Oil, Democracy and Country Fixed Effects[*]

Silje Aslaksen[†]

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Abstract

This paper revisit the empirical finding of a correlation between oil and democracy. Existing studies establish a strong negative cross-country correlation between oil and democracy, but do typically not control for country fixed effects that simultaneously affect oil abundance and democracy. This paper empirically analyze the influence of oil on democracy by controlling for unobservable heterogeneity and by taking into account the persistence of some of the variables. We show that controlling for such factors do not change the insight that oil hinders democracy.

Keywords: Oil, Democracy

JEL *classification*:

1 Introduction

Understanding the determinants of democracy is important. The modernization theory (e.g. Lipset, 1959) emphasizes the role of education as well as economic development in promoting democracy. Empirical work, for example by Barro (1999), provides evidence consistent with this view. Two of the most robust determinants of democracy, per capita GDP and schooling, found by Barro (1999), have recently been put into doubt. Acemoglu et al. (2004) find little support for the hypothesis that income causes democracy when country fixed effects are included, and Acemoglu et al. (2005) find no evidence indicating that a given country (with its other characteristics held constant) is more likely to become more democratic as its population becomes more educated.[1] Their argument is that the earlier literature looks at the cross-sectional correlation between income and democracy and education and democracy rather than the within variation. Hence existing inference may be driven by omitted factors.

It is widely thought that resource wealth, especially oil, is a curse for democracy (Ross, 2001; Jensen and Wantechekon, 2004; Tsui, 2005). Existing literature looks mainly at the cross-sectional correlation between resource income and democracy rather than at the within variation. Hence existing inference may be potentially driven by omitted factors influencing both the oil abundance measure and democracy in the long run. If insights regarding income level and education have been found to change when country fixed effects are included, perhaps it is necessary to put the insights regarding oil and democracy to a similar test. A causal link between oil income and democracy suggests that we should also see a relationship between changes in oil income and changes in democracy. In other words, we should ask whether a given country (with its

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[1] Castellò-Climent (2006) and Bobba and Coviello (2006) argue that education systematically predicts democracy also when country fixed effects are included, and explain the results in Acemoglu (2005) with weak instruments.

other characteristics held constant) is more likely to become less democratic as it becomes richer in oil. We show that the answer to this question is yes. We show that the cross-sectional relationship between oil and democracy persist when country and time effects are included using a dynamic panel model.

There are several reasons why the existing literature on oil and democracy may be problematic. Oil is of obvious reasons not measured in absolute quantity in cross-country regressions. What is of relevance is the value of the oil sector compared to the rest of the economy − the relative importance of oil. Therefore, in cross-country regressions (whether we rely on the stock or the flow of oil), when oil it is measured as a share of GDP or as a share of export it will be subject to the same concerns as those addressed by Acemoglu et al. (2004) and Acemoglu et al. (2005). Also, over the past decade, a distinguished body of empirical literature has emerged in support of arguments that institutional form and quality are deeply embedded in history and geography (Acemoglu et.al 2001, 2002, 2003; Easterly and Levine 2002). Acemoglu et al. (2001, 2002) have documented that mortality rates faced by Europeans and population density at the time of colonization were major determinants of European colonization strategy, and subsequent institutional and economic development paths. Thus, in countries with extractive institutions, the only profitable economic activity will be resource extraction. If there is a natural resource to be exploited, it will be, even though other sectors suffer from a lack of secure property rights and bad infrastructure. Therefore, omitted factors that determine the quality of institutions could also determine the level of oil dependency. Because of initial conditions, countries are both heavily dependent on their resource sector and non democratic. If this is so, oil does not hinder democracy, but the two are correlated due to omitted variables and a correct approach is to control for country fixed effects.

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Perhaps the most celebrated explanation for why oil hinders democracy is the rentier effect. The mechanisms underlying the claim that renterism harms democracy are of three main sorts (for a more extensive discussion, see Ross, 2001). The first concerns how the state collects revenue. When government derive sufficient revenues from the sale of oil, they are likely to tax their population less, and the public in turn will be less likely to demand accountability from and representation in their government. The second mechanism concerns how the state spends revenues. Oil wealth may lead to greater spending on patronage, which in turn dampens latent pressure for democratization. A third mechanism focuses on society. When oil revenues provide the government with enough money, the government will use its wealth to prevent the formation of social groups that are independent of the state and hence that may demand political rights.

