But seriously: does oil *really* hinder democracy?

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October 29, 2008

PRELIMINARY DRAFT; COMMENTS WELCOME

Abstract: Recent studies have disputed the claim that 'oil hinders democracy,' or raised questions about the causal mechanisms behind it. I re-examine the question of petroleum wealth and regime type, using pooled logit regressions, an improved measure of petroleum wealth, and a dataset that covers up to 170 countries from 1960 to 2002. I also explore other types of evidence on oil and authoritarian rule, including data on public opinion, gasoline prices, and the survival of government leaders. The results suggest a) oil wealth strongly inhibits democratic transitions in authoritarian states; b) oil has no overall affect on the survival of democracies, but may weakly encourage democratic breakdown in low-income states; c) once oil's role is properly accounted for, Islam seems to have no effect on regime type; d) oil wealth lengthens the tenure of authoritarian rulers, although this result is somewhat fragile; e) there is little support for two of the three causal mechanisms suggested by Ross [2001], although careful testing is hampered by poor data; f) alternative causal mechanisms suggested by Boix [2003], Smith [2007], and Morrison [forthcoming], are unpersuasive.

In a 2001 article, I argued that "oil hinders democracy," and suggested three causal mechanisms to explain this pattern. Although this article was not the first to make this argument, it helped touch off a debate over the link between natural resource wealth and regime types. Some studies supported the central finding that oil inhibits democratization [Jensen and Wantchekon 2004; Epstein et al. 2006; Ulfelder 2007; Gassebner, Lamla, and Vreeland 2008], or extended the argument in new directions [Egorov, Guriev, and Sonin 2007; Dunning 2008; Goldberg, Wibbels, and Mvukiyehe 2009]. Dissenters argued that oil's impact on government accountability has been exaggerated [Herb 2004], does not stand up to alternative statistical tests [Haber and Menaldo 2007; Acemoglu et al. 2008; Horiuchi and Wagle 2008], is true but for different reasons than the ones I suggested in 2001 [Boix 2003; Smith 2007; Morrison forthcoming], or that oil has both positive and negative effects on the likelihood of democratic transitions, which makes its net impact ambiguous [Herb 2004; Dunning 2008].

There were many shortcomings in my 2001 study: the statistical method may not have been the most appropriate; the model conflated two distinct issues, the survival of authoritarianism and the survival of democracies; I conflated oil wealth with oil export dependence, although the latter probably biased the estimations in ways that supported my argument; and the regression results were weakened by missing data, and the use of variables that poorly measured the concepts in the theory.

Here I revisit the central claims in my earlier study, using a better measure of oil wealth, separating democratic transitions from democratic survival, employing a dataset that extends from 1960 to 2002 and covers up to 170 states – more than doubling the number of country-year observations available for scrutiny. I find evidence that oil wealth strongly inhibits democratic transitions in authoritarian states, that this pattern is reasonably robust, and that regardless of any possible countervailing pro-democracy effects, oil's net impact on democratic transitions is strongly negative. I also show that oil has no overall affect on the survival of democracies, but may weakly encourage democratic breakdown in low-income states; and that oil lengthens the tenure of individual authoritarian rulers (as opposed to authoritarian regimes), although this result is somewhat fragile and is driven by the durability of oil-rich monarchies in the Middle East.

After further examining the causal mechanisms, I find that two of them – the 'repression effect' and the 'modernization effect' – do not appear to be valid, but there is at least partial support for the 'rentier effect.' I also argue against two alternative explanations for the oil-authoritarianism link: that elites more strongly oppose democratization when their wealth comes from oil, since it is a "fixed asset" that cannot be transferred to safe havens abroad [Boix 2003]; and that oil's impact on authoritarianism is an artifact of the broader, stabilizing effects that petroleum has on regime types [Smith 2007; Morrison forthcoming]. [1]

[1] Although it is not the focus of this paper, I find no evidence that non-fuel mineral wealth – when measured as 'mineral rents per capita,' instead of 'mineral exports over GDP' – has any affect on democratic transitions or democratic failures.

En route I also show how oil wealth can help resolve the seemingly-intractable debate over whether income affects the likelihood of democratic transitions.

The Original Argument and Its Shortcomings

Ross [2001] evaluates the claim, developed by a generation of Middle East scholars, that oil dependence retards democratization. It had four main conclusions:

a. the oil-impedes-democracy claim is "both valid and statistically robust," and has a larger effect on poor countries than rich ones [356];
b. these effects are not limited to the Middle East: the oil-authoritarianism correlation remains statistically significant when dummy variables for the Middle East region, and (alternatively) the Arabian Peninsula, are included in the model;
c. other types of minerals, besides oil and natural gas, have similar, democracy-inhibiting effects;
d. there was at least "tentative support" for three causal mechanisms linking oil and authoritarianism: "a rentier effect, through which governments use low tax rates and high spending to dampen pressures for democracy; a repression effect, by which governments build up their internal security forces; and a modernization effect, in which the failure of the population to move into industrial and service sector jobs renders them less likely to push for democracy [356-7]."

These findings were supported by a series of time-series cross national regressions with random effects, in which the "oil" variable was measured as the ratio of fuel exports to GDP, and the "regime type" variable was drawn from the Polity 98 dataset, supplemented by data from Freedom House.

In hindsight, there were many flaws in the analysis. Ulfelder [2007] pointed out a conceptual problem in this research design: it was impossible to determine if oil was reducing the likelihood that dictatorships would become democracies, or increasing the likelihood that democracies would break down and become dictatorships – or perhaps, both. A better approach, he suggested, was to use an event history design, and a bivariate measure of regime type, to separately determine how oil was affecting autocracies and democracies.

The "oil" variable (as well as the "non-fuel minerals" variable) also had problems. To my subsequent regret, I followed the practice of Sachs and Warner [1995] and Collier and Hoeffler [1998], and focused on the effects of oil dependence – measured as oil, gas, and coal exports as a fraction of GDP – rather than oil wealth per se. Since then, I have come to appreciate two shortcomings of the oil dependence measure – one conceptual, the other a bias that probably tilted the analysis in favor of my hypotheses.

The measure is flawed conceptually because it only accounts for fuel that is exported – and it is hard to see why fuel that is sold domestically should not be counted. According to the causal mechanisms that I and others have suggested, extracting oil is harmful because of the revenues it generates, either for the government or private elites; but revenues can come from both domestic and foreign sales.

The measure was also be biased in favor of my argument. The ideal measure of a country's oil wealth should be uninfluenced by all other variables of interest. The oil-exports-to-GDP ratio contains biases in both its numerator and its denominator that tend to inflate its value in countries that are poorer, more corrupt, and more conflict-ridden – and which might thereby cause a false correlation with authoritarianism.

Even if two countries produce the same quantity of oil, the numerator – a country's oil exports – will typically be larger in poorer countries. Most oil-producing countries use a fraction of their oil domestically and export the surplus. Rich countries will consume more of their own oil, while poor countries will consume less of it, and hence, export more. For example, on a per-capita basis, the US produces more oil than Angola or Nigeria, but Angola and Nigeria export more than the US – because the US is wealthier than Angola or Nigeria and consumes more of its oil domestically. When we measure oil exports, we are indirectly measuring the size of a country's economy.

A similar problem occurs in the denominator. Even if two countries export the same quantity of oil, the poorer country will have a smaller GDP, and hence, higher oil-exports-to-GDP ratio. This opens the door to several endogeneity problems. For example, having a high oil exports-to-GDP ratio might cause slow economic growth (or corruption, or civil war), but it could also be a result of these ailments, since they tend to reduce a country's GDP. If democracy is influenced by economic growth and violent conflict, this might again bias any estimations.

I now prefer to measure production instead just exports; to use the total value of petroleum rents (i.e., the value of production minus the country-specific extraction costs, including the cost of capital); and to use a country's population, not its total exports or GDP, to normalize the value of these rents. Since most governments do a pretty good job of collecting oil rents, this is a better measure of oil's fiscal impact.

The resulting measure, *Oil Rents per capita,* also has a more intuitive meaning than the oil exports-to-GDP ratio. If two countries with similar populations produce similar quantities of oil and gas at similar costs – for example, Angola and the Netherlands – they will have similar levels of *Oil Rents per capita* (in this case, about $380 per capita in 2003). If we measured them by their oil-exports-to-GDP ratios, however, we'd find Angola's measure (.789) much higher than the Netherlands' (.056), because Angola is too poor to consume much of its own oil (making the numerator larger), and because its GDP is much smaller (making the denominator smaller).[2]

The *Oil Rents* variable also produces a tougher test of the 'oil hinders democracy' claim, and related arguments about the resource curse: it allows us to determine whether oil rents alone – regardless of how strong or weak the economy is – has a consistent effect on a given outcome.

[2] Dunning [2008] uses an almost-identical measure of oil rents, covering the same period. Where our models are similar, so are our results. For more on the sources for my measure, see Ross [2008].

A First Look at the Data

Before embarking on statistical analysis, it may be useful to observe some simple patterns in the data – using *Oil Rents per capita* to measure oil wealth, income data from World Bank [2007], and the dichotomous measure of regime type developed by Przeworski et al. [2000].

First, note that oil appears to reverse the "normal" relationship between income and democratic transitions. In general, income is strongly and positively correlated with the likelihood that an authoritarian state will become (and stay) democratic. Figure 1 illustrates this relationship by looking at all countries that were under authoritarian rule in 1960, the first year of the dataset, or became independent after 1960 and were under authoritarian rule in their first year of independence. The values on the x-axis represent a country's average non-oil income between 1960 and 2002; values on the y-axis denote the percentage of the time, between 1960 and 2002, that each country dwelt under a democratic government. Those that were continuously authoritarian have a score of "zero"; and those that transited between democracy and authoritarianism during these years have scores that represent the fraction of this period that they spent under democratic government. The upward-sloping line suggests the general relationship between these two factors: the higher a country's non-oil income, the greater the time it probably spent under a democratic government.[3]

But if we look at income from oil, we see the *opposite* pattern. Figure 2 is identical to Figure 1 in all respects but one: the x-axis now measures a country's income from the production of oil. Note the change in the slope of the fitted line: income that comes from oil is *negatively* correlated with democracy.

The cross-tabulations in Table 1 show the same pattern. The numbers in the cells represent the percentage of authoritarian states in each category that, on average, transited to democracy each year. The first column shows the oil-producing states, and the second shows the non-oil states. In each of the income and regional categories, transitions to democracy were less likely among oil producers.

Another way to view the oil-authoritarianism link is by looking at historical trends. Figures 3 and 4 display the number of democracies and autocracies in non-oil producing states, and oil-producing states, between 1960 and 2002. Figure 3 shows a familiar pattern: since the late 1970s there has been a sharp rise in the number of democracies and a corresponding drop in autocracies. But Figure 4, covering only the oil producers, shows little trend either towards or away from democracy: the number of oil-producing democracies in 2002 was the same as it was in 1985. Almost all of the increase in global democracy since the early 1980s has come from the non-oil states.

Of course, some oil producers have transited to democracy. Table 2 lists the only ten countries to ever go from authoritarian to democratic rule while earning at least $100 per

[3] There is a great deal of debate about how to interpret this relationship: whether higher incomes promote democracy, whether democracy promotes higher incomes, or whether the two are the joint product of a third, unmeasured variable. For our purposes, however, this debate is irrelevent.

capita in oil rents. At the top of the list is Nigeria, which transited to democracy in 1979 while generating $935 per capita in oil rents.

