-economic pressure on economic liberalization). Both variables come from the WDI.

3.4 Endogeneity

Potentially, estimates from equation (1) will suffer from endogeneity bias. This bias may have several sources such as measurement error, omitted variables and simultaneity. With respect to simultaneity, while we argue that oil wealth may result in poor economic institutions, the opposite may also be true. That is, weak property rights may disincentivize innovation, competition and long-run investment and thus "naturally" lead to a resource-extraction heavy economy. In other words, dependence on natural resource income could be more of a symptom of poor institutions rather than their cause.

As a consequence, the OLS estimates from (1) may be biased downwards due to simultaneity if sound economic institutions reduce the overall economic importance of oil in a country's economy. Similarly, attenuation bias as a consequence of measurement error in the main explanatory variable (per capita oil income) will also bias OLS estimates towards zero, leading us to potentially underestimate the effect of oil wealth on property rights protection.

To reduce the influence of endogeneity bias and provide estimates of the effect of oil on property rights that can be interpreted c*ausally*, we also estimate a series of two-stage instrumental-variable (IV) OLS estimations of the following form:

$$oil_{it} = \alpha * oil\_res_{it-10} + \delta' * X'_{it} + \varepsilon_{it} \quad (2a)$$

$$pr\_rights_{it} = \beta * \widehat{oil}_{it} + \gamma' * X'_{it} + \varepsilon_{it} \quad (2b)$$

In the first stage (2a), we explain oil wealth by our instrument, the *ten-year lag of per capita oil reserves* in the country of interest (*oil_res*), before using the first-stage results to estimate the effect of oil wealth on property rights, with the former now being instrumented by oil reserves (indicated by $\widehat{oil}$) in the second stage (2b). The oil reserve data are drawn from Haber and Menaldo (2011). Oil reserves are also used as instrumental variables in several recent studies estimating the effect of oil wealth on institutional outcomes, including, e.g., Haber and Menaldo (2011), Wright et al. (2015) and Brooks and Kurtz (2016).

Considering *instrumental relevance*, the argument for our instrument is straightforward: Larger oil reserves will lead to higher (future) oil production (e.g., Pickering, 2008; Cotet and Tsui, 2013). Indeed the bivariate correlation between both variables is satisfactorily high and positive (r=0.61, p<0.01), pointing to sufficient instrument relevance.

In terms of *instrument exogeneity*, to the extent that oil reserves depend on the size of oil deposits (i.e., sub-surface pools of hydrocarbons contained in rock formation), oil reserves are clearly exogenous. However, the size of a country's *documented* reserves (as recorded in the Haber-Menaldo dataset) may also be determined by the quality of the country's institutions: when institutions are weak, there may be fewer incentives to conduct oil exploration, given the inherent riskiness of the oil exploration business (as the potential for commercialization of oil exploration is a priori unknown) and the long time-horizons involved. Indeed, Bohn and Deacon (2000) find that non-democratic institutions and political instability may undermine

oil production and exploration (see also Ross, 2015: 243). Such considerations would affect the exclusion restriction and thus instrument credibility.

We, however, believe that concerns are negligible for our analysis. First, we always use a 10-year lag of the oil reserves variable as an instrument. We expect oil reserves at such a long lag to be less likely to be influenced by expectations about the future arrangement of property rights. At the same time, while weak institutions may have initially disincentivized oil exploration efforts, we expect this effect to be less influential after 10 years, meaning that the oil reserve data we employ ought to be purged from under-exploration and under-reporting effects. Second, in our baseline model we control for democratic underdevelopment and political instability (civil war), so as to avoid omitting relevant variables that may affect oil reserve, oil production and oil exploration efforts at the same time (Bohn and Deacon, 2000). This ought to make it more likely that the exclusion restriction holds. Third, and most importantly, given that oil exploration is usually administered (directly or indirectly) by state-owned oil companies or privately-owned oil conglomerates, i.e., the oil elites themselves, we expect them to arrange for economic institutions (i.e., property rights) that insulate their own source of income and economic-political power from property loss. In other words, while oil elites will have an incentive to push for weak property rights *in general*, they will not gain from – and thus do not push for – weak property rights specifically concerning oil exploration and production.

4. Empirical Results

4.1 Main Results

Our baseline OLS and IV-OLS results are reported in Table 2. In the non-IV setting, we find that oil wealth (operationalized as per capita oil production) has a small and negative effect on

property rights protection. This speaks to our main hypothesis that oil wealth is damaging to the quality of economic institutions, presumably because of the undue influence of elites emerging from their control of oil income.

In the IV-setting, the adverse effect of oil wealth on property rights is much more pronounced and always statistically significant. While we cannot directly compare the OLS and IV-OLS estimates (as the local average treatment effect from the IV-approach will differ from the average treatment effect from the OLS-approach), the IV-OLS estimates nevertheless suggest that the OLS estimates are downward biased, potentially due to classical measurement error or simultaneity. As for the quality of the IV-estimates, the associated diagnostics are always satisfactory. First, past oil reserves predict present-day oil production, with the associated first-stage *F*-statistic easily surpassing the usual rule of thumb of $F=10$ that would signal instrument weakness. Second, relying on weak-instrument robust inference yields similar results (for an introduction to fully robust inference with weak instruments, see Stock et al., 2002). That is, even in case of instrument weakness – obscured by misleading first-stage *F*-statistics – we find that oil wealth reduces property rights protection, with the estimated confidence intervals being very similar to the standard IV-estimates and firmly statistically significant at conventional levels. Finally, tests for endogeneity (with the null hypothesis being that oil wealth can actually be treated as exogenous) indicate that IV-methods are warranted; thus, for the remainder of this analysis we will only report findings from our IV-approach.

Using the baseline specifications (3) and (4) in Table 2, our results imply that a one standard deviation increase in oil wealth reduces property rights protection by approximately 5% of a standard deviation in the non-IV and by approximately 29% of a standard deviation in the IV setting. These effects are hardly trivial, especially given the prominent role sound property rights play in economic growth and development.

