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Abstract

The study assesses the role of governance in modulating the effect of oil wealth on wealth inequality in 45 countries in the world. The empirical evidence is based on Pooled Ordinary Least Squares and the Generalised Method of Moments. The findings show that oil rents unconditionally increase wealth inequality while govenance dyanmics (in terms of rule of law, corruption-control, government effectiveness, regulatory quality) moderate oil rents for an overall net negative effect on wealth inequality. Good governance thresholds at which the unconditional effect of oil rents on the wealth inequality changes from positive to negative are computed and discussed. It follows that while governance is a necessary condition for improving the redistributive effects of oil wealth, it becomes a sufficient condition for net positive improvements in wealth distribution only when some critical levels of good governance have been reached. Other policy implications are discussed.

JEL Classification: F21; F54; L71

Keywords: Governance; Oil wealth; Wealth inequality, Panel data

1. Introduction

There is a consensus in the contemporary inclusive development literature that inequality is a key determinant of economic development (Tchamyou et al., 2019a, 2019b; Asongu et al., 2020a, 2020b). However, there has a being a focus of economic research on the relevance of income inequality in driving economic prosperity on the one hand and on the other, the effect of economic growth on the distribution of wealth. Whereas the remit of income ineqality is relevant, especially as it pertains to the nexus underpinning income distribution and economic prosperity, it is equally worthwhile to be concerned about the growing wealth inequality in the world (Tadadjeu et al., 2021).

According to Oxfam (2016), the richest 62 people in the world possess the equivalent of the wealth of the poorest half of the world combined. Similarly, Piketty (2014) reports that approximately half of the world's wealth is held by the top one per cent of the world's population and that the poorest 50 per cent have less than five per cent. According to Davies et al. (2008), the global wealth holding is strongly concentrated relative to income, with most country-specific Gini coefficients for income that is disposable being between 0.3 and 0.5, while those for wealth are typically between 0.6 and 0.8. The top 10 percent of adults possessed 70.7 percent of total household wealth in 2000, and the associated Gini coefficient for worldwide wealth was 0.802 (Davies et al., 2011). Credit Suisse (2014) reports that from 1910 to 2013 for instance, the average wealth share of the first percent in the United States was approximately one-fifth higher compared to income share, whereas with respect to the top ten percent, the average share of wealth was approximately 30 percentage points more compared to the income share (Tadadjeu et al., 2021).

This growing increase in wealth inequality has led both researchers and policy makers to examine the factors that might explain it. To date, several studies have highlighted factors such as income growth, interest rates, inflation, expansionary monetary policy, financial development, knowledge, war, trade openness, the transmission of bequest, human capital, entrepreneurship, labor earnings, precautionary savings, stochastic returs to wealth, saving rates, inheritance, and genetic endowments (Campanale, 2007; Benhabib et al., 2017; Lusardi et al., 2017; De Nardi and Fella, 2017; Elinder et al., 2018; Berisha and Meszaros, 2020; Bagchi et al., 2019; Hasan et al., 2020; Barth et al., 2020). Despites these continuous efforts to analyse the determinants of wealth inequality, the role of natural resources have been overlooked by these previous studies.

Sachs and Warner (1995, 2001) in their influencial works conclude on a negative effect of natural resources on economic growth, and this trend has been observed so often that it has been referred to as the "resource curse". Since then, several empirical and theoretical studies have analysed the existence and causes of the paradox of plenty. Much of this research confirms the findings of Sachs and Warner (1995, 2001) (e.g. Papyrakis and Gerlagh, 2004; Boyce and Emery, 2011; Satti et al., 2014; Gerelmaa and Kotani, 2016; Henry, 2019; Cheng et al., 2016; Sharma and Pal, 2021; Sun and Wang, 2021) and identifies several economic and institutional mechanisms for such a paradox. Concerning economic mechanims, two channels that have mostly been covered in the literature are the commodity price volatility and the Dutch disease. The Dutch disease is understood as the shrinkage of industrial development owing to a loss of competitiveness in the light of a real exchange rate appreciation (Corden and Neary, 1982). For Van der Ploeg and Poelhekke (2009), the volatility associated with commodity prices tends to undermine public spending decisions. They conclude that commodity price volatility is the quintessential resource curse (Van Der Ploeg and Poelhekke, 2017). From a political perspective, the literature suggests that the discovery of natural resources breeds authoritarianism, increases corruption, risks and the duration of conflicts (Ross, 2001; Arezki and Brückner, 2011; Collier et al., 2009; Arezki and Gylfason, 2013). Fors and Olsson (2007) highlight elites' reluctance in resource-rich countries to tailor institutions to oversee and sanction rent-seeking behaviour. On the other hand, other authors show that natural resource abundance does not necessarily lead to reduced economic growth. On the contrary, natural resources provide the necessary income to stimulate growth (Brunnschweiler and Bulte 2008; James, 2015). At the intersection of these two groups of works, a third paradigm shows that the effect of natural resources depends on constitutional arrangements (Andersen and Aslaksen, 2008), ownership (Khanna, 2017) regime types, ideological leanings (Kim and Lee, 2018) and governance (Belarbiet al., 2021), among others.

In this study, we examine the link between oil rents, governance and wealth inequality for 45 sample countries over the period 2000-2014. Most studies have focused on income inequality by examining the relationship between natural resources and inequality, with mixed findings. Some suggest that natural resource endowments are associated with high levels of inequality (Stevens, 2003; Sarraf and Jiwanji, 2001). Leamer et al. (1999) assert that resource exploitation does not involve significant human capital and that as a result, the labor force in resource-rich countries is not prepared for the much needed transition towards knowledge-based economies and human capital-intensive manufacturing. Consequently, these countries could experience more inequality in income for lengthier durations compared to resource-poor economies. Similarly, Ross (1999) shows how resource rents result in the abuse of political power for private benefit. Goderis and Malone (2011) suggest that income inequality declines in the short-run, immediately after a resource boom, and then increases steadily over time.

The impact of democracy on income distribution has been substantially covered in both theoretical and empirical literature. According to Reuveny and Li (2003), countries with better democractic intitutions are more likely to adopt progressive tax systems as well as policies that favor budgets allocated for high social welfare targets such education and healthcare Moreover, it is more likely that democracies facilitate the involvement of the poor to participate in reflections surrounding decision-making processes that lead to income redistribution mechanisms (Boix, 1998; Chan, 1997). On the empirical front, studies on the nexus between inequality and democracy have led to mixed results. While some have concluded that democracy mitigates income inequality (Muller, 1988; Rodrik, 1998), another strand of studies such that from Huber et al. (2006) has argued that income inequality is positively linked to democratic traditions. Coversely, there is a third strand of studies in which no statistically significant nexus is found between income distribution and democracy, notably: Bollen and Jackman (1985) and Deininger and Squire (1998). Still, other studies have established a non-linear nexus between the two underlying variables. An example is Simpson (1990) which finds an inverted U-shaped nexus between the two variables, such that, at the advent of democracy, income inequality grows up to a certain threshold of democracy and then diminishes.

