Oil Wealth and Governance:
A Panel Data Analysis

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Abstract

This paper examines the relationship between oil wealth, measured by historical international oil prices and Governance, measured by a country's Polity2 democratization score and by Freedom House's score for Civil Rights. I used data from 1980 to 2004 for 58 countries in five different regions: Africa, Latin America, Middle East, Asia and Eurasia. Oil wealth, in general, is shown to have a negative effect on measures of governance. This paper also studies the relationship between oil wealth and governance in oil and non-oil dependent countries, predominantly Islamic countries and countries located in Africa and the Middle East. The results of the empirical analysis in this paper show a significant relationship between oil prices and governance with significant evidence to support the existence of endogeneity (joint causality). Therefore, this paper uses an instrumental variable three-stage least squares approach to solve the problem of endogeneity and the possibility of omitted variable bias.

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“It’s the devil’s excrement. We are drowning in the devil’s excrement.”
-*Juan Pablo Perez Alfonso*, Founder –OPEC-

1. Introduction

What is the nature of the relationship between oil wealth and governance? More specifically, can changes in oil wealth or governance affect each other? These questions have been the subject of a long-standing debate in the realm of economic and political science literature.

In this paper, I examine the relationship between oil wealth and governance. I study how two different governance measures will change as oil wealth increases in oil dependent countries, countries that are predominantly Islamic and countries located in Africa or the Middle East. On the direction of causality, I consider the hypothesis that more oil wealth will result in weaker governance measures and the hypothesis that both oil wealth and governance are endogenous. As for the measurement of oil wealth, this paper proposes several proxies that would be ideal for testing my hypothesis. However, due to the limitations in available data, this paper uses only one aspect of oil wealth to study the relationship between oil wealth and governance: oil prices.

This paper adds to some of the previous literature by using an instrumental variable three-stage least squares estimation to study the hypothesis of joint causality. Very generally, oil price increases have a negative relationship with governance. However, oil price increases seem to be more detrimental to governance in oil dependent countries, predominantly Islamic countries and African as well as Middle Eastern countries.

This paper is divided in 8 sections. Section 2 discusses the basic theory and previous literature on the relationship between oil wealth and governance indicators. Section 3 discusses the conceptual models underlying this relationship. Section 4 discusses the ideal data for this model. Section 5 describes the actual data in this study. In

section 6 I present results for my single equation model and in section 7 I present the analysis and results of my instrumental variable approach. Finally, section 8 concludes my study with recommendations for further research.

2 Literature Review

2.1 Theoretical Background

The basic theory behind the behavior of autocratic governments and their utilization of economic rent was first discussed in a paper by McGuire and Olson (1996). The model proposed in this paper suggests that when an autocratic government seizes and holds a given territory, it will pay for the government to provide a peaceful order and public goods to its people so as to maximize extraction and economic rent out of it. Out of this increase in output, the government will obtain more resources from its own purposes than from taxation policies. Hence, although the subjects of an autocratic government will pay less in taxes, their governments will have more rent invested in repressive apparatuses that will assure its continued control over economic rent and natural resources. On the other hand, the authors argue that democracies will provide a higher level of public goods through less rent extraction and more taxation than in autocracy. The reason for this is than under simple majority, citizens looking to "encompass interest" will limit rent seeking when it reduces total income by more than the rent extracted from the minority.

The key of the Mcguire/Olson model and its relationship to oil prices and governance is that during oil price increases, an autocratic ruler will want to maximize utility as a function of how much rent it can extract from its resources. The argument goes that during oil price increases an autocratic government will invest in repressive

apparatuses that will assure its rent seeking maximizing behavior over the population. On the other hand, during periods of reducing oil prices we would expect the population to exert more constrains on the government and more decentralization to occur – the case of democracies - where there is more dependence on taxation than on economic rent from natural resources.

Huntington (1984) and Kraay (2006) argue that governments which have as characteristics entities that require the dispersion of political and economic power will be more likely to be democratic (have better governance). In his research, Huntington characterizes a democratic nation as one that has a high level of wellbeing, transparency in institutions, an autonomous middle class and a market oriented economy. Kraay *et al* (2006) states that there is a general consensus in the literature and in academia that good governance matters significantly for development and growth. Sudden wealth they say, does not necessarily lead to better governance, as the disappointing performance of many countries experiencing natural resource booms has shown. However, they conclude by saying that although the direction of causality between governance and resource wealth is not written in stone they argue that the literature tends to point to governance as a cause for economic growth and not the other way round.

Eifert (2003) finds that oil-exporting states have developed opaque, highly politicized fiscal systems that lack checks and balances necessary to ensure the appropriate distribution of resources. Additionally, he argues that oil revenues provide fiscal flexibility needed to adjust spending in line with changes in resources. The author divides autocracies into *Predatory autocracies* that base their power on the military and the support of a narrow elite as a basis for their authority (regimes with great continuity, corrupt and non transparent institutions) and *Reformist Autocracies* that create legitimacy

by funding lavish welfare programs through productive investments and economic growth. The relationship of Eifert's analysis with oil wealth and governance is that during oil price increases *Predatory Autocracies* will invest money on military power and support for the elite, undermining civil liberties while *Reformist Autocracies* will try to legitimize their rule by utilizing economic rent to buy off the public through lavish welfare programs.

Finally, Friedman (2006) has put forth the hypothesis that the price of oil and the pace of freedom always move in opposite directions in oil rich states. He defines oil rich states as those that have oil production as the bulk of their exports or gross domestic product and argues that oil rich states governance represent a curse for their people because of the correlation that he argues exists between increasing oil prices and the decreasing levels of freedom and democracy in a country. The higher the oil price, he argues, the more erosion there will be on the right of free speech, free press, free elections, freedom of assembly, government transparency, an independent judiciary and the rule of law.

2.2Previous Empirical Research

While the theory recognizes the relationship between resource wealth and governance, our empirical understanding of the effects that resource wealth has on the development of democracy and governance on any particular country is limited. The empirical literature seems to be divided in several dimensions. There is consensus in the literature about the general direction of causality (more oil wealth leads to less governance) but resent research has reported endogeneity and there is little agreement on the definition and measurement for governance and the type of data that should be used to accurately test the various theories of how resource wealth, and more specifically, oil, can affect it.

One of the central questions of this paper is to address the direction of causality. Although there is significant empirical evidence that supports the hypothesis that increases in oil wealth affect governance measures, could it be possible, that oil prices and therefore oil revenues are simultaneously determined by changes in political regimes of oil nations?

In addition to addressing the question of causality in a variety of ways, the empirical research has divided itself into three main schools of thought. *The Rentier State Thesis* that explains how a state becomes more dependent on oil revenues by moving away from taxation dependent policies and because of this, oil wealth is associated with greater likelihood of regime failure (Delacroix 1980). *The Repression Thesis* that suggests that oil revenues allow exporting states to invest in repressive apparatuses that can keep them in power despite social opposition and thus counteract the destabilizing effects of *The Rentier Thesis*, while *Modernization Theory* holds that growth based on the exports of oil and minerals fails to bring about the social and cultural changes that tend to produce democratic government.

Smith (2004) and Ross (2001) use panel data to test the effects of oil wealth on governance but take different approaches when choosing the dependent variables. Smith compares 107 oil and non-exporting developing states between 1986 and 1999 and runs three separate regressions to obtain a more nuanced view of effects of oil wealth on governance (regime failure, anti-state protest and internal conflicts). Ross (2001) also compares national data of 113 states between 1971 and 1997 to explore the three aspects of the oil impedes democracy claim (*Rentier, Reppresion and Modernization Thesis)* but uses regime[1] as a proxy for democracy as his dependent variable.

[1] Regime is measured by the Polty98 data set constructed by Gurr and Jaggers (2000) which gives countries a measure of democracy that is scaled as a 0 -10 variable, where 10 represents the most democratic.

Both Smith (2004) and Ross (2001) use primary explanatory variables related to oil exports but Smith (2004) uses time dependant dummies to account for the booms and bust of the 1970's and 1980's. However, both authors agree that the optimal measure for oil dependency should be a ratio of the value of oil exports to gross domestic product in a given year. The choice to use this ratio as a proxy for oil dependency is very sensible since it allows the authors to assess whether, once other factors are accounted for, oil exporting states tend to differ from non exporters.

Smith's (2004) decision to use time dependant dummy variables is theoretically sensible since it allowed him to assess the hypothesis that the booms and bust political effects build over time and the argument that more dependent states suffer more than less dependent states from the fluctuations in oil prices and in their domestic economies.[2]

Both authors investigate whether the apparent effects of oil is caused by cultural or historical impediments to democratization that are specific to the Middle East and Sub Saharan by using region dummies. These are added to the model and are coded 1 or 0 depending on whether a country belongs to the region or not and test the more broader hypothesis that the antidemocratic effects of oil dependency might not be limited to the Middle East or Subsaharan Africa. However, Ross (2001) goes one step further and uses dummy variables to control for Islam and OECD membership. With this, Ross challenges the hypothesis that Muslim states (all over the world) might be less democratic than non-Muslim states and takes into account for any western specific effects that his model might be accounting for without taking a position on the mechanisms behind it (OECD dummy).

Smith (2004) lags his independent variable regime (proxy for democracy) and finds that only his models with a five-year lagged independent variable offered significant

[2] The choice to use these decade dependent dummies agrees with Friedman's argument in the previous section that oil price fluctuations could have an adverse effect on oil dependent economies.

results. His most important conclusion is that longevity of regimes – even through volatile price shocks of the 70's and 80's- is the dominant trend among oil exporters. His findings suggest that oil's strengthening effect does not appear to be a function of repression and that the persistence of oil rich states long after the bust of the 1980's is caused by the investment of windfall revenues in building state institutions and political organizations that could carry them through hard times. Ross (2001) lags the dependent variable regime and turns his equation into a change model, transforming the dependent variable from regime type to the change in a country's regime type over a given five- year period. This change ensured that the regression indeed measured both time series and cross-sectional changes in regime types. Finally, his model includes a set of twenty-six dummy variables, one for each year covered by the data (1971 – 1997).

Although Smith (2001) doesn't empirically test for the *Rentier Thesis* in his model, he find that regimes in oil rich states enjoy a boost in longevity as a result of their access to oil rents when compared to other developing countries inspite of the boom bust periods caused by price volatility. These results are against what the *Rentier* hypothesis predicted, since it argues that oil dependent regimes should be more vulnerable during boom bust periods. On the other hand Ross (2004) uses three indicators to test this hypothesis (Taxes, Spending Effect and Government Consumption) and finds what the *Rentier Effect* stated: higher personal and corporate taxes are strongly associated with a democratic government**.** Their inclusion affects significantly the oil coefficient and implies that the taxation effect may account for part of the antidemocratic influence of oil. Smith (2004) uses a dummy representing highly authoritarian regimes[3] and finds that these actually experience considerable higher levels of protest than other types of regimes, that repression lowered

[3] The dummy variable was coded "1" if the democracy score was between – 6 and -10.

the expected number of protests and that it *did not* reduce the effect of oil wealth, suggesting that factors other than subjugation are used in what he finds to be a robust relationship between oil wealth and regime durability. Ross (2001) uses two variables to test this hypothesis, *Military / GNP*[4] and *Military*[5]. When he re-estimates his dependent variable a regression with the control variables he finds that oil exporters are indeed positively and significantly related with military spending and supports the linkage that exists between oil wealth and higher levels of military spending, which in turn tends to impede democracy as the repression effect suggests.

The papers discussed so far have tested the hypothesis that oil wealth causes bad governance, and not vice versa. Ramsay (2006) studied this relationship from a different perspective. He proposed that oil prices and oil revenues are simultaneously determined by changes in political regimes (instability) of oil nations. The author criticizes the previous literature by observing that oil prices, and as a consequence oil wealth, are influenced by changes in political regimes of oil nations, possibly, as much as the other way around.

Additionally, the author argues that the analysis of oil wealth and governance has a real possibility of omitted variable bias. He argues that this arises from our inability to measure certain covariates that are believed to be important for explaining political institutions, problems of data availability on measurable covariates and a limited understanding of the things that determine governance measures in many developing countries.

The author uses a Wu-Hausman to test for endogeneity in his initial OLS regression in which he includes a vector of control covariates, oil wealth a random disturbance error

[4] Measures the size of the military budget as a fraction of GNP.

[5] Measures the size of the military as a fraction of the labor force.

term time and time dependant dummy variables. By rejecting the null hypothesis of exogeneity the author provides evidence for simultaneous causation in the OLS specification and uses an instrumental variable approach to propose that certain types of natural disasters are useful for determining the effect oil revenues on governance. Ramsay (2001) argues that natural disasters that occur in countries outside of a country's home region are good instrumental variables because they have no direct effect on a country's political institutions, other than possibly through increases in returns from the resulting changes in world oil prices. Through the use of two stage least squares and instrumental variable analysis the author finds that the relationship between disaster damage and polity scores is negative and statistically significant and that natural disasters and world oil prices have a positive and statistically significant relationship. More importantly, the use of the instrumental variable in this model gave an unbiased and indirect estimate on the oil wealth coefficient, which further supports the hypothesis that increases in oil wealth have a negative and statistically negative relationship with governance measures.