TABLE 2

As for the controls, the results are as expected. First, higher levels of economic development (indicated by lower infant mortality) coincide with better property rights protection, pointing to a virtuous circle of economic and institutional development. Second, population size tends to be negatively related to private property rights, suggesting that larger countries can afford (e.g., due to larger internal markets) weaker economic institutions. Third, democratic institutions lead to better property rights protection, pointing to another virtuous circle of democratic and economic liberalism. Fourth, Socialist/Communist governments will see weaker property rights, potentially due to an emphasis on economic planning and collectivization. Fifth, there is a negative effect of political instability (indicated by incidences of civil war) on property rights protection. For instance, this may be due to state weakness resulting in an inability to enforce property rights. Finally, there is evidence that receiving development aid induces stronger property rights (e.g., due to political pressure by aid-giving countries or international organizations), while there is no evidence that economic performance affects private property rights.

As a robustness check, we also examine the effect of oil wealth on property rights over 11 consecutive 5-year averages. This approach may be useful given the relative persistence of the dependent variable and many of the covariates. Reassuringly, using the averaged data yields results that mirror the baseline results that employ annual data, especially with respect to oil wealth causing weaker private property rights.

4.2 Robustness Checks

4.2.1 Additional Covariates

As a first robustness check, we introduce additional control variables into our baseline model. In detail, we account for *mineral rents* (to differentiate between oil and non-oil resource

income), *trade openness* (to account for the role of economic globalization) and *government size* (as a measure of public redistribution); these variables are drawn from the WDI. We also run a specification that includes a *lagged dependent variable* as another way of controlling for omitted variables. As reported in the appendix (Supplementary Table 2), adding these variables to our model does not change our main findings. In particular, oil wealth continues to exert a negative effect on private property rights especially in the IV-setting.

4.2.2 Alternative Instrumental Variables

As a second robustness check, we consider how the use of alternative instrument affects our IV-estimates. First, we use an instrument proposed by Ramsay (2011). He argues that the *economic damage from natural disasters in out-of-region oil-producing countries* is a valid instrument for domestic oil production.[5] Here, "natural disasters" refers to five different types of natural disasters (earthquakes, volcano eruptions, mudslides, floods and windstorms), while "out-of-region economic damage" means that the global value of a year's disaster damage in oil-producing countries minus the value of a country's own region (either East Asia and the Pacific; Europe and Central Asia; the Americas; the Middle East and Northern Africa; Sub-Saharan Africa; or South Asia) is considered. The economic damage natural disaster data is from the *International Disaster Database*.[6] According to Ramsay (2011: 514), natural disasters in other oil-producing countries will adversely affect oil production in these countries (e.g., by destroying infrastructure or oil extraction capabilities) and thus increase world oil prices, thereby plausibly affecting the value of oil production in non-affected countries. Following Ramsay (2011: 514), we only consider out-of-region economic damage to rule out other effects

[5] Due to its construction, we cannot include regional-year trends when employing this instrumental variable. As shown below, however, this is immaterial to our empirical findings.

[6] The data can be accessed here: https://www.emdat.be/emdat_db/.

of foreign natural disasters on local oil production value (e.g., via increased regional instability), thus ensuring that natural disaster economic damage only affects the value of domestic oil production via its effects on oil prices (exclusion restriction).

Second, we use an instrument provided by Cotet and Tsui (2013), namely *unexpected changes in oil reserves* over time. Here, unexpected changes in oil reserves are successes of oil explorations that are in excess of expected discoveries, conditional upon country-specific oil exploration attempts (for more details on the construction of this variable, see Cotet and Tsui, 2013: 70). Similarly to Ramsay's instrument generating exogenous variation in oil wealth due to unexpected oil price changes, the Cotet-Tsui instrument generates exogenous variation due to unexpected oil discoveries. As the data from Cotet and Tsui (2013) is only available between 1960 and 2003 and for a smaller sample of major oil-producing countries, we restrict our analysis to this sub-sample when using this instrumental variable.

Table 3 reports our findings when we use these two additional instruments, either separately or in conjunction with our baseline instrumental variable (the ten-year lag of a country's oil reserves). As our major result, we find that oil wealth continues to cause weaker property rights, regardless of which (combination of) instrumental variable(s) we employ. The IV-diagnostics are always satisfactory. What is more, combining the instruments, the various tests for overidentifying restrictions (Hansen's *J*-statistic) indicate that the instruments are valid (i.e., uncorrelated with the error term) and that the excluded instruments are correctly excluded from the estimated equation. This provides further confidence in the IV-estimates.

In sum, as the alternative instrumental variables yield results very similar to our baseline instrument both in terms of statistical significance and effect size, suggesting that our initial IV-approach was valid and that our findings are not driven by the choice of a particular instrumental variable. As our initial instrument maximizes sample size and allows for the

inclusion of regional trends, we continue using this instrumental variable for the remainder of our analysis.

TABLE 3

4.2.3 Alternative Measures of Economic Institutions

Next, we introduce six measures of the quality of economic institutions as alternative dependent variables. All variables come from the VDEM Dataset. As shown in the appendix (Supplementary Table 3a), they strongly and positively correlate with each other and with our main dependent variable (property rights protection), suggesting that they indeed capture (related) aspects of the quality of economic institutions.

First, we consider the effect of oil wealth on *property rights for men* and *property rights for women*. Similar to our main dependent variable, these variables indicate how large the share of men/women is that enjoy the right to private property, with the state potentially limiting those property rights. Given the influence of religious and cultural factors on women empowerment (e.g., in oil-rich MENA countries), it ought to be interesting to consider differential effects of oil wealth on property rights along gender lines.

Second, we use a variable measuring *private ownership of the economy*. It gauges the degree to which the state owns and controls capital (including land) in the industrial, agricultural and service sectors. We expect high levels of state ownership of capital to coincide with low levels of private ownership and weak private property rights.

Third, the flip-side of sound property rights is a *sound legal-judicial system* that allows for *contract and property rights enforcement*. Consequently, we also employ three indicators measuring the quality of the legal system. In detail, these indicators measure *access to justice* (i.e., access to a fair trial without risk to personal safety), the *transparency and predictable*

enforcement of laws and the overall *rule of law* (a composite index that accounts for access to justice and transparency and enforcement of the law, but also for judicial accountability, corruption, independence etc.).