Mahdavy (1970) received scholarly credit for the elaboration of the concept of rentier state in the 1960s for the specific case of Iran. According to the author, "*oil revenues received by the governments of the oil- exporting countries have very little to do with the production processes of their domestic economies*" (Mahdavy 1970: 429). Still, the "*problems of income distribution are more serious in Rentier States because of the concentration of vast external rents in few hands. The temptations for a government bureaucracy to turn into a rentier class with its own independent source of income are considerable*" (Ibid.:467). Hence, according to Beblawi and Luciani (1987), the role of the government is growingly to play a role of mechanism for "allocative" efficiency in oil-rich economies. The authors further posit that given that income from oil is external with respect to the domestic economy on the one hand and on the other, only a small percentage of the population has a fundamental role in generating such income, the remaining faction of the society is only left of engage such wealth once it is distributed. Furthermore, it is argued by Bjorvatn et al. (2013) that in countries that are rosource-rich, governments tend to maximize their benefits from patronage through the expansions of employment in the public sector.

When households in Iran were examined by Tabibian (2000) in a survey, substantial ramifications in terms of fundamental functional inequalities were apparent owing to the country's rentier economic structure. The survey revealed that when oil price increased, it rewarded the highest income decile compared to other income strata. Moreover, rents from oil in terms of extensive subsidies of the government for utilities, basic foodstuffs and fuel increased income inequality while contributing to mitigating poverty.

The above contemporary and non-contemporary studies have provided for the most part, blacked policy implications because policy vaiables (i.e. for policy thresholds) are not taken in account in the estimation exercise. The present paper contributes to the evolving literature of development in the long run by means of geographic endownments. Accodingly, it is a subject that has been receiving growing scholarly attention over the past decades (Nunn and Qian, 2011; Easterly, 2007; Summerhill, 2010). Contrary to the underlying extant literature, the present study goes beyond establishing nexuses between inequality and natural resources to providing critical levels or threholds of good governance that are essential to reverse a resource-curse such that the oil rents, instead of increasing inequality, reduce it. The findings show that oil rents unconditionally increase wealth inequality while govenance dynamics (in terms of government effectiveness, regulatotary quality, voice and accountability, political stability, control of corruption and rule of law) moderate oil rents for an overall net negative effect on wealth inequality. Good governance thresholds at which the unconditional effect of oil rents on the wealth inequality changes from positive to negative are computed and discussed. It follows that while governance is a necessary condition for improving the redistributive effects of oil wealth, it becomes a sufficient condition for net positive improvements in wealth distribution only when some critical levels of good govenrenace have been reached. Another added value of this study in relation to the underlying literature is that prior to 2014 is that, income inequality was used as a proxy for wealth inequality. Hence, this study uses a new dataset on wealth ineqality recently made available to the scientific community (Credit Suisse, 2014).

The rest of the paper is organized as follows. Section 2 presents that data and empirical framework while Section 3 discloses the empirical estimates, and corresponding robustness tests. Section 4 concludes with implications and future research directions.

2. Data and methodology

2.1 Data

Our sample covers 45 developed and developing countries over the period 2000-2014 with data from various sources, notably: World Development Indicators (WDI) of the World Bank; World Bank: World Governance Indicators (WGI) of the World Bank; Credit Suisse (2014); and Forbes magazine. The periodicity under consideration is selected in the light of constraints in data availability, especially on wealth inequality.

2.1.1 Wealth inequality measures

Until 2014, when the first real database on wealth inequality was published by the Credit Suisse (2014) report, all studies used income inequality instead of wealth inequality (Balac, 2008). One of the qualities of this database is that it combines relevant temporal and individual dimensions. Indeed, the data on wealth inequality published by Credit Suisse (2014) concerns all regions of the world and covers 45 countries over a 15-year period from 2000 to 2014. In addition, this database has the advantage of simultaneously providing information on the top one percent as well as the top ten percent of wealth shares. According to the recent literature on wealth inequality (Islam and McGillivray, 2020; Islam, 2018; Tadadjeu et al., 2021), this paper uses the top one percent as well as top ten percent wealth shares as a measure of wealth inequality. Three reasons have been advanced in the literature to justify the choice of the top wealth shares as a measure of wealth inequality (Islam, 2018). First, the top wealth shares are simple to understand and are rigid to wealth variations at the bottom of wealth distribution. Second, the probability that the wealth of individuals with the highest wealth share will increase is greater than the probability that the wealth of less wealthy individuals will increase. Finally, this measure of wealth inequality is highly correlated with the Gini coefficient that measures income inequality.

Although the top wealth share is a much better measure of wealth inequality, it is worth nothing that is does not account for all the dimension of wealth inequality. Therefore, in this paper, we follow Bagchi and Svejnar (2015) using billionaire's wealth as a percentage of GDP as an alternative measure of wealth inequality. The listings of billionaires in Forbes magazine is the source of data on billionaire wealth. Accordingly, from 1982, Forbes Magazine began publishing a list of the richest 400 Americans. However, as from 1987, the attendant list was expanded to include the global rankings of wealthiest individuals as well as their families (Tadadjeu et al., 2021). We therefore used this list of billionaires worldwide to construct our variable. Billionaire as a percentage of GDP is the sum of the wealth of all billionaires in a given country divided by the country's GDP. This variable is increasingly used in the literature to measure wealth inequality (Bagchi and Svejnar, 2015; Bagchi et al., 2019; Islam and McGillivray, 2020).

2.1.2 Oil measures

Our main independent variable is oil rent as a percentage of GDP (Oil rent) derived from the World Bank: World Development Indicators. We interpret this variable as a measure of oil dependence rather than a measure of oil abundance. Behavior associated with rent-seeking is captured by oil dependence, given the premise that higher economic dependency on resources also engenders a higher probability of state capture and rent-seeking by the political elites (Antonakakis et al., 2017). To distinguish between the effect of dependence on and abundance in oil, we use the total oil income per capita (in constant dollars, 2014) from Ross and Mahdavi (2015) as a measure of abundance (i.e. oil abundance). The measurement of abundance is in terms of the amount of gas and oil that are extracted, multiplied by the unit price and divided by the population (oil and gas value per capita) (O'Connor et al., 2018). Such a distinction is relevant because an oil-rich country may not depend on its oil wealth if it diversifies its production structure. Few studies to date have made such a distinction, sometimes with mixed results (see Shahbaz et al., 2019).

2.1.3 Governance measure

The second main variable of interest is governance quality. This paper uses the six governance indicators from the World Bank: World Governance Indicators. They are: (i)voice and accountability and political stability/no violence to capture political governance; (ii) regulatory quality and government effectiveness to appreciate economic governance and (iii) the rule of law and corruption – control to proxy for institutional governance. These variables are chosen according to recent literature on governance (Ajide and Raheem, 2016a, 2016b; Ajide et al., 2020; Tchamyou, 2021).