But Nigeria's achievement was fleeting: it remained a democracy for just four years, before succumbing to a military coup. Six of these ten transitions were aborted by coups.[4] Since Venezuela's transition in 1958, no country with more oil wealth than Mexico in 2000 has made a *successful* transit to democracy.

Some recent studies suggest the net impact of oil wealth (or oil dependence) is ambiguous: while it may hinder democratic transitions through some channels, it promotes democratization through others [Herb 2004; Dunning 2008; Goldberg, Wibbels, and Mvukiyehe 2009]. Whether or not oil has countervailing pro-democracy effects, these figures suggest oil's net impact has been strongly negative.

Some simple figures may also illuminate the relationship between oil wealth and democratic failures. Table 3 shows the annual rate of democratic failures in oil-producing and non-oil countries across several income and regional categories. Among low-income countries, democratic failures were more than twice as frequent among the oil producers; among middle and high income countries, there was no strong pattern. The failure of oil-producing democracies seemed most prevalent in Sub-Saharan Africa, perhaps because of the concentration of low-income states.

Figures 5 and 6 illustrate these patterns by plotting the relationship between oil rents and democracy for all countries that were democracies in 1960, or were democratic in their first year of post-1960 independence. Figure 5, which includes only high-income states (i.e., states with above-median incomes), suggests that the relationship between oil rents and democracy is weakly positive: wealthy democracies have been somewhat *more* stable when they have more income from oil. But Figure 6, which includes only low-income countries, shows the opposite: the more oil rents these countries produced, the less time they spent under democratic rule. The width of the 95 percent confidence interval, however, suggests that there is much uncertainty around this trend: there may be too few states in this category to make strong inferences about the role of oil rents.

These simple cross-tabs and scatterplots imply that oil is correlated with fewer democratic transitions; that even if oil has countervailing pro-democracy effects, its net effects are strongly negative; and that oil's affect on democratic failures is ambiguous, but may depend on a country's income level. We now turn to a regression analysis to see if these patterns hold up.

Model Specification

To see whether oil rents affect regime type, I use panel logit regressions, which has become a common way to estimate the likelihood of democratic transitions. Since there is no reason to expect democratic transitions and democratic failures to be caused by the same underlying process, I explore them separately. Standard errors clustered by

[4] Of these six failures, three eventually returned to democracy – two of them (Nigeria and Peru) after their oil rents dropped to much lower levels.

country. The core model is parametric, and assumes that the underlying hazard rate takes a specific form. In the robustness tests, I consider alternative assumptions about the base hazard rate.

Some prior studies of democratic transitions have included country fixed effects in their logit models to control for unobserved country-specific factors, and to focus on within-country variations over time rather than cross-country variations [Haber and Menaldo 2007]. While these tasks are desirable, the decision to include country fixed effects in a logit model creates an even larger problem: it eliminates from the sample all countries that have never transited to democracy, a group that includes most of the oil-rich developing countries. The result is a severe selection bias: countries that have transited to democracy remain in the sample, while countries that have not transited are dropped. The main hypothesis – that oil helps prevent transitions to democracy – can not be meaningfully tested with this sample.

To avoid this problem – and keep the oil-rich autocracies in the sample – I do not include country fixed effects; I do, however, use regional fixed effects to assess the model's robustness.

Hypotheses
The claim that 'oil hinders democracy' can be broken into two hypotheses:

H_1: Higher levels of oil rents reduce the likelihood that authoritarian states will become democratic;

H_2: Higher levels of oil rents increase the likelihood that democratic states will become authoritarian.

Dependent Variable
To identify transitions between authoritarianism and democracy, I use the dichotomous democracy-autocracy measure developed by Przeworski et al. (2000) and updated by Cheibub and Gandhi (2004). [5] To fill in observations for countries absent from their dataset, I use Polity IV. From this data, I create *Democratic Transition,* a dummy variable that denotes the year that a country changes from authoritarian to democratic rule; and *Democratic Failure,* a dummy variable that denotes a transition from democratic to authoritarian rule.

The resulting dataset covers up to 170 countries between 1960 and 2002 with very few missing observations.

[5] They define regimes as democracies if they meet all of the following conditions: the chief executive is elected; the legislature is elected; there are at least two political parties; and at least one incumbent regime has been defeated.

My analysis in many ways follows Ulfelder (2007), who also uses an event history design to test a similar pair of hypotheses, but develops his own dichotomous autocracy-democracy measure. Our substantive results are similar.

Core Variables

To keep the analysis simple, I first develop a 'core model' with three substantive variables; I also include a fourth variable to control for duration dependence. I later assess the robustness of the models to the inclusion of additional control variables.

The independent variable of interest, as noted above, is *Oil Rents per capita,* which is measured in constant 2000 dollars. It measures the value of oil and gas production, minus the country-specific extraction costs, divided by the country's midyear population. It is not completely unbiased, since the advanced industrialized countries attract a disproportionate share of the world's investments in petroleum extraction, relative to their subsoil assets [UNCTAD 2007]. Hence the value of *Oil Rents* will be biased upwards in countries with higher incomes. But since higher incomes are positively associated with democracy, the *Oil Rents* variable is biased against any finding consistent with either H_1 or H_2.

The first control variable accounts for a country's history of regime changes. Several studies suggest that when states have prior experience with democracy, it boosts the likelihood of a subsequent transition to democracy [e.g., Gassebner, Lamla, and Vreeland 2008]. Similarly, prior experience with authoritarian rule might increase the likelihood that democracies will fail. To capture this effect, I create a dummy variable to indicate that an autocratic country was previously a democracy (*Prior Democracy*), and a second variable to indicate that a democracy was previously autocratic (*Prior Autocracy*), since 1946.

The second control variable in the core model is *Income,* which measures the natural log of income per capita based on data from the World Development Indicators, with missing observations filled in with adjusted figures from Heston, Summers, and Aten [2004]. Most prior studies of democratization suggest that income is a critical factor: when incomes rise, so does the likelihood that an authoritarian state will become democratic [Londregan and Poole 1996; Barro 1999; Boix and Stokes 2003; Epstein et al 2006]. Przeworski et al. [2000] argue that higher incomes reduce the likelihood that democracies will become autocratic, but have no effect on the probability that autocratic states will become democracies.[6] This debate need not be resolved to determine whether oil rents affect democracy: since income *might* affect democracy, I control for it in the core model.

Finally, the core model also includes a variable to account for duration dependence. *Regime Duration* is the natural log of the number of continuous years (since the beginning of the dataset in 1960) that a country has been under democratic or authoritarian rule; it represents the underlying hazard rate. In the robustness section, I show that the *Oil Rents* variable is unaffected by differing assumptions about the base hazard rate.

[6] Not all studies agree that incomes matter. Acemoglu et al. [2008] argue that income and democracy may be jointly determined by unobserved factors, like the political institutions that stem from colonial rule. Once they control for these unobserved factors with country fixed effects, they find that income has no impact on either democratic transitions or democratic failures. See my comment on this debate below..

Results: Democratic Transitions
Table 4 displays the results of estimations in which *Democratic Transition* is the dependent variable. To facilitate comparisons, all of the variables are standardized.

Column one includes only the control variables, and shows they are strongly linked to the likelihood of a democratic transition: states with higher incomes and prior transitions are more likely to become democratic. Column two includes *Oil Rents,* and shows it has a strong, negative effect on the likelihood of a democratic transition.[7]

In column three I start to explore the model's robustness by adding the variable *Economic Growth,* which is measured as the year-to-year change in income per capita. Several studies find that growth helps autocracies survive [Haggard and Kaufman 1995, Przeworski et al. 2000; Epstein et al. 2006; Gassebner, Lamla, and Vreeland 2008].

Oil production almost certainly influences a country's economic growth, although the precise effect is unclear. Including *Economic Growth* in the model could hence bias the *Oil Rents* coefficient in ways that are difficult to predict. As column three shows, its inclusion has little effect on the *Oil Rents* coefficient.

In columns four and five I explore the alleged effects of Islamic culture and traditions on democratic transitions; I use the variable *Islam,* which represents the Muslim fraction of the population and is taken from Barrett [1982]. Many studies argue that states with large Muslim populations are less likely to become democracies [Barro 1999, Fish 2002]. Since many Muslim countries are also significant oil producers, it is easy to confuse the effects of Islam with the effects of oil production.

In column four I add *Islam* to the model, and temporarily drop *Oil Rents;* the *Islam* variable is negative and statistically significant. In column five I add *Oil Rents* back to the model, which causes the *Islam* variable to lose statistical significance at conventional levels. This implies that until oil production is taken into account, Islam *appears* to inhibit democratization; but that once oil is accounted for, Islam's affect turns out to be illusory. Studies tying Islam to authoritarian rule may be mistaken: once oil's effects are well-measured and hence fully accounted for, Islam is not robustly linked to regime type [Midlarsky 1998; Barro 1999; Fish 2002; Donno and Russet 2004].

Collectively, these estimations are consistent with H_1: authoritarian states with more oil rents are less likely to become democracies.

Parenthetically, the results in columns one and two may cast light on the debate over the relationship between income and democratic transitions. There is much disagreement about whether the broad association between high incomes and democracy is caused by the positive effect of income on the likelihood of democratic transitions [e.g., Boix and

[7] Note that in all of the estimations, the substantive effect of *Oil Rents* appears to be remarkably large; this is an artifact of the skewness of the oil data, which makes the standard deviation quiite large. In the robustness tests, I show that the regression results are unchanged when I use the log of oil rents – which reduces the skewness.

Stokes 2003; Epstein et al. 2006], or by the positive effect of income on the survival of democracies [e.g., Przeworski et al. 2000; Gassebner, Lamla, and Vreeland 2008]. This dispute *may* have been caused by a composition problem in the 'income' variable: income from oil seems to retard democratic transitions, but income from other sources may encourage them. The reason why some studies find that income has no effect is that they fail to address this composition problem by controlling for income from oil. Przeworski et al. 2000, who found that income had no effect on democratic transitions, failed to control for oil; Boix and Stokes [2003] and Epstein et al. [2006] controlled for oil and found that income had a strong effect on democratic transitions.

In Table 4, the value of the *Income* coefficient in column one – when *Oil Rents* are excluded – is .265 and marginally significant. When *Oil Rents* is added in column two, the *Income* coefficient more than doubles to .616, and becomes highly significant.

Results: Democratic Failures

The regression estimates in Table 5, in which the dependent variable is *Democratic Failure,* are generally consistent with the cross-tabulations in Table 3. Column one includes only the control variables; it suggests that *Income* tends to reduce the likelihood that democracies will break down, but *Prior Autocracy* has no significant effect. Column two includes the *Oil Rents* variable; it is not statistically significant. The *Economic Growth* variable is added in column three, but its inclusion has little effect on the other variables.

Would a more up-to-date analysis alter this result? Since the data on regime change ended in 2002, several oil-rich democracies – Russia and Venezuela – may have at least partially reverted to authoritarian rule. In column four I rerun the core model from column two, but now code Russia and Venezuela as reverting to authoritarian rule in 2002, the final year in the dataset. The sign on the *Oil Rents* coefficient switches from negative to positive but remains far from statistical significance.