To conclude this section, we can say that previous literature has clearly used several different methods and theories to test the relationships between oil dependency (or for some, oil wealth) on governance. However, the literature leaves the effect of oil on governance as a puzzle. While there is empirical evidence that suggests that being an oil dependent country will lead to political stability through the investment of repressive apparatuses there is also empirical literature that suggests that more oil wealth reduces democracy and civil liberties in the maximization of economic rent. Smith (2004) finds that oil dependency increased regime durability, reduced the plausibility of a civil war and decreased the levels of social protest, even when taking into account repression. On the other hand empirical evidence by Ross (2004) ,Wantchekon (1999) and Ramsay (2006)

showed that the oil-impedes democracy claim is both valid and statistically robust; or in other words, that oil *does* hurt democracy. Even further, their evidence concludes that oil does have a graver damage to democracy and good governance in oil-poor countries than in oil rich ones and a that a given rise in oil exports will do more harm in oil-poor states and in oil-rich ones.

Table 1 includes a summary of the results of previous empirical research discussed in this section.

3. Conceptual Model

This paper uses two models to study the relationship between oil wealth and governance. A single equation model studies the hypothesis that increases in oil wealth reduce governance scores, and an instrumental variables model studies the hypothesis that oil wealth and governance are simultaneously determined.

3.1 Single Equation Model

The singe equation model uses ordinary least squares, random effects, and a fixed effects high variance estimator to study the hypothesis that having oil negatively affects the levels of democracy and civil rights in the country, which as mentioned in the literature review can be used as indicators for good governance. The control variables included are explained in the literature as the most robust determinants of good governance and includes a variable for oil that interacts with other terms related to region, religion and oil dependence to see if they add any explanatory power.

Table 1

1. Synthesis of Theoretical Studies on Governance, Democracy and Oil
2. Comparison of Regressions Predicting Governance and Political Instability using Oil Dependency

Paper	Year	Dependent Variable	Measures of Oil Dependency	Coefficient estimate for oil dependency/ Results	Control Variables
1. Synthesis of Theoretical Studies					
McGuire/Olson	1996			An autocratic government will want to maximize utility as a function of how much rent it can extract from its territory. It will maximize economic rent by investing in apparatuses that will assure control over the territory and its productivity.	
Eiftert	2003			During oil price increases *Predatory Autocracies* will invest in repressive apparatuses while *Reformist Autocracies* will invest lavish welfare programs to buy public support.	
Friedman	2006			Oil Dependent Countries experience a negative relationship between oil price increases and the pace of freedom.	
2. Cross – Sectional Regressions					
Smith	2001	Regime Failure	Oil Exp/GDP	-3.011***	Income Per Capita, Inflation, Rates of Economic Growth, Regime Type, Ethnoinguistic fragmentization, rate of urbanization, population, region, price volatility.
Smith	2001	Civil War	Oil Exp/ GDP	-5.065***	**Same controls as previous model**
Smith	2001	Social Protest	Oil Exp/ GDP	-2.849***	**Same controls as previous model**
Ross	2004	Regime	Oil Exp/ GDP	-0.0223***	**Rentier, Reppression Modernization Effects**[5]
Ramsay	2006	Democracy	Oil Exp/GDP	- 0.633***	Log Region Natural Disaster Damage, income per capita, Region, income Inequality, Centralization.

1) Although these regressions are cross sectional many of them contain region specific dummy variables
2) Income per capita is logGDP for all regressions.
3) The Regime and regime type variables were collected from the Polity measures by Gurr Jaggers.
4) *** indicates significance at 0.01 level

The basic regression model is:

$Governance_{it}$ = f(Level of $Wellbeing_{it-5}$, Trade Openness, Middle Class Population, History of $Governance_{it-5}$, $Oil\ Wealth_{it-5}$)

The first three arguments in the model can be explained through Huntington's criteria for a successful democracy and good governance. A high level of wellbeing will reflect on the quality of life of the population, trade openness reflects the ability of a government to negotiate with other countries and the presence of a strong middle class allows for the creation of transparent and democratic institutions that can limit the amount of state power.[6] This model also assumes that the history of governance in a country will affect its current state. Countries that have tended to have weak scores in governance measures are expected to keep doing so and the inverse goes for high governance scoring countries. As for oil wealth, the theoretical framework of this study suggests that this variable will have a negative relationship on different measures of governance.

3.2 Instrumental Variables Model

The instrumental variables model studies the issue of endogeneity and causality. This model studies the hypothesis that oil prices are simultaneously determined by changes in political regimes of oil nations. The out of region natural disaster appears in previous empirical evidence as a strong instrumental variable correlated with the price of oil and not correlated with governance measures. Through the use of three stage least squares this model attempts to have an exogenous estimation of the oil wealth coefficient on the premise that natural disasters in oil producing countries influence the price of oil

[6] It is assumed that a strong middle class is by definition one that has higher levels of wellbeing and education than the rest of the population. Further on, the middle class predominantly lives in the biggest cities and is the backbone of modern industrial societies. Therefore it is assumed that they will have a greater desire for the creation of democratic institutions that will protect their interests and investments.

and that they have no direct effect on a country's political institutions, other than possibly through increases in returns from resulting changes in world oil prices. This model uses the same specification as the previous model but the regressions are ran through three stage least squares:

1. **Oil Wealth$_{it\ -}$ = f(Level of Wellbeing$_{it-5}$, Trade Openness$_{it}$, Middle Class Population$_{it}$, History of Governance$_{it\ -5}$, Out of Region Natural Disaster$_{it}$)**
2. **Governance$_{it}$ = f(Level of Wellbeing$_{it-5}$, Trade Openness$_{it}$, Middle Class Population$_{it}$, History of Governance$_{it\ -5}$,Oil Wealth$_{it}$)**

In this model, the out of region natural disaster is expected to have a positive relationship with oil wealth (due to oil price increases). A natural disaster occurring outside a country's region is only expected to affect the country by increases in oil wealth due to increases in oil prices. The other variables are what the literature suggests as the most robust determinants for a democracy and I expect the same sign on coefficients as the previous model.

4. Ideal Data

Ideally I would have liked to measure how oil affects governance by using variables that capture it in different forms. These include (1) oil dependency (oil exports as a fraction of GDP) and (2) oil reserves (the actual amount of oil that a country has as a natural resource). Having such measures would have allowed me to distinguish between the effects of different forms of oil wealth on governance measures.

Ideal measures for governance would encompass all its indicators so as to have one score for good governance. Civil rights, government effectiveness, quality of public

institutions and rule of law are all good indicators for good governance. However, finding available measures and accurate proxies for them is difficult due to their intangibility.

The main problem with measuring governance is the number of factors that affect it, and therefore, having an accurate depiction of it would require including all possible indicators. As for the control variables, the number of people who finish and receive a high school education would have been a more accurate measure for the presence of a strong middle class. Additionally an optimal measurement for trade openness would have been the total volume of trade (imports and exports) adjusted for the size of the economy.

5. Actual Data

The panel data set used by this paper includes observations from 58 developing countries between the years 1980 and 2004. The countries are distributed by regions across Africa, Latin America, Middle East, Asia and Eurasia (please see Appendix for full list of countries).

Unfortunately, there is very limited, freely available data on oil wealth (historical oil exports/imports records, oil reserves and revenues) and as a consequence I use international oil prices ($/bbl –inflation adjusted-) from 1980 to 2004 as a proxy for oil wealth in my model. Even further, given the theory that more oil wealth leads to weaker scores in governance, oil price increases are a good proxy for oil wealth since countries that produce oil will tend to collect more revenue from it as price increases (oil is a highly inelastic good).[7]

[7] Historical Oil prices were retrieved from the American Energy Information Administration

This paper measures governance in two ways. The first one is a POLITY2 score of democracy retrieved from the POLITY IV project that ranges from -10 (strongly autocratic) to 10 (strongly democratic).[8] The second measure is a score from 1 (best civil rights) to 7 (worst civil rights) provided by Freedom House. The POLITY2 score takes into account aspects of a plural democracy such as the rule of law, transparency of institutions and institutionalized constraints on the executive to assign the score, and Freedom House measures the guarantee of civil rights and liberties to all citizens in their daily lives and in acts of participation.

As for the control variables used, GDP per capita, percentage of the population that lives in urban areas and exports plus imports as a fraction of GDP are used as proxies for the level of wellbeing, the presence of a middle class and openness of the economy. The data for these three variables was retrieved from the World Bank's *World Development Indicators* for all countries from 1980 to 2004. Finally, the out of region natural disaster data comes from the Emergency Disaster Data Base, managed by the Center for Research on the Epidemiology of Disasters at Universit Catholique de Louvain, located in Brussels.

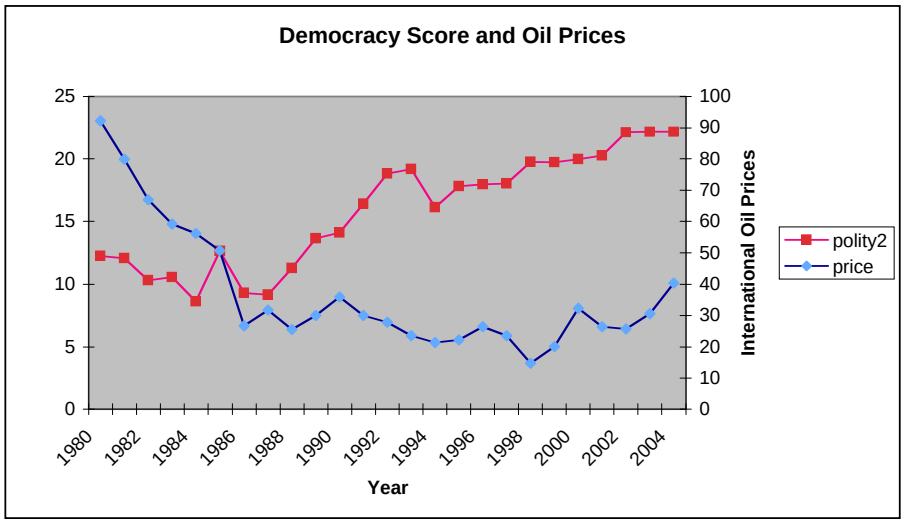
Table 2

Descriptive Statistics

Variable	Mean	Std Dev	Min	Max	Observations
Oil Prices ($/bbl - inflation adjusted)	36.83	19.31	14.83	92.26	1450.00
Polity2 Score	-0.18	7.00	-10.00	10.00	1450.00
Civil Liberties	4.31	1.54	1.00	7.00	1450.00
urbpop (% of total)	48.51	22.36	8.00	98.00	1450.00
open (exp + imp)/GDP	0.70	0.88	0.00	30.02	1450.00
gdp capita ($)	4014.68	4138.99	340.00	25312.00	1450.00
ndisaster ($)	1613867.21	3221592.88	0.00	14269000.00	1450.00

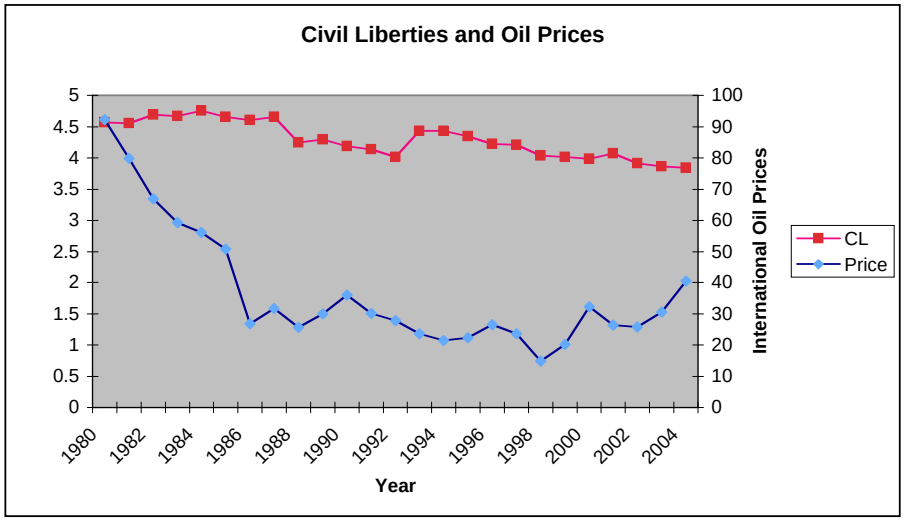
[8] The polity IV variables can be found in the website of the center for international development and conflict management at http://www.cidcm.umd.edu/polity/

Fig1



Note: The Polity2 score was normalized from -10 to 10 to become 0 to 20 (20 being the best score). This figure depicts the relationship between international prices and the average level of democracy for all countries in the data ranging from 1980 to 2004. Polity2 was retrieved from the PolityIV project website.

Fig2.



Note: The civil liberties score is the average for all the civil liberties scores from 1980 to 2004 for all the countries in my data. This figure depicts the relationship between civil liberties and oil prices. A lower score of civil liberties is better. Civil Liberties scores were retrieved from Freedom House's database.

As we can see from figures 1 and 2, the raw data depicts the inverse relationship that exists between changes in international oil prices and governance indicators. Figure 1 shows the average Polity2 scores for all 58 countries in my data across time against international oil prices. Figure 2 depicts the average civil liberties score for 58 countries in my data across time against international oil prices. Very generally, we see an inverse relationship between these governance indicators and changing oil prices. Increases in oil

prices seem to reduce the governance indicators while decreases in oil prices seem to increase them.