Many earlier studies have documented a negative statistical association between the share of fuel exports in GDP and democracy. For example, analyzing panel data across 113 countries from 1971 to 1997 Ross (2001) finds that oil revenues, measured by mineral based fuel export values as a fraction of GDP, have a statistically significant negative correlation with a country's political institutions. Similar, Wantechekon (2004) finds that a crucial determinant of political regimes in many Third World countries is their dependence on natural resources. Along similar lines Jensen and Wantechekon (2004) find empirical evidence suggesting a robust and negative correlation between the presence of a sizable natural resource sector and the level of democracy in Africa.[2]

This paper advocates that the negative relationship between oil and democ-

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[2]However, considerable disagreement exists over whether this relationship is causal (e.g. Alexeev and Conrad, 2005; Herb 2005). One argument is that earlier studies when controlling for "initial" level of income in their regressions create a problem because income is usually measures after oil discovery. It has been found that removing the oil component from the "initial" income level, the oil curse disappears (see e.g. Alexeev and Conrad, 2005; Herb 2005).

racy persist when country fixed effects are included. In this paper we rely on the system GMM estimator, which has been proved to perform better than the first-difference estimator in Monte Carlo simulations when variables are highly persistent (see Blundell and Bond, 1998). Although fixed effect and first difference GMM estimators exploit the within country variation in the data, they might not be appropriate when variables are highly persistent over time, as is the case of democracy and oil income. Therefore, an econometric technique that exploits the bulk of the variation in the data would be preferable in order to improve the precision of the estimated coefficient. By adding the original equation in levels to a system of equations that also include equations in first differences, the system GMM estimator is particularly useful in this context since, in addition to controlling for country-specific effects, it preserves the cross-country dimension of the data that is lost when only the first differenced equation is estimated (Castellò-Climent, 2006).

The paper proceeds as follows. In Section 2 we describe the data. Section 3 present some basic regressions similar to the pooled cross-sectional approach of the existing literature, documenting a negative correlation between oil and democracy. Section 4 shows the results when including country fixed effects. Section 5 discuss the robustness of the results and Section 6 concludes.

2 Data

There has been a great deal of controversy over the issue of how to measure democracy in the political science literature. The main disagreement is over what actually constitutes a democracy. We follow much of the existing research in this area in adopting a definition based on a number of institutional conditions. Our main measure of democracy is the Freedom House Political Rights

Index. This index ranges from 1 to 7, with 7 representing the least amount of political freedom and 1 the most freedom. A country gets a score of 1 if political rights come closest to the ideal suggested by a checklist of questions regarding the electoral process, the political pluralism and participation and the functioning of government.[3] We transform the index so that it lie between 0 and 1, with 1 corresponding to the most democratic institutions.

As a check on our main measure of democracy, we also look at the widely used composite Polity index. The composite Polity index is the difference between the Polity's Democracy and Autocracy indices.[4] The Polity Democracy Index ranges from 0 to 10 and is derived from coding the competitiveness of political participation, the openness and competitiveness of executive recruitment and constraint on the chief executive. The Polity Autocracy Index also ranges from 0 to 10 and is constructed based on scoring countries according to competitiveness of political participation, the regulation of participation, the openness and competitiveness of executive recruitment and constraints on chief executive.[5] To facilitate comparison with the Freedom House score, we also normalize the Polity index to lie between 0 and 1.

Using the Freedom House and the Polity data, we construct five-yearly panels. We follow Acemoglu et al. (2004), Acemoglu et al. (2005), Bobba and Coviello (2006) and Castellò-Climent (2006) and take the observation every fifth year instead of averaging the five-yearly data, since averaging introduces additional serial correlation, making inference more difficult. The Freedom House data is five-yearly panels for the period 1972-2002, whereas the composite Polity data is five-yearly panels for the period 1970-2000.[6]

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[3]The checklist includes 3 questions on the electoral process, 4 questions on the extent of political pluralism, and participation and 3 questions on the functioning of government. For details see Freedom House (2006), http://www.freedomhouse.org/template.cfm?page=351&ana_page=298&year=2006

[4]See Marshall and Jaggers (2002).

[5]For details see Marshall and Jaggers (2002).

[6]The Freedom House data begin in 1972.