The cross-tabulations in Table 3 suggest the impact of oil rents on democratic failures may vary by income; the estimations reported in columns 5 and 6 hence split the sample by income. Among countries with incomes below the sample median ($1400), *Oil Rents* now increases the likelihood of democratic failure (column 4); but among richer countries, the coefficient on the *Oil Rents* variable switches signs and loses significance, suggesting it has no effect (column 5).

Overall, these results are not consistent with H5.2: in the full sample of democracies, oil rents seem to have no effect on the likelihood that a democracy will fail. But they do suggest a modified hypothesis: oil rents may boost the probability that poor democracies will fail.

This tends to support Jensen and Wantchekon [2004], who argue that oil has led to the breakdown of democracies in Sub-Saharan Africa, the world's poorest region. As far as the data can guide us, oil wealth is not more harmful for African states than non-African states: a term that interacts *Oil Rents* with an Africa dummy is not statistically linked to

democratic failures. But as we will see below, the link between oil and democratic failure – among both low-income and African states – is somewhat fragile.

Robustness

Table 5.6 reports the results of six robustness tests for the core *Democratic Transitions* model, and five tests for the modified (i.e., low-income) *Democratic Failures* model. The cells display the standardized *Oil Rents* coefficients, and their statistical significance, under the following conditions:

- Row one shows the *Oil Rents* coefficients from the core models reported in Tables 4 and 5.
- Row two second column shows the effect of changing the base hazard rate from the log of the number of continuous years that a country has been under democratic or authoritarian rule, to the simple number of years of continuous democratic or authoritarian rule;
- Row three shows the effects of further modifying the base hazard rate by including the square of the number of continuous democratic or authoritarian years;
- Row four shows the results when *Oil Rents* is replaced with the log of oil rents, to reduce the influence of outliers.
- Row five displays the effects of after dropping the most influential observations from the sample. In the *Democratic Transitions* model, I drop all observations of the seven oil-producing countries on the Arabian Peninsula: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates, and Yemen. In the *Democratic Failures* model, I drop all observations of Nigeria, which has twice transited from democracy to autocracy and appears to be the single most influential country in producing the correlation between oil rents democratic failures among low-income states.
- Row six shows the impact of adding dummy variables for the Sub-Saharan Africa, Latin America, East Asia and the OECD regions.
- Row seven shows the effect of controlling for an additional factor – the type of authoritarian regime – in the democratic transitions model only. Geddes [1999] suggests there are three types of authoritarian regimes and that they vary in their durability: military regimes, which are the most fragile; personalistic regimes, which are somewhat more durable; and one-party regimes, which last the longest. Herb [1999] and Ulfelder [2007] suggest that another authoritarian subtype, monarchies, are also unusually durable. I include dummy variables for three of these four regime subtypes to control for their impact on democratization.[8] Since many oil-rich states are also monarchies, their inclusion can help us separate the effects of oil production from monarchical rule.[9]

[8] I rely on the original Geddes coding of regimes, plus an update by Joseph Wright, which includes his own coding of monarchies; I am grateful to him for sharing this data.

[9] The link between oil and monarchy may be no coincidence: in countries like Saudi Arabia, Kuwait, Oman, Qatar, the United Arab Emirates, and Brunei, oil rents may have helped royal families remain in power while their counterparts in oil-poor states were swept aside. If so, the inclusion of a variable

In general, these tests suggest that H_1 is quite robust: under a wide range of conditions, oil rents seem to impede transitions to democracy. Even when all seven countries on the Arabian Peninsula are dropped from the sample, the *Oil Rents* coefficient is largely unaffected.

The tests also suggest that the modified version of H_2 is not robust: although it "passes" two of the five tests, the correlation between oil rents and democratic failures in low-income states does not hold under several reasonable extensions of the model. Perhaps most striking is that *Oil Rents* loses all statistical significance when a single country, Nigeria, is dropped from the sample. If oil leads to democratic breakdown among low-income states, its effects may be contingent on further conditions, which are as yet unknown.

Oil and Incumbency

Further evidence on the oil-authoritarianism link might be gleaned from data on political rulers. The heightened durability of oil-backed authoritarianism might come from the increased longevity of individual rulers, as well as the longevity of the regime itself.[10] If *Oil Rents* tend to lengthen the tenure of individual authoritarian rulers, it would add further support to H_1.

To identify the transition from one leader to the next, I rely on the Archigos database developed by Goemans, Gleditsch, and Chiozza (2007), which identifies the term in office of a country's effective leader. From this dataset, I generate a variable called *Leadership Change,* which takes the value one in the year that a leader falls, and zero otherwise. Since in some cases a country has more than one leadership change in a single year, the dataset includes multiple observations for some countries in some years.

A simple correlation between oil and authoritarian leadership can be seen in a scatterplot in which the horizontal axis shows a country's oil wealth, and the vertical axis represents the number of years that a leader was in power (Figure 7). Each observation is an individual leader. The fitted line slopes upward, suggesting that when countries have more oil, dictators stay in power longer.

The cross-tabulations in Table 7 confirm this pattern: across each of the income and regional categories, leaders in oil-producing countries last longer.

For a more careful look, I use a different type of survival analysis. Here a discrete time survival analysis (i.e., panel logit) is problematic because the data include multiple observations for some country-years (i.e., when a country had more than two leaders in a

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controlling for monarchical rule would bias downwards the statistical and substantive effect of the *Oil Rents* variable through a post-treatment effect.

[10] Although I find no robust relationship between oil and the durability of democratic leaders, there may be such a link at the subnational level in the US, according to Goldberg, Wibbels, and Mvukiyehe [2008]. They find a positive correlation between a state's oil and coal wealth, and the vote share of incumbent governors. When 20 percent of a state's income came from oil or coal, a governor's margin of victory was boosted by about 3 percent.

given calendar year); instead I use a continuous time survival model with a Cox distribution. Since the Cox distribution is semi-parametric, it makes only weak assumptions about the distributional form of the unobserved duration data – in other words, it helps reflect our uncertainty about the durability of leaders that were still in office in 2004, the dataset's final year.

There are few quantitative studies of leadership change, and hence more ambiguity about the proper variables to control for when exploring this issue. A vast political science literature suggests that incumbents in both democratic and authoritarian states benefit politically from economic growth; I hence include *Economic Growth* in all models. Leaders probably stay in power longer in authoritarian states; I hence control for regime type with the dichotomous variable *Democracy,* which is drawn from the Przeworski dataset.

It is unclear whether income is related to leadership change. It may have an indirect effect, through its impact on democracy, but it is not obvious that it has a direct affect on leadership duration. Still, it seems prudent to see if the *Oil Rents* variable is robust to its inclusion.

The regression results are displayed in Table 8. In the core model in column one, the control variables perform as expected: *Democracy* is positively correlated, and *Growth* is negatively correlated, with the likelihood that a leader will depart. In column two, *Oil Rents* is negatively linked to *Leadership Change,* suggesting that higher levels of oil wealth tend to reduce the chances that a leader will be replaced. *Income* is added to the model in column three; it is not statistically significant and hence is dropped from subsequent models.[11]

Columns four and five separately explore the effects of *Oil Rents* on authoritarian states (column three) and democratic states (column four). While oil reduces the likelihood that an autocratic leader will depart, it has no effect on the longevity of democratic leaders.

Column six suggests that *Islam* has no effect on leadership duration; but columns seven and eight show that the inclusion of dummy variables for either the Middle East region, or monarchies, reduce the size of the *Oil Rents* coefficient and leave it statistically insignificant. The link between oil wealth and the incumbency of authoritarian leaders seems to be largely caused by the longevity of monarchs in the oil-rich Middle East. While this relationship *might* be causal, I cannot reject the null hypothesis that it is merely a coincidence caused by the location of petroleum deposits on the Arabian Peninsula.[12]

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[11] For these estimations, I use the log of *Oil Rents*, rather than just *Oil Rents*, since the results differ: *Oil Rents* is correlated with the longevity of democratic leaders, while the log of *Oil Rents* is not. In the other tables, using the log value of *Oil Rents* has no effect on the results, so I stick with *Oil Rents* because it is easy to interpret.

[12] Terms that interaction *Oil Rents* with the Mideast region, or monarchies, or both, are not significant predictors of leadership duration; this implies that the impact of oil wealth on authoritarian survival in the Mideast is no different than its impact elsewhere, or on non-monarchies.

Causal Mechanisms

It is relatively easy to show that oil is correlated with authoritarianism; it is much harder to explain why. One problem is that we must figure out why something does *not* happen: why oil-rich authoritarian states *fail* to become democratic.

In Ross [2001], I argued that there were three mechanisms that tied oil wealth to authoritarianism: a rentier effect, through which governments use low tax rates and high spending to dampen pressures for democracy; a repression effect, by which governments build up their internal security forces; and a modernization effect, in which the failure of the population to undergo certain social changes renders them less likely to push for democracy.

I still believe there is evidence to support the rentier effect; although the statistical evidence is admittedly mixed, I attribute this to data quality problems I explain below. I no longer find support for a modernization or repression effect.

The Modernization Effect

Ross [2001] argues that oil inhibits democratization through a 'modernization' effect, by retarding certain social changes that tend to produce more accountable government. The modernization argument drew on the work of earlier scholars – most importantly Inglehart [1997], but also Lipset [1959] and Deutsch [1961] – who suggested that democratization comes about when a society is transformed by higher education levels, urbanization, the development of modern communications, and greater occupational specialization. If oil wealth inhibits these social changes, it could also impede the democratization process.

Using more complete data, and more careful statistical methods, I no longer find compelling statistical evidence of a modernization effect: neither female labor force participation, nor urbanization, nor the prevalence of phones and televisions, nor a long list of other variables linked to social modernization, can help account for the oil-authoritarianism link.[13] Oil production *can* powerfully affect social development – reducing female labor force participation, and increasing fertility rates [Ross 2008]. And Inglehart and others may be right that certain social changes lead to democratic transitions. But there is not compelling evidence that oil's impact on social modernization helps explain its impact on democracy.

Repression

In Ross [2001], I showed that oil-rich dictators spent an unusually large fraction of their budgets on the military; from this I inferred that oil helps authoritarian rulers stay in power by funding greater repression. Smith [2007] argued there was no evidence of a repression effect, when repression is measured by a country's Polity score. Since neither study used variables that measured government repression directly, the debate was unresolved.

[13] Results available from author.

Fortunately, a direct measure of government repression is now available from the invaluable Cingranelli-Richards dataset [2008]. Using annual human rights reports from the US State Department – which are surprisingly comprehensive – they construct a measure called *Physical Integrity Rights*, which gauges the annual incidence of torture, extrajudicial killing, political imprisonment, and disappearances that are attributable to the government.

Using the *Physical Integrity Rights* measure, I find that oil producers are indeed more repressive than non-oil producers, but only because they are more frequently ruled by dictators, and dictatorships are more repressive than democracies. Among authoritarian states, and among democracies, oil producers are no more repressive than non-oil producers. Once regime type is controlled for, *Oil Rents* and *Physical Integrity Rights* are uncorrelated.[14]

There is still evidence that many oil-producing states spend large sums on their armed forces, but I suspect this is better explained by other factors. States on the Arabian Peninsula that invest heavily in their armed forces – like Bahrain, Oman, Kuwait, and Saudi Arabia – do so to protect themselves against external threats from their neighbors, and internal threats from terrorist groups. Iran, Venezuela, and Gabon have made direct transfers from their oil sector to the military – probably as a form of patronage, to maintain the loyalty of the armed forces.[15] Algeria spends an unusual sum on its military because it is fighting an insurgency.