6. Single Equation Model: Analysis and Results

Given the conceptual model in section 3 and the theoretical framework from section 2, I constructed a single equation regression model that uses the same control variables for two different governance indicators (Democracy and Civil Rights). The following regressions study the relationship that exists between 5 year lagged international oil prices and governance. Additionally these regressions also study how historical oil price increases will affect democracy and civil rights in oil dependent countries, predominantly Islamic countries and countries located in Africa or the Middle East.[9]

6.1 Basic Regression Model Results

Regression 1

$$\mathbf{G}overnance_{it} = \beta_0 + \beta_1 urbpop_{it} + \beta_2 open_{it} + \beta_3 laggovernance_{it-5} + \beta_4 lag\ln current_{it-5} + \beta_5 lagprice_{it-5}$$

Where Governance = can be either the score for democracy (-10 to 10) or the score for civil rights (1 to 7) in a country i at year t.

$urbpop_{it}$ is the percentage of the population that lives in cities in country i at year t.

$open_{it}$ is the ratio of exports plus imports to GDP in country i at year t.

[9] All these dummy variables are interacting with international oil prices from 1980 to 2004. Both the intercept and the slope coefficients are shown in my results.

$laggovernance_{it-5}$ is the "historical score" for democracy or civil rights in country i at year t -5[10]

$lag\ln current_{it-5}$ is natural log of gdp per capita in country i at year t -5[11]

$lagprice_{it-5}$ is the international oil price of oil ($/bbl) adjusted for inflation in country i at year t-5 (*note the international oil prices are the same for all countries)*[12]

Polity2 Dependent Variable

As suggested by my conceptual model developed in section three, the expected sign on β_5 is negative. An increase in oil prices will reduce a country's governance score. The expected signs on β_1, β_2, β_3 and β_4 are positive.[13] Results from pooled, random effects and fixed are presented in table 3.

The results from the pooled, random and fixed effects estimations are generally aligned with theory. The lagged international oil prices dummy has a negative relationship with the level of democracy and it is statistically significant in all models. A one dollar increase in international oil prices five years ago will decrease a country's democracy score by 0.027 in the pooled model, by 0.042 in the random effects model and by 0.049 in the fixed effects model.

Additionally, a Hausman Test between the fixed and random effects models indicate that this model is best explained by a fixed effects estimation (please see Appendix for results). A fixed effects estimation allows for time independent effects for

[10] Lag governance is lagged 5 years since I expect historical levels of governance to be good predictors of the current state of governance in a country.

[11] By using the natural logarithm I compress the differences between observations at the high end of the scale, and expand them at the low end, making GDP per capita more normally distributed and regression residuals more random. Additionally since the direction of causality is not clear between governance and GDP per capita I lagged it 5 years to reduce the possibility of endogeneity.

[12] International Prices are lagged 5 years since I don't expect historical oil price increases to have an immediate effect in countries governance. I expect the effects of oil prices increases to be felt in a country's governance after governments have had the opportunity to do something with revenue collected from those oil price increases.

[13] Note, the signs on some of these variables change depending on pooled, random and fixed effects

all individuals and accounts for heterogeneity among nations. These results show, using my most general model, that historical oil prices have a negative relationship with the level of democracy in the developing countries in my panel.

Table 3 : Basic Regression Model
(Dependent Variable is Polity2)
(-10 autocracy to 10 democracy)

Variable	Pooled (t st)	Random Effects (z st)	Fixed Effects (t st)
%Urban Population	0.0195992**	0.0153919	-0.0076768
	(1.96)	(0.92)	(-0.19)
Opennes Economy	0.0570369	0.5279307	2.998675***
	(0.17)	(1.03)	(4.29)
lagpolity2	0.7340365***	0.4464712***	0.2288968***
	(38.24)	(18.71)	(8.84)
laglncurrent	-0.0268922	0.3638313	1.168415*
	(-0.37)	(0.91)	(2.03)
lagprice	-0.0268922***	-0.0423368***	-0.049125***
	(-4.22)	(-7.23)	(-6.75)
Constant	1.883343	-1.439532	-8.159836*
	(1.14)	(-0.55)	(-1.85)
Observations	1158	1158	1158
Countries	58	58	58
Years	1980-2004	1980-2004	1980-2004
Adjusted R^2	0.5972	-	-
Adjusted Overall	-	0.5716	0.3321

Hausman Test : Chi2 568.78 Reject the Null Hypothesis of Random Effects (use Fixed Effects)

*** Indicates statistical significance at 1% level
** Indicates statistical significance at 5% level
* Indicates statistical significance at 10% level
# Please see appendix for Hausman Test

Civil Rights Dependent Variable

As suggested from the theoretical framework provided in section 2 and the conceptual models created in section 3, lagged international oil prices indeed have a negative relationship with the level of civil rights. Additionally, the variable signs for this model are opposite from those in the previous model since the highest level of civil rights is 1 and the lowest is 7. The results can be seen in table four.

The results of the pooled, random and fixed effects are all aligned with my theoretical framework. The variable for lagged international oil prices has a negative effect and is statistically significant for all models. A one dollar increase in 5 fiver lagged

international oil prices will decrease the present score of civil rights 0.0039 in the pooled model, by 0.042 in the random effects model and by 0.0046 in the fixed effects model.

Table 4 : Basic Regression Model
(Dependent Variable is Civil Rights)
(1 to 7, 1 is most Civil Rights)

Variable	Pooled	Random Effects	Fixed Effects
%Urban Population	0.0011686	-0.0005029	-0.0176295*
	(0.51)	(-0.14)	(-1.87)
Opennes Economy	-1.245729	-0.02070321***	-0.87272957
	(-1.63)	(-2.57)	(-5.34)
lagCivilRights	0.7256922***	0.4342173***	0.1610091***
	(35.59)	(17.15)	(5.8)
lagLNcurrent	-0.1264961**	-0.2217843**	-1.093955
	(-2.14)	(-2.47)	(-0.82)
lagprice	0.0039158***	0.0423368***	0.0045592***
	(2.7)	(3.45)	(2.72)
Constant	1.889451***	4.090931***	5.662658***
	(4.59)	(6.7)	(5.56)
Observations	1158	1158	1158
Countries	58	58	58
Years	1980-2004	1980-2004	1980-2004
Adjusted R^2	0.5659	-	-
Adjusted Overall	-	0.5362	0.2277

Hausman Test: Chi2 671.11 Reject the Null Hypothesis of Random Effects (use Fixed Effects)

*** Indicates statistical significance at 1% level
** Indicates statistical significance at 5% level
* Indicates statistical significance at 10% level
# Please see appendix for Hausman Test

Additionally a Hausman test between the fixed and random effects models indicate that the fixed effects model best explains this model. This allows for time independent effects for all countries and accounts for heterogeneity among nations. These results show, using my most general model that an increase in oil prices five year ago would decrease the level of civil rights for the developing countries in my panel.

6.2 Oil Dependency and Oil Price Increases

$$\mathbf{G}overnance_{it} = \beta_0 + \beta_1 urbpop_{it} + \beta_2 open_{it} + \beta_3 laggovernance_{it-5} + \beta_4 lag\ln current_{it-5} + \beta_5 lagprice_{it-5}$$
$$\beta_6 oildependent_i + \beta_7 (oildependent_i * lagprice_{it-5})$$

where $oildependent_i$ takes the value '1' if country is an oil dependent country and '0'otherwise

$oildependent_i * lagprice_{it\ -5}$ is an interaction term that investigates the relationship between oil price increases and governance in oil dependent states

B_6 represents the difference in intercepts between groups. That is, the difference in intercepts between oil-dependent and non-oil-dependent countries.

B_7 represents the differences in slopes between lagged oil price increases for oil and non-oil dependent countries.

Regression 2, measures how my two governance indicators respond to 5 year lagged international oil prices in oil dependent and non-oil dependent countries.

Democracy and Oil Dependency

The results of the pooled, random and fixed effects seem to show that, compared to other developing countries, oil dependent countries seem to be less affected by international oil price increases. For all models the lagged international oil prices dependency interaction term is positive and aligned with theory but only statistically significant for the fixed effects method. The results of pooled, random effects and fixed effects estimations of this model are reported in table 5.

Just as I had stated in the theoretical framework of section 3, the model predicts that after five years the marginal influence of international oil prices on democracy will be larger on countries whose oil exports are a small fraction of the economy, and the effect drops as the country grows more dependent on oil (the list of oil dependent countries used in the study can be seen in the appendix). Additionally a Hausman test between the fixed and random effects regressions indicates that a fixed effects model best explains this model. This allows for time independent effects for all countries and accounts for heterogeneity among nations.

Table 5 : Oil Dependency
(Dependent Variable is Polity2)
(-10 autocracy to 10 democracy)

Variable	Pooled (t st)	Random Effects (z st)	Fixed Effects (t st)
%Urban Population	0.0279827***	0.0289649*	-0.0045704
	(2.84)	(1.76)	(-0.11)
Opennes Economy	-0.5742883*	-0.1441675	2.680711***
	(-1.70)	(-0.28)	(3.83)
lagpolity2	0.6996346***	0.4320904***	0.2177251***
	(35.94)	(18.11)	(8.4)
laglncurrent	0.1493047	0.5560169	1.164193**
	(0.60)	(1.42)	(2.04)
lagprice	-0.0334934***	-0.0518732***	-0.0626361***
	(-4.35)	(-7.38)	(-7.71)
oil dependent	-2.753664***	-3.976186***	-see note
	(-4.77)	(-5.68)	
price*oildependent	0.0183294	0.0311944***	0.0364405***
	(1.45)	(2.86)	(3.65)
constant	0.9367626	-1.843364	-8.0386699*
	(0.566)	(-0.72)	(-1.84)
		-	-
Observations	1158	1158	1158
Countries	58	58	58
Years	1980-2004	1980-2004	1980-2004
Adjusted R^2	0.6130	-	-
Adjusted Overall	-	0.5828	0.2721

Hausman Test: Chi2 537.54 Reject the Null Hypothesis of Random Effects (use Fixed Effects)

*** Indicates statistical significance at 1% level
** Indicates statistical significance at 5% level
* Indicates statistical significance at 10% level
# Please see appendix for Hausman Test
Note - Dummy variables are dropped in the Fixed Effects model becaue this estimator is already taking into account heterogeneity among nations. That is, adding a dummy variable that differentiates among nations is redundant and hence, its dropped.

The coefficients on the fixed effects estimation shows that a dollar increase in historical oil prices leads to a 0.063 loss on the democracy scale for non-oil dependent countries while oil-dependent countries only have a loss of 0.026 on the democracy scale. It is important to note that both these coefficients are statistically significant and with the correct sign, as well as for the other control variables in the model.

Civil Rights and Oil Dependency

The results of the pooled, random and fixed effects show once again that compared to other developing countries, oil dependent countries seem to be less affected by international oil price increases. Additionally, the results of this model suggest that after five years, oil dependent governments use an increase in oil prices to promote civil

rights in their countries. For all models the signs are what my conceptual model and theoretical framework predicted. The results of pooled, random effects and fixed effects estimations of this model are reported in table 6.

Additionally a Hausman test between the fixed and random effects indicates that a fixed effects model best explains this estimation, allowing for time independent effects and accounting for heterogeneity among nations. The coefficients on the fixed effects estimation show that after five years a dollar increase in oil prices will lead to a 0.01 loss on the civil rights scale for non-oil dependent countries while oil-dependent countries actually *increase* their civil rights score by 0.005

Table 6 : Oil Dependency
(Dependent Variable is Civil Rights)
(1 to 7, 1 is most civil rights)

Variable	Pooled (t st)	Random Effects (z st)	Fixed Effects (t st)
%Urban Population	-0.0012797	-0.0041342	-0.0196138***
	(-0.57)	(-1.18)	(-2.12)
Opennes Economy	0.0429026	-0.0867311	-0.7631773***
	(0.56)	(-0.79)	(-4.74)
lagcr	0.6686762***	0.4126396***	0.1240151***
	32.39	(16.46)	(4.47)
laglncurrent	-0.2147923***	-0.2932696***	-0.0910117***
	(-3.72)	(-3.47)	(-0.7)
lagprice	0.0060187***	0.008013***	0.0102851***
	(3.49)	(5.06)	(5.57)
oil dependent	0.8987493***	1.266635***	-see note
	(6.76)	(8,25)	-
price*oildependent	-0.0072519**	-0.0115994***	-0.015571***
	(-2.51)	(-4.53)	(-6.76)
constant	2.541645***	4.365779***	5.692937***
	(6.27)	(7.57)	(5.7)
		-	-
Observations	1158	1158	1158
Countries	58	58	58
Years	1980-2004	1980-2004	1980-2004
Adjusted R^2	0.5955	-	-
Adjusted Overall	-	0.5637	0.1009

Hausman Test: Chi2 682.82 Reject the Null Hypothesis of Random Effects (use Fixed Effects)

*** Indicates statistical significance at 1% level
** Indicates statistical significance at 5% level
* Indicates statistical significance at 10% level
# Please see appendix for Hausman Test
Note - Dummy variables are dropped in the Fixed Effects model becaue this estimator is already taking into account heterogeneity among nations. That is, adding a dummy variable that differentiates among nations is redundant and hence, its dropped.

It is important to note that both these coefficients are statistically significant and with the correct signs, as well as the other control variables in the model.

6.3 Oil Wealth and Democracy: Islam

Regression 3:

$$\mathbf{G}overnance_{it} = \beta_0 + \beta_1 urbpop_{it} + \beta_2 open_{it} + \beta_3 laggovernance_{it-5} + \beta_4 lag\ln current_{it-5} + \beta_5 lagprice_{it-5} \beta_6 islam50_i + \beta_7 (islam50_i * lagprice_{it-5})$$

where $islam50_i$ takes the value of '1' if country i has 50% or more of its population following Islam and '0' otherwise

$islam50_i*lagprice_{it-5}$ is an interaction term that studies the relationship between five year lagged price increases and governance in predominantly Islamic nations.