In Table 4, we report our findings when employing the alternative dependent variables. We find that oil wealth causes weaker property rights for men and women (with little difference between both measures) as well as a lower extent of private ownership of the economy and a lower quality of the legal-judicial system (regardless of how this quality is indicated). The IV-diagnostics and weak-instrument robust tests are always satisfactory, while the results for the controls are as expected. In sum, this suggests that our main results are not due to the choice of a specific dependent variable, instead indicating that we capture a more general relationship between oil wealth and poor economic institutions.

TABLE 4

4.2.4 Alternative Measures of Oil Wealth

Potentially, our results are affected by the choice of the main explanatory variable for oil wealth. In this sub-section, we therefore consider six alternative measures. As shown in the appendix (Supplementary Table 3b), these alternative oil variables rather strongly correlate with each other and our main explanatory variable (logged per capita oil production).

First, we use *oil rents as a share of GDP*, with the data coming from the WDI. This variable is used in many studies on the political and economic consequences of oil wealth, since it captures the net value of oil extraction and is readily available. Oil rents per GDP, however, could also be thought of as a measure of dependence rather than a measure of abundance. More

problematically, results could also be determined by the sensitivity of the denominator (GDP) to other factors that are unmeasured in the model but related to the outcome.[7]

Second, another measure often used in empirical research are *fuel exports as a share of exports*, with the data being drawn from the WDI. Again, while is variable is readily available, it may be biased due to domestic consumption, which reflects, in turn, the level of industrial development.

Finally, four further variables are variants of our original oil wealth measure, logged oil production per capita; these variables are all derived from the dataset of Ross and Madhavy (2015). First, since differences in per capita oil production might generate more noise rather than clarity, we create a simple *dummy variable* that is equal to unity when there is any oil production for a given country-year observation. The second and third variable measure *total oil production* in 2000 prices and in barrels, respectively. Using these variables allows us to consider whether population growth, price effects or production level changes are influential. Finally, we use total oil production per capita but do not logarithmize this variable; this is to check whether transforming our original oil wealth variable provides misleading results.

As reported in Table 5, using these variables in our baseline IV-regression framework, we find that oil wealth – regardless of how it is operationalized – leads to poorer private property rights protection. The IV-diagnostics and results for the controls are reasonable. In sum, the findings

[7] In contrast, our main explanatory variable (oil production per capita) is less likely to suffer from the denominator problem because other unmeasured factors do not affect population as much as they might affect GDP (e.g., Ross, 2012).

reported in Table 5 suggest that our main results are not due to the choice of a specific oil wealth variable.

TABLE 5

4.2.5 Sub-Sample Analysis

As a final robustness check, we analyze whether the oil-property rights relationship is driven by specific sub-samples of countries or time periods, which we consecutively drop from our sample in the following ways.

First, we only focus on oil-producing countries. For instance, this has the advantage of ruling out the effect of confounders that would only be influential in non-oil-producing countries. Second, we drop from our analysis the MENA and OECD countries, respectively. While many of the former countries are well-known for their exceptionally high levels of oil production, the latter countries enjoy particularly high levels of property rights protection (while usually not being resource-rich). Disregarding these countries therefore ought to make our analysis less vulnerable to potential outliers. Finally, we restrict our analysis (i) to the 1974-2014 period, so that the increasing importance of oil in revenue generation after the first oil shock is emphasized and (ii) to countries with a per capita oil income of less than 500 US-$ to restrict the influence of extreme outliers in the value of per capita oil production.

As shown in Table 6, running analyses for these various restricted samples produces findings that are very much in line with our baseline results reported in Table 2. That is, oil wealth continues to exert a negative, statistically significant and economically substantive effect on the extent of private property rights. Reassuringly, the IV-diagnostics and results for the control variables are always satisfactory, suggesting that the results are not spurious.

TABLE 6

4.3 The Roles of Democracy and Inequality

The framework we introduced in Section 2 and Figure 1 suggests that the eventual arrangement of economic institutions is not only determined by oil wealth but also (i) de jure political institutions and the exercise of de jure political power (e.g., in national parliaments) and (ii) a country's overall resource distribution, which will not only affect the de facto political power of oil elites but also of other segments of society that have access to disproportionate levels of wealth from non-oil sources (landowners, business tycoons, industrial magnates etc.).

On the one hand, this suggests that the influence of *democratic institutions* (sound de jure political institutions) could be a counter-weight to the exercise of de facto political power by rich oil elites, e.g., by giving voice and veto power to the non-selectorate. On the other hand, this also suggests that a country's overall level of *economic equality* will matter. In an otherwise equal society, oil wealth is less likely to translate into sizeable de facto political power to influence property rights protection because other interest groups – potentially interested in stronger property rights – will command sufficient economic and de facto political power to counter political actions by the oil elites.

To test these propositions, we divide our sample into two sub-samples of roughly equal size which differ with respect to the level of democratic development and inequality, respectively. We (i) use our binary democracy measure to differentiate between non-democratic countries (for which the mean of the democracy variable is 0.07) and democratic countries (for which the mean of the democracy variable is 0.78). While countries in the non-democratic (democratic) group may still see spells of democracy (non-democracy), the difference between both groups makes it reasonable to assume that political institutions are more liberal in the democratic group compared to the non-democratic group of countries. Additionally, we (ii) use an index of equal distribution of resources from VDEM as a measure of economic inequality;

inter alia, this index accounts for inequalities in health and education. We differentiate between unequal countries (for which the mean of the equal distribution index is 0.31) and equal countries (for which the mean of the equal distribution index is 0.79). Again, these differences – potential changes in inequality over time notwithstanding – make it reasonable to assume that inequality is generally higher and more entrenched in the former country group.

We report our analysis for the four distinct sub-samples in Table 7. We find that oil wealth reduces the quality of property rights protection in both relatively non-democratic and democratic as well as relatively unequal and equal countries.[8] However, the adverse effect of oil wealth on economic institutions tends to be more pronounced in non-democratic or unequal countries. This suggests that relatively strong (i.e., democratic) de jure political institutions and relatively high levels of equity may provide some insurance against the ill effects of oil on property rights. At the same time, however, democracy and equity do not inoculate societies against such effects, e.g., as pork-barrel spending and other forms of rent-seeking and patronage will not be completely absent in relatively democratic or more egalitarian societies that are oil-rich.