I hence no longer see convincing evidence that repression helps explain why oil-producing autocracies are so durable.

The Rentier Effect

I now suspect that the 'rentier effect' is the main – perhaps only – channel through which oil prolongs authoritarian rule. As I argued in Ross [2001], the rentier effect can be decomposed into three related pieces: oil wealth may boost the government's revenues, and hence its ability to buy support, through a *spending effect*; reduce the tax burden that falls on citizens, and hence reduces their demand for democratic accountability, through a *taxation effect*; and weaken social organizations that might otherwise counterbalance the state's power, through a *group formation effect*.

These mechanisms – which collectively make up the rentier effect – can be easily transposed onto standard political science theories of democratization. Most of these theories posit that societies are composed of "elites" and "masses"; that in authoritarian states, the government is controlled by the elite; and that in democracies, the elites and the masses share control of the government. Some theories emphasize the interests of these two groups, while others look at their capabilities. Several key studies, for example, suggest it is sometimes in the interest of an elite to share control of the government with the masses, and thus facilitate democratization [O'Donnell, Schmitter, and Whitehead

[14] Results available from author.

[15] On Iran, see Amuzegar [2005]; on Gabon, see Yates [1996]; on Venezuela, see International Crisis Group [2007].

1986; Boix 2003; Acemoglu and Robinson 2005; Dunning 2008]. Another class of theories suggests the masses sometimes have the capacity to produce – and the elite lack the capacity to block – a democratic transition [Moore 1966, Rueschemeyer et al. 1992].

The rentier effect may inhibit democratization through three of these four routes:

- it boosts the capacities of state elites to thwart democracy though the spending effect;
- it reduces the capacity of the masses to instigate democracy through the group formation effect;
- and it reduces the interests of the masses in democracy through the taxation effect.

I believe oil wealth has no effect on the preferences of the elite – a point disputed by Boix [2003] and Tsui [2007], and which I address below.

The spending effect
There is good evidence that oil-producing governments spend a lot more than similar governments without oil.

High-quality data on government revenues, and government size, is surprisingly difficult to obtain in oil-rich states: they sometimes run a large fraction of their governments through off-budget accounts, or through their national oil companies. In Azerbaijan, for example, about half of all government spending runs through SOCAR, the national oil company; since SOCAR is not treated as part of the state budget, the government's expenditures appear to be half their actual size. In Iraq under Saddam, more than half the national budget was funneled through the national oil company [Alnaswari 1994]. In Angola in the 1990s, about 40 percent of government spending was off-budget [Human Rights Watch 2004].

As a result, there are huge discrepancies in figures on government spending in oil-producing countries between the World Bank, the IMF, and the Penn World Tables [Figure 8]. Still, using figures from IMF Article IV reports – which appear to be the most complete source – oil-producing states are typically much larger than neighboring states without oil [Figure 9].

In oil-producing states, the government's fiscal powers may be greater than even the true figures suggest, since the private sector – which might otherwise counterbalance the economic power of the state – tends to be unusually small and dependent on the government. This is partly the fault of the Dutch Disease, which causes a boom in the oil sector to produce a decline in agriculture and manufacturing, since these 'tradable' goods become cheaper to import than produce locally. This makes agriculture and manufacturing – which constitute a large fraction of the private sector – dependent on government help for their survival.[16]

[16] In his classic study of oil windfalls in the 1970s in Algeria, Ecuador, Indonesia, Nigeria, Trinidad, and Venezuela, Gelb [1988] found that subsidies often rose twice as fast as nonmining GDP in these countries,

In contrast to agriculture and manufacturing, the service sector – including construction and retail – tends to large in oil-producing economies, and can operate profitably without government subsidies. But much of their business comes from government contracts – for example, to build public infrastructure, or provide services to the oil industry. This makes businesses in the service sector, like those in agriculture and manufacturing, dependent on decisions made by the government. Hence the Dutch Disease can make the private sector in oil-rich countries less autonomous from the government, and less able to function with the government's support.

Even with low-quality data, there is still a strong correlation between a country's oil rents per capita, and the size of government consumption – with or without country fixed effects. But when added to the democratic transitions model, government consumption is not statistically significant, and has no impact on the *Oil Rents* variable. I suspect that better data on government finances in oil-producing states would change this result.

The taxation effect

There is ample evidence that a rise in a country's oil rents tends to reduce its reliance on taxes. The gist of the pattern is illustrated by Figure 10, which is based on data from 134 states between 1990 and 2006. The vertical axis shows the percentage of each government's revenues that comes from taxes on goods and services; the horizontal axis displays oil rents per capita. The downward-sloping line suggests that countries with more oil rents are less reliant on taxes. In the Middle East, for example, oil-rich governments in Algeria, Oman, Kuwait, and Iran get ten percent or less of their revenues from taxing goods and services; oil-poor governments in Jordan, Lebanon, and Tunisia get 25 percent or more of their revenues this way.[17]

The same pattern can be seen in regressions, both across countries and within them over time. In Table 9, column one shows a strong negative correlation between oil rents and *Taxes on Goods*; column two shows that the correlation remains strong even when country fixed effects are introduced.

Perhaps these correlations are no surprise: higher oil rents almost certainly increase government revenues, which means that even if the government's tax revenues (in dollars) are unchanged, the government's reliance on taxes (as a fraction of total revenues) will drop.

But there is also evidence that oil production causes a drop in non-oil taxes as a fraction of the economy. In column three I add to the model a variable called *Government Revenues* (measured as a fraction of GDP), while keeping the fixed effects. The correlation between higher oil rents and lower taxes remains strong; this tends to support

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partly because governments tried to protect these vulnerable industries from the effects of the Dutch Disease.

[17] Taxes on goods and services only constitute a fraction of relevent tax burden, and is hence a crude measure for evaluating the taxation effect. I use it here because the other readily-available measure of tax collection – taxes on income – includes corporate taxes that governments collect from oil companies.

both a narrow interpretation of H5.5, that oil rents lead to a drop on the government's reliance on non-oil taxes, and a broader interpretation, that oil rents produce a drop in non-oil taxes as a fraction of the economy.

The effect of these reduced taxes on democratic transitions, however, is mixed. In Table 9, column 4, I replicate the core model of democratic transitions, using only observations in which my key intervening variable – *Taxes on Goods* – is not missing. In column 5 I add *Taxes on Goods;* it is strongly correlated with democratic transitions in the expected direction. Its inclusion slightly reduces the size of the *Oil Rents* coefficient, and renders it substantively insignificant – which is also consistent with the taxation effect. But the interaction of *Oil Rents* and *Taxes on Goods* is not statistically significant, which is *not* consistent with the taxation effect.

From these estimations I infer that oil production reduces the state's reliance on taxation; that a reduced reliance on taxation tends to inhibit democratic transitions; and that the reductions in taxes caused by oil production *might* help account for oil's antidemocratic effects, but the effect is ambiguous. I again suspect that the failure of oil producing states to report their true size leads to a bias in the *Taxes on Goods* measure: by understanding the size of government spending (the denominator), it makes this variable appear larger than their true size in oil-producing states, masking their actual effect. [18]

Another place to look for evidence of a taxation effect is public opinion data. If oil wealth leads to lower taxes, and lower taxes reduce the popular demand for democracy, then citizens in oil-producing states should display less affection for democracy than citizens elsewhere. Alternatively, if Boix [2003] and Tsui [2007] are correct that higher oil rents make control of the government more desirable, citizens in oil-producing countries should express stronger support for democracy.

These opposing implications can be assessed with public opinion data gathered by the World Values Survey, which asked respondents in 79 countries whether they agree with the following statement: "democracy has its problems, but it is better than other systems of government."

Instead, a low opinion of democracy – in both democratic and authoritarian states – was strongly correlated with higher levels of oil revenues. The pattern can be seen in Figure 11, which records the fraction of respondents in each country that agreed, or strongly agreed, with the statement supporting democracy. The downward-sloping line represents the overall trend: higher levels of oil rents per capita are correlated with less support for democracy.

[18] Unfortunately, it is not possible to test the relationship between taxation and leadership duration with the available data. When I replicate the core model of leadership change using only observations for which the *Taxes on Goods* variable is not missing, *Oil Rents* is no longer statistically significant. This means that there are too few observations containing data on all of the key variables – particularly *Taxes on Goods* – to tell us much about any possible link between taxation and the longevity of rulers.

This pattern holds across regions of the world: in Africa, Latin America, the Middle East and North Africa, and the Former Soviet Union, citizens in oil-rich states have less affection for democracy than citizens in oil-poor states [Figure 12].[19]

We might expect people in more repressive states to be more reluctant to express support for democracy. But this turns out to be untrue: neither a standard measure of democracy (the Polity score), nor a separate measure of human rights violations (the Cingranelli-Richards measure of government respect for "physical integrity") is correlated with views about democracy. Respondents were equally likely to support democracy in repressive states and democratic ones.

These figures suggest the absence of democracy in many oil producers is not only caused by the government's reluctance to *supply* democracy; it also reflects the failure of citizens to *demand* it. While they are consistent with the taxation effect (and more broadly, the rentier effect), they do not fit the Boix or Tsui models.

The Civil Society Effect

The production of oil and gas may also weaken civil society – though since there is no good cross-national data on the strength of civil society groups, this argument must remain speculative.

The civil society effect occurs when rulers use their oil wealth to stifle or suppress independent organizations that might otherwise favor democratization. Scholars have long suggested that democracies emerge through the efforts of social institutions that are independent from the state. Some, like Putnam [1993], emphasize civil society organizations, like bowling leagues and choral societies. Others focus on the role of independent economic classes, whose interests diverge from the government's and hence wish to constrain the government's power. Barrington Moore [1966], for example, argued that the formation of a bourgeoisie that was independent from the monarchy led to the rise of democracy in England and France.

As incubators for democracy, independent civic organizations are a natural target for authoritarian leaders, whether or not their countries have oil. Dictators often ban these organizations; those with access to enough revenues, however, can use a subtler strategy, creating state-funded organizations to displace independent ones. According to Chaudhry [1994, 9], oil-rich governments in the Middle East have used their revenues to "develop programs that were "explicitly designed to depoliticize the population…In all cases, governments deliberately destroyed independent civil institutions while generating others designed to facilitate the political aims of the state."

[19] In Venezuela, 91 percent of respondents favored democracy, making it a notable anomaly. But there may be something misleading about these survey results. In 1992, 62 percent of surveyed Venezuelans supported an attempted military coup against their democratically-elected government [Montaner 2008]. According to the annual Latinobarometer survey, the number of Venezuelans who reported they were "satisfied" or "very satisfied" with the way democracy was working in their country rose from 35 percent in 1998 to 59 percent in 2007 – while the government of Hugo Chavez became notably less democratic.