B_6 accounts for the differences between intercepts for Islamic and non-Islamic nations.

B_7 accounts for the difference between the five year lagged oil price increases slopes for the respective groups. That is, Islamic and non-Islamic nations.

Regression 3 measures how my two different measures for governance respond to historical price increases in countries with different religious preferences.

Democracy and Islam

The results of the pooled, random and fixed effects seem to show that, compared to other developing countries, democracy in Islamic nations is more affected by international oil price increases. For all models the lagged international oil prices and Islam interaction term is negative and aligned with theory but not statistically significant. The results of pooled, random effects and fixed effects estimations of this model are reported in table 7.

The results from these methods agree with the theoretical framework in section 3 that suggest that predominantly Islamic nations are not hospitable to democracy due to their resistance to change and to the value that they place on hierarchical relationships. Additionally, a Hausman test between the fixed and random effects regressions indicates that a fixed effects model best explains this model. This allows for time independent effects for all countries and accounts for heterogeneity among nations. The coefficients on the fixed effects estimation show that a dollar increase in historical oil prices will cause a 0.044 loss on the democracy scale for non-Islamic nations while predominantly Islamic nations will have a greater loss of 0.055. It is important to note that although the interaction terms are not statistically significant, the signs for the control variables are what the theoretical framework predicted and they are statistically significant.

Table 7 : Islam
(Dependent Variable is Polity2)
(-10 autocracy to 10 democracy)

Variable	Pooled (t st)	Random Effects (z st)	Fixed Effects (t st)
%Urban Population	0.0115243	0.0056276	-0.0036169
	(1.13)	(0.33)	(-0.09)
Opennes Economy	0.0790524	0.5807071	3.052642***
	(0.24)	(1.14)	(4.36)
lagpolity2	0.7225959***	0.4422106***	0.2299524***
	(37.26)	(18.50)	(8.88)
laglncurrent	0.1455052	0.6373343	1.173447**
	(0.56)	(1.57)	(2.04)
lagprice	-0.018982*	-0.0359825***	-0.0438772***
	(-4.35)	(-4.96)	(-5.16)
islam50	-0.2808615	-1.26629*	- see note
	(-0.51)	(-1.92)	
priceislam	-0.0189072	-0.0133621	-0.0115507
	(-1.52)	(-1.27)	(-1.2)
constant	0.4947887	-2.663079	-8.462887*
	(0.30)	(-1.01)	(-1.92)
		-	-
Observations	1158	1158	1158
Countries	58	58	58
Years	1980-2004	1980-2004	1980-2004
Adjusted R^2	0.6020	-	-
Adjusted Overall	-	0.5719	0.3426

Hausman Test: Chi2 537.42 Reject the Null Hypothesis of Random Effects (use Fixed Effects)

*** Indicates statistical significance at 1% level
** Indicates statistical significance at 5% level
* Indicates statistical significance at 10% level
# Please see appendix for Hausman Test
Note - Dummy variables are dropped in the Fixed Effects model becaue this estimator is already taking into account heterogeneity among nations. That is, adding a dummy variable that differentiates among nations is redundant and hence, its dropped.

Civil Rights and Islam

In this case, the results of the pooled, random and fixed effects show that compared to other developing countries, civil rights in Islamic nations will tend to be *less* affected by international oil price increases. These results agree with the Kraay *et al* (2006) hypothesis that one cannot only use one measure for governance. The results of pooled, random effects and fixed effects estimations of this model are reported in table 8.

Table 8 : Islam
(Dependent Variable is Civil Rights)
(1 to 7, 1 is most civil rights)

Variable	Pooled (t st)	Random Effects (z st)	Fixed Effects (t st)
%Urban Population	0.0027559	0.0011937	-0.0169684*
	(1.17)	(0.31)	(-1.79)
Opennes Economy	-0.1290098*	-0.3039668***	-0.8635569***
	(-1.69)	(-2.63)	(-5.27)
lagcr	0.7188061***	0.4267548***	0.1612938***
	(35.15)	(16.83)	(5.81)
laglncurrent	-0.1727767***	-0.2687499***	-0.1084178
	(-2.84)	(-2.92)	(-0.82)
lagprice	0.004701**	0.0053689***	0.0053614***
	(2.55)	(3.24)	(2.74)
islam50	0.2831402**	0.3745003**	-[see note]
	(2.23)	(2..52)	
priceislam	-0.0024403	-0.0024252	-0.0017783
	(-0.85)	(-0.98)	(-0.8)
constant	2.099242***	4.268396***	5.160824***
	(4.29)	(6.9)	(5.49)
		-	-
Observations	1158	1158	1158
Countries	58	58	58
Years	1980-2004	1980-2004	1980-2004
Adjusted R^2	0.5975	-	-
Adjusted Overall	-	0.5637	0.2270

Hausman Test: Chi2 647.25 Reject the Null Hypothesis of Random Effects (use Fixed Effects)

*** Indicates statistical significance at 1% level
** Indicates statistical significance at 5% level
* Indicates statistical significance at 10% level
# Please see appendix for Hausman Test
Note - Dummy variables are dropped in the Fixed Effects model becaue this estimator is already taking into account heterogeneity among nations. That is, adding a dummy variable that differentiates among nations is redundant and hence, its dropped.

Additionally a Hausman test between the fixed and random effects estimations indicate that a fixed effects model best explains this model, allowing for time

independent effects and accounting for heterogeneity among nations. The coefficients on the fixed effects estimation show that after five years a dollar increase in oil prices will lead to a 0.0054 loss on the civil rights scale for non-Islamic nations while Islamic nations will only have a loss of 0.0036. It is important to note that although the coefficient on Islam and international oil prices is not significant, the other coefficients in the fixed effects model are generally statistically significant and in accordance to my theoretical framework.

6.4 Oil Wealth and Democracy: Africa and the Middle East

Regression 4:

$$\mathbf{G}overnance_{it} = \beta_0 + \beta_1 urbpop_{it} + \beta_2 open_{it} + \beta_3 laggovernance_{it-5} + \beta_4 lag\ln current_{it-5} + \beta_5 lagprice_{it-5} + \beta_6 middleeast_i + \beta_7 africa_i + \beta_8 price_{it-5} ME_i + \beta_9 price_{it-5} AF_i$$

where $middleeast_i$ takes the value '1'if country i is in the Middle East and '0' otherwise

$africa_i$ takes the value '1' if country i is in Africa and '0' otherwise

B_7 and B_8 are the differences between the 5 year lagged oil price slopes for the respective groups and countries not belonging to these regions.

Regression 4 measures how governance responds to historical oil price increases in different regions.

Democracy and Regional Differences

The results of the pooled, random and fixed effects seem to show that, compared to other developing countries, democracy in African and Middle Eastern countries is more affected by historical oil price increases. For all models the lagged international oil prices and regional specific interactions are generally aligned with theory and with the expected signs for coefficients. The results of pooled, random effects and fixed effects estimations of this model are reported in table 9.

The results from these methods agree with the theoretical framework in section 3 that suggests that countries with autocratic regimes will tend to use oil wealth to further invest in their repressive apparatuses. Additionally, a Hausman test between the fixed and random effects estimations indicates that a fixed effects model best explains this model. This allows for time independent effects for all countries and accounts for heterogeneity among nations.

Table 9 : Regional Differences
(Dependent Variable is Polity2)
(-10 autocracy to 10 democracy)

Variable	Pooled (t st)	Random Effects (z st)	Fixed Effects (t st)
%Urban Population	0.022654**	0.017021	-0.0095859
	(2.27)	(1.02)	(-0.23)
Opennes Economy	0.2142578	0.7222428	3.15199**
	(0.64)	(1.40)	(4.48)
lagpolity2	0.7283231***	0.4467382***	0.2315798***
	(37.76)	(18.68)	(8.92)
laglncurrent	-0.2901864	0.1566638	1.17168**
	(-1.09)	(0.38)	(2.04)
lagprice	-0.0131469	-0.0336047***	-0.0409223***
	(-1.35)	(-3.85)	(-4.38)
priceME	-0.0350466*	-0.0259615*	-0.0250063*
	(-1.93)	(-1.68)	-1.77
priceAF	-0.0228443*	-0.0139833	-0.0095291
	(-1.73)	(-1.24)	(-0.93)
middleeast	0.5712858	-0.222543	- see note
	(0.71)	(-0.23)	-
africa	-0.0979747	-0.9575981	-
	(-0.17)	(-1.32)	-
constant	3.166736*	0.4605882	-8.200849*
	1.71	(0.16)	(-1.86)
Observations	1158	1158	1158
Countries	58	58	58
Years	1980-2004	1980-2004	1980-2004
Adjusted R^2	0.6015	-	-
Adjusted Overall	-	0.5736	0.3416

Hausman Test: Chi2 546.29 Reject the Null of Random Effects (use Fixed Effects)

*** Indicates statistical significance at 1% level
** Indicates statistical significance at 5% level
* Indicates statistical significance at 10% level
# Please see appendix for Hausman Test
Note - Dummy variables are dropped in the Fixed Effects model becaue this estimator is already taking into account heterogeneity among nations. That is, adding a dummy variable that differentiates among nations is redundant and hence, its dropped.

The coefficients on the fixed effects estimation show that a dollar increase in international oil prices years ago will cause a 0.04 loss on the democracy scale for nations

outside Africa and the Middle East, being an African country will cause a loss of 0.058 in the democracy scale (not statistically significant) and being a Middle Eastern country will cause a loss of 0.065 in the democracy scale (statistically significant at the 10% level).

Civil Rights and Regional Differences

In this case, the results of the pooled, random and fixed effects show that compared to other developing countries, civil rights in Africa and the Middle East will be more affected by historical oil price increases. The results of pooled, random effects and fixed effects estimations of this model are reported in table 10.

Table 10 : Regional Differences
(Dependent Variable is Civil Righs)
(1 to 7 , 1 is most civil rights)

Variable	Pooled (t st)	Random Effects (z st)	Fixed Effects (t st)
%Urban Population	0.0009175	-0.0009613	-0.0173266*
	(0.4)	(-0.25)	(-1.84)
Opennes Economy	-0.1521699**	-0.3395019***	-0.8890225***
	(-1.96)	(-2.88)	(-5.41)
lagcr	0.7229123***	0.4202707***	0.1570707***
	(35.29)	(16.51)	(5.67)
laglncurrent	-0.1382411**	-0.2203903**	-1.1301009
	(-2.22)	(-2.33)	(-0.98)
lagprice	0.0013177	0.0016685	0.0008855
	(0.59)	(0.84)	(0.41)
priceME	0.0008811	0.0007834	0.0016626
	(0.21)	(0.22)	(0.51)
priceAF	0.0053351*	0.0064461	0.0075808***
	(1.74)	(2.46)	(3.22)
middleeast	0.1503684	0.2447092	- see note
	(0.81)	(1.12)	-
africa	-0.1647042	-0.0923514	-
	(-1.2)	(-0.57)	-
constant	2.078552	4.19569***	5.8442943***
	2.078552	(6.24)	(5.75)
Observations	1158	1158	1158
Countries	58	58	58
Years	1980-2004	1980-2004	1980-2004
Adjusted R^2	0.5671	-	-
Adjusted Overall	-	0.5324	0.2249

Hausman Test: Chi2 684.14 Reject the Null of Random Effects (use Fixed Effects)

*** Indicates statistical significance at 1% level

** Indicates statistical significance at 5% level

* Indicates statistical significance at 10% level

Please see appendix for Hausman Test

Note - Dummy variables are dropped in the Fixed Effects model becaue this estimator is already taking into account heterogeneity among nations. That is, adding a dummy variable that differentiates among nations is redundant and hence, its dropped.

Additionally a Hausman test between the fixed and random effects estimations indicate that a fixed effects model best explains this model, allowing for time independent effects and accounting for heterogeneity among nations. The coefficients on the fixed effects estimation show that after five years a dollar increase in oil prices will lead to a 0.00088 loss on the civil rights scale for countries outside Africa and the Middles East (not statistically significant), African countries will have a loss of 0.0084 (statistically significant at the 1% level) and Middle Eastern countries will have a loss of 0.0025 in the civil rights scales (not statistically significant). It is important to note that although the Middle Easte and price interaction term does not offer any explanatory power, the Africa and price term does and the rest of the control variables are aligned with the theoretical framework from part 3. That is, these results support the hypothesis that oil poor autocratic governments will tend to use new oil wealth in ways that reduce good governance scores in their countries.

7. Instrumental Variable Estimation: Results and Analysis

Following are the equations I used to investigate the hypothesis of joint causality (endogeneity) between oil prices and democracy (political instability)[14]. Given the potential for simultaneous causation in the previous analysis I use a three stage least squares method to estimate the impact of oil price increases on democracy through instrumental variable analysis.