TABLE 7

4.4 Transmission Channels

Finally, we briefly explore potential mechanisms related to the oil wealth-property rights relationship. According to our theoretical framework, oil wealth leads to weaker property rights

[8] As a caveat, our analysis does not account for potentially complex interactions between oil wealth, democracy, inequality and property rights. For instance, oil wealth may also have a direct effect on democracy and inequality. Such interactions may be considered in more detail in future research.

via the exercise of de facto political power, i.e., via the (i) remuneration of the selectorate and (ii) the punishment of the non-selectorate.

To indicate rewards to the selectorate, we draw two variables from the VDEM Dataset that measure the extent of *neo-patrimonial rule* (indicating the level of clientelistic political relationships, the use of public resources for political legitimation etc.) and of *regime corruption* (indicating the amount of corruption due to executive embezzlement as well as executive, judicial and legislative bribes), respectively. We expect oil wealth to increase patronage and nepotism (as legal and semi-legal ways to distribute oil wealth) as well as corruption (as a usually illegal way to allot oil income), benefitting the selectorate in return for their consent to weaker economic institutions and reduced economic growth.

To indicate punishments of the non-selectorate, we use two additional VDEM variables measuring *repression* (indicating the use of political killings and torture by the government) and *media harassment* (indicating threats of libel, imprisonment or violence by governmental or powerful non-governmental actors against legitimate journalistic activities). We expect oil wealth to induce repression as an instrument to rein in the non-selectorate.

Finally, we extract a VDEM variable indicating the *exclusion of political groups* (measuring whether different political groups have unequal access to state jobs, state business opportunities, public services etc.) as a direct measure of favoritism (non-favoritism) toward the selectorate (non-selectorate).

We regress the aforementioned transmission variables on oil wealth and the baseline controls, employing the usual IV-approach. As shown in Table 8, we indeed find that higher levels of oil wealth are associated with higher levels of clientelism, corruption, repression and journalist harassment. There is also evidence that oil wealth leads to more exclusion of political groups, pointing to the presence of political favoritism consistent with selectorate theory. In sum, we

find evidence that is suggestive of the translation of economic power from oil wealth into de facto political power in the form of rewards for the selectorate and disbenefits for the non-selectorate.

TABLE 8

5. Conclusions

We empirically analyze the relationship between oil wealth and weak economic institutions for a large sample of 156 countries between 1960 and 2014. We find that higher levels of oil wealth cause weaker private property rights. This main result is robust to different instrumental-variable approaches as well as different operationalizations of oil wealth and economic institutions.

We argue that our results can be explained by insights from theory of the hierarchy and persistence of institutions by Acemoglu and co-authors (e.g., Acemoglu et al., 2005; Acemoglu and Robinson, 2012) and the selectorate theory of Bueno de Mesquita and Smith (e.g., Smith, 2008; Bueno de Mesquita and Smith, 2012). That is, oil wealth will provide disproportionate economic and political power to elites controlling oil income who will use this power to buy support for weak property rights from their supporters (the selectorate), while also punishing the opposition (i.e., the non-selectorate). Indeed, we provide evidence that oil wealth leads to rewards provided to some segments of society (e.g., in the form of clientelism and corrupt exchanges) and punishment administered to others (e.g., in the form of exclusion from state jobs and business opportunities). Consequently, this political economy will lead to weaker property rights that favor the oil elite, allowing it to consolidate and perpetuate the existing distribution of economic and political power and blocking potential challengers, who would benefit from stronger property rights, to the status quo.

Our theoretical framework and empirical evidence link oil wealth to the unequal distribution of economic and political power, the survival of authoritarianism in oil-economies (e.g., Smith, 2004; Wright et al., 2015) and the poor economic performance of oil-abundant economies. Here, anemic economic growth and weak political institutions are reflections of the oil elites buying off the selectorate. Given the economic and political advantages of self-interested elites that favor weak property rights, there are no easy solutions to overcome this variant of the "resource curse". Indeed, if the remedy to this "resource curse" is the diversification of oil-led economies, and diversification requires expanding economic rights and encouraging entrepreneurship, our results are rather bad news. However, while internal institutional progress may be blocked by powerful oil elites, international "shocks" (e.g., scientific and technological advances, a pandemic etc.) may also modify the balance of economic and de facto political power in ways that weaken the oil elites (Acemoglu et al., 2005: 392-393). For example, *global climate change* – given the adverse role oil plays in it – may constitute such a "shock" in the coming decades.

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Variable	N*T	Mean	Std. Dev.	Min.	Max.
Property Rights Protection	7,981	0.569	0.278	0.002	0.949
Property Rights Protection (Men)	7,981	0.529	1.313	-4.398	2.425
Property Rights Protection (Women)	7,981	0.436	1.389	-3.75	2.822
Private Ownership of Economy	7,981	0.001	1.393	-4.197	3.295
Rule of Law	7,981	0.51	0.306	0.005	0.998
Access to Justice	7,981	0.553	0.289	0.002	0.995
Transparent Laws with Predictable Enforcement	7,981	0.375	1.531	-4.197	3.295
Oil Wealth (=Oil Production p.c., Year 2000 Value, logged)	7,764	2.174	2.787	0	11.12
Oil Reserves (=Oil Reserves Per Capita, logged)	7,093	0.191	0.656	0	5.587
Oil Rents	5,756	4.585	10.968	0	88.866
Fuel Exports	5,291	17.221	32.729	0	722.763
Oil Production Dummy Variable	7.767	0.529	0.499	0	1
Total Value of Oil Production (logged)	7,767	10.765	10.385	0	26.553
Total Oil Production (logged)	7,767	7.931	7.771	0	20.234
Infant Mortality	7,478	87.114	82.531	2.4	418.4
Population Size (logged)	7,978	15.898	1.58	10.766	21.034
Democracy	7,981	0.423	0.494	0	1
Socialist/Communist Government	7,966	0.265	0.323	0	1
Incidence of Civil War	7,981	0.165	0.371	0	1
Development Aid	7,981	3.843	7.636	-0.741	94.946
Economic Growth	6,764	2.096	6.426	-64.992	140.371
Out-of-Region Natural Disaster Damage (logged)	7,981	16.200	2.048	0	19.669
Unexpected Oil Discoveries (logged)	2,067	0.005	0.067	-0.174	0.176
Neo-Patrimonialism	7,969	0.521	0.304	0.006	0.99
Regime Corruption	7,981	0.497	0.303	0.006	0.98
Exclusion by Political Group	7,473	0.476	0.295	0.012	0.979
Freedom from Political Repression	7,981	0.549	0.312	0.013	0.987
Harassment of Journalists	7,981	0.128	1.647	-3.088	3.985