The oil variables are from the World Bank Adjusted Net Savings dataset (also called the genuine savings dataset). Our main oil measure, *oil share*, is the value of oil extraction as percentage of GDP. The oil extraction variable, in its original form, only contains values for oil extracting countries. Countries that do not produce oil have missing values for this variables. Therefore, for some countries it is unclear whether oil extraction is zero or actually missing. Therefore, missing values are replaced with zero if there is no onshore or offshore oil production for that country according to the PETRODATA dataset (See Lujala et al., 2007). Our alternative measure of oil, *oil value per capita*, is the value of oil per capita (in thousands 2005 USD), and this alternative measure is hence independent of GDP. Covariates include coastline as a share of total boundaries, education, latitude, log of real GDP per capita, log of population, number of Muslims as a percentage of the countries population, an openness measure, and number of years since independence. See Variable Description for a detail description of variables and their sources. Table 1 contains descriptive statistics for the variables included in the analysis.

3 Results with Pooled Cross Sections

We first replicate some of the basic results in the literature using a pooled cross-sectional approach. Table 2 reports estimates of the following model:

$$d_{it} = \alpha d_{it-1} + \beta oil_{it-1} + \boldsymbol{x'}_{it-1} + \gamma_t + u_{it} \qquad (1)$$

where d_{it} is the democracy score of country i in period t. The lagged value of this variable on the right hand side is included to capture persistence in democracy and also potentially mean-reverting dynamics, i.e., the tendency of the democracy score to return to some equilibrium value for the country

(Acemoglu et al., 2004). The main variable of interest is oil_{it-1}, the lagged value of oil income in GDP. The parameter β therefore measures whether oil has an effect on democracy. All other potential covariates are included in the vector $\mathbf{x_{it-1}}$. γ_t denotes a full set of time effects, which capture common shocks to the democracy score of all countries, and u_{it} is an error term, capturing all other omitted factors. The sample period in column 1-5 is 1972-2002 and in column 6-10 the sample period is 1970-2000, all columns with five-year intervals.

It is useful to note that equation (1) does not include any country fixed effects. Therefore, the only source of long-run differences in democracy across countries are the right hand side variables. In other words, the only cross-country differences in the long-run democracy score will be due to differences in oil or other covariates across countries. The estimates of the relationship between democracy and oil from equation (1) will reveal the cross-sectional relationship between these two variables (i.e., they will capture the fact that oil rich counties are less democratic). Column 1-5 uses the Freedom House data and column 6-10 uses the Polity data to present pooled cross-sectional regressions of democracy and oil. All columns include a full set of time effects, and standard errors are clustered at the country level.[7]

Columns 1 and 6 are the most parsimonious specifications, including only lagged democracy, the oil variable and time effects. Lagged democracy is highly significant, and shows a considerable degree of persistence in democracy. More precise, the estimate of about 0.8 in column 1 and 6, implies that a 10% higher score of democracy five years ago is typically associated with a 8% higher score of democracy today. The oil variable is also significant and illustrates the well-documented negative relationship between oil and democracy. Though statistically highly significant, the effect of oil is quantitatively small. A coefficient of

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[7]Clustering is a simple strategy to correct the standard errors for potential correlation across observations both over time and within the same time period (Acemoglu et al., 2004).

0.002 (as in column 1 and 6) implies that an increase in the oil value in GDP of 10 percentage point is associated with a 2% lower score of democracy.

Columns 2 and 7 add log of real GDP per capita to the basic specification. The oil variable is now larger (-0.004 with the Freedom House Measure and -0.003 with the Polity measure) and still highly significant. Log of GDP per capita itself is significant, and shows a positive association between income and democracy. Column 3, 4, 8 and 9 add average years of schooling and log population. The coefficients of the oil variable are about the same and still statistically significant at 1 percent. Educational attainment itself is significant in column 4, and indicate a positive association between education and democracy, log population is insignificant when average years of schooling is included. The oil variable remains in the same range and highly significant when additional controls are included (column 5 and 10). The Muslim percentage of the country's population is negatively related to democracy,[8] the absolute value of latitude (distance from the equator), a popular proxy for geographic effects on economic development, is marginally significant (at 10 percent) in column 5 and the fraction of a country's border that is coastal is associated with better democracy. The magnitude of the oil variable, when the full set of covariates are included, is within the same range as in Ross (2001). Overall, the regressions in Table 2 confirm the main finding of the existing literature of a negative association between oil and democracy.[9]

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[8] This is in accordance with Ross (2001) and Barro (1999).
[9] The democracy variable in Ross (2001) is rescaled as a 0-10 variable, while we have rescaled the democracy as a 0-1 variable.