Using a Grange Causality test I found that oil prices granger cause democracy in the previous model. With a chi squared of 24.77, I reject the null hypothesis that these

[14] The Polity2 score can be used as a measure for political instability because it measures political transitions inside countries. Political transitions can be caused by the introduction of elections, civil wars or by other means.

two variables do not granger cause each other at all significance levels. [15] Furthermore, I introduce a one year lag to oil prices and still reject the null hypothesis that last years oil prices do not granger cause democracy this year with a chi squared of 14.54 at all significance levels. Additionally, I also find that political instability in a current year measured by a Polity2 score granger causes oil prices with a chi squared of 4.25 at the 5% and 10% significance levels. Hence, this provides significant evidence to support the joint causality hypothesis and the use of instrumental variable analysis in determining the impact oil prices on democracy. Very generally, the results from the 3SLS fixed effects IV analysis are more consistent and aligned with theory than the previous estimations. The coefficient on oil prices has a greater impact on democracy scores (political instability), all the signs on the control variables are aligned with theory and the oil price coefficient only becomes more robust as we add explanatory power to the model.

7.1 Oil Prices and Natural Disasters: Basic Model Results

Regression 5:

$$Democracy_{it} = \beta_0 + \beta_1 urbpop_{it} + \beta_2 open_{it} + \beta_3 lagdemocracy_{it-5} + \beta_4 lag\ln current_{it-5} + \beta_5 oilprice_{it}$$
$$Oilprice = \beta_6 + \beta_7 urpop_{it} + \beta_8 open_{it} + \beta_9 \ln current_{it} + \beta_{10} ndisaster_{it}$$

where $ndisaster_{it}$ is a country's total out of region natural disaster in a particular year.

As suggested by my conceptual model developed in section three, the expected sign on $ß_{10}$ is positive. An out of region natural disaster will increase international oil prices. Additionally, the fact that the equation is exactly identified (1 troublesome variable, 1 instrument), that the instrument and the instrumented oil price coefficients have the expected signs and that the instrument $ndisaster_{it}$ is highly correlated with the

[15] Please See appendix for the granger causality test.

endogenous variable (adjusted R^2 0.4211) further supports the instruments validity. Results from 3SLS and 3SLS fixed effects are presented in table 11.

Table 11: Basic Instrumental Variable Analysis
(Dependent Variable is Polity2 and OilPrice)
(-10 autocracy to 10 Democracy)

Variable		3 SLS (z st)	3 SLS Fixed (z st)
3 Stage	**Polity2**		
urbpop		0.0201972*	0.1052866*
		(1.87)	(1.87)
open		0.1564381	2.929799 **
		(0.45)	(3.35)
lagpolity2		0.7424826***	0.2519632***
		(37.02)	(9.23)
laglncurrent		-.1358661	3.014126**
		(-0.47)	(2.56)
oilprice		-0.2681907**	-0.2785029*
		(-2.25)	(-1.36)
cons		8.679975*	-27.98175 *
		(1.94)	(-1.66)
1st Stage	**Oil Price**		
urbpop		0.0108836	0.0096312
		(0.67)	(0.6)
open		0.1703106	0.1565784
		(0.3)	(0.28)
lncurrent		-0.6287087	-0.5926733*
		(-1.53)	(-1.45)
ndisaster		3.00e-07***	2.87e-07 ***
		(4.78)	(4.76)
cons		32.1085***	31.91665***
		(12.08)	(12.05)
Observations		1158	1158
Countries		58	58
Years		1980-2004	1980-2004
Adjusted R2 1st		0.2110	0.4211
Adjusted R^{2} 3rd		0.5339	0.6957

Hausman Test: Chi2 807.40 Reject the Null hypothesis of 3SLS (use Fixed Effects)

NOTE: Three Stage Least Square Regression
*** Indicates statistical significance at 1% level
** Indicates statistical significance at 5% level
* Indicates statistical significance at 10% level
# Please see appendix for Hausman Test

The results of 3SLS and 3SLS fixed effects are generally aligned with theory. An increase in oil prices will reduce a country's democracy score in the current year and all the coefficients have the signs that I expected from my conceptual model. According to the three-stage least squares coefficient for oil prices, a $1 increase in prices in the current year will cause a 0.279 decrease in the polity2 score of that year. On the first-stage least squares regression, an out of region natural disaster will increase oil prices and

the coefficient is small due to the magnitude of the measurements. Oil prices are measured in dollars while out of region natural disasters reach millions of dollars.

Additionally, a Hausman Test between 3SLS and 3SLS fixed effects models indicate that this model is best explained by fixed effects estimation. Fixed effects estimation not only allows for independent effects for all indivuals and accounts for heterogeneity among nations but also reduces the peril that omitted relevant variables might bias the instrument in my reports.

7.2 Oil Prices and Natural Disasters: Oil Dependency

Regression 6

$$Democracy_{it} = \beta_0 + \beta_1 urbpop_{it} + \beta_2 open_{it} + \beta_3 lagdemocracy_{it-5} + \beta_4 lag\ln current_{it-5} + \beta_5 oilprice_{it} + B_6 oildependent_{it} + B_7 priceodependent_{it}$$

$$Oilprice = \beta_8 + \beta_9 urpop_{it} + \beta_{10} open_{it} + \beta_{11}\ln current_{it} + \beta_{12} ndisaster_{it}$$

where $oildependent_i$ takes the value '1' if country is an oil dependent country and '0'otherwise

$oildependent_i * price_{it}$ is an interaction term that investigates the relationship between oil price increases and governance in oil dependent states.

The results of 3SLS and 3SLS fixed effects seem to support Friedman's hypothesis that an oil dependent country's democracy score will be more affected by oil price increases than a non oil dependent country. An increase in oil prices will affect oil dependent government while it will have no effect on non-oil dependent countries, which makes intuitive sense. The previous models had suggested that oil dependent countries were less affected by oil price increases than poor oil countries, supporting the hypothesis put forth by other researchers that oil poor countries would invest more in repressive apparatuses than more established oil nations. However, as has been shown by Ramsay

(2006), endogeneity might cause bias amongst explanatory variables, and, the fact that the significance on our oil coefficient increases by the addition of explanatory variables only suggests its explanatory power in the model. The results of 3SLS and 3SLS fixed effects are reported in table 12.

Table 12: Oil Dependent Variable Analysis

(Dependent Variable is Polity2 and OilPrice)

Polity2	**(-10 autocracy to 10 Democracy)**	
Variable	**3SLS (z st)**	**3SLS Fixed (z st)**
urbpop	0.0299791**	0.29696*
	(2.85)	(1.94)
open	-0.4020985*	-3.231524
	(-1.17)	(-0.59)
lagpolity2	0.7085973***	0.1857203**
	(35.29)	(2.24)
laglncurrent	0.1574392	5.889593**
	(0.56)	(2.73)
oilprice	-0.2084463*	0.3496098
	(-1.79)	0.6
priceoildependent	-0.0748821***	-0.8245125*
	(-7.01)	(-1.81)
oildependent	-0.148821***	see note
	(-5.3)	
cons	5.299109*	-53.49049
	(1.21)	(-0.76)
Oil Price		
urbpop	0.0108423	0.0097155
	(0.67)	(0.6)
open	0.0929214	0.1669519
	(0.17)	(0.3)
lncurrent	-0.6155353*	-0.5957568*
	(-1.51)	(-1.45)
ndisaster	0.0000003***	2.88e-07***
	(4.78)	(4.53)
cons	32.05894***	31.92923***
	(12.15)	(12)
Observations	1158	1158
Countries	58	58
Years	1980-2004	1980-2004
Adjusted R2 1st	0.2110	0.4211
Adjusted R^2	0.5635	0.4960

Hausman Test: Chi2 707.82 Reject the Null hypothesis of 3SLS (use Fixed Effects)

*** Indicates statistical significance at 1% level

** Indicates statistical significance at 5% level

* Indicates statistical significance at 10% level

Please see appendix for Hausman Test

Note - Dummy variables are dropped in the Fixed Effects model becaue this estimator is already taking into account heterogeneity among nations. That is, adding a dummy variable that differentiates among nations is redundant and hence, its dropped.

Additionally, a Hausman Test between 3SLS and 3SLS fixed effects models indicate that this model is best explained by fixed effects estimation. Fixed effects estimation not only allows for independent effects for all indivuals and accounts for

heterogeneity among nations but also reduces the peril that omitted relevant variables might bias the instrument in my reports.

7.3 Oil Prices and Natural Disasters: Islam

Regression 7:

$$\mathbf{G}overnance_{it} = \beta_0 + \beta_1 urbpop_{it} + \beta_2 open_{it} + \beta_3 laggovernance_{it-5} + \beta_4 lag\ln current_{it-5} + \beta_5 price_{it} \beta_6 islam50_i + \beta_7 (islam50_i * lagprice_{it})$$

$$Oilprice = \beta_8 + \beta_9 urpop_{it} + \beta_{10} open_{it} + \beta_{11}\ln current_{it} + \beta_{12} ndisaster_{it}$$

where $islam50_i$ takes the value of '1' if country i has 50% or more of its population following Islam and '0' otherwise

$islam50_i$*$lagprice_{it}$ is an interaction term that studies the relationship between current oil price increases and governance in predominantly Islamic nations.

Democracy and Islam

The results of the 3SLS and 3SLS fixed effects seem to show that, compared to other developing countries, democracy in Islamic nations is more affected by international oil price increases. For both models international oil prices and Islam interaction term are negative, aligned with theory and statistically significant. The addition of this explanatory variable confirms the robustness of the results since both the impact on democracy and the statistical significance of the *oilprice* coefficient increase. The results of this model are reported in table 13.

The results from these models agree with the theoretical framework in section 3 that suggest that predominantly Islamic nations are not hospitable to democracy due to their resistance to change and to the value that they place in hierarchical relationships. The results, which were supported by the previous models now contain validity due to the

impact and the statistical significance of the coefficients. More importantly, this specification has reduced bias since all the signs on my control variables and their signs are aligned with theory.

Table 13: Islam Instrumental Variable Analysis
(Dependent Variable is Polity2 and OilPrice)

Polity2	**(-10 autocracy to 10 Democracy)**	
Variable	**3SLS (z st)**	**3SLS Fixed (z st)**
urbpop	0.0064692	0.0631083*
	(0.66)	(1.26)
open	0.2188908	5.092793***
	(0.67)	(3.14)
lagpolity2	0.7043183***	0.2721386***
	(36.6)	(6.82)
laglncurrent	0.1836711	1.513113**
	(0.75)	(2.35)
oilprice	-0.0483356**	0.7825262***
	(-2.88)	(3.58)
islam50	-2.155071***	see note
	(-7.65)	
priceislam	-1.8906449**	-2.409446***
	(-2.21)	(-3.89)
cons	1.321468	23.85044*
	(0.81)	(1.93)
Oil Price		
urbpop	0.0097799	0.0096837
	(0.6)	(0.6)
open	0.1620221	0.1614091
	(0.29)	(0.29)
lncurrent	-0.5965811*	-0.5934246*
	(-1.45)	(-1.44)
ndisaster	0.000000289***	0.000000289***
	(4.56)	(4.54)
cons	31.93244***	31.91405***
	(12)	(11.99)
Observations	1158	1158
Countries	58	58
Years	1980-2004	1980-2004
Adjusted R2 1st	0.2010	0.4210
Adjusted R^2	0.6144	0.8610

Hausman Test: Chi2 803.05 Reject the Null hypothesis of 3SLS (use Fixed Effects)

*** Indicates statistical significance at 1% level
** Indicates statistical significance at 5% level
* Indicates statistical significance at 10% level
# Please see appendix for Hausman Test
Note - Dummy variables are dropped in the Fixed Effects model becaue this estimator is already taking into account heterogeneity among nations. That is, adding a dummy variable that differentiates among nations is redundant and hence, its dropped.

The coefficient on the fixed effects estimation suggests that a dollar increase in current oil prices will have a 0.782 increase on the democracy scale for non-Islamic nations while predominantly Islamic nations will have a loss of 1.26 on the democracy

scale. Our instrument is still significant in three stage least squares and a Hausman Test between 3SLS and 3SLS fixed effects tells us that fixed effects estimation best explains this model allowing for heterogeneity across nations and reducing the peril of omitted variable bias.

7.4 Oil Prices and Natural Disasters: Democracy and Regional Differences

Regression 8

$$\mathbf{G}overnance_{it} = \beta_0 + \beta_1 urbpop_{it} + \beta_2 open_{it} + \beta_3 laggovernance_{it-5} + \beta_4 lag\ln current_{it-5} + \beta_5 lagprice_{it-5} + \beta_6 middleeast_i + \beta_7 africa_i + \beta_8 price_{it-5} ME_i + \beta_9 price_{it-5} AF_i$$

$$Oilprice = \beta_{10} + \beta_{11} urpop_{it} + \beta_{12} open_{it} + \beta_{13} \ln current_{it} + \beta_{14} ndisaster_{it}$$

where $middleeast_i$ takes the value '1'if country i is in the Middle East and '0' otherwise

$africa_i$ takes the value '1' if country i is in Africa and '0' otherwise

Democracy and Regional Differences

The results of the 3SLS and 3SLS fixed effects support the hypothesis that, compared to other countries, democracy in African and Middle Eastern countries is more affected by international oil price changes than other countries. For both models, international oil prices and regional specific interactions are all aligned with theory and with the expected signs on the coefficients. The results of 3SLS and 3SLS fixed effects effects estimations of this model are reported in table 14.

The results of these models agree with those in section 6 and suggest that countries with autocratic regimes will tend to use oil wealth to further invest in their repressive apparatuses. However, with the IV 3SLS analysis the coefficients on our interactions have a greater impact on democracy and are statistically significant. Additionally, a Hausman test between 3SLS and 3SLS fixed effects indicates that a fixed

effects estimation best explains this model. This allows for time independent effects and heterogeneity across nations and reduces the peril of omitted variable bias in our model.