Table 1: Summary Statistics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Parsimonious Model		Baseline Model		Baseline Model with Additional Controls				5-Year Averages	
Oil Wealth	-0.003	-0.029	-0.005	-0.034	-0.004	-0.033	-0.002	-0.023	-0.006	-0.031
	(0.001)**	(0.004)***	(0.002)***	(0.004)***	(0.003)*	(0.004)***	(0.002)	(0.008)***	(0.004)*	(0.006)***
Infant Mortality	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Population Size	-0.082	-0.082	-0.019	-0.016	-0.020	-0.016	-0.026	-0.010	-0.009	-0.007
	(0.005)***	(0.005)***	(0.012)*	(0.011)	(0.012)*	(0.011)	(0.017)	(0.016)	(0.014)	(0.013)
Democracy	0.101	0.098	0.080	0.073	0.079	0.073	0.062	0.059	0.097	0.090
	(0.007)***	(0.007)***	(0.007)***	(0.007)***	(0.006)***	(0.007)***	(0.011)***	(0.011)***	(0.010)***	(0.012)***
Socialist/Communist			-0.137	-0.139	-0.135	-0.138	-0.043	-0.044	-0.150	-0.152
Government			(0.010)***	(0.009)***	(0.010)***	(0.009)***	(0.015)***	(0.015)***	(0.014)***	(0.012)***
Civil War			-0.015	-0.017	-0.016	-0.018	-0.030	-0.031	-0.022	-0.025
			(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.010)**	(0.008)***
Development Aid					0.002	0.001				
					(0.000)***	(0.000)***				
Economic Growth							0.001	0.001		
							(0.001)	(0.001)		
First-Stage Regression Results										
Oil Reserves $_{t-10}$		1.104		1.120		1.097		1.481		1.344
		(0.129)***		(0.133)***		(0.135)***		(0.286)***		(0.235)***
Effective F-Statistic		73.71		71.15		66.18		26.80		35.24
Weak Instrument Robust Inference										
Anderson-Rubin (AR)		[-0.036;		[-0.042;		[-0.041;		[-0.042;		[-0.048;
90% Confidence		-0.022]		-0.028]		-0.027]		-0.012]		-0.018]
Intervals										
AR Wald Test-Statistic		10.75		14.10		13.64		8.97		4.47
(Pr.>χ^2)		(0.00)***		(0.00)***		(0.00)***		(0.00)***		(0.03)**
Exogeneity Test-Statistic		9.94		13.06		12.82		6.69		4.27
(Pr.>χ^2)		(0.00)***		(0.00)***		(0.00)***		(0.00)***		(0.03)**
Region-Specific Trends	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of Observations	6,752	6,752	6,752	6,752	6,752	6,752	6,039	6,039	1,382	1,382

Notes: Constant not reported. Fixed-effects effects and instrumental-variable fixed-effects estimates reported. Country-fixed and year-fixed effects always included. Driscoll-Kraay standard errors in parentheses. *p<0.1, **p<0.05, ***p<0.01.

Table 2: Fixed-Effects and Instrumental-Variable Fixed-Effects Estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sample →	Full Sample: 156 countries, 1960-2014			Reduced Sample: 54 countries, 1960-2003				
Oil Wealth	-0.028	-0.181	-0.033	-0.032	-0.033	-0.034	-0.028	-0.047
	(0.004)***	(0.026)***	(0.005)***	(0.007)***	(0.014)**	(0.007)***	(0.009)***	(0.011)***
Infant Mortality	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Population Size	-0.072	-0.069	-0.072	-0.128	-0.129	-0.130	-0.072	-0.140
	(0.005)***	(0.023)***	(0.006)***	(0.024)***	(0.027)***	(0.025)***	(0.030)**	(0.028)***
Democracy	0.092	0.076	0.092	0.153	0.147	0.153	0.161	0.150
	(0.006)***	(0.011)***	(0.007)***	(0.018)***	(0.021)***	(0.018)***	(0.016)***	(0.019)***
Socialist/Communist	-0.135	-0.159	-0.136	-0.192	-0.181	-0.193	-0.207	-0.197
Government	(0.011)***	(0.019)***	(0.011)***	(0.018)***	(0.019)***	(0.017)***	(0.018)***	(0.015)***
Civil War	-0.022	-0.035	-0.022	-0.006	-0.007	-0.007	-0.013	-0.009
	(0.005)***	(0.012)***	(0.005)***	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)
IV-Regression Diagnostics								
Instrumental Variables	Oil Res	Out-Des	Oil Res + Out-Des	Oil Res	Unexp Disc	Oil Res + Unexp Disc	Oil Res + Unexp Disc	Oil Res + Unexp Disc + Out-Des
Effective F-Statistic	71.57	24.64	66.47	36.32	11.64	18.38	19.95	27.64
AR Wald Test-Statistic	23.81	44.66	32.10	8.27	4.33	4.20	3.46	15.26
(Pr.> χ^2)	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.04)**	(0.02)**	(0.04)**	(0.00)***
Hansen J-Statistic			2.69			0.24	0.28	2.69
(Pr.>χ^2)			(0.11)			(0.62)	(0.60)	(0.26)
Region-Specific Trends	No	No	No	No	No	No	Yes	No
No. of Observations	6,752	6,752	6,752	1,893	1,893	1,893	1,893	1,893

Notes: Constant not reported. Instrumental-variable fixed-effects estimates reported. Country-fixed and year-fixed effects always included. Oil Res=Oil reserves (t-10). Out-Des=Out-of-region economic damage from natural disasters in oil-producing countries (t-1). Unexp Disc=Unexpected oil discoveries (t-1). AR=Anderson-Rubin. Driscoll-Kraay standard errors in parentheses. *p<0.1, **p<0.05, ***p<0.01.