4 Results with Fixed Effects

We now revisit the basic results of the last section in the panel set up with fixed effects. In terms of equation (1), the presence of fixed effects implies that the error term can be represented as $u_{it} = \delta_i + \varepsilon_{it}$, which differs from the specification in (1) because it includes a full set of country dummies. These country dummies capture any time-invariant country characteristic that affect the equilibrium democracy level (Acemoglu et al., 2004). Consequently, even if two countries have the same values of the covariates, they can have different long-run equilibrium values of democracy.

If the error term takes the form $u_{it} = \delta_i + \varepsilon_{it}$, with the δ_i's correlated with oil_{it-1} or x_{it-1}, then pooled OLS estimates are biased and inconsistent. Underlying political and social forces shaping both equilibrium political institutions and the potential for export diversity and economic development will be controlled for in the fixed effects specification. There should however, be no presumption that fixed effects regressions will necessarily estimate the causal effect of oil on democracy. In the presence of factors that affect the joint evolution of democracy and oil abundance, there is no reason to expect that the fixed effects estimates will be consistent. Nevertheless, under plausible assumptions, the inclusion of fixed effects will lead to estimates that are less biased than the pooled OLS estimates. In addition, there is also an econometric problem involved in the estimation of the fixed effect specification. The regressor d_{it-1} is mechanically correlated with ε_{is} for $s < t$, so the standard fixed effects estimation is not consistent.

The so called "Difference" GMM estimator relies upon the following orthogonality conditions:

$$E(d_{it-s}\Delta\varepsilon_{it}) = 0 \quad t = 3,...T \tag{2}$$

where d_{it-s} represents the instruments set used in this GMM estimator. In this setting, it is well known that the higher the persistence of the series used as instruments, the lower the correlation between levels and subsequent differences.[10] The characteristic of persistency in the explanatory variables may cause several biases in the first difference GMM estimator. Both democracy, oil income and education are highly persistent, therefore lagged levels are weak instruments and it is possible to gain precision in terms of point estimates bias by exploiting some additional moment restrictions. The so-called "System" GMM estimator stacks together the equation in first differences and the equation in levels in a system of equations and employs both lagged levels and differences as instruments (Bobba and Coviello, 2006). In order to consider the additional moments as valid instruments, the following additional linear moment conditions must be satisfied:

$$E(\Delta d_{it-1}(\delta_i + \varepsilon_{it})) = 0 \quad t = 4, ...T \tag{3}$$

Equation (3) implies that changes in democracy are orthogonal to the country fixed effects. We test the validity of this assumption. We also control for a weak form of exogenety in the oil variable (and other covariates) by assuming that our explanatory variables can be affected by current and past realizations of democracy but are uncorrelated with future unpredictable innovations in democracy (the error term).

Table 3 reports the results across various estimators using the Freedom House measure of democracy. Column 1 and 2 show the results of Pooled OLS and Within Groups estimators that provide the upper and lower bound bound for the autoregressive coefficient of democracy.[11] Column 3 and 4 employ the one

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[10]Simulation results show that the Difference GMM may be subject to a large downward finite sample bias, particularly when T is small. See Blundell and Bond (1998).

[11]See Bond (2002) for details on the bias of the two bounds.

and two-step Difference GMM estimators.[12] As seen from column 3 and 4 the oil variable is not statistically significant, and the education variable is negative. The negative coefficient of education on democracy, with this specification, has been found in related research (e.g. Acemoglu et al., 2005; Bobba and Coviello, 2006). Acemoglu et al. (2005) interpret the result that the positive association between education and democracy disappears once we control for country specific-effects as the cross-sectional relationship between education and democracy is driven by omitted factors influencing both education and democracy rater than a causal relationship. Bobba and Coviello (2006) and Castello-Climent (2006) disagree in this interpretation and argue that due to the high persistence in democracy and education, the findings of Acemoglu et al. (2005) are subject to weak instruments problems. In order to address these weak instruments problems they argue in favour of using an alternative estimator that reduces the potential biases and imprecision associated with the first difference estimator. They show that education systematically predict both levels and changes in democracy by considering a different identification assumption by using additional and more informative moment conditions to instrument the regressors. In light of this discussion we conclude that the estimators in column 3 and 4 are biased, and the consequent finding that oil has no effect on democracy and that education has a negative effect may not be instructive.