Table 14: Regional Differences Instrumental Variable Analysis
(Dependent Variable is Polity2 and OilPrice)

	Polity2	**(-10 autocracy to 10 Democracy**
Variable	**3SLS (z st)**	**3SLS Fixed (z st)**
urbpop	-0.003003	-0.3536816**
	(-0.08)	(-2.09)
open	5.448125*	21.10089**
	(1.42)	(2.55)
lagpolity2	0.9228048**	0.5296335***
	(2.94)	(3.98)
laglncurrent	0.5448095	5.415844**
	(0.84)	(2.73)
oilprice	6.276632**	3.173327***
	(2.12)	(4.17)
priceME	-17.61041**	-11.3287***
	(-2.1)	(-4)
priceAF	-9.727027**	-4.140406***
	(-2.17)	(-4.52)
middleeast	494.281**	see note
	(2.07)	
africa	274.013**	see note
	(2.13)	
cons	-183.0101**	-161.5398***
	(-2.04)	(-3.39)
Oil Price		
urbpop	0.0096535	0.0096498
	(0.59)	(0.59)
open	0.156865	0.158775
	(0.28)	(0.28)
lncurrent	-0.5930827*	-0.593089*
	(-1.44)	(-1.44)
ndisaster	0.000000288***	0.000000288***
	(4.54)	(4.54)
cons	31.91639***	31.91526***
	(11.99)	(11.99)
Observations	1158	1158
Countries	58	58
Years	1980-2004	1980-2004
Adjusted R2 1st	0.2110	0.4211
Adjusted R^2	0.4792	0.6662

Hausman Test: Chi2 287.78 Reject the Null hypothesis of 3SLS (use Fixed Effects)

*** Indicates statistical significance at 1% level
** Indicates statistical significance at 5% level
* Indicates statistical significance at 10% level
# Please see appendix for Hausman Test
Note - Dummy variables are dropped in the Fixed Effects model becaue this estimator is already taking into account heterogeneity among nations. That is, adding a dummy variable that differentiates among nations is redundant and hence, its dropped.

The coefficients on the 3SLS fixed effects estimation suggest that a dollar increase in current international oil prices will cause a 3.17 increase on the democracy scale for nations outside Africa and the Middle East, being an African will cause a loss of

0.967 on the democracy scale and being a Middle Eastern country will cause a loss of 8.16 on the democracy scale.

A note on residuals

In all the models presented in these sections, Gambia, Haiti, Pakistan and Sudan consistently produce the largest difference in residuals, indicating that my models have lacked the explanatory power to account for changes in democracy and civil rights for these countries. Haiti and Pakistan dramatically increased their democracy and civil right scores in the late 80's and early 90's due to the presence of historically free democratic elections[16] while Sudan's and Gambia's scores dramatically decreased due to the presence of violent conflict.[17] These countries have experienced events that have dramatically changed their democracy and civil rights scores and therefore, these results are but one more example of the many things that have to be taken into account when trying to model an accurate estimate for governance. Finally, when comparing residuals by country code one can see that in general, my models are much better at explaining variation in democratic ruling than in the level of civil rights. Once again, this is another indicator of how there are many more factors that one has to account for when attempting to estimate an accurate measure for governance. The country code and the residuals can be seen in the appendix.

[16] Haiti held its first free democratic elections in 1990 when Jean Bertrand Aristide was elected president. Pakistan held its first free democratic elections in 1988 after the death of General Zia with which the Zia Dictatorship era came to an end and a interim government set the stage for democratic elections. Source : www.wikipedia.com

[17] In 1988 the Mujahadeen created massive human rights abuses that created a famine in Sudan in which 250,000 people lost their lives and in 1994 Gambia experienced a coup d'etat in which the Armed Forces took control of the country. Political instability in these countries still lasts to our year. Source : www.wikipedia.com

7. Conclusions and Further Research

Using panel data analysis with data from 1980 to 2004 from 58 countries in five different regions, I have found significant evidence to support the hypothesis that oil wealth, measured by international oil price increases will have a weakening effect on democracy and the quality of governance.

In this paper I addressed the problem of simultaneous causation that has caused identifying the affects of changes in oil prices on democracy and governance difficult. Through the use of 3SLS fixed effects instrumental variable approach, this paper has attempted to solve the problem of joint causality while at the same time reducing the peril of omitted variable bias in the estimations. The instrumental variable approach examines how increases in international oil prices (an increase in oil wealth) increases affect the levels of democracy and civil rights in oil and non-oil dependent countries, countries which are predominantly Islamic and countries located in Africa and the Middle East. This paper found that international oil price increases will have a more negative relationship on democracy and governance in oil dependent countries, Islamic countries and countries located in Africa and the Middle East than in other developing countries.

Nonetheless, this paper did not study the relationship between different indicators for governance and different types of oil wealth. As Kraay *et al* (2006) stated there is not one indicator or proxy to accurately depict quality of governance. Additionally, oil wealth can be measured in ways that could give us better measure for how rich a country is because of oil. Some examples of these measures are would be oil exports and oil reserves for any country at any period in time.

Finally, I firmly believe that future studies should focus in using as many indicators of governance as possible to study the hypothesis discussed in this paper.

Additionally, and as mentioned in my *note on residuals*, future research should take into account shocks to the quality of governance in a country. Government changes or the rising of armed violence also cause dramatic changes in the quality of governance that needs to be accounted for.

Finally, and in a very general level, this paper has shown that the relationship between oil wealth and governance in developing countries is a negative one. Important steps have to be taken in order to persuade governments to maximize the use of their oil revenues in order to increase the quality of life and governance in their nations.

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Appendix

Countries Used in This Study (In Panel Code Order, Used to Examine Residuals)

*Indicates Oil Dependent Country (According to the Joint Oil Data Initiative)

^Indicates Country with Islam as Predominant Religion

1	Algeria*^	41	Oman*
2	Argentina*	42	Pakistan^
3	Bangladesh	43	Panama
4	Botswana	44	Paraguay
5	Brazil*	45	Peu
6	Cameroon	46	Saudi Arabia*^
7	Chad	47	Senegal^
8	Chile	48	South Africa
9	China*	49	Sri Lanka^
10	Colombia*	50	Sudan^
11	Congo DR	51	Syria*^
12	Congo Rep	52	Thailand^
13	Costa Rica	53	Uganda^
14	Ivory Coast^	54	UAE*^
15	Dominican Republic	55	Uruguay
16	Ecuador*	56	Venezuela*
17	Egypt*^	57	Zambia
18	Salvador	58	Zimbabwe
19	Ethiopia^		
20	Gabon		
21	Gambia^		
22	Ghana		
23	Guatemala		
24	Guyana		
25	Haiti		
26	Honduras		
27	India*		
28	Indonesia*^		
29	Iran*^		
30	Israel		
31	Jordan^		
32	Kenya		
33	Kuwait*^		
34	Lesotho		
35	Mexico*		
36	Mongolia		
37	Morocco		
38	Mozambique		
39	Nicaragua		
40	Nigeria*^		

Regression 1:

Polity2 Dependent Variable

```
xtreg polity2 urbpop open lagpolity2 laglncurrent lagprice,fe

Fixed-effects (within) regression           Number of obs      =      1158
Group variable (i): code                    Number of groups   =        58

R-sq:  within  = 0.2707                     Obs per group: min =        19
       between = 0.4004                                    avg =      20.0
       overall = 0.3321                                    max =        20

                                            F(5,1095)          =     81.30
corr(u_i, Xb)  = 0.2443                     Prob > F           =    0.0000

------------------------------------------------------------------------------
     polity2 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      urbpop |  -.0076768   .0408117    -0.19   0.851    -.0877548    .0724012
        open |   2.998675   .6988559     4.29   0.000     1.627427    4.369923
  lagpolity2 |   .2288968   .0258816     8.84   0.000     .1781138    .2796798
laglncurrent |   1.168415   .5751802     2.03   0.042     .0398346    2.296994
   lagprice  |   -.049125   .00728      -6.75   0.000    -.0634093   -.0348407
       _cons |  -8.159836   4.403741    -1.85   0.064    -16.80056    .4808876
-------------+----------------------------------------------------------------
     sigma_u |  4.790822
     sigma_e |  3.3780065
         rho |  .66792888   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(57, 1095) =    15.02          Prob > F = 0.0000
```

Civil Rights Dependent Variable

```
xtreg cr urbpop open lagcr laglncurrent lagprice, fe

Fixed-effects (within) regression           Number of obs      =      1158
Group variable (i): code                    Number of groups   =        58

R-sq:  within  = 0.1377                     Obs per group: min =        19
       between = 0.2637                                    avg =      20.0
       overall = 0.2277                                    max =        20

                                            F(5,1095)          =     34.97
corr(u_i, Xb)  = -0.0044                    Prob > F           =    0.0000

------------------------------------------------------------------------------
          cr |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      urbpop |  -.0176295   .0094489    -1.87   0.062    -.0361696    .0009105
        open |  -.8727957   .1634253    -5.34   0.000    -1.193458   -.5521335
       lagcr |   .1610091   .027767      5.80   0.000     .1065265    .215491
laglncurrent |  -.1093955   .1327802    -0.82   0.410    -.3699278    .1511369
   lagprice  |   .0045592   .0016749     2.72   0.007     .0012728    .0078455
       _cons |   5.662658   1.019155     5.56   0.000     3.662941    7.662374
-------------+----------------------------------------------------------------
     sigma_u |  1.1292516
     sigma_e |  .78105391
         rho |  .67641225   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(57, 1095) =    14.93          Prob > F = 0.0000
```

Hausman Test:

Test: Ho: difference in coefficients not systematic

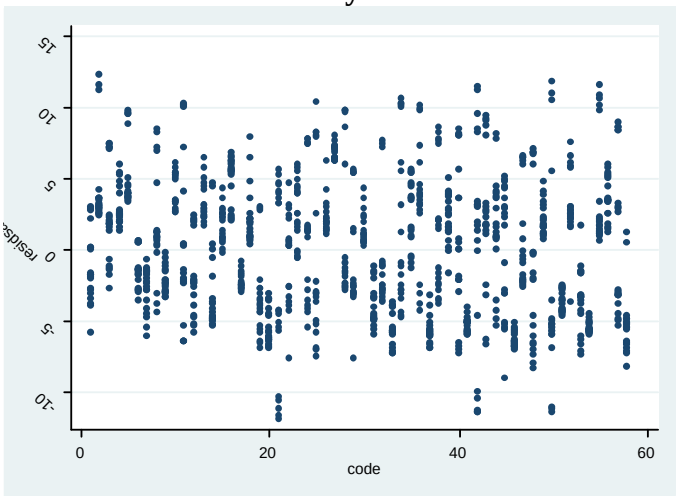
```
chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
        =     568.78
Prob>chi2 =     0.0000
```

Test: Ho: difference in coefficients not systematic

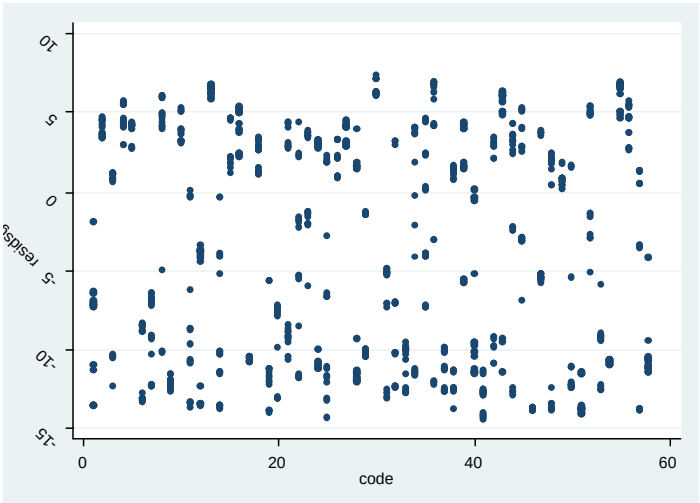
```
chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
        =     671.11
Prob>chi2 =     0.0000
```

Residuals by Country Code

Polity2



Civil Rights



Regression 2:
Polity2

```
. xtreg polity2 urbpop open lagpolity2 laglncurrent lagprice oildependent
priceodependent ,fe

Fixed-effects (within) regression           Number of obs      =      1158
Group variable (i): code                    Number of groups   =        58

R-sq:  within  = 0.2795                     Obs per group: min =        19
       between = 0.2875                                    avg =      20.0
       overall = 0.2721                                    max =        20

                                            F(6,1094)          =     70.74
corr(u_i, Xb)  = 0.1534                     Prob > F           =    0.0000

------------------------------------------------------------------------------
     polity2 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      urbpop |   -.0045704   .0405925    -0.11   0.910    -.0842183    .0750774
        open |    2.680711   .7003766     3.83   0.000     1.306477    4.054944
  lagpolity2 |    .2177251   .0259179     8.40   0.000     .1668708    .2685794
laglncurrent |    1.164193   .5719654     2.04   0.042     .0419194    2.286466
   lagprice  |   -.0626361   .0081292    -7.71   0.000    -.0785866   -.0466856
oildependent |  (dropped)
priceodepe~t |   .0364405   .0099741     3.65   0.000     .0168701    .0560109
       _cons |   -8.038699   4.379244    -1.84   0.067    -16.63137    .5539676
-------------+----------------------------------------------------------------
     sigma_u |  5.0224418
     sigma_e |  3.3591192
         rho |   .69093088   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(57, 1094) =    14.01                 Prob > F = 0.0000
```