Table 3: Alternative Instruments

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable →	Property Rights (Men)	Property Rights (Women)	Private Ownership of Economy	Access to Justice	Transparent Laws with Predictable Enforcement	Rule of Law
Oil Wealth	-0.134	-0.178	-0.278	-0.041	-0.223	-0.052
	(0.025)***	(0.034)***	(0.058)***	(0.006)***	(0.051)***	(0.009)***
Infant Mortality	-0.001	-0.001	-0.001	-0.001	-0.003	-0.000
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.001)***	(0.000)
Population Size	-0.231	-0.034	-0.070	-0.038	0.160	0.025
	(0.047)***	(0.060)	(0.096)	(0.014)***	(0.126)	(0.015)*
Democracy	0.343	0.247	0.344	0.211	0.980	0.185
	(0.041)***	(0.040)***	(0.033)***	(0.012)***	(0.070)***	(0.008)***
Socialist/Communist	-0.891	-0.540	-1.295	0.004	0.149	0.053
Government	(0.048)***	(0.052)***	(0.114)***	(0.011)	(0.053)***	(0.011)***
Civil War	-0.085	-0.056	-0.008	-0.046	-0.146	-0.023
	(0.021)***	(0.022)**	(0.047)	(0.007)***	(0.031)***	(0.005)***
First-Stage Regression Results						
Oil Reserves $_{t-10}$	1.120	1.120	1.120	1.120	1.120	1.120
	(0.133)***	(0.133)***	(0.133)***	(0.133)***	(0.133)***	(0.133)***
Effective F-Statistic	71.15	71.15	71.15	71.15	71.15	71.15
Weak Instrument Robust Inference						
Anderson-Rubin (AR) 90% Confidence Intervals	[-0.178; -0.088]	[-0.250; -0.126]	[-0.372; -0.166]	[-0.053; -0.032]	[-0.322; -0.139]	[-0.070; -0.037]
AR Wald Test-Statistic (Pr.>χ^2)	9.32 (0.00)***	13.34 (0.00)***	7.66 (0.00)***	13.10 (0.00)***	9.67 (0.00)***	12.47 (0.00)***
No. of Observations	6,572	6,572	6,572	6,572	6,572	6,572

Notes: Constant not reported. Instrumental-variable fixed-effects estimates reported. Country-fixed effects, year-fixed effects and region-specific trends always included. Driscoll-Kraay standard errors in parentheses. *p<0.1, **p<0.05, ***p<0.01.

Table 4: Alternative Measures of Economic Institutions

	(1)	(2)	(3)	(4)	(5)	(6)
Oil Wealth Variable →	Oil Rents (% of GDP)	Fuel Exports (% of Exports)	Oil Production Dummy Variable	Total Value of Oil Production	Total Oil Production	Total Oil Production Per Capita (No Logs)
Oil Wealth Variable	-0.012	-0.006	-0.604	-0.018	-0.024	-12.026
	(0.004)***	(0.002)***	(0.131)***	(0.002)***	(0.003)***	(3.460)***
Infant Mortality	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Population Size	-0.046	-0.006	0.066	0.035	0.032	-0.064
	(0.018)**	(0.018)	(0.029)***	(0.018)*	(0.017)*	(0.016)***
Democracy	0.051	0.059	0.081	0.077	0.075	0.080
	(0.014)***	(0.013)***	(0.007)***	(0.007)***	(0.007)***	(0.007)***
Socialist/Communist	-0.068	-0.025	-0.111	-0.125	-0.125	-0.134
Government	(0.020)***	(0.018)	(0.018)***	(0.012)***	(0.012)***	(0.011)***
Civil War	-0.036	-0.028	-0.021	-0.020	-0.021	-0.016
	(0.008)***	(0.008)***	(0.009)**	(0.006)***	(0.006)***	(0.005)***
First-Stage Regression Results						
Oil Reserves $_{t-10}$	4.257	12.414	0.064	2.098	1.619	0.003
	(1.434)***	(3.964)***	(0.017)***	(0.341)***	(0.257)***	(0.001)***
Effective F-Statistic	8.81	9.81	14.59	37.77	39.78	10.22
Weak Instrument Robust Inference						
Anderson-Rubin (AR) 90% Confidence Intervals	[-0.027; -0.007]	[… ; -0.003]	[-0.951; -0.433]	[-0.023; -0.015]	[-0.029; -0.019]	[-22.575; -7.779]
AR Wald Test-Statistic (Pr.>χ^2)	11.65 (0.00)***	13.73 (0.00)***	14.10 (0.00)***	14.10 (0.00)***	14.10 (0.00)***	14.10 (0.00)***
No. of Observations	5,485	4,858	6,752	6,752	6,752	6,572

Notes: Constant not reported. Instrumental-variable fixed-effects estimates reported. Country-fixed effects, year-fixed effects and region-specific trends always included. Driscoll-Kraay standard errors in parentheses. *p<0.1, **p<0.05, ***p<0.01.

Table 5: Alternative Measures of Oil Wealth

	(1)	(2)	(3)	(4)	(5)
Sub-Sample →	Only Oil Producers	No MENA Countries	No OECD Countries	After 1973 (Oil Shock)	Oil Income Per Capita below 500 US-$
Oil Wealth	-0.038	-0.024	-0.053	-0.045	-0.025
	(0.007)***	(0.004)***	(0.008)***	(0.004)***	(0.009)***
Infant Mortality	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Population Size	-0.048	-0.088	-0.021	-0.003	-0.041
	(0.013)***	(0.025)***	(0.009)**	(0.012)	(0.023)*
Democracy	0.105	0.079	0.039	0.066	0.081
	(0.014)***	(0.007)***	(0.008)***	(0.012)***	(0.008)***
Socialist/Communist	-0.186	-0.137	-0.107	-0.138	-0.105
Government	(0.017)***	(0.010)***	(0.010)***	(0.014)***	(0.010)***
Civil War	-0.018	-0.020	-0.035	-0.021	-0.032
	(0.007)**	(0.005)***	(0.005)***	(0.006)***	(0.005)***
First-Stage Regression Results					
Oil Reserves $_{t-10}$	0.920	2.769	0.594	0.901	6.989
	(0.117)***	(0.722)***	(0.097)***	(0.095)***	(1.635)***
Effective F-Statistic	62.26	14.71	37.33	89.19	18.26
Weak Instrument Robust Inference					
Anderson-Rubin (AR) 90% Confidence Intervals	[-0.051; -0.027]	[-0.032; -0.019]	[-0.068; -0.040]	[-0.052; -0.037]	[-0.043; -0.009]
AR Wald Test-Statistic (Pr.>χ^2)	11.91 (0.00)***	12.67 (0.00)***	11.94 (0.00)***	8.68 (0.00)***	5.35 (0.02)**
No. of Observations	4,196	5,811	5,729	5,672	5,796