2.1.4 Control variables

To substantiate the investigated relationship and avoid omission variable bias, we include in the baseline specification and according to the previous literature three control variables: (i) GDP per capita (US constant 2014); (ii) trade openness measured by the sum of exports and imports to GDP, and (iii) Education (Tchamyou, 2020, 2019). The control variables are substantiated in what follows. First, one of the main determinants of wealth inequality is economic growth since both theoretical and empirical literature provides strong evidence of the link between per capita GDP and wealth inequality. Empirical studies such as Berisha and Meszaros (2020) show that economic growth is negatively correlated with wealth inequality. Therefore, to capture the general macroeconomic condition of an economy, we include per capita GDP as a control variable and we expect a negative relationship between economic growth and wealth inequality. Second, trade openness can engender both positive and negative effects on inclusive development contingent on whether a country has a favorable or unfavorable balance of trade (i.e. the difference between exports and imports within a given period) (Asongu & Nwachukwu, 2017). A positive balance of trade is indicative that a country has created more wealth whereas a negative balance of trade reflects the opposite tendency. Third, education has been documented to reduce income inequality and improved socio-economic conditions (Asiedu, 2014; Tchamyou, 2020).

Table 1: Summary statistics and data sources

Variable	Obs.	Mean	Std. Dev.	Min	Max	Sources
Top decile	675	63.063	8.319	46.8	84.8	Credit suisse (2014)
Top percentile	675	32.32	9.541	16.9	66.2	Credit suisse (2014)
Billionaire/GDP	675	6.368	10.653	0	79.642	Forbes magazine
Oil rent	675	2.814	7.381	0	54.260	World Bank (WDI)
Oil abundance	645	1422.401	3996.895	0	29538.03	World Bank (WDI)
Voice and accountability	630	0.629	0.896	-1.907	1.800	World Bank (WGI)
Political stability	630	0.271	0.938	-2.374	1.760	World Bank (WGI)
Government effectiveness	630	0.968	0.844	-0.877	2.436	World Bank (WGI)
Regulatory quality	630	0.900	0.774	-1.074	2.233	World Bank (WGI)
Role of law	630	0.823	0.925	-1.097	2.100	World Bank (WGI)
Control of corruption	630	0.851	1.049	-1.144	2.469	World Bank (WGI)
GDP per cap.	675	28404.67	20986.15	826.592	91565.73	World Bank (WDI)
Trade	674	87.525	71.727	19.798	442.62	World Bank (WDI)
Education	587	104.445	7.146	93.821	150.785	World Bank (WDI)
Ethnic	675	0.303	0.225	0.001	0.751	Alesina et al. (2003)
Pop. Growth	675	1.069	1.416	-1.853	15.177	World Bank (WDI)
Credit	655	81.834	45.207	9.501	214.128	World Bank (WDI)

2.2 Empirical model and estimation strategy

Two main models are applied within the framework, notably: a static model and a dynamic model. On the one hand, the static model is the Pooled Ordinary Least Squares (POLS) that does not take into account time effects, group effects and the stochastic behavior of the outcome variable. On the other hand, the dynamic model is the Generalized Method of

Moments (GMM) that takes on board the persistent or stochastic behavior of the outcome variable while controlling for time effects and eliminating group effects by first-differencing to avoid concerns pertaining to endogeneity form the correlation between the lagged outcome variables and group effects.

The POLS that is consistent with Çinar (2017) is as follows:

$$WI_{i,t} = \omega_0 + \omega_1 Oil_{i,t} + \sum_{h=1}^{3} \theta_h X_{h,i,t} + \mu_{i,t} \quad (1)$$

where, $WI_{i,t}$ is wealth inequality of country i in period t, ω_0 is a constant, ω_1 is the parameter corresponding to Oil rents (Oil), X is the vector of control variables (GDP per capita, trade and education), θ_h denotes parameters corresponding to three control variables adopted in the conditioning information set and hence h varies from 1 to 3 (i.e. θ_1 for GDP per capita, θ_2 for international trade and θ_3 for education),and $\varepsilon_{i,t}$ is the error term which is independently and identically distributed.

The choice of the GMM empirical strategy is motivated by four main factors in accordance with contemporary GMM-centric literature (Meniago & Asongu, 2018; Tchamyou, 2019). First of all, the number of groups or countries (i.e. 45) exceeds the corresponding time interval within each group (i.e. 15). Second, the first lag and level series' of the outcome variable is highly correlated. Third, given the panel data structure, cross-country variations are involved in the estimation exercise. Fourth, the involvement of time fixed effects controls for the unobserved heterogeneity while the consideration of instruments addresses the corresponding concern related to simultaneity or reverse causality.

The following equations in level (2) and first difference (3) summarize the standard *system* GMM estimation procedure.

$$WI_{i,t} = \sigma_0 + \sigma_1 WI_{i,t-\tau} + \sigma_2 Oil_{i,t} + \sigma_3 G_{i,t} + \sigma_4 OilG_{i,t} + \sum_{h=1}^{3} \delta_h W_{h,i,t-\tau} + \eta_i + \xi_t + \varepsilon_{i,t} \quad (2)$$

$$\begin{aligned} WI_{i,t} - WI_{i,t-\tau} = {} & \sigma_1 (WI_{i,t-\tau} - WI_{i,t-2\tau}) + \sigma_2 (Oil_{i,t} - Oil_{i,t-\tau}) + \sigma_3 (G_{i,t} - G_{i,t-\tau}) + \sigma_4 (OilG_{i,t} - OilG_{i,t-\tau}) \\ & + \sum_{h=1}^{3} \delta_h (W_{h,i,t-\tau} - W_{h,i,t-2\tau}) + (\xi_t - \xi_{t-\tau}) + (\varepsilon_{i,t} - \varepsilon_{i,t-\tau}) \end{aligned} \quad (3)$$

where, $WI_{i,t}$ is the wealth inequality variable of country i in period t, σ_0 is a constant, σ_1, σ_2, σ_3 and σ_4 are the parameters corresponding to the lagged wealth inequality, oil rents, governance and the interaction between governance and oil rents, respectively. Oil reflects oil rents, G represents governance dynamics (i.e. political stability, voice & accountability, government effectiveness, regulatory quality, corruption-control and the rule of law), $OilG$ is the interaction between oil rents and governance, W is the vector of control variables (GDP per capita, trade and education), δ_h reflects parameters related to the three control variables that are adopted in the set of control variables and hence h varies from 1 to 3 (i.e. δ_1 for GDP per capita, δ_2 for international trade and δ_3 for education), τ denotes auto-regression coefficient that is one in the present paper because a year lag is sufficient to capture past information, ξ_t is the time-specific constant, η_i is the country-specific impact and $\varepsilon_{i,t}$ is the error term.

3. Empirical results

This section is intended for the presentation of the results of our estimates, which will be done in three stages. In the first step, we present our baseline result estimated by the OLS (see Table 2). In the second step, we control endogeneity by estimating our baseline model by the system GMM. In the third step, we test our results by several robustness tests. Finally, the fourth step is devoted to examining the role of governance in the relationship between natural resources and wealth inequality.