The civil society effect can be seen as a variant of the spending effect: dictators can use patronage to simultaneously win the support of key constituencies, and to forestall the formation of independent social organizations. For example, Angolan President Eduardo dos Santos has channeled oil rents into the Eduardo dos Santos Foundation (FESA), a nominally private, philanthropic organization under his personal control. FESA sponsors organizations and conferences that concern a wide range of popular topics, including sports, AIDS, environmental protection, and the needs of women, children, and the elderly. It even funds professional associations for engineers, lawyers, and architects [Messiant 2001]. Through FESA, dos Santos has used oil rents to both purchase the servility of many influential actors, and crowd out organizations that might otherwise have formed independently, and supported democratic reforms.

Similarly, authoritarian governments use gasoline subsidies as both a public good, which helps boost their popularity, and to avoid protests, which in authoritarian states can escalate into pro-democracy movements. Even though gasoline subsidies are economically inefficient – and environmentally disastrous, since they encourage the production of greenhouse gases – they are politically popular in oil-rich states, where citizens believe they have a right low-cost fuels.

We might näively expect to find these subsidies in democratic countries, where politicians must cater to the whims of the public, rather than authoritarian countries, where the government is more insulated from public opinion. Yet the opposite is true: more oil wealth tends to produce higher gasoline subsidies from authoritarian governments, but not democratic ones.

Figure 13 is a scatterplot comparing the price of a gallon of gasoline in 2006 in 64 undemocratic countries to each country's oil and gas revenues: the greater their oil revenues, the lower the price of gas. The most extreme example is Turkmenistan, where a highly repressive government provides the public with gasoline at two cents a gallon, plus free electricity. Among democratic states, there little or no correlation between oil wealth and gas prices (see appendix for more details).[20]

While both democratic and authoritarian leaders face public pressure to keep gas prices low, authoritarian leaders are much more likely to maintain fuel subsidies, since the removal of subsidies could lead to organized demonstrations – the most spontaneous, and politically volatile, type of independent social organizations.

The September 2007 protests in Burma, for example, began with rallies against the reduction of fuel subsidies; these rallies quickly turned into demonstrations against the military junta. Similarly, the February 2008 riots in Cameroon began with protests against the removal of fuel subsidies; they soon escalated into a campaign to stop a constitutional amendment that would allow the incumbent president to remain in office.

Asset Specificity

[20] At least, not in most democratic states. Venezuela, where a gallon of gas sold for about 12 cents in 2005, is an exception. Data on gasoline prices are from GTZ [2007].

Boix [2003] offers an alternative argument about the role of oil, using a formal model to specify the conditions under which democratization should occur. Like other models of democratization, it posits that when countries move from dictatorship to democracy, political rights are extended from a wealthy elite to the rest of the citizenry.[21] In the Boix model, however, the elite will only agree to democratize if they can protect their wealth from seizure by the newly-empowered masses. If their wealth comes from assets that are mobile – and hence can be easily transferred abroad – they need not worry about having their assets seized, and will hence agree to democratize. The masses, realizing they cannot expropriate this mobile wealth, agree to restrain their demands. But if their wealth is based on oil, they will oppose democratization since oil is a 'fixed' asset and hence subject to seizure by a newly-democratic government. Since they cannot protect their wealth by sending it abroad, they will oppose democratization.

Boix's statistical results are similar to those of many other studies: when states have more oil, they are less likely to democratize. But is the purported mechanism – an elite's fear that a democratic government will deprive them of their oil wealth – correct?

I find this argument unpersuasive for several reasons. The most important is that the wealth derived from oil deposits is not "fixed" or "immobile." True, petroleum deposits themselves cannot be relocated – but money from the sale of these assets can be sent abroad just as easily as money from any other source. Hence any autocrats or tycoons in petroleum-rich countries, who fear that democratization will deprive them of their influence over their nation's oil sector, can simply sell off exploration and drilling rights and deposit the proceeds in the foreign bank accounts.

In fact, dictators in oil-rich states have done this with depressing frequency. Many of the world's most notorious kleptocrats – Nigeria's Sani Abacha, the Congo's Mobutu Sese Seko, Equatorial Guinea's Teodoro Obiang – have embezzled hundreds of millions, even billions, of dollars from their country's oil, gas, and mineral sectors and sent the money abroad.[22] None of this would be possible if oil wealth was 'immobile.'

There are other problems with the Boix mechanism. The Boix model suggests that natural resource wealth is owned by an elite, who oppose democratization because they fear it will be expropriated. But almost all of the oil wealth in the developing world was expropriated by governments – usually authoritarian governments – during the Great Transformation of the 1960s and 1970s. There may be a handful of historical cases that fit the Boix profile: as Dunning [2008] points out, in 1952, Bolivia's mineral wealth was privately owned by a wealthy elite, who fiercely opposed democratization. But such cases are few.

[21] As Boix notes, his model is an extension of the seminal Meltzer-Richard [1981] model.

[22] This same ability to turn immobile petroleum deposits into cash allows oil-producing governments to create sovereign wealth funds, to invest their oil revenues abroad. In 2008, eight of the world's twelve largest sovereign asset funds were owned by oil-producing countries; a ninth was owned by the oil-rich state of Alaska [Economist 2008].

The Boix mechanism is also not supported by public opinion data on democracy reported above. If the Boix model is correct, and elites and masses are motivated by their efforts to control a country's wealth, then the masses should more strongly favor democratization in oil-rich countries – since it would give them access to the oil wealth previously monopolized by the elite. Yet people in oil-rich states are *less* motivated to seek democracy [Figures 11 and 12].

Incumbency, Not Authoritarianism

Several studies argue that oil does not merely inhibit democratic transitions, but all transitions – both from authoritarianism to democracy, and democracy to authoritarianism. This implies that the 'oil hinders democracy' claim is misleading; oil's true effect is to stabilize regimes of all types [Smith 2007; Morrison forthcoming].

The statistical tests described in Appendix 5.1 suggest that oil has a strong effect on the stability of autocratic regimes, but an ambiguous effect on the stability of democratic ones. When we pool all democracies together, oil does *not* seem to have a stabilizing effect on democracies. I also show above that oil wealth seems to help individual authoritarian leaders stay in power, but not individual democratic leaders. This is consistent with the claim that oil inhibits democratization, but not the claim that it stabilizes regimes of all types.

Conclusion

This paper revisits the analysis in Ross [2001], and offers several improvements, including better measures of the key variables and a wider data set. Despite flaws in the earlier analysis, and many challenges from other scholars, there is strong evidence that oil wealth tends to prolong authoritarian rule. There is also weak evidence – which warrants further scrutiny – that oil wealth may foster the breakdown of democracy in low-income states.

It is much harder to explain, however, *why* oil rents impede democratization. Using improved data, and more stringent criteria, I no longer find support for two of the three mechanisms I discussed in my earlier analysis. The mechanism I find most persuasive – the rentier effect – is partially supported by the data, but some of the regression results are not consistent with it. My best explanation for this anomaly is poor data, resulting from the proclivity of many oil-rich states to keep their revenues and expenditures off the books, which conceals their true size and operations.

Even if my analysis in this paper is correct, it is still just the beginning of a deeper understanding of natural resources and regime types. As Dunning [2008] suggests, this type of analysis tells us something about the average effect that oil wealth has on democracy, but surely the ultimate effect of oil wealth will vary under different conditions – and identifying these conditions lies at the frontier of research on this problem. So does a deeper understanding of how different types of government revenues can affect governance [Morrison forthcoming; Brautigam, Fjeldstad, and Moore 2008]; the relationship between oil's effect on regime types, and its effects on economic

performance and violent conflict; and the effectiveness of policy interventions to help countries overcome the resource curse [Humphreys, Sachs, and Stiglitz 2007].

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Table 1: Annual Likelihood of Transition to Democracy, 1960-2002 (percentage)

	Oil Producers	**Non-Oil Producers**
By Income:		
Low Income (below $1000)	1.3	2.2
Middle Income ($1000 to 5000)	1.5	3.7
High Income (above $5000)	0.5	1.1
By Region:		
Middle East & North Africa	0.0	0.0
Sub-Saharan Africa	1.5	1.6
Neither Middle East nor Africa	2.2	3.1
Total:	1.0	2.3

Figures indicate the annual likelihood that a state will transit from authoritarian to democratic rule, expressed as a percentage. I categorize states as "Oil Producers" if they produced at least $100 in oil and gas rents per capita.

Table 2: Democratic Transitions by Oil Rents, 1950-2002

Country	*Year*	*Oil Rents*	*Outcome*
Nigeria	1979	935	Failure
Russia	1991	859	Failure
Venezuela	1958	808	Success
Ecuador	1979	726	Failure
Mexico	2000	365	Success
Argentina	1983	305	Success
Peru	1980	286	Failure
Bolivia	1982	241	Success
Congo Republic	1992	235	Failure
Bolivia	1979	197	Failure

Table 3: Annual Likelihood of Democratic Failure, 1960-2002 (percentage)

	Oil Producers	**Non-Oil Producers**
By Income:		
Low Income (below $1000)	11.0	4.1
Middle Income ($1000 to 5000)	2.2	2.4
High Income (above $5000)	3.6	3.0
By Region:		
Middle East & North Africa	0.0	6.3
Sub-Saharan Africa	14.3	5.0
Neither Middle East nor Africa	0.8	1.4
Total:	1.3	1.8

Figures indicate the annual likelihood that a state will transit from democratic to authoritarian rule, expressed as a percentage.

Table 4: Democratic Transitions, 1960-2002
(Panel Logit; Dependent Variable is Democratic Transition)

	(1)	(2)	(3)	(4)	(5)
Prior Democracy	0.597***	0.515***	0.551***	0.577***	0.535***
	(0.10)	(0.11)	(0.11)	(0.11)	(0.11)
Income (log)	0.265*	0.616***	0.642***	0.280*	0.573***
	(0.15)	(0.19)	(0.20)	(0.16)	(0.19)
Oil Rents		-4.415***	-4.318***		-3.579**
		(1.71)	(1.67)		(1.63)
Economic Growth			-0.434***	-0.397***	-0.436***
			(0.091)	(0.082)	(0.090)
Islam				-0.425***	-0.224
				(0.16)	(0.17)
Regime Duration	0.512***	0.541***	0.480***	0.485***	0.489***
	(0.15)	(0.15)	(0.15)	(0.16)	(0.16)
Observations	3353	3310	3210	3251	3210

Robust standard errors in parentheses
All variables have been standardized
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Democratic Failures, 1960-2002
(Panel Logit; Dependent Variable is Democratic Failure)

	(1) all democracies	(2) all democracies	(3) all democracies	(4) all democracies	(5) low income democracies	(6) high income democracies
Prior Autocracy	0.0235	0.0273	0.0254	0.0865	-0.0918	-0.0380
	(0.17)	0.17)	(0.19)	(0.19)	(0.24)	(0.32)
Income (log)	-1.023***	-1.001***	-0.995***	-0.995***	-0.750	-2.176**
	(0.25)	(0.25)	(0.27)	(0.26)	(0.55)	(0.97)
Oil Rents		-1.199	-1.263	0.569	5.034*	-5.728
		(1.34)	(1.37)	(0.60)	(2.70)	(3.90)
Economic Growth			-0.104	-0.0841	-0.109	-0.161
			(0.11)	(0.11)	(0.096)	(0.31)
Regime Duration	-0.198	-0.195	-0.185	-0.112	-0.0853	-0.342
	(0.17)	(0.17)	(0.18)	(0.19)	(0.23)	(0.28)
Observations	2413	2406	2352	2352	583	1769

Robust standard errors in parentheses
All variables have been standardized
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Robustness Tests

	Democratic Transitions	Democratic Failures (low income only)
Core Model	-4.31***	5.03*
Simple Regime Duration	-4.01**	2.92
Add Regime Squared	-4.13**	5.41*
Log of Oil Rents	-.307**	.181*
Drop Key Countries	-3.78**	5.82
Add Regional Dummies	-3.78**	4.24
Add Regime Subtypes	-2.79*	-

*** p<0.01, ** p<0.05, * p<0.1

These figures are the standardized coefficients of the "oil rents" variable in each of the models described. The 'core models,' refer to Table 4 column 2 (for Democratic Transitions), and Table 5 column 5 (for Democratic Failures). In row five, for the "Democratic Transitions" model, all seven countries on the Arabian Peninsula have been dropped: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates, and Yemen. In the "Democratic Failures" model, the country of Nigeria has been dropped.