Civil Rights

```
. xtreg cr urbpop open lagcr laglncurrent lagprice oildependent priceodependent, fe

Fixed-effects (within) regression           Number of obs      =      1158
Group variable (i): code                    Number of groups   =        58

R-sq:  within  = 0.1723                     Obs per group: min =        19
       between = 0.0866                                    avg =      20.0
       overall = 0.1009                                    max =        20

                                            F(6,1094)          =     37.96
corr(u_i, Xb)  = -0.2506                    Prob > F           =    0.0000

------------------------------------------------------------------------------
          cr |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      urbpop |   -.0196138   .0092663    -2.12   0.035    -.0377955   -.0014321
        open |   -.7631773   .1610038    -4.74   0.000    -1.079088   -.447266
       lagcr |   .1240151   .0277609     4.47   0.000     .0695444    .1784857
laglncurrent |   -.0910117   .1301766    -0.70   0.485    -.3464357    .1644123
   lagprice  |    .0102851   .0018472     5.57   0.000     .0066603    .0139095
oildependent |  (dropped)
priceodepe~t |   -.015571   .0023024    -6.76   0.000    -.0200887   -.0110534
       _cons |   5.692937   .9989628     5.70   0.000     3.732837    7.653036
-------------+----------------------------------------------------------------
     sigma_u |  1.3082371
     sigma_e |  .76557175
         rho |   .74490597   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(57, 1094) =    13.86                 Prob > F = 0.0000
```

Hausman Test:

Test: Ho: difference in coefficients not systematic

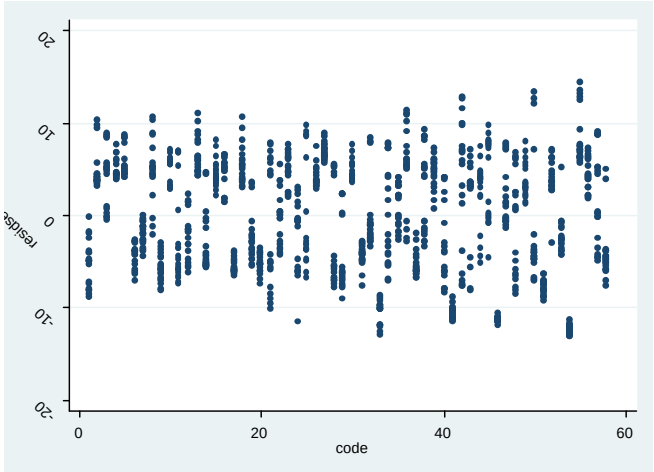
```
chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
        =     537.54
Prob>chi2 =     0.0000
```

Test: Ho: difference in coefficients not systematic

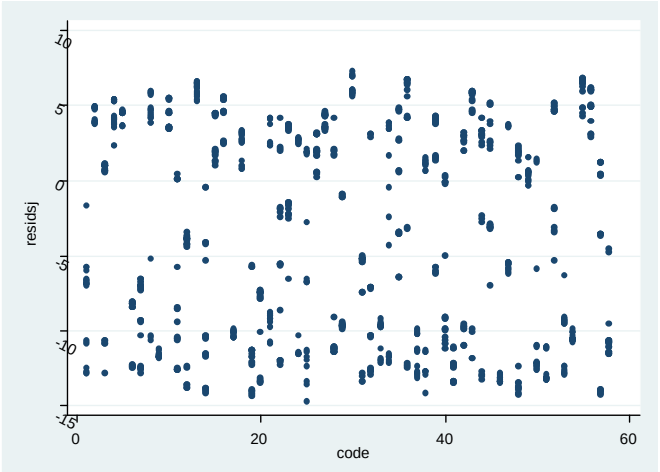
```
chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
        =     682.82
Prob>chi2 =     0.0000
```

Residuals By Country Code

Polity2



Civil Rights



Regression 3:

Polity2

```
xtreg polity2 urbpop open lagpolity2 laglncurrent lagprice islam50 priceislam, fe

Fixed-effects (within) regression           Number of obs      =      1158
Group variable (i): code                    Number of groups   =        58

R-sq:  within  = 0.2717                     Obs per group: min =        19
       between = 0.4126                                    avg =      20.0
       overall = 0.3426                                    max =        20

                                            F(6,1094)          =     68.02
corr(u_i, Xb)  = 0.2477                     Prob > F           =    0.0000

------------------------------------------------------------------------------
     polity2 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      urbpop |  -.0036169   .0409448    -0.09   0.930    -.083956    .0767223
        open |   3.052642   .7001749     4.36   0.000    1.678805    4.426479
  lagpolity2 |   .2299524   .0258915     8.88   0.000    .1791498    .2807551
laglncurrent |   1.173447   .5750828     2.04   0.042    .0450575    2.301837
   lagprice  |  -.0438772   .0084993    -5.16   0.000   -.0605541   -.0272003
    islam50  |  (dropped)
 priceislam  |  -.0115507   .0096599    -1.20   0.232   -.0305047    .0074033
       _cons |  -8.462887   4.410165    -1.92   0.055   -17.11622    .1904514
-------------+----------------------------------------------------------------
     sigma_u |  4.7391469
     sigma_e |  3.3773437
         rho |  .66318837   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(57, 1094) =    14.59          Prob > F = 0.0000
```

Civil Rights

```
. xtreg cr urbpop open lagcr laglncurrent lagprice islam50 priceislam,fe

Fixed-effects (within) regression           Number of obs      =      1158
Group variable (i): code                    Number of groups   =        58

R-sq:  within  = 0.1382                     Obs per group: min =        19
       between = 0.2626                                    avg =      20.0
       overall = 0.2270                                    max =        20

                                            F(6,1094)          =     29.24
corr(u_i, Xb)  = 0.0053                     Prob > F           =    0.0000

------------------------------------------------------------------------------
          cr |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      urbpop |  -.0169684   .0094869    -1.79   0.074    -.035583    .0016462
        open |  -.8635569   .1638639    -5.27   0.000    -1.18508   -.5420339
       lagcr |   .1612938    .027774     5.81   0.000    .1067975    .2157901
laglncurrent |  -.1084178    .132808    -0.82   0.414    -.369005    .1521695
   lagprice  |   .0053614   .0019548     2.74   0.006    .0015259    .0091969
    islam50  |  (dropped)
 priceislam  |  -.0017783   .0022332    -0.80   0.426   -.0061602    .0026036
       _cons |   5.610824   1.021401     5.49   0.000    3.606697    7.614951
-------------+----------------------------------------------------------------
     sigma_u |  1.1301335
     sigma_e |  .78118444
         rho |  .6766808   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(57, 1094) =    14.65          Prob > F = 0.0000
```

Hausman Test:

Test: Ho: difference in coefficients not systematic

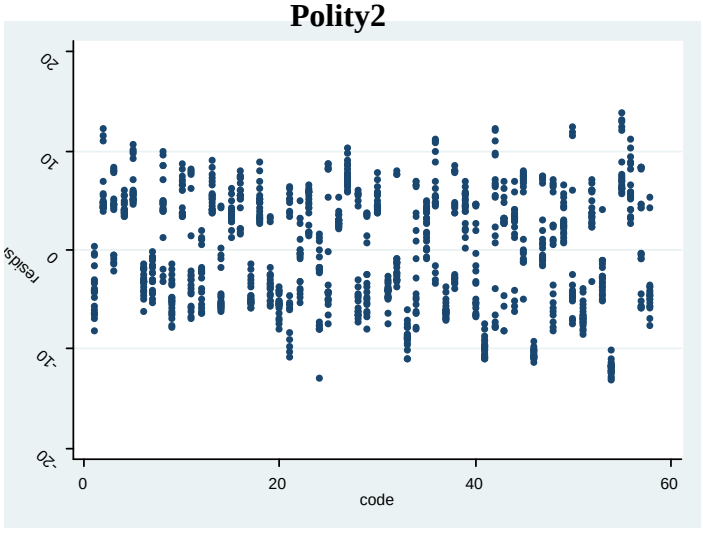
```
chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
        =      537.42
Prob>chi2 =      0.0000
```

Test: Ho: difference in coefficients not systematic

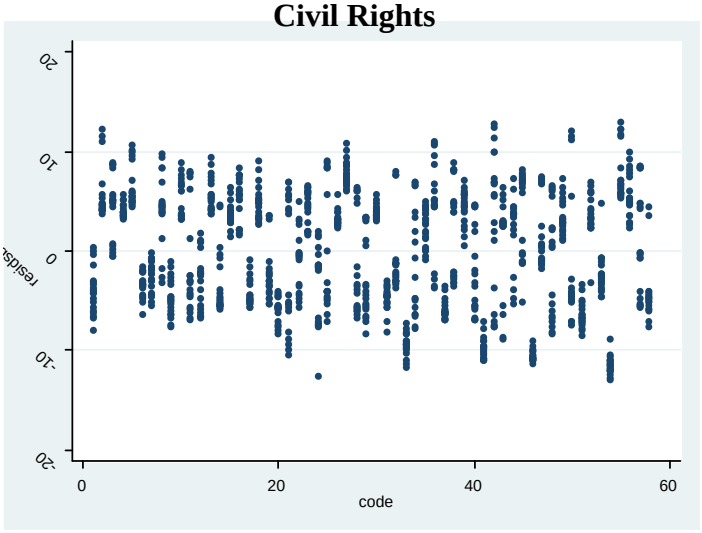
```
chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
        =      647.25
Prob>chi2 =      0.0000
```

Residuals by Country Code

Polity2



Civil Rights



Regression 4:

Polity2

. xtreg polity2 urbpop open lagpolity2 laglncurrent lagprice priceME priceAF middleeast africa ,fe

Fixed-effects (within) regression Number of obs = 1158
Group variable (i): code Number of groups = 58

R-sq: within = 0.2729 Obs per group: min = 19
between = 0.4165 avg = 20.0
overall = 0.3416 max = 20

F(7,1093) = 58.60
corr(u_i, Xb) = 0.2554 Prob > F = 0.0000

polity2	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
urbpop	-.0095859	.0408069	-0.23	0.814	-.0896546	.0704828
open	3.15199	.7039094	4.48	0.000	1.770823	4.533156
lagpolity2	.2315798	.025948	8.92	0.000	.1806662	.2824933
laglncurrent	1.17168	.5754589	2.04	0.042	.0425509	2.300809
lagprice	-.0409223	.0093459	-4.38	0.000	-.0592603	-.0225843
priceME	-.0250063	.0141021	-1.77	0.076	-.0526764	.0026639
priceAF	-.0095201	.0102497	-0.93	0.353	-.0296313	.0105911
middleeast	(dropped)					
africa	(dropped)					
_cons	-8.200849	4.40466	-1.86	0.063	-16.84339	.4416959

sigma_u	4.7559633
sigma_e	3.3761226
rho	.6649301 (fraction of variance due to u_i)

F test that all u_i=0: F(57, 1093) = 14.60 Prob > F = 0.0000

Civil Rights

xtreg cr urbpop open lagcr laglncurrent lagprice priceME priceAF middleeast africa ,fe

Fixed-effects (within) regression Number of obs = 1158
Group variable (i): code Number of groups = 58

R-sq: within = 0.1462 Obs per group: min = 19
between = 0.2569 avg = 20.0
overall = 0.2249 max = 20

F(7,1093) = 26.74
corr(u_i, Xb) = -0.0638 Prob > F = 0.0000

cr	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
urbpop	-.0173266	.0094124	-1.84	0.066	-.035795	.0011419
open	-.8890225	.164179	-5.41	0.000	-1.211164	-.5668809
lagcr	.1570707	.0276806	5.67	0.000	.1027577	.2113838
laglncurrent	-.1301009	.1323964	-0.98	0.326	-.3898807	.1296788
lagprice	.0008855	.0021341	0.41	0.678	-.003302	.0050729
priceME	.0016626	.0032456	0.51	0.609	-.0047057	.0080309
priceAF	.0075808	.002357	3.22	0.001	.0029561	.0122054
middleeast	(dropped)					
africa	(dropped)					
_cons	5.842943	1.016501	5.75	0.000	3.848429	7.837457

sigma_u	1.1371202
sigma_e	.77789541
rho	.68120699 (fraction of variance due to u_i)

F test that all u_i=0: F(57, 1093) = 15.03 Prob > F = 0.0000

Hausman Test:

Test: Ho: difference in coefficients not systematic

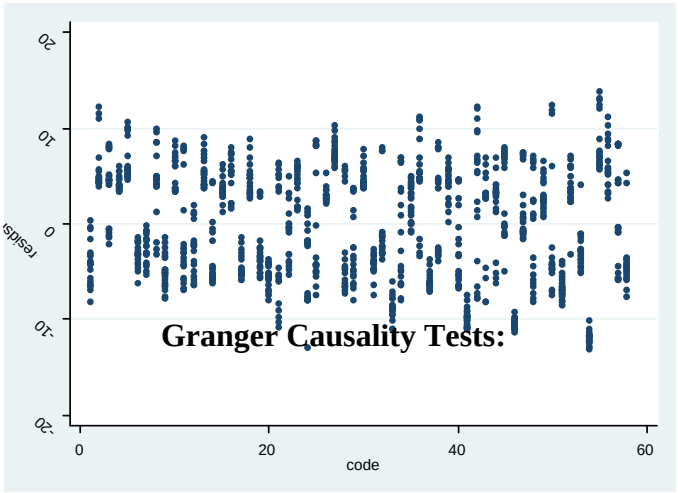
chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 546.29
Prob>chi2 = 0.0000