3.1 Baseline OLS regression

Table 2 reports the baseline results in which oil rents is used as a proxy of oil dependence. In these estimations, we include three determinants of wealth inequality: the log of per capita GDP, trade openness, and education. Columns (1) and (4) display the bivariate specification without control variables. The results in Column (1) show that the coefficient associated with oil rents is positive and statistically significant at 1%, meaning that oil rents increase wealth inequality. The result is the same in Column (4) where the effect of oil rents on the top 1% wealth share is positive and this effect is significant at the 1% level. In Columns (2), (3), (5) and (6); we introduce the control variables into the model. Once again our results show that the coefficients associated with oil rent remain positive and statistically significant at 1%, although the coefficients are slightly lower in term of magnitude. Overall, these results suggest that oil rent-dependent countries are on average associated with greater inequalities of wealth. These results are thus consistent with the idea that elites in resource-rich countries can distribute rents selectively and create networks of patronage from which only the leaders of politically important groups benefit (Basedau and Lay., 2009). Our result is also similar to those of Gylfanson and Zoega (2003), Buccellato and Mickiewicz (2009), Fum and Hodler (2010) and Gadom et al. (2018) who show that natural resources are positively associated with income inequality. However, our result contradicts those of Goderis and Malone (2011), Howie and Atakhanova (2014), Parcero and Papyrakis (2016), Kim and Lin (2017) who show that oil abundance and dependence are associated with lower income inequality.

Table 2: Oil rent and Wealth inequalities (pooled OLS)

Dependent variable	Top 10% wealth share			Top 1% wealth share		
	(1)	(2)	(3)	(4)	(5)	(6)
Oilrent	3.141***	2.229***	2.421***	3.961***	2.475***	2.532***
	(0.289)	(0.241)	(0.293)	(0.366)	(0.291)	(0.361)
GDPpercap		-3.004***	-3.075***		-4.895***	-5.306***
		(0.263)	(0.285)		(0.274)	(0.287)
Trade			1.261			2.028**
			(0.902)			(0.928)
Education			4.384			0.402
			(4.575)			(5.361)
Constant	60.95***	91.08***	66.22***	29.66***	78.75***	72.41***
	(0.382)	(2.577)	(23.95)	(0.400)	(2.792)	(27.73)
Observations	675	675	587	675	675	587
R-squared	0.125	0.269	0.285	0.151	0.441	0.481
R-squared adjusted	0.124	0.267	0.280	0.150	0.440	0.477

Notes: **,*** denote statistical significance at the 5% and 1% levels respectively. Robust standard errors reported in parenthesis.

3.2 GMM results

Although the results in Table 2 show a positive and statistically significant relationship between oil rents and wealth inequality, these results do not account for endogeneity. To address these limitations, we apply the two-step GMM and the estimation results are summarized in Table 3. The consistency and coherence of the GMM estimators depend on the validity of the assumption of no second order serial correlation of the error terms and the validity of the instruments (Hansen test). The results of the diagnostic tests show that our models are well specified. The Hansen test does not reject the validity of the instruments. Furthermore, the test results validate the absence of second order serial correlation. Too many instruments can seriously weaken and bias Hansen's test of identification restrictions and the rule of thumb is therefore that the number of instruments should be less than the number of countries (Roodman, 2009). The system GMM presented in Table 3 generated a maximum of 40 instruments, which is less than the number of countries, and the regression results are therefore free of instrument proliferation.

Table 3: Oil rent and Wealth inequalities (two-step GMM)

Dependent variable	Top 10% wealth share			Top 1% wealth share		
	(1)	(2)	(3)	(4)	(5)	(6)
L.dependent variable	1.019***	1.267***	0.974***	0.778***	1.077***	0.961***
	(0.106)	(0.150)	(0.0132)	(0.219)	(0.107)	(0.0146)
Oil rent	0.0176***	0.00584*	0.385***	0.0521*	0.0145*	0.400***
	(0.00424)	(0.00311)	(0.131)	(0.0284)	(0.00840)	(0.0848)
GDP per cap		0.838	-0.520***		1.049	-0.761***
		(0.529)	(0.124)		(1.365)	(0.146)
Trade			2.768***			4.725***
			(0.600)			(0.617)
Education			-7.660***			-11.21***
			(1.034)			(0.750)
Constant	-1.199	-25.03*	30.38***	7.080	-12.66	40.83***
	(6.657)	(14.60)	(5.679)	(7.159)	(16.46)	(4.941)
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	630	585	549	630	540	511
Number of countries	45	45	43	45	45	43
Number of instruments	8	8	34	5	7	40
AR(1)	0.0133	0.0234	0.0643	0.934	0.0127	0.0103
AR(2)	0.119	0.125	0.160	0.213	0.117	0.101
Hansen OIR	0.113	0.692	0.172	0.823	0.584	0.253

Notes: *,**,*** denote statistical significance at the 10%, 5% and 1% levels, respectively. Robust standard errors reported in parenthesis. The coefficients are based on the two-step GMM system estimation, using the finite sample correction of Windmeijer (2005). The size of the instrument matrix is reduced (collapsing instruments). All explanatory variables are treated as potentially endogenous. The lags of the explanatory variables are taken as an instrument for the difference equation, while the first differences of the explanatory variables are taken as an instrument for the level equation. The largest number of instruments used is 45. Hansen's test checks the validity of the instruments when the null hypothesis is that the instruments are uncorrelated with the residuals. The null hypothesis of the AR(2) test is that the error terms in the first differenced regression exhibit no second-order serial correlation. All regressions also satisfy the AR (1) test for first-order serial correlation. Thus the estimated coefficients are valid.

3.3 Robustness Tests

In order to assess the sensitivity of our results, we study robustness in three distinct ways: we first consider additional control variables; we then use an alternative independent variable of interest as well as an alternative dependent variable. The results presented in this section corroborate our previous findings and enhance our understanding of the link between oil wealth and wealth inequality.

3.3.1 Additional control variables

In Table 4, we test the robustness of our basic results to the introduction of additional control variables, namely ethnic fractionalization, population growth, and domestic credit. We observe in these new specifications that our results remain remarkably identical to those previously obtained. Thus, the coefficients associated with oil rent remain positive and statistically significant after the introduction of three additional control variables.

Table 4: Additional control variables

Dependent variable	Top 10% wealth share			Top 1% wealth share		
	(1)	(2)	(3)	(4)	(5)	(6)
L.dependent variable	0.981***	1.005***	0.983***	0.973***	1.044***	1.015***
	(0.00829)	(0.00504)	(0.00916)	(0.0175)	(0.0154)	(0.0234)
Oilrent	0.123***	0.162***	0.203**	0.506***	0.511***	0.394**
	(0.0249)	(0.0378)	(0.0908)	(0.124)	(0.0867)	(0.196)
GDPpercap	-0.486***	-0.174***	-0.771***	-0.874***	-0.240	-0.645*
	(0.0632)	(0.0465)	(0.140)	(0.180)	(0.270)	(0.341)
Trade	1.783***	-0.219	0.949***	4.749***	3.795***	2.536***
	(0.199)	(0.189)	(0.324)	(0.717)	(0.427)	(0.494)
Education	-8.746***	-3.963**	0.744	-9.225***	-0.302	2.577
	(1.311)	(1.640)	(1.148)	(1.014)	(0.906)	(1.986)
Ethnic	-0.125	0.262*	-0.200	-3.100	-3.729	-2.182
	(0.179)	(0.133)	(0.313)	(2.583)	(2.224)	(2.539)
Population growth		-0.871***	-0.788***		-0.837***	-0.548***
		(0.100)	(0.0704)		(0.108)	(0.0629)
Domestic credit			0.420**			1.098
			(0.175)			(0.672)
Constant	39.15***	20.45**	-0.709	32.83***	-12.90**	-21.01**
	(6.712)	(8.153)	(5.114)	(5.600)	(5.397)	(9.281)
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	549	510	490	549	475	502
Number of countries	43	43	43	43	43	43
Number of instruments	42	41	42	34	39	39
AR(1)	0.0074	0.0148	0.0121	0.0007	0.0086	0.0031
AR(2)	0.133	0.216	0.133	0.135	0.156	0.120
HansenOIR	0.511	0.490	0.440	0.176	0.177	0.502