Columns 5 and 6 report the System GMM estimates, one and two-step, respectively, and the results are striking: lagged oil share now has a negative and significant effect on democracy at the one percent significant level, and lagged level of education now has a positive and significant effect. The coefficient of the oil variable in the System GMM specifications are similar to the Pooled OLS specification. In fact, when we control for country and time specific effects and

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[12]The two-step GMM is implemented using the Windmeijer (2005) correction using xtabond2.

take into account the cross-country variation in the data the results are akin to those obtained by Ross (2001). Columns 7 and 8 repeat the System GMM estimates, including only non OPEC countries and the results are similar.

The reliability of the results depend on the validity of the instruments. We report tests at the bottom of the table. The p-value of the AR(2) test gives the probability of correctly rejecting the null hypothesis of no second order serial correlation. The Hansen test validates the adequacy of the instruments, the failure to reject the null hypothesis of the validity of the instruments indicate that the specification is correct. The Diff Hansen test evaluates the validity of the additional orthogonality condition in the System GMM. As displayed at the bottom of Table 3, the values of the tests suggest that the instruments are valid.

5   Robustness of the Results

The evidence found in the previous section reveals one main finding. It shows that even when controlling for fixed omitted variables, more oil is related to less democracy. In this section we study the robustness of this result.

In Table 4 we control for some additional potential determinants of democracy that have been suggested by the existing literature. In columns 1 and 2 democracy is measured thorough the Freedom House political rights index and we also check the robustness of the results using the alternative Policy Democracy Index, columns 3 and 4. The additional controls include the log of per capita income; a measure of the country size such as the level of population (in logs) and a measure of openness such as the sum of import and export in GDP.

The results suggest that controlling for these potential determinants of democracy does not change the main finding of the paper. In all cases, the coefficient

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of the oil share remains negative and statistically significant. The education variable is insignificant when the Polity Democracy Index is used, a result also found by Castello-Climent (2006). Log of per capita income is insignificant in all specifications and hence support the results found in Acemoglu et al. (2004), who argue that controlling for factors that simultaneously affect income and democracy (country fixed-effects) removes the statistical association between income per capita and democracy.

In the last table we check the robustness of the results to an alternative measure of oil abundance, oil income per capita. In the previous tables, there is the concern that changes in the oil variable is due to the change in the denominator, and not actually in oil income. Table 5 indicate that this is not the case. When oil revenues per capita (in thousand 2005 US$) are used instead of oil revenues in GDP the results are similar - more oil is associated with less democracy.

Finally, we check if the results are influenced by the presence of atypical observations. In order to control for outliers, we reestimate the regression in column 5 of Table 3 by removing one country at a time. In all regressions the oil coefficient is negative and within the same range as in column 5 of Table 3, and it is always statistically significant.

6   Conclusion

Some of the empirical findings of the determinants of democracy has recently been challenged. Acemoglu et al. (2004) and Acemoglu et al. (2005) argue that insights regarding income level and education change when country fixed effects are taken into account. These authors point out that previous empirical evidence could suffer from potential omitted variable bias. The present paper

advocates that this is not the case for the relationship between oil and democracy. Although a fixed effects and first-difference GMM estimator show no statistically significant relationship between oil and democracy, we have argued that these estimators may not be appropriate in the estimation of a dynamic panel data model with persistent variables. Improvements in the econometric techniques to estimate a dynamic panel data model with persistent variables has been made by Arrelano and Bover (1995) and Blundell and Bond (1998). When this more appropriate econometric technique is used, the results are in line with Ross (2001), which states a negative association between oil and democracy. This result holds for alternative measures of democracy and alternative measures of oil abundance, it is robust when including additional covariates and when removing major oil producers.