Table 7: Leadership Duration in Autocracies, 1960-2004 (years)

	Oil Producers	Non-Oil Producers
By Income:		
Low Income (below $1000)	8.2	7.3
Middle Income ($1000 to 5000)	11.6	6.9
High Income (above $5000)	9.9	9.8
By Region:		
Middle East & North Africa	10.9	10.8
Sub-Saharan Africa	10.1	8.1
Neither Middle East nor Africa	8.7	8.6
Total:	10.6	7.3

Table 8: Leadership duration
(cox survival analysis; Dependent Variable is Leadership Failure)

	(1) All states	(2) All states	(3) All states	(4) Democracies	(5) Autocracies	(6) Autocracies	(7) Autocracies	(8) Autocracies
Democracy	0.240***	0.239***	0.199***					
	(0.048)	(0.047)	(0.047)					
Economic Growth	-0.0972***	-0.0891**	-0.105***	-0.0937	-0.0763*	-0.0751*	-0.0765*	-0.0835**
	(0.037)	(0.037)	(0.038)	(0.064)	(0.042)	(0.042)	(0.043)	(0.042)
Oil Rents (log)		-0.103**	-0.136**	-0.0299	-0.168***	-0.133**	-0.0953	-0.0813
		(0.043)	(0.058)	(0.064)	(0.055)	(0.064)	(0.074)	(0.063)
Income (log)			0.0984					
			(0.077)					
Islam						-0.103		
						(0.070)		
Middle East							-0.115*	
							(0.069)	
Monarchy								-0.120***
								(0.040)
Observations	1226	1225	1225	741	484	484	484	408

Robust standard errors in parentheses
All variables are standardized
*** p<0.01, ** p<0.05, * p<0.1

Table 9: The Taxation Effect
(Pooled OLS and Pooled Logit)

	(1)	(2)	(3)	(4)	(5)
Dependent Variable	**Taxes on Goods**	**Taxes on Goods**	**Taxes on Goods**	**Democratic Transition**	**Democratic Transition**
Oil Rents	-1.376*** (0.21)	-1.301*** (0.21)	-1.352*** (0.22)	-4.993** (2.47)	-2.990* (1.75)
Government Revenue			-1.006*** (0.31)		
Prior Democracy				0.702*** (0.15)	0.629*** (0.17)
Income (log)				0.798*** (0.25)	0.796*** (0.25)
Economic Growth				-0.622*** (0.18)	-0.645*** (0.18)
Taxes on Goods					0.467** (0.20)
Taxes on Goods*Oil Rents					-0.674 (0.84)
Regime Duration				0.817** (0.38)	0.815** (0.37)
Fixed Effects?	No	Yes	Yes	-	-
Observations	3213	3213	2698	1411	1411
Number of countries	150	150	143	-	-

All variables are standardized
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.

Figure 1: Non-oil Income and Time Under Democratic Rule (for countries that were initially authoritarian), 1960-2002

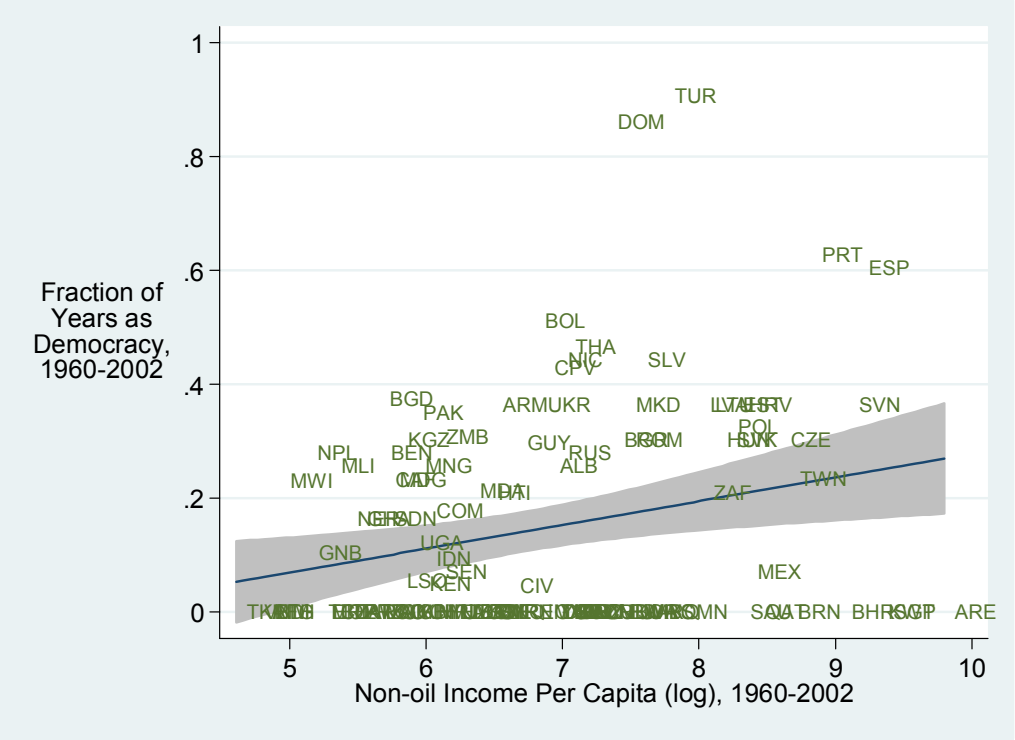


Figure 2: Oil Income and Time Under Democratic Rule (for countries that were initially authoritarian), 1960-2002