Notes: *,**,*** denote statistical significance at the 10%, 5% and 1% levels, respectively. Robust standard errors reported in parenthesis. The coefficients are based on the two-step GMM system estimation, using the finite sample correction of Windmeijer (2005). The size of the instrument matrix is reduced (collapsing instruments). All explanatory variables are treated as potentially endogenous. The lags of the explanatory variables are taken as an instrument for the difference equation, while the first differences of the explanatory variables are taken as an instrument for the level equation. The largest number of instruments used is 42. Hansen's test checks the validity of the instruments when the null hypothesis is that the instruments are uncorrelated with the residuals. The null hypothesis of the AR (2) test is that the error terms in the first differenced regression exhibit no second-order serial correlation. All regressions also satisfy the AR (1) test for first-order serial correlation. Thus the estimated coefficients are valid.

3.3.2 Alternative measure of oil rents

We examine the robustness of our baseline results to the use of an alternative measure of oil wealth, namely oil abundance from the Ross and Mahdavy (2015) database. This indicator is measured as the quantity of oil and gas extracted, multiplied by the unit price and divided by the population (per capita value of oil and gas). The results of the estimates summarized in Table 5 show that the coefficient associated with oil abundance is positive and statistically significant. Overall, these results are consistent with our first hypothesis that oil-rich countries are associated with greater wealth inequality.

Table 5: Alternative measure of oil wealth (Oil abundance)

Dependent variable	Top decile			Top percentile		
	(1)	(2)	(3)	(4)	(5)	(6)
L. dependent variable	1.110***	0.976***	0.933***	1.023***	1.047***	1.085***
	(0.113)	(0.00323)	(0.0252)	(0.0950)	(0.0698)	(0.0206)
OilAbundance	2.249*	0.00935**	0.191**	3.065*	4.589*	0.115*
	(1.221)	(0.00400)	(0.0734)	(1.800)	(2.619)	(0.0666)
GDPpercap.		-0.381***	-1.375***		-2.332	-0.954***
		(0.0327)	(0.339)		(3.200)	(0.219)
Trade			2.914***			3.805***
			(0.852)			(0.667)
Education			1.313			-5.181***
			(1.749)			(1.764)
Constant	-16.70*	5.265***	-1.372	-13.87	1.120	14.41
	(9.747)	(0.510)	(8.489)	(9.876)	(21.05)	(10.19)
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	602	602	532	602	602	532
Number of countries	43	43	41	43	43	41
Number of instruments	6	39	33	4	6	38
AR(1)	0.0210	0.0106	0.00962	0.0635	0.0693	0.00556
AR(2)	0.175	0.106	0.140	0.121	0.302	0.0902
Hansen OIR	0.563	0.219	0.615	0.424	0.757	0.344

Notes: *,**,*** denote statistical significance at the 10%, 5% and 1% levels, respectively. Robust standard errors reported in parenthesis. The coefficients are based on the two-step GMM system estimation, using the finite sample correction of Windmeijer (2005). The size of the instrument matrix is reduced (collapsing instruments). All explanatory variables are treated as potentially endogenous. The lags of the explanatory variables are taken as an instrument for the difference equation, while the first differences of the explanatory variables are taken as an instrument for the level equation. The largest number of instruments used is 39. Hansen's test checks the validity of the instruments when the null hypothesis is that the instruments are uncorrelated with the residuals. The null hypothesis of the AR(2) test is that the error terms in the first differenced regression exhibit no second-order serial correlation. All regressions also satisfy the AR (1) test for first-order serial correlation. Thus the estimated coefficients are valid.

3.3.3 Alternative measure of wealth inequality

To further examine the robustness of our results, an alternative measure of wealth inequality is employed, namely, the Billionaire Wealth as a percentage of GDP. Indeed, Forbes magazine publishes a list of billionaires around the world every year. It is most probable that these billionaires belong to the richest group in terms of the top 1% or 0.1%. Oxfam (2016) reveals that 62 people that are richest in the world own wealth that is equivalent to wealth owned by the poorest 3.6 billion or half of the world's population. Therefore, the Billionaire Wealth as a percentage of GDP indicator (i.e. measured by the ratio of the share of billionaires' wealth in GDP), serves as a proxy for our an alternative measure of wealth inequality. The results of the regressions reported in Table 6 show that the coefficient associated with oil rent has a positive and statistically significant sign at the 1% level. This coefficient, although quantitatively and qualitatively lower than those obtained in our baseline estimates, confirms the positive effect of oil rent on wealth inequality.

Table 6: Alternative measure of wealth inequality

	Dependent variable: Billionaire wealth to GDP					
	Oil dependence			Oil abundance		
	(1)	(2)	(3)	(4)	(5)	(6)
L.Dependent	0.898***	0.894***	0.728***	1.010***	0.913***	0.746***
	(0.0458)	(0.0353)	(0.0125)	(0.0499)	(0.0374)	(0.0138)
Oil dependence	0.693***	0.248***	0.128***			
	(0.173)	(0.0883)	(0.0215)			
Oil Abundance				0.172***	0.160***	0.0901***
				(0.0425)	(0.0374)	(0.0271)
GDP per capita		-0.186***	-0.158***		-0.165**	-0.143***
		(0.0597)	(0.0295)		(0.0747)	(0.0363)
Trade			1.057***			1.138***
			(0.0879)			(0.155)
Education			-2.974***			-2.449***
			(0.418)			(0.549)
Constant	-0.149	1.902***	11.28***	-0.692***	1.084	8.015***
	(0.160)	(0.534)	(2.193)	(0.242)	(0.721)	(2.885)
Observations	576	576	505	502	548	488
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of countries	45	45	43	43	43	41
Number of Instruments	14	22	42	14	20	37
AR(1)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AR(2)	0.975	0.854	0.646	0.447	0.464	0.926
Hansen OIR	0.167	0.128	0.295	0.112	0.120	0.197

Notes: *,**,*** denote statistical significance at the 10%, 5% and 1% levels, respectively. Robust standard errors reported in parenthesis. The coefficients are based on the two-step GMM system estimation, using the finite sample correction of Windmeijer (2005). The size of the instrument matrix is reduced (collapsing instruments). All explanatory variables are treated as potentially endogenous. The lags of the explanatory variables are taken as an instrument for the difference equation, while the first differences of the explanatory variables are taken as an instrument for the level equation. The largest number of instruments used is 42. Hansen's test checks the validity of the instruments when the null hypothesis is that the instruments are uncorrelated with the residuals. The null hypothesis of the AR(2) test is that the error terms in the first differenced regression exhibit no second-order serial correlation. All regressions also satisfy the AR (1) test for first-order serial correlation. Thus the estimated coefficients are valid.