Notes: Constant not reported. Instrumental-variable fixed-effects estimates reported Country-fixed effects, year-fixed effects and region-specific trends always included. Driscoll-Kraay standard errors in parentheses. *p<0.1, **p<0.05, ***p<0.01.

Table 6: Sub-Sample Analysis

	(1)	(2)	(3)	(4)
Sample →	Non-Democratic	Democratic	Unequal	Equal
Oil Wealth	-0.051	-0.021	-0.034	-0.025
	(0.011)***	(0.004)***	(0.016)**	(0.006)***
Infant Mortality	-0.001	-0.001	-0.001	-0.001
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Population Size	0.017	-0.145	0.079	-0.059
	(0.009)*	(0.025)***	(0.073)	(0.018)***
Democracy	-0.030	0.145	0.003	0.187
	(0.011)***	(0.011)***	(0.008)	(0.014)***
Socialist/Communist	-0.014	-0.186	-0.021	-0.256
Government	(0.013)	(0.011)***	(0.011)*	(0.012)***
Civil War	-0.028	-0.043	-0.048	0.038
	(0.006)***	(0.011)***	(0.006)***	(0.013)***
First-Stage Regression Results				
Oil Reserves $_{t-10}$	0.529	3.659	1.431	1.020
	(0.114)***	(0.891)***	(0.414)***	(0.185)***
Effective F-Statistic	21.75	16.88	11.93	30.46
Weak Instrument Robust Inference				
Anderson-Rubin (AR) 90% Confidence Intervals	[-0.071; -0.032]	[-0.031; -0.014]	[-0.077; -0.009]	[-0.038; -0.016]
AR Wald Test-Statistic (Pr.>χ^2)	9.04 (0.00)***	10.35 (0.00)***	4.42 (0.04)**	10.48 (0.00)***
No. of Observations	3,206	3,546	3,340	3,412

Notes: Constant not reported. Instrumental-variable fixed-effects estimates reported. Country-fixed effects, year-fixed effects and region-specific trends always included. Driscoll-Kraay standard errors in parentheses. *p<0.1, **p<0.05, ***p<0.01.

Table 7: Roles of Democracy and Inequality

	(1)	(2)	(3)	(4)	(5)
Channel (Dependent Variable) →	Neo-Patrimonialism	Regime Corruption	Repression	Media Harassment	Political Exclusion
Oil Wealth	0.041	0.032	0.048	0.127	0.030
	(0.007)***	(0.008)***	(0.006)***	(0.058)**	(0.008)***
Infant Mortality	0.001	-0.001	0.001	0.005	0.001
	(0.000)**	(0.000)***	(0.000)***	(0.001)***	(0.000)***
Population Size	0.017	-0.034	-0.008	0.618	-0.013
	(0.011)	(0.013)**	(0.010)	(0.073)***	(0.011)
Democracy	-0.210	-0.077	-0.270	-1.140	-0.178
	(0.009)***	(0.009)***	(0.014)***	(0.076)***	(0.012)***
Socialist/Communist	-0.026	-0.165	-0.043	0.078	0.039
Government	(0.010)**	(0.014)***	(0.014)***	(0.068)	(0.016)**
Civil War	0.019	0.025	0.083	0.083	0.020
	(0.006)***	(0.005)***	(0.009)***	(0.043)*	(0.006)***
First-Stage Regression Results					
Oil Reserves $_{t-10}$	1.112	1.120	1.120	1.120	1.146
	(0.136)***	(0.133)***	(0.133)***	(0.133)***	(0.133)***
Effective F-Statistic	66.71	71.15	71.15	71.15	73.94
Weak Instrument Robust Inference					
Anderson-Rubin (AR) 90% Confidence Intervals	[0.029; 0.054]	[0.020; 0.046]	[0.060; 0.037]	[0.0221; 0.015]	[0.015; 0.045]
AR Wald Test-Statistic (Pr.>χ^2)	10.59 (0.00)***	8.82 (0.00)***	12.19 (0.00)***	3.17 (0.08)*	7.86 (0.00)***
No. of Observations	6,740	6,752	6,752	6,752	6,316

Notes: Constant not reported. Instrumental-variable fixed-effects estimates reported. Country-fixed effects, year-fixed effects and region-specific trends always included. Driscoll-Kraay standard errors in parentheses. *p<0.1, **p<0.05, ***p<0.01.

Table 8: Potential Transmission Channels

Variable	CD-Test Statistic	Mean Absolute Correlation
Property Rights Protection	236.51***	0.50
Property Rights Protection (Men)	176.09***	0.41
Property Rights Protection (Women)	220.81***	0.48
Private Ownership of Economy	250.51***	0.54
Rule of Law	29.07***	0.45
Access to Justice	16.21***	0.47
Transparent Laws with Predictable Enforcement	109.36***	0.39
Oil Wealth	116.92***	0.20
Oil Reserves	17.08	0.13
Oil Rents	69.34***	0.17
Fuel Exports	80.08***	0.35
Oil Production Dummy Variable	11.99***	0.02
Total Value of Oil Production	138.86***	0.22
Total Oil Production	42.3***	0.19
Infant Mortality	645.98***	0.91
Population Size	563.28***	0.92
Democracy	40.78***	0.08
Socialist/Communist Government	23.34***	0.20
Incidence of Civil War	5.32***	0.06
Development Aid	22.77***	0.19
Economic Growth	67.87***	0.20
Out-of-Region Natural Disaster Damage	693.14***	0.92
Unexpected Oil Discoveries	3.91***	0.02
Clientelism	82.83***	0.45
Regime Corruption	18.26***	0.42
Exclusion by Political Group	187.58***	0.46
Freedom from Political Repression	168.73***	0.42
Harassment of Journalists	167.34***	0.45

Note: ***p<0.01 (rejection of H_0 of cross-sectional independence).