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A   Variable Description

- Coast

Coastline as share of total boundaries. $\frac{Coastline}{Coastline+Land\,boundaries}$. Source: CIA.
The World Factbook. https://www.cia.gov/cia/publications/factbook/

- *Democracy − Freedom House Political Rights Index*

Freedom House Political Rights Index. Original range 1,2,...,7, normalized 0-1.
Source: Freedom House. http://www.freedomhouse.org/uploads/fiw/FIWAllScores.xls

- *Democracy − Polity Composite Democracy Index*

The composite index is the democracy score minus the autocracy score. Original
range -10, -9, ...,10, normalized 0-1. Source: Polity IV Project. http://www.cidcm.umd.edu/polity/

- *Education*

Average years of schooling in the population aged 25 and over. Source: Barro
and Lee (2000). http://www.cid.harvard.edu/ciddata/ciddata.html

- *Latitude*

Absolute latitude. Source: CIA. The World Factbook. https://www.cia.gov/cia/publications/factbook/

- *Log rgdpl*

Log of real GDP per capita. Real GDP is obtained by adding up consumption,
investment, government and exports, and subtracting imports in any given year.
The given year components are obtained by extrapolating the 1996 values in
international dollars from the Geary aggregation using national growth rates.
It is a fixed base index where the reference year is 1996, hence the designation.
Source: PWT. http://pwt.econ.upenn.edu/

- *Log population.*

Log of population. Source: PWT. http://pwt.econ.upenn.edu/

- *Muslim*

Number of Muslims as a percentage of the countries population in year 2005.
Source: World Christian Database.

- *Openness*

Exports plus Imports divided by RGDPL. Source: PWT. http://pwt.econ.upenn.edu/

- *Oil Share*

The value of oil extraction as percentage of GDP.

$$\frac{Oil\,production\,volume\,(in\,metric\,tons)*crude\,oil\,price\,(in\,current\,USD)}{GDP\,(current\,USD)}*100.$$

Missing values have been replace with zero, if there is no onshore or offshore production for that country. Source: Oil production volume and crude oil price are from the World Bank's data set on genuine savings (adjusted net savings), GDP (in current USD) are from the World Development Indicators, onshore and offshore production is from PETRODATA/Lujala et al. (2007).

- *Oil value per capita*

Oil value per capita in thousand 2005 USD.

$$\frac{Oil\,production\,volume\,(in\,barrels)*oil\,price\,per\,barrel(in\,onstant\,2005\,USD)}{Population}/1000$$

Missing values have been replace with zero, if there is no onshore or offshore production for that country. Source: Oil production volume is from the World Bank's data set on genuine savings (adjusted net savings), Oil price per barrel in constant 2005 UDS are from BP Statistical Review of World Energy June 2006 (http://www.bp.com/liveassets/bp_internet/globalbp/globalbp_uk_english/publications/energy Population data from PWT, and onshore and offshore production is from PETRODATA/Lujala et al. (2007).

- *Years of indep.*

Number of years since independence. Year of Independence is the year a country enters the Polity IV dataset.

Table 1 Descriptive Statistics

Variable		Freedom House Political Rights Dataset					Polity Composite Democracy Dataset				
		Mean	Std.Dev	Min	Max	Observations	Mean	Std.Dev	Min	Max	Observations
democracy	overall between within	0.4710935	0.365761 0.3180418 0.1835516	0	1	N = 1009 n = 160 T= 6.30625	0.5028497	0.3779787 0.3222694 0.2007138	0	1	N = 965 n = 158 T= 6.10759
Oil share	overall between within	5.472795	13.62115 12.64364 5.917903	0	101.56	N = 1016 n = 157 T= 6.47134	6.316548	15.71177 14.54029 6.739324	0	101.74	N = 1008 n = 157 T= 6.42038
Education	overall between within	4.867908	2.954525 2.902823 0.9556351	0.04	12.25	N = 741 n = 121 T= 6.12397	4.867908	2.954525 2.902823 0.9556351	0.04	12.25	N = 741 n = 121 T= 6.12397
Log rgdpl	overall between within	8.287951	1.165583 1.103579 0.2615444	5.471178	11.19966	N = 975 n = 157 T= 6.21019	8.261572	1.161172 1.091577 0.2683881	5.139029	11.11862	N = 972 n = 160 T= 6.075
Log Population	overall between within	15.8624	1.545161 1.531981 0.2303541	11.81082	20.97044	N = 1127 n = 161 T = 7	15.82447	1.551631 1.537526 0.2370007	11.62025	20.95647	N = 1127 n = 161 T = 7
Openness	overall between within	69.47475	46.1913 42.02616 21.87539	2.02	383.55	N = 977 n = 157 T= 6.22293	68.54965	46.71821 45.784 22.62357	2.02	377.68	N = 974 n = 160 T = 6.0875
Muslim	overall between within	26.66099	35.78986 35.8862 0	0	99.13	N = 1120 n = 160 T = 7	26.66099	35.78986 35.8862 0	0	99.13	N = 1120 n = 160 T = 7
Years of independence	overall between within	73.96404	65.96689 65.28899 9.625487	0	202	N = 1001 n = 159 T = 6.2956	73.91487	65.7352 64.92346 9.625962	0	200	N = 975 n = 159 T = 6.13208
latitude	overall between within	26.35416	16.83737 16.88241 0	0	64	N = 1127 n = 161 T = 7	26.35416	16.83737 16.88241 0	0	64	N = 1127 n = 161 T = 7
coast	overall between within	0.3687956	0.350333 0.3512701 0	0	1	N = 1127 n = 161 T = 7	0.3687956	0.350333 0.3512701 0	0	1	N = 1127 n = 161 T = 7
Oil value per capita	overall between within	0.6477491	2.992709 2.404336 1.712419	0	44.42234	N = 1073 n = 161 T = 6.6646	0.8408952	4.258189 3.16235 2.758475	0	64.0479	N = 1062 n = 161 T = 6.59627