3.4 Oil, governance and wealth inequality

The interactive estimations are provided in this section. These results are summarized in Tables 7 and 8 for the Top decile and Top percentile indicators, respectively. The attendant tables report the results from examining the role of governance as measured by the six WGI indicators in the relationship between oil rent and wealth inequality. The corresponding findings show on the one hand that, the coefficients associated with oil rent all remain positive and statistically significant in the regressions of both tables. On the other hand, the coefficients associated with the interaction variables between oil rent and governance indicators (i.e. government effectiveness, corruption control, regulatory quality and role of law) are negative and statistically significant in Table 7. Similar results are also found in Table 8, except that the coefficient on the interaction variable between oil rent and corruption control is now insignificant. These results are like those of Hartwell et al. (2019), who found that democracy mitigates the positive effect of natural resource rents on income inequality. In sum, these last results confirm our second hypothesis concerning the moderating role of governance in mitigating the positive effects of oil rent on wealth inequalities.

In the second column or first specification of Table 7, the net impact from government effectiveness in modulating oil rents to affect wealth inequality is -1.263([-1.494× 0.968] + [0.183]). In this computation, the average value of government effectiveness is 0.968; the unconditional effect of oil rents is 0.183, whereas, the conditional impact from the interaction between oil rents and government effectiveness is -1.494. The corresponding threshold at which the unconditional positive effect becomes negative is 0.122 (0.183/1.494). This computation of net effects and corresponding threshold is consistent with recent interactive regressions literature (Asongu, le Roux & Biekpe, 2017, 2018; Tchamyou & Asongu, 2017).
The following findings are apparent in Table 7. First, with the exception of political stability and "voice & accountability" for which net effects and thresholds cannot be computed because at least one estimated coefficient relevant for their computation is not significant, overwhelmingly net negative effects are apparent from the role of the other governance dynamics. It follows that in the light of the negative interactive effects, the corresponding governance thresholds needed to reverse the positive effect of oil rent on the Top 10% of wealth share are: (i) 0.122 for government effectiveness and 0.258 for regulatory quality and (ii) 1.119 for corruption-control and 0.296 for the rule of law. In Table 8, the findings from Table 7 are broadly confirmed with the exception of the role of corruption-control which is now insignificant. The corresponding governance thresholds related to the role of governance in completely dampening the positive role of oil rent on wealth inequality in the Top 1% of wealth share are: (i) 0.251 for government effectiveness and 0.241 for regulatory quality and (ii) 0.343 for the rule of law.

An extended interactive regression analysis is performed to assess if the established findings withstand empirical scrutiny when oil abundance is used in place of oil rents. The findings which are reported in Table A2 and Table A3 for the Top 10% wealth share and Top 1% wealth share respectively, broadly confirm the findings in Table 7 and Table 8, especially as it pertains to the negative interactive effects. These negative interactive effects are evidence of the potential for governance policy thresholds that are relevant in reducing the positive role of oil abundance in increasing wealth inequality.

Table 7: Oil rent, wealth inequality (top decile) and role of governance

	Dependent variable: Top 10% wealth share					
	(1)	(2)	(3)	(4)	(5)	(6)
Oil rent	0.183***	0.330***	0.271***	0.244***	1.301*	0.395*
	(0.0528)	(0.0853)	(0.0958)	(0.0844)	(0.771)	(0.227)
Gov. effectiveness	-0.929***					
	(0.167)					
Political stability		-0.759***				
		(0.187)				
Control of corruption			-2.942***			
			(0.196)			
Regulatory quality				-1.515***		
				(0.155)		
Rule of law					0.705	
					(1.228)	
Voice and accountability						-0.627
						(0.896)
Oil rent×Gov. effectiveness	-1.494***					
	(0.224)					
Oil rent×Political stability		-0.0312				
		(0.0594)				
Oil rent×Control of corruption			-0.242*			
			(0.137)			
Oil rent×Regulatory quality				-0.943***		
				(0.0881)		
Oil rent×Rule of law					-4.389***	
					(1.251)	
Oil rent×Voice and accountability						0.606
						(0.593)
GDP per cap	-0.0725	0.0273	0.175	-0.173	1.475	-0.0642
	(0.253)	(0.0556)	(0.170)	(0.163)	(0.967)	(0.331)
Trade	0.769***	3.087***	2.153***	0.952***	2.084**	-0.0767
	(0.104)	(0.325)	(0.144)	(0.181)	(0.866)	(0.385)
Education	-4.010***	-4.774***	-5.972***	-9.711***	7.922	-8.766**
	(1.091)	(0.802)	(1.644)	(1.382)	(6.615)	(3.316)
Topdecile(t-1)	0.955***	0.971***	0.961***	0.945***	1.012***	0.972***
	(0.0102)	(0.00884)	(0.0115)	(0.00992)	(0.0410)	(0.0179)
Constant	20.18***	10.65***	10.77	44.42***	-61.44*	43.79***
	(6.376)	(3.506)	(8.381)	(7.213)	(35.04)	(15.94)
Time effects	Yes	Yes	Yes	Yes	Yes	Yes

Net effects of Oil rent	-1.263	na	0.065	-0.604	-2.311	na
Governance thresholds	0.122	na	1.119	0.258	0.296	na
Observations	511	473	511	473	511	473
Number of countries	43	43	43	43	43	43
Hansen OIR	0.213	0.308	0.220	0.362	0.467	0.346
Number of instruments	40	41	40	40	17	24
AR(2)	0.359	0.141	0.153	0.117	0.433	0.166
AR(1)	0.00225	0.00661	0.00663	0.0257	0.00057	0.0102

Notes: *,**,*** denote statistical significance at the 10%, 5% and 1% levels, respectively. Robust standard errors reported in parenthesis. The coefficients are based on the two-step GMM system estimation, using the finite sample correction of Windmeijer (2005). The size of the instrument matrix is reduced (collapsing instruments). All explanatory variables are treated as potentially endogenous. The lags of the explanatory variables are taken as an instrument for the difference equation, while the first differences of the explanatory variables are taken as an instrument for the level equation. The largest number of instruments used is 41. Hansen's test checks the validity of the instruments when the null hypothesis is that the instruments are uncorrelated with the residuals. The null hypothesis of the AR(2) test is that the error terms in the first differenced regression exhibit no second-order serial correlation. All regressions also satisfy the AR (1) test for first-order serial correlation. Thus the estimated coefficients are valid..The mean values of the governance dynamics are the following: 0.629 for "voice and accountability"; 0.271 for political stability; 0.968 for government effectiveness; 0.900 for regulatory quality; 0.823 for the rule of law and 0.851 for the control of corruption.na: not applicable because at least one estimated coefficient needed for the computation of the net effects and/or threshold is not significant.