Supplementary Table 1: Test for Cross-Sectional Dependence

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Oil Wealth	-0.001	-0.048	-0.002	-0.026	-0.001	-0.024	-0.002	-0.006
	(0.002)	(0.0014)***	(0.002)	(0.009)***	(0.002)	(0.009)***	(0.001)*	(0.003)**
Mineral Rents (% of GDP)	0.002	0.003						
	(0.001)*	(0.001)**						
Trade Openness			0.001	0.001				
			(0.000)***	(0.000)***				
Government Size					0.001	0.001		
					(0.000)**	(0.000)**		
Lagged Dependent Variable							0.892	0.891
							(0.042)***	(0.042)***
First-Stage Regression Results								
Oil Reserves $_{t-10}$		0.945		1.557		1.562		1.057
		(0.204)***		(0.335)***		(0.336)***		(0.105)***
Effective F-Statistic		21.45		21.60		21.59		100.64
Weak Instrument Robust Inference								
Anderson-Rubin (AR) 90%		[-0.094;		[-0.049;		[-0.046;		[-0.012;
Confidence Intervals		-0.031]		-0.013]		-0.012]		-0.001]
AR Wald Test-Statistic		11.88		8.93		8.66		4.14
(Pr.>χ^2)		(0.00)***		(0.00)***		(0.00)***		(0.04)**
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of Observations	5,658	5,658	5,776	5,776	5,622	5,622	6,434	6,434

Notes: Baseline controls are infant mortality, population size, democracy, Socialist/Communist government and incidence of civil war. Constant not reported. Fixed-effects effects and instrumental-variable fixed-effects estimates reported. Country-fixed effects, year-fixed effects and region-specific trends always included. Driscoll-Kraay standard errors in parentheses. *p<0.1, **p<0.05, ***p<0.01.

Supplementary Table 2: Additional Fixed-Effects and Instrumental-Variable Fixed-Effects Estimates

	Property Rights (Men)	Property Rights (Women)	Private Ownership of Economy	Rule of Law	Access to Justice	Transparent Laws with Predictable Enforcement
Property Rights	0.94*	0.96*	0.63*	0.62*	0.75*	0.67*
Property Rights (Men)		0.86*	0.68*	0.58*	0.71*	0.64*
Property Rights (Women)			0.60*	0.87*	0.85*	0.67*
Private Ownership of Economy				0.43*	0.53*	0.51*
Rule of Law					0.84*	0.87*
Access to Justice						0.85*

Note: (*) indicates that the correlation coefficients are significant at the 1% level.

Supplementary Table 3a: Pairwise Correlations between Alternative Measures of Economic Repression

	Oil Rents	Fuel Exports	Oil Production Dummy	Total Value of Oil Production	Total Oil Production	Total Oil Production Per Capita (No Logs)
Oil Wealth	0.71*	0.61*	0.74*	0.83*	0.85*	0.48*
Oil Rents		0.81*	0.36*	0.45*	0.47*	0.63*
Fuel Exports			0.30*	0.39*	0.40*	0.38*
Oil Production Dummy				0.98*	0.96*	0.19*
Total Value of Oil Production					0.99*	0.24*
Total Oil Production						0.25*

Note: (*) indicates that the correlation coefficients are significant at the 1% level.

Supplementary Table 3b: Pairwise Correlations between Alternative Measures of Oil Wealth

Afghanistan	Croatia	Italy	Niger	Togo
Albania	Cuba	Jamaica	Nigeria	Trinidad and Tobago
Algeria	Cyprus	Japan	Norway	Tunisia
Angola	Czech Republic	Jordan	Oman	Turkey
Argentina	Denmark	Kazakhstan	Pakistan	Turkmenistan
Armenia	Djibouti	Kenya	Panama	Uganda
Australia	Dominican Republic	Korea, North	Papua New Guinea	Ukraine
Austria	Ecuador	Korea, South	Paraguay	United Arab Emirates
Azerbaijan	Egypt	Kuwait	Peru	United Kingdom
Bahrain	El Salvador	Kyrgyz Republic	Philippines	United States
Bangladesh	Equatorial Guinea	Lao PDR	Poland	Uruguay
Barbados	Estonia	Latvia	Portugal	Uzbekistan
Belarus	Ethiopia	Lebanon	Qatar	Venezuela
Belgium	Fiji	Lesotho	Romania	Yemen
Benin	Finland	Liberia	Russian Federation	Zambia
Bhutan	France	Libya	Rwanda	Zimbabwe
Bolivia	Gabon	Lithuania	Saudi Arabia	
Bosnia and Herzegovina	Gambia	Macedonia	Senegal	
Botswana	Georgia	Madagascar	Sierra Leone	
Brazil	Germany	Malawi	Singapore	
Bulgaria	Ghana	Malaysia	Slovak Republic	
Burkina Faso	Greece	Mali	Slovenia	
Burundi	Guatemala	Mauritania	Somalia	
Cambodia	Guinea	Mauritius	South Africa	
Cameroon	Guinea-Bissau	Mexico	Spain	
Canada	Guyana	Moldova	Sri Lanka	
Central African Republic	Haiti	Mongolia	Sudan	
Chad	Honduras	Morocco	Suriname	
Chile	Hungary	Mozambique	Swaziland	
China	India	Myanmar	Sweden	
Colombia	Indonesia	Namibia	Switzerland	
Congo, Rep.	Iran	Nepal	Syria	
Congo, DR	Iraq	Netherlands	Tajikistan	
Costa Rica	Ireland	New Zealand	Tanzania	
Cote d'Ivoire	Israel	Nicaragua	Thailand	

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2019-02	Tim Krieger, Daniel Meierrieks	The Economic Consequences of Terrorism for the European Union [Published in: Bossong, R. (ed.), Terrorismus als Herausforderung der Europäischen Union, Nomos, Baden-Baden, 87-108, 2019.]
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