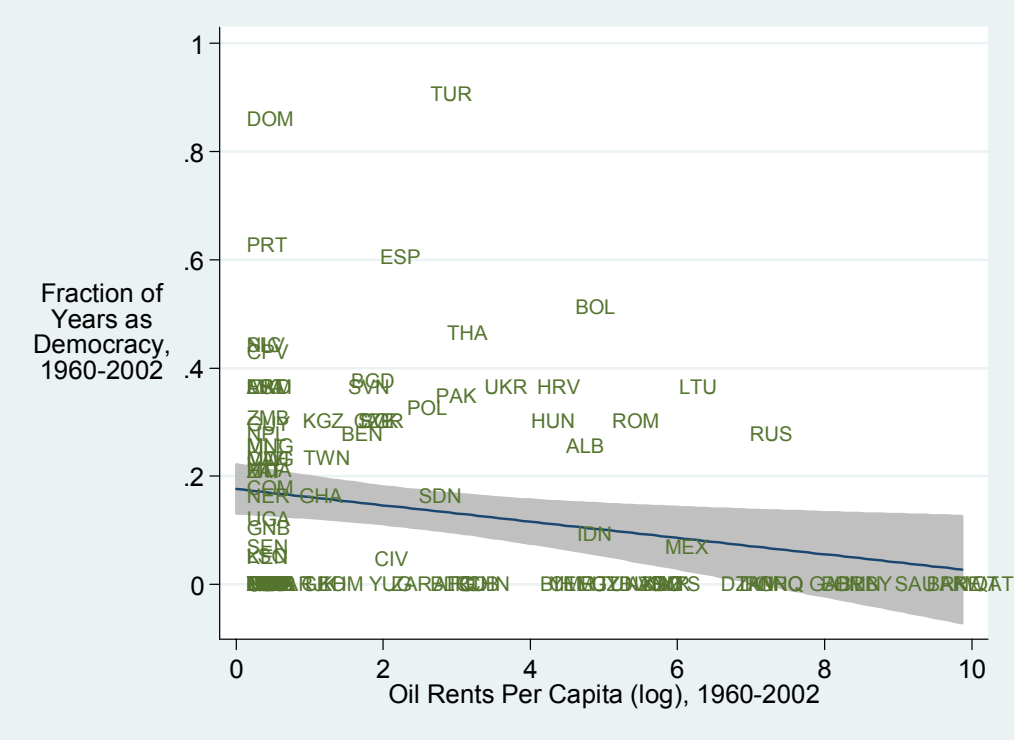


Figure 3: Democracies and Autocracies, 1960-2002

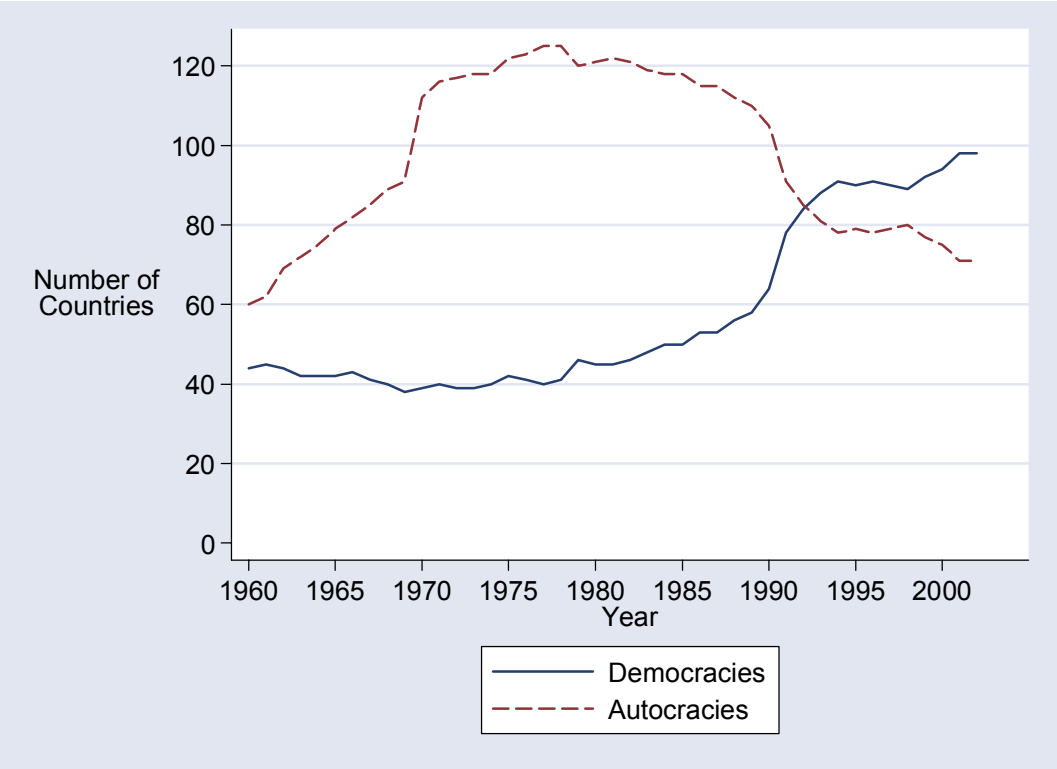


Figure 4: Democracies and Autocracies (oil producers only), 1960-2002

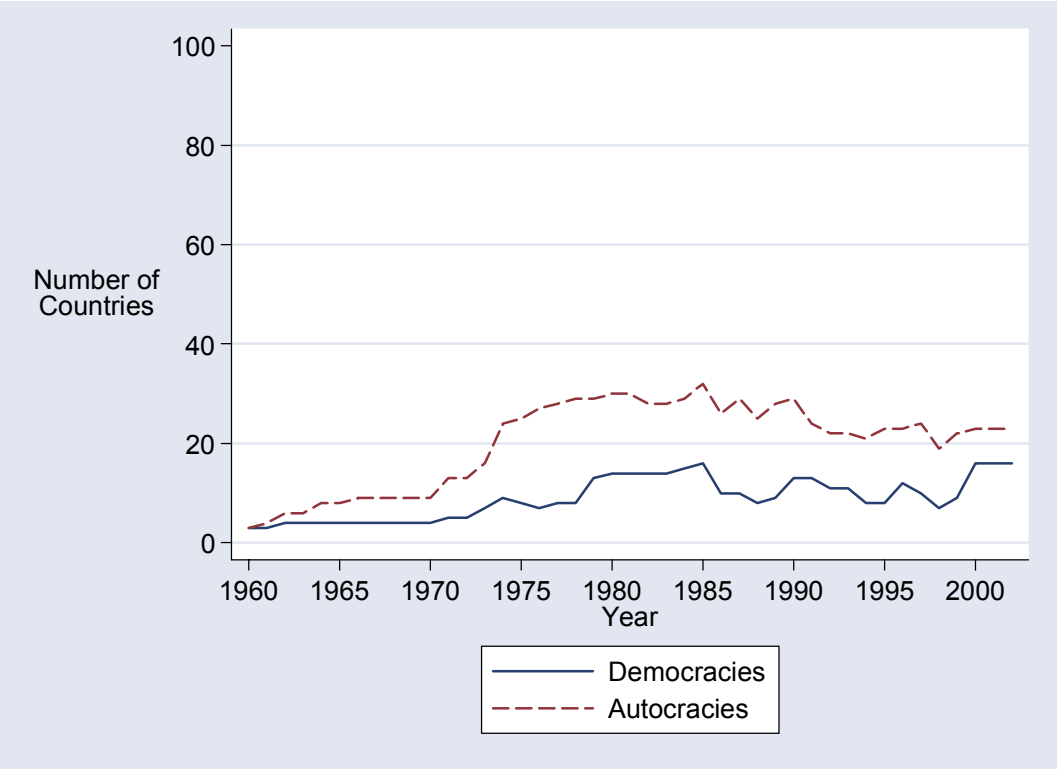


Figure 5: Oil and Democratic Stability in Rich Countries, 1960-2002

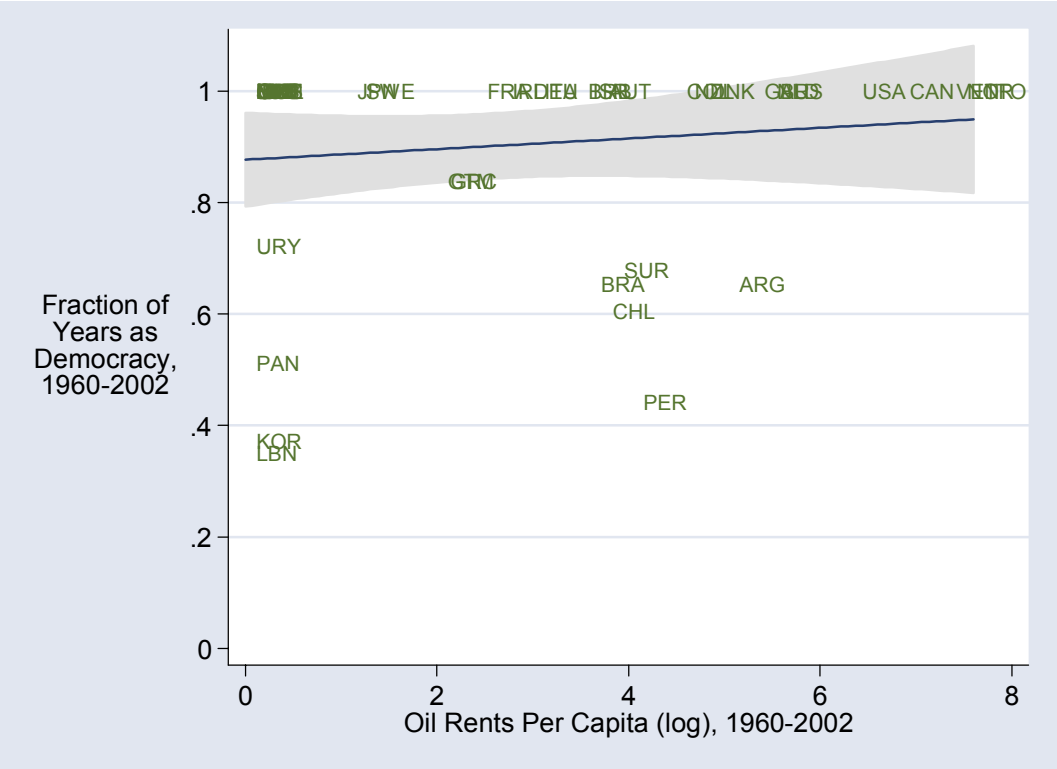


Figure 6: Oil and Democratic Stability in Poor Countries, 1960-2002

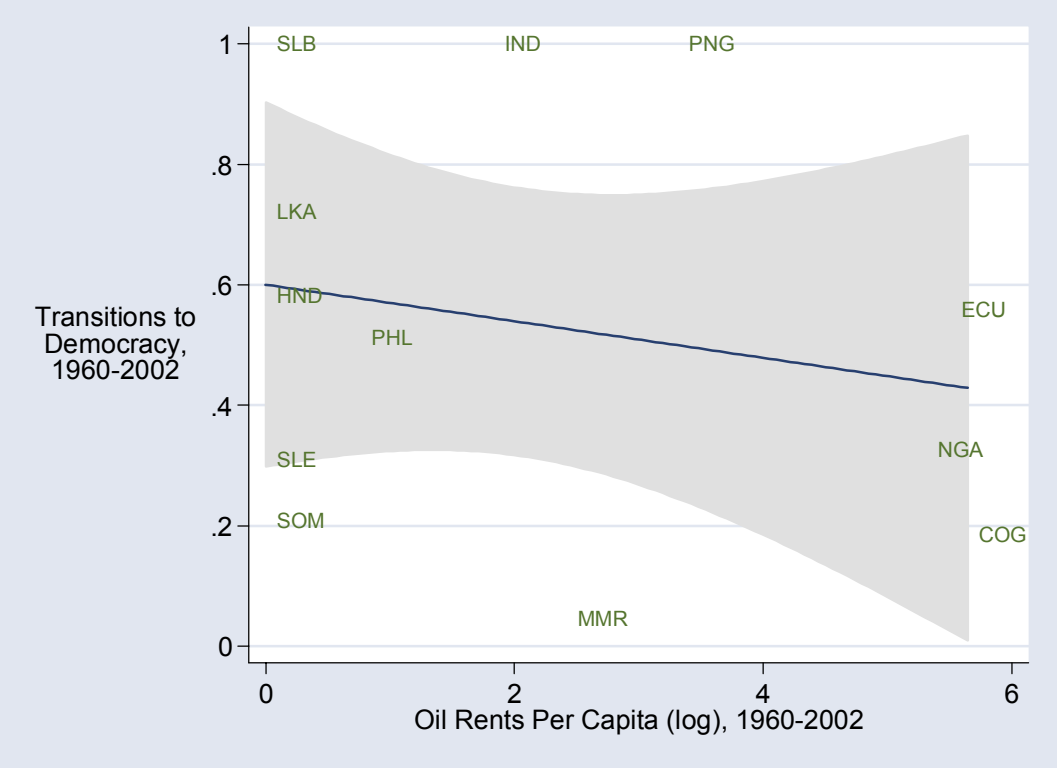


Figure 7: Oil Rents and Leadership Duration in Authoritarian States, 1960-2004

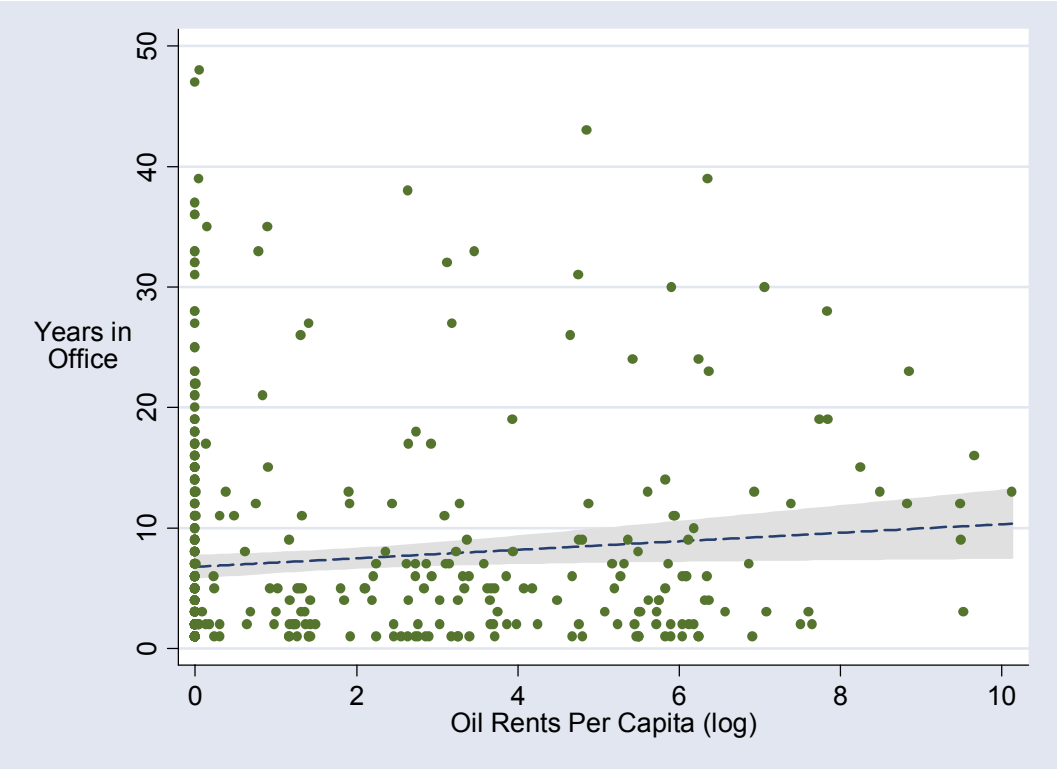


Figure 8: Conflicting Data on Government Size in Oil Producers

	Year	Penn World Tables	WDI	IMF
Gabon	2004	6.3	----	29%
Kuwait	2003	25.2	43	53%
Nigeria	2004	4.3	----	21%
Venezuela	1998	16.2	18	21%

Year is the most recent for which data are available. IMF figures are calculated from the country statistical appendices posted on the IMF web site, www.imf.org. IMF figure on Gabon Estimated from figures in "Gabon: Selected Issues and Statistical Appendix, 2005; IMF Country Report 05/147," Page 90; IMF figure on Kuwait is for 2002/2003, from "Kuwait: Statistical Appendix, 2006," IMF Country Report 06/133." Page 20. Nigeria IMF figure is central government revenue from petroleum, from "Nigeria: Selected Issues and Statistical Appendix, 2005," IMF Country Report 05/303. Page 84. Venezuela IMF figure is for public sector petroleum revenues, from "Venezuela: Statistical Appendix, 1999," IMF Staff Country Report 99/111. Page 13.