Table 8:Oil rent, wealth inequality (top percentile) and the role of governance

	Dependent variable: Top 1% wealth share					
	(1)	(2)	(3)	(4)	(5)	(6)
Oil rent	0.440***	0.244**	1.563***	0.605**	1.456*	0.466*
	(0.158)	(0.110)	(0.462)	(0.234)	(0.814)	(0.266)
Gov. effectiveness	-1.428***					
	(0.206)					
Political stability		-1.882***				
		(0.282)				
Control of corruption			-3.207***			
			(0.635)			
Regulatory quality				-0.762***		
				(0.244)		
Rule of law					1.888	
					(1.567)	
Voice and accountability						0.0196
						(0.820)
Oil rent×Gov. effectiveness	-1.748***					
	(0.427)					
Oil rent×Political stability		0.176				
		(0.171)				
Oil rent×Control of corruption			0.672			

			(0.492)			
Oil rent ×Regulatory quality				-2.487***		
				(0.350)		
Oil rent×Rule of law					-4.243***	
					(1.271)	
Oil rent×Voice and accountability						0.194
						(0.606)
GDP per cap	0.144	-0.0598	-1.016***	0.171	0.991	-0.401
	(0.297)	(0.183)	(0.289)	(0.284)	(1.024)	(0.380)
Trade	0.860***	6.683***	0.156	-0.272	1.284	-0.471
	(0.172)	(0.477)	(0.397)	(0.277)	(1.020)	(0.436)
Education	-8.752***	-3.631***	-3.064	-17.23***	4.746	-17.50***
	(2.140)	(1.105)	(3.896)	(3.151)	(7.178)	(3.415)
Toppercentile(t-1)	0.921***	0.932***	0.963***	0.948***	1.048***	0.979***
	(0.0124)	(0.00817)	(0.0150)	(0.0158)	(0.0461)	(0.0192)
Constant	39.80***	-8.229	-31.75	82.24***	-40.41	87.80***
	(10.75)	(5.754)	(24.23)	(14.75)	(40.22)	(17.14)
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Net effects of Oil rent	-1.252	na	na	-1.633	-2.035	na
Governance thresholds	0.251	na	na	0.243	0.343	na
Observations	511	469	511	473	510	473
Number of id	43	43	43	43	43	43
Hansen OIR	0.135	0.281	0.176	0.627	0.229	0.186
Number of instruments	36	41	20	31	17	24
AR(2)	0.114	0.327	0.213	0.401	0.353	0.374
AR(1)	0.00253	0.00150	0.00046	0.0124	0.00094	0.00286

Notes: *,**,*** denote statistical significance at the 10%, 5% and 1% levels, respectively. Robust standard errors reported in parenthesis. The coefficients are based on the two-step GMM system estimation, using the finite sample correction of Windmeijer (2005). The size of the instrument matrix is reduced (collapsing instruments). All explanatory variables are treated as potentially endogenous. The lags of the explanatory variables are taken as an instrument for the difference equation, while the first differences of the explanatory variables are taken as an instrument for the level equation. The largest number of instruments used is 41. Hansen's test checks the validity of the instruments when the null hypothesis is that the instruments are uncorrelated with the residuals. The null hypothesis of the AR(2) test is that the error terms in the first differenced regression exhibit no second-order serial correlation. All regressions also satisfy the AR (1) test for first-order serial correlation. Thus the estimated coefficients are valid.The mean values of the governance dynamics are the following: 0.629 for "voice and accountability"; 0.271 for political stability; 0.968 for government effectiveness; 0.900 for regulatory quality; 0.823 for the rule of law and 0.851 for the control of corruption.na: not applicable because at least one estimated coefficient needed for the computation of the net effects and/or threshold is not significant.

4. Concluding implications and future research directions

The study has examined the role of governance in modulating the effect of oil wealth on wleath inequality in 45 countries in the world for the period 2000–2014. The empirical evidence is based on the POLS and the GMM. The findings show that oil rents unconditionally increase wealth inequality while govenance dyanmics (in terms of rule of law, corruption-control, government effectiveness, regulatotary quality) moderate oil rents for an overall net negative effect on wealth inequality. Good governance thresholds at which the unconditional effect of oil rents on the wealth inequality changes from positive to negative are computed and discussed. It follows that while governance is a necessary condition for improving the redistributive effects of oil wealth, it becomes a sufficient condition for net positive improvements in wealth distribution only when some critical masses of good govenrenace have been reached. More policy implications are discussed in what follows.

From the findings it is apparent that economic governance and institutional governance are more relevant in modualting oil rents for an overall negative incidence on wealth inequality compared to political governance (entailing 'voice & accountability" and political stability). Economic governance consists of regulatory quality and government effectiveness while institutional governance entails the rule of law and corruption-control. It follows that ..“*the capacity of government to formulate and implement policies, and to deliver services (Economic Governance)*”(Andres et al., 2015: 1041) and “*the respect for citizens and the state of institutions that govern the interactions among them (Institutional Governance)*” (Andres et al., 2015: 1041) are better governance moderators than “*the process by which those in authority are selected and replaced(Political Governance)*” (Andres et al., 2015: 1041). This study has provided policy relevant levels of governance that should be attained in order for oil rents to reduce wealth inequality contingent on good governance, namely: (i) for the Top 10% of wealth share, 0.122 of government effectiveness and 0.258 of regulatory quality, 1.119 of corruption-control and 0.296 of the rule of law and (ii) for the Top 1% of wealth share, 0.251 of government effectiveness, 0.241of regulatory quality and 0.343 of the rule of law.

As more data become available from which to take more countries on board and explore more times series properties, future studies should assess using the attendant robust estimation techniques whether the thresholds in this study withstand empirical scrutiny. It is also worthwhile to engage other policy variables by which the positive effect of oil rents on wealth inequality can be mitigated.

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Appendix

Table A1: Oil dependence, oil abundance and income inequality

Dependent variable	Gini index					
	Oil dependence			Oil abundance		
	(1)	(2)	(3)	(4)	(5)	(6)
L.Gini index	0.0971***	0.101**	0.421***	0.318***	0.126***	0.226***
	(0.0309)	(0.0429)	(0.0289)	(0.0382)	(0.0243)	(0.0355)
Oil rent	0.0328***	0.0242**	0.00910***			
	(0.00822)	(0.0114)	(0.00284)			
Oil Abundance				0.00454***	0.00408**	0.00407***
				(0.00161)	(0.00171)	(0.000677)
GDP per cap		-0.0337*	-0.0356***		-0.0606***	-0.0512***
		(0.0189)	(0.00290)		(0.0154)	(0.00453)
Trade			0.0171***			0.00533
			(0.00496)			(0.00383)
Education			-0.107*			-0.114
			(0.0551)			(0.0810)
Constant	0.317***	0.664***	0.993***	0.233***	0.911***	1.293***
	(0.0185)	(0.202)	(0.282)	(0.0204)	(0.155)	(0.410)
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	602	602	536	574	574	519
Number of countries	43	43	41	41	41	39
Number of instruments	17	17	26	17	17	26

AR(1)	0.0293	0.0373	0.0436	0.0287	0.0285	0.0485
AR(2)	0.408	0.376	0.221	0.118	0.288	0.310
Hansen OIR	0.153	0.341	0.110	0.157	0.672	0.371

Notes: *,**,*** denote statistical significance at the 10%, 5% and 1% levels, respectively. Robust standard errors reported in parenthesis. The coefficients are based on the two-step GMM system estimation, using the finite sample correction of Windmeijer (2005). The size of the instrument matrix is reduced (collapsing instruments). All explanatory variables are treated as potentially endogenous. The lags of the explanatory variables are taken as an instrument for the difference equation, while the first differences of the explanatory variables are taken as an instrument for the level equation. The largest number of instruments used is 63. Hansen's test checks the validity of the instruments when the null hypothesis is that the instruments are uncorrelated with the residuals. The null hypothesis of the AR test (2) is that the error terms in the first differenced regression exhibit no second-order serial correlation. All regressions also satisfy the AR (1) test for first-order serial correlation. Thus the estimated coefficients are valid.