Table 2 Pooled OLS

	Freedom House Measure of Democracy					Polity Measure of Democracy				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Democracy$_{t-1}$	0.828	0.714	0.712	0.635	0.602	0.816	0.739	0.736	0.681	0.640
	(0.021)***	(0.030)***	(0.029)***	(0.038)***	(0.037)***	(0.022)***	(0.035)***	(0.034)***	(0.044)***	(0.041)***
Oil share$_{t-1}$	-0.002	-0.004	-0.004	-0.003	-0.002	-0.002	-0.003	-0.003	-0.003	-0.002
	(0.000)***	(0.001)***	(0.001)***	(0.001)***	(0.001)***	(0.000)***	(0.001)***	(0.001)***	(0.001)***	(0.001)***
Log lrgdpl$_{t-1}$		0.057	0.057	0.034	0.030		0.045	0.046	0.048	0.047
		(0.008)***	(0.008)***	(0.016)**	(0.015)**		(0.009)***	(0.009)***	(0.016)***	(0.014)***
Log Population$_{t-1}$			0.005	-0.002	-0.005			0.009	0.004	-0.006
			(0.004)	(0.006)	(0.008)			(0.004)**	(0.006)	(0.007)
Education$_{t-1}$				0.019	0.008				0.006	0.000
				(0.006)***	(0.006)				(0.005)	(0.005)
Openness$_{t-1}$					-0.000					-0.001
					(0.000)					(0.000)***
Muslim					-0.001					-0.001
					(0.000)***					(0.000)**
Years of indep.					0.000					0.000
					(0.000)					(0.000)
Latitude					0.001					0.000
					(0.001)*					(0.001)
Coast					0.050					0.057
					(0.028)*					(0.026)**
r2	0.718	0.741	0.741	0.725	0.734	0.748	0.763	0.765	0.743	0.756
Countries	156	153	153	110	110	155	151	151	108	108
Observation	804	768	768	581	581	768	744	744	570	570

Pooled cross-sectional OLS regressions, with robust standard errors clusterd by country in parantheses. Year dummies and constant term in all regressions. Dependent variable in column 1 – 5 is the Freedom House Political Rights Index. Dependent variable in column 6 – 10 is the Polity Composite Democracy Index. The sample period column 1 – 5 is an unbalanced panel, 1972 -2002, with data at 5-year intervals. The sample period column 6 – 10 is an unbalanced panel, 1970 -2000, with data at 5-year intervals.

Table 3 Fixed Effects

	Pooled OLS	Within Group	Diff-1 GMM	Diff-2 GMM	Sys-1 GMM	Sys-2 GMM	Sys-1 GMM	Sys-2 GMM
	All countries	All countries	All countries	All countries	All countries	All countries	Non OPEC	Non OPEC
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Democracy$_{t-1}$	0.663	0.290	0.531	0.493	0.596	0.602	0.581	0.575
	(0.035)***	(0.044)***	(0.071)***	(0.078)***	(0.057)***	(0.058)***	(0.060)***	(0.064)***
Oil share$_{t-1}$	-0.003	-0.000	0.003	0.003	-0.003	-0.004	-0.003	-0.004
	(0.001)***	(0.001)	(0.003)	(0.002)	(0.001)***	(0.001)***	(0.001)***	(0.001)***
Education$_{t-1}$	0.027	-0.032	-0.098	-0.112	0.031	0.026	0.029	0.027
	(0.004)***	(0.019)	(0.050)*	(0.046)**	(0.008)***	(0.008)***	(0.008)***	(0.009)***
Hansen			0.295	0.295	0.267	0.267	0.198	0.198
Diff Hansen					0.985	0.985	0.879	0.879
AR(1)			0.000	0.000	0.000	0.000	0.000	0.000
AR(2)			0.242	0.268	0.258	0.252	0.365	0.375
Observations	595	595	476	476	595	595	559	559
Countries	116	116	102	102	116	116	108	108