Figure 9: Size of Government in Selected Oil and Non-Oil Countries (2003)

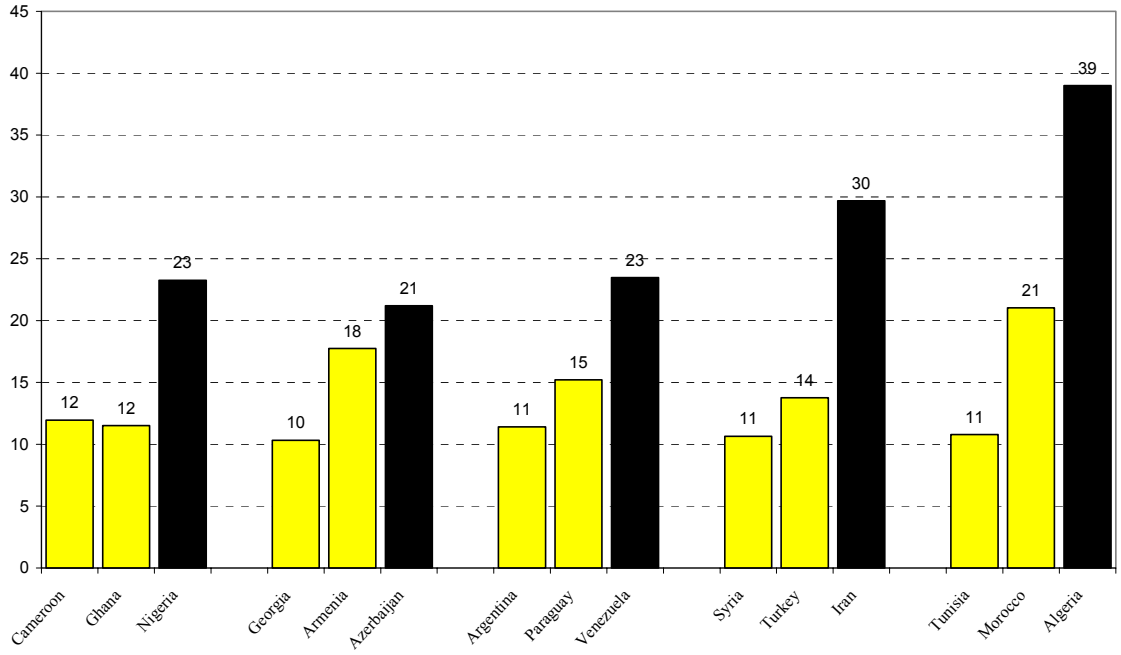


Figure 10: Oil Rents and Taxes on Goods and Services, 1990-2006

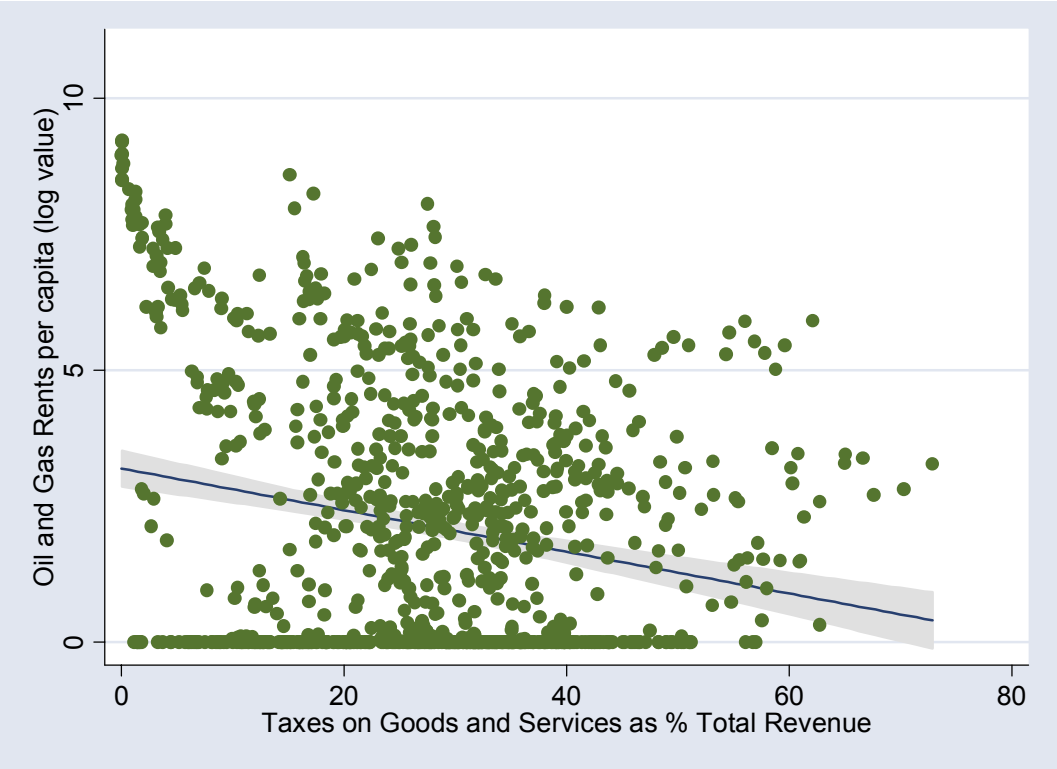
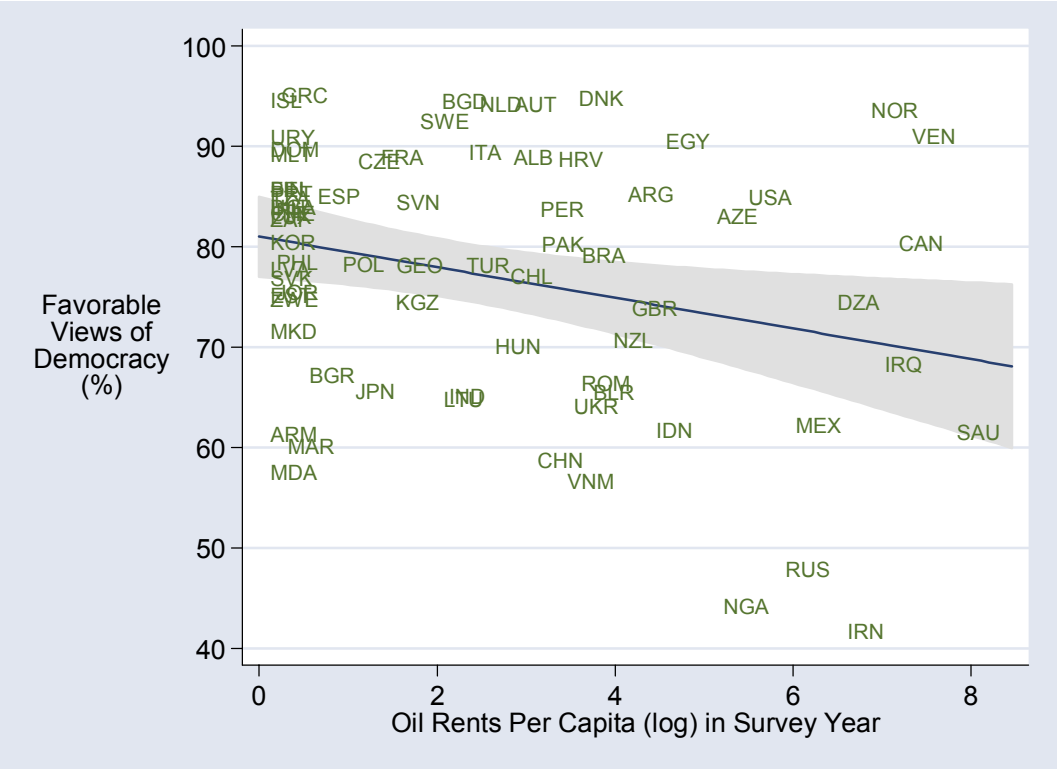


Figure 11: Favorable Views of Democracy (%) and Oil Rents



The Y-axis records the percentage of survey respondents who either agree, or strongly agree, with the statement that "democracy has its problems but it is better than other forms of government," from the World Values Survey. Responses are from the most recent survey in each country; surveys were carried out between 1995 and 2004. The X-axis reports the oil rents per capita (log value) in each response country, in the year the survey was conducted.

Figure 12: Support for Democracy in Selected Countries

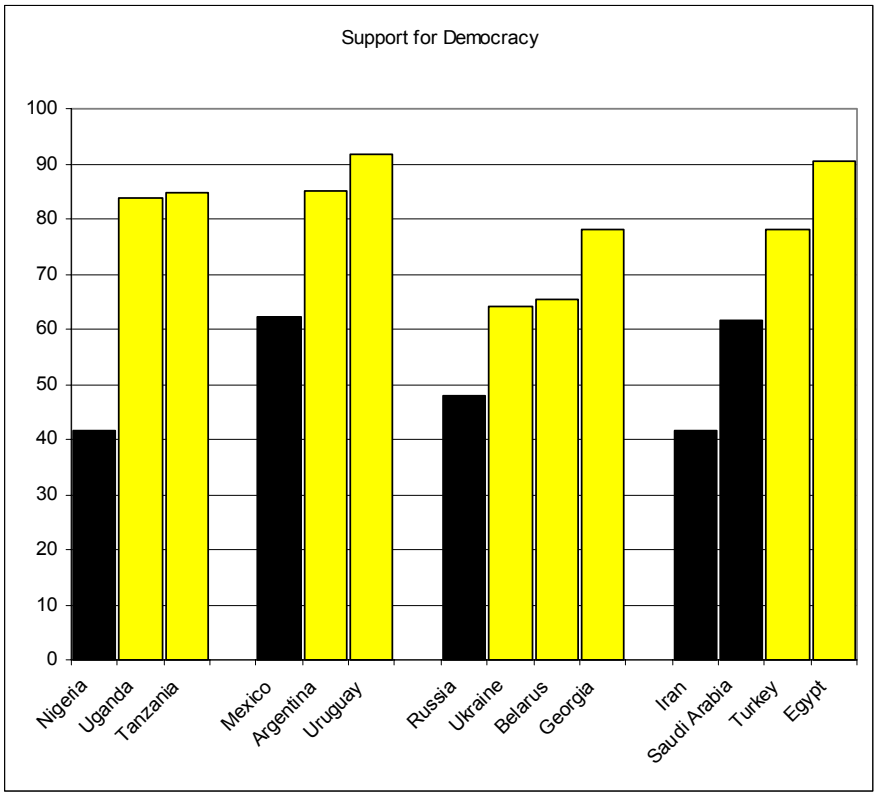


Figure 13: Oil Rents and Gasoline Prices in Authoritarian States, 2006