Table A2:Oil Abundance and wealth inequality (top decile): role of governance

Dependent variable	Dependent variable :Top decile					
	(1)	(2)	(3)	(4)	(5)	(6)
L.top decile	1.053***	1.045***	0.791***	0.825***	0.861***	0.977***
	(0.0191)	(0.0481)	(0.0121)	(0.0140)	(0.0148)	(0.0271)
Oil Abundance	0.311***	0.278**	0.336***	0.270***	0.195**	0.478**
	(0.0759)	(0.137)	(0.0620)	(0.103)	(0.0843)	(0.182)
Governance effectiveness	-0.620*					
	(0.359)					
OilAbundance × Gov effectiveness	-0.349***					
	(0.0613)					
Political stability		0.877				
		(0.829)				
OilAbundance × Political stability		-0.284*				
		(0.162)				
Control of corruption			-1.419***			
			(0.373)			
OilAbundance × Control of corruption			-0.288***			
			(0.0656)			
Regulatory quality				-0.847**		
				(0.350)		

OilAbundance × Regulatory quality				-0.296***		
				(0.0895)		
Role of law					-1.345***	
					(0.382)	
OilAbundance × Role of law					-0.261***	
					(0.0723)	
Voice and accountability						1.095
						(0.972)
OilAbundance × Voice and accountability						-0.317***
						(0.116)
Baseline control	Yes	Yes	Yes	Yes	Yes	Yes
Constant	32.09	-21.45*	89.88***	70.76***	50.54***	-32.89***
	(21.81)	(10.96)	(11.90)	(12.86)	(6.177)	(5.711)
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	458	477	495	495	477	477
Number of countries	41	41	41	41	41	41
Number of instruments	38	29	40	40	41	34
AR(1)	0.0183	0.00984	0.0460	0.0346	0.0112	0.00770
AR(2)	0.338	0.149	0.117	0.221	0.151	0.171
Hansen OIR	0.624	0.638	0.690	0.427	0.754	0.325

Notes: *,**,*** denote statistical significance at the 10%, 5% and 1% levels, respectively. Robust standard errors reported in parenthesis. The coefficients are based on the two-step GMM system estimation, using the finite sample correction of Windmeijer (2005). The size of the instrument matrix is reduced (collapsing instruments). All explanatory variables are treated as potentially endogenous. The lags of the explanatory variables are taken as an instrument for the difference equation, while the first differences of the explanatory variables are taken as an instrument for the level equation. The largest number of instruments used is 63. Hansen's test checks the validity of the instruments when the null hypothesis is that the instruments are uncorrelated with the residuals. The null hypothesis of the AR test (2) is that the error terms in the first differenced regression exhibit no second-order serial correlation. All regressions also satisfy the AR (1) test for first-order serial correlation. Thus the estimated coefficients are valid.The mean values of the governance dynamics are the following: 0.629 for "voice and accountability"; 0.271 for political stability; 0.968 for government effectiveness; 0.900 for regulatory quality; 0.823 for the rule of law and 0.851 for the control of corruption. na: not applicable because at least one estimated coefficient needed for the computation of the net effects and/or threshold is not significant.

Table A3:Oil Abundance and wealth inequality (top percentile): role of governance

Dependent variable	Dependent variable :Top percentile					
	(1)	(2)	(3)	(4)	(5)	(6)
L.Top percentile	1.014***	1.118***	0.993***	1.088***	1.046***	1.114***
	(0.0146)	(0.0403)	(0.0196)	(0.0182)	(0.0233)	(0.0263)
Oil Abundance	0.336***	0.374**	0.153**	0.184**	0.536**	0.455*
	(0.0576)	(0.161)	(0.0622)	(0.0802)	(0.241)	(0.232)
Governance effectiveness	-0.975***					
	(0.359)					
OilAbundance × Gov effectiveness	-0.392***					
	(0.0540)					
Political stability		0.683				
		(1.586)				
OilAbundance × Political stability		-0.131				

		(0.306)				
Control of corruption			-2.221***			
			(0.464)			
OilAbundance × Control of corruption			-0.179***			
			(0.0533)			
Regulatory quality				-0.320		
				(0.652)		
OilAbundance × Regulatory quality				-0.137**		
				(0.0686)		
Role of law					0.461	
					(1.071)	
OilAbundance × Role of law					-0.380**	
					(0.177)	
Voice and accountability						1.269
						(1.049)
OilAbundance × Voice and accountability						-0.431***
						(0.151)
Baseline control	Yes	Yes	Yes	Yes	Yes	Yes
Constant	49.92*	-29.69*	16.77*	-30.72***	-45.83***	1.638
	(25.94)	(15.90)	(9.203)	(9.760)	(7.391)	(16.91)
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	458	495	477	471	477	495
Number of countries	41	41	41	41	41	41
Number of instruments	38	26	39	40	34	27
AR(1)	0.00274	0.00305	0.00520	0.00707	0.00275	0.00419
AR(2)	0.214	0.192	0.223	0.253	0.143	0.141
Hansen OIR	0.385	0.325	0.640	0.432	0.548	0.137

Notes: *,**,*** denote statistical significance at the 10%, 5% and 1% levels, respectively. Robust standard errors reported in parenthesis. The coefficients are based on the two-step GMM system estimation, using the finite sample correction of Windmeijer (2005). The size of the instrument matrix is reduced (collapsing instruments). All explanatory variables are treated as potentially endogenous. The lags of the explanatory variables are taken as an instrument for the difference equation, while the first differences of the explanatory variables are taken as an instrument for the level equation. The largest number of instruments used is 63. Hansen's test checks the validity of the instruments when the null hypothesis is that the instruments are uncorrelated with the residuals. The null hypothesis of the AR test (2) is that the error terms in the first differenced regression exhibit no second-order serial correlation. All regressions also satisfy the AR (1) test for first-order serial correlation. Thus the estimated coefficients are valid.The mean values of the governance dynamics are the following: 0.629 for “voice and accountability”; 0.271 for political stability; 0.968 for government effectiveness; 0.900 for regulatory quality; 0.823 for the rule of law and 0.851 for the control of corruption. na: not applicable because at least one estimated coefficient needed for the computation of the net effects and/or threshold is not significant.

Table A1: List of 45 countries

Argentina,	Denmark	Israel	Poland	Thailand
Australia	Egypt, ArabRep,	Italy	Portugal	Turkey
Austria	Finland	Japan	RussianFederation	United ArabEmirates
Belgium	France	Malaysia	SaudiArabia	United Kingdom
Brazil	Germany	Mexico	Singapore	United States
Canada	Greece	Netherlands	South Africa	
Chile	Hong Kong SAR, China	New Zealand	South Korea	
China	India	Norway	Spain	
Colombia	Indonesia	Peru	Sweden	
CzechRepublic	Ireland	Philippines	Switzerland	