Dependent variable is the Freedom House Political Rights Index. Diff-1 GMM and Diff-2 GMM are the one (two) step difference GMM estimation. Sys-1 GMM and Sys-2 GMM are the one (two) step system GMM estimation. Robust standard errors in parentheses. The values reported for the Hansen test are the p-values for the null hypothesis of instrument validity. The Diff Hansen reports the p-value for the validity of the additional moment restrictions required by the Sys GMM. The values reported for AR(1) and AR(2) are the p-values for first and second order autocorrelated disturbances in the first differences equations. Five year panel, 1972-2002.

Table 4 Fixed Effects. Additional Covariates

	Freedom House Democracy Index		Polity Democracy Index	
	Sys-1 GMM	Sys-2 GMM	Sys-1 GMM	Sys-2 GMM
	(1)	(2)	(3)	(4)
Democracy$_{t-1}$	0.596	0.579	0.676	0.680
	(0.055)***	(0.057)***	(0.067)***	(0.067)***
Oil share$_{t-1}$	-0.003	-0.003	-0.003	-0.003
	(0.001)***	(0.001)***	(0.001)***	(0.001)***
Education$_{t-1}$	0.029	0.028	0.012	0.011
	(0.010)***	(0.010)***	(0.011)	(0.012)
Log lrgdpl$_{t-1}$	0.007	0.018	0.036	0.038
	(0.027)	(0.028)	(0.027)	(0.027)
Log population$_{t-1}$	-0.008	-0.002	-0.009	-0.007
	(0.008)	(0.009)	(0.007)	(0.008)
Openness$_{t-1}$	-0.000	-0.000	-0.001	-0.001
	(0.000)	(0.000)	(0.000)***	(0.000)***
Hansen	0.122	0.122	0.113	0.113
Diff Hansen	0.223	0.223	0.549	0.549
AR(1)	0.000	0.000	0.000	0.000
AR(2)	0.248	0.252	0.969	0.978
Observations	581	581	570	570
Countries	110	110	108	108

Dependent variable in column 1 – 2 is the Freedom House Political Rights Index. Dependent variable in column 3– 4 is the Polity Composite Democracy Index. The sample period column 1 – 2 is an unbalanced panel, 1972 - 2002, with data at 5-year intervals. The sample period column 2 – 3 is an unbalanced panel, 1970 -2000, with data at 5-year intervals. Sys-1 GMM and Sys-2 GMM are the one (two) step system GMM estimation. Robust standard errors in parentheses. The values reported for the Hansen test are the p-values for the null hypothesis of instrument validity. The Diff Hansen reports the p-value for the validity of the additional moment restrictions required by the Sys GMM. The values reported for AR(1) and AR(2) are the p-values for first and second order autocorrelated disturbances in the first differences equations. Five year panel, 1972-2002.

Table 5 Alternative Oil Measure

	Sys-1 GMM	Sys-2 GMM
	(5)	(6)
Democracy$_{t-1}$	0.652	0.640
	(0.055)***	(0.057)***
Oil value per capita$_{t-1}$	-0.004	-0.004
	(0.001)***	(0.002)***
Education$_{t-1}$	0.019	0.021
	(0.007)***	(0.008)***
Hansen	0.123	0.123
Diff Hansen	0.323	0.323
AR(1)	0.000	0.000
AR(2)	0.340	0.343
Observations	628	528
Countries	120	120

Sys-1 GMM and Sys-2 GMM are the one (two) step system GMM estimation. Robust standard errors in parentheses. The values reported for the Hansen test are the p-values for the null hypothesis of instrument validity. The Diff Hansen reports the p-value for the validity of the additional moment restrictions required by the Sys GMM. The values reported for AR(1) and AR(2) are the p-values for first and second order autocorrelated disturbances in the first differences equations. Five year panel, 1972-2002.