Test: Ho: difference in coefficients not systematic

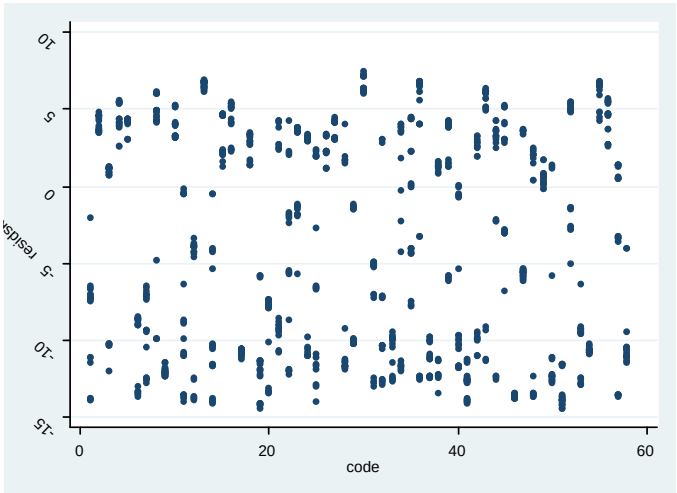
chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 684.14
Prob>chi2 = 0.0000

Residuals by Country Code

Polity2



Civil Rights



Granger Causality Tests:

```
xtreg polity2 l1.polity2, fe

Fixed-effects (within) regression               Number of obs      =      1392
Group variable (i): code                        Number of groups   =        58

R-sq:  within  = 0.7775                         Obs per group: min =        24
       between = 0.9970                                        avg =      24.0
       overall = 0.9109                                        max =        24

                                                F(1,1333)          =   4658.75
corr(u_i, Xb)  = 0.7259                         Prob > F           =    0.0000

------------------------------------------------------------------------------
     polity2 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     polity2 |
         L1. |   .8724493   .0127822    68.26   0.000     .8473739    .8975247
       _cons |   .1884494   .0553636     3.40   0.001     .0798402    .2970586
-------------+----------------------------------------------------------------
     sigma_u |  .79256243
     sigma_e |  2.0607362
         rho |  .12885793   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(57, 1333) =     1.68            Prob > F = 0.0014

. xtreg polity2 l1.polity2 oilprice, fe

Fixed-effects (within) regression               Number of obs      =      1392
Group variable (i): code                        Number of groups   =        58

R-sq:  within  = 0.7816                         Obs per group: min =        24
       between = 0.9970                                        avg =      24.0
       overall = 0.9108                                        max =        24

                                                F(2,1332)          =   2383.30
corr(u_i, Xb)  = 0.7323                         Prob > F           =    0.0000

------------------------------------------------------------------------------
     polity2 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     polity2 |
         L1. |   .8517083   .0133374    63.86   0.000     .8255437     .877873
    oilprice |  -.0179738   .0036112    -4.98   0.000     -.025058   -.0108897
       _cons |   .8027079   .1350626     5.94   0.000     .5377493    1.067667
-------------+----------------------------------------------------------------
     sigma_u |  .89992226
     sigma_e |  2.0426021
         rho |  .16255449   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(57, 1332) =     2.01            Prob > F = 0.0000

. test oilprice

 ( 1)  oilprice = 0

       F(  1,  1332) =   24.77
            Prob > F =    0.0000



xtreg polity2 l1.polity2 oilprice l1.oilprice, fe

Fixed-effects (within) regression               Number of obs      =      1392
Group variable (i): code                        Number of groups   =        58

R-sq:  within  = 0.7823                         Obs per group: min =        24
       between = 0.9970                                        avg =      24.0
       overall = 0.9107                                        max =        24

                                                F(3,1331)          =   1594.16
corr(u_i, Xb)  = 0.7331                         Prob > F           =    0.0000

------------------------------------------------------------------------------
     polity2 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     polity2 |
         L1. |   .8468788   .0135257    62.61   0.000     .8203448    .8734127
    oilprice |
          --. |  -.0012082   .0088976    -0.14   0.892     -.018663    .0162467
         L1. |  -.0150886   .0073201    -2.06   0.039    -.0294489   -.0007283
       _cons |   .7759772   .1355201     5.73   0.000     .5101208    1.041834
-------------+----------------------------------------------------------------
     sigma_u |  .92518981
     sigma_e |  2.0401158
         rho |   .1705795   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(57, 1331) =     2.08            Prob > F = 0.0000

. test oilprice l1.oilprice

 ( 1)  oilprice = 0
 ( 2)  L.oilprice = 0

       F(  2,  1331) =   14.54
            Prob > F =    0.0000



. xtreg oilprice l1.oilprice l2.oilprice l3.oilprice l4.oilprice, fe

Fixed-effects (within) regression               Number of obs      =      1218
```

```
Group variable (i): code                        Number of groups   =        58

R-sq:  within  = 0.5788                         Obs per group: min =        21
       between = 1.0000                                        avg =      21.0
       overall = 0.5788                                        max =        21

                                                F(4,1156)          =    397.18
corr(u_i, Xb)  =      .                         Prob > F           =    0.0000

------------------------------------------------------------------------------
    oilprice |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    oilprice |
         L1. |    .524772   .0317161    16.55   0.000     .4625444    .5869996
         L2. |   -.1639401   .0346259    -4.73   0.000    -.2318768   -.0960034
         L3. |    .091089   .0346934     2.63   0.009     .0230199     .159158
         L4. |   .1077581   .0258217     4.17   0.000     .0570955    .1584207
       _cons |    11.6344   .5550647    20.96   0.000     10.54535    12.72345
-------------+----------------------------------------------------------------
     sigma_u |          0
     sigma_e |   6.316394
         rho |          0   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(57, 1156) =     0.00            Prob > F = 1.0000

. xtreg oilprice l1.oilprice l2.oilprice l3.oilprice l4.oilprice polity2, fe

Fixed-effects (within) regression               Number of obs      =      1218
Group variable (i): code                        Number of groups   =        58

R-sq:  within  = 0.5804                         Obs per group: min =        21
       between = 0.0000                                        avg =      21.0
       overall = 0.5765                                        max =        21

                                                F(5,1155)          =    319.49
corr(u_i, Xb)  = -0.0819                        Prob > F           =    0.0000

------------------------------------------------------------------------------
    oilprice |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    oilprice |
         L1. |    .522094   .0316982    16.47   0.000     .4599015    .5842864
         L2. |   -.1624006   .0345854    -4.70   0.000    -.2302577   -.0945434
         L3. |    .0930458   .0346576     2.68   0.007     .0250468    .1610448
         L4. |   .1151585   .0260338     4.42   0.000     .0640797    .1662374
     polity2 |   .1041264   .0504797     2.06   0.039     .0050842    .2031687
       _cons |   11.28012   .5802857    19.44   0.000     10.14158    12.41865
-------------+----------------------------------------------------------------
     sigma_u |  .59883093
     sigma_e |  6.3075204
         rho |  .00893293   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(57, 1155) =     0.05            Prob > F = 1.0000

. test polity 2
2 not found
r(111);

. test polity2

 ( 1)  polity2 = 0

       F(  1,  1155) =    4.25
            Prob > F =    0.0394
```

Regression 5:

```
xi: reg3 (polity2 i.country urbpop open lagpolity2 laglncurrent oilprice) (oilprice = urbpop open lncurrent ndisaster)
i.country         _Icountry_1-59      (_Icountry_1 for coun~y==algeria omitted)

Three-stage least-squares regression
------------------------------------------------------------------------------
Equation          Obs  Parms        RMSE    "R-sq"       chi2         P
------------------------------------------------------------------------------
polity2          1159     62    3.819886    0.6957    3776.23    0.0000
oilprice         1159      4    14.69036    0.4211    1054.12    0.0000
------------------------------------------------------------------------------

      urbpop |    .1052866     .05626     1.87   0.061    -.0049809    .2155542
        open |    2.929799   .8742068     3.35   0.001     1.216386    4.643213
  lagpolity2 |    .2519632   .0272849     9.23   0.000     .1984857    .3054407
laglncurrent |    3.014126   1.177537     2.56   0.010     .7061959    5.322055
    oilprice |   -.2785029   .2041458    -1.36   0.172    -.6786213    .1216155
       _cons |   -27.98175   16.85133    -1.66   0.097    -61.00975    5.046249
-------------+----------------------------------------------------------------
```

```
oilprice    |
      urbpop |   .0096312   .0161769     0.60   0.552    -.0220749    .0413374
        open |   .1565784   .5634553     0.28   0.781    -.9477737     1.26093
   lncurrent |  -.5926733   .4089892    -1.45   0.147    -1.394277    .2089308
   ndisaster |   2.87e-07   6.03e-08     4.76   0.000     1.69e-07    4.05e-07
       _cons |   31.91665   2.647605    12.05   0.000     26.72744    37.10586
------------------------------------------------------------------------------
Endogenous variables:  polity2 oilprice
Exogenous variables: urbpop open lagpolity2 laglncurrent lncurrent ndisaster
------------------------------------------------------------------------------
```

Hausman Test:

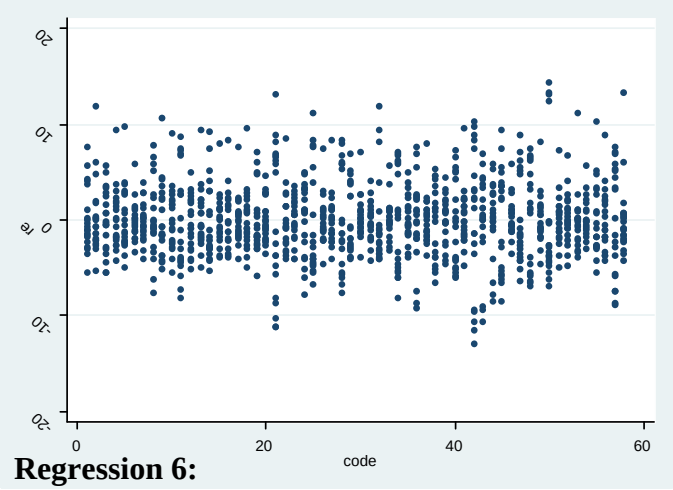
```
hausman fe 3SLS

                 ---- Coefficients ----
              |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
              |       fe           re         Difference          S.E.
--------------+----------------------------------------------------------------
      urbpop  |    .1052866     .0201972        .0850894        .0552144
        open  |    2.929799     .1564381        2.773361        .8019244
  lagpolity2  |    .2519632     .7424826       -.4905194        .0184966
laglncurrent  |    3.014126    -.1358661        3.149992        1.141863
    oilprice  |   -.2785029    -.2681907       -.0103122        .1657738
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from reg3
            B = inconsistent under Ha, efficient under Ho; obtained from reg3

    Test:  Ho:  difference in coefficients not systematic

                  chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =      807.40
                Prob>chi2 =      0.0000
                (V_b-V_B is not positive definite)
```

Residuals by Country Code: Polity2 Dependant Variable



Regression 6:

```
xi:reg3 (polity2 i.country urbpop open lagpolity2 laglncurrent oilprice oildependent priceodependent) (oilprice =
urbpop open lncurrent ndisaster) (priceodependent = oilprice *oildependent)

Three-stage least-squares regression
------------------------------------------------------------------------------
Equation          Obs  Parms        RMSE    "R-sq"       chi2         P
------------------------------------------------------------------------------
polity2          1159     63    4.915906    0.4960    2482.52    0.0000
oilprice         1159      4    7.493012    0.4211    1054.12    0.0001
priceodepe~t     1159      2    3.602894    0.9354   16231.60    0.0000
------------------------------------------------------------------------------

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      urbpop |      .29696   .1528415     1.94   0.052    -.0026038    .5965237
        open |  -3.231524   5.519136    -0.59   0.558    -14.04883    7.585784
  lagpolity2 |    .1857203   .0829432     2.24   0.025     .0231547    .3482859
laglncurrent |    5.889593   2.156709     2.73   0.006      1.66252    10.11666
    oilprice |    .3496098   .5837023     0.60   0.549    -.7944257    1.493645
oildependent |   -.8245125   0.193926    -1.81   0.049    -.0037049    .6176348
priceodepe~t |   -.8245125   2.242533    -0.37   0.713    -5.219796    3.570771
       _cons |   -53.49049   70.55326    -0.76   0.448    -191.7723    84.79135
-------------+----------------------------------------------------------------
oilprice     |
      urbpop |    .0097155   .0162718     0.60   0.550    -.0221766    .0416077
        open |    .1669519   .5637398     0.30   0.767    -.9379578    1.271862
   lncurrent |   -.5957568   .4120572    -1.45   0.148    -1.403374    .2118604
   ndisaster |    2.88e-07   6.35e-08     4.53   0.000     1.63e-07    4.12e-07
       _cons |    31.92923   2.660576    12.00   0.000     26.71459    37.14386
```

```
-------------+----------------------------------------------------------------
priceodepe~t |
    oilprice |   .3586559   .0511041     7.02   0.000     .2584936    .4588181
oildependent |   28.30269   .2225349   127.18   0.000     27.86653    28.73885
       _cons |  -10.14723   1.451661    -6.99   0.000    -12.99243   -7.302025
------------------------------------------------------------------------------
Endogenous variables:  polity2 oilprice priceodependent
Exogenous variables: urbpop open
     lagpolity2 laglncurrent lncurrent ndisaster oildependent
------------------------------------------------------------------------------
```

Hausman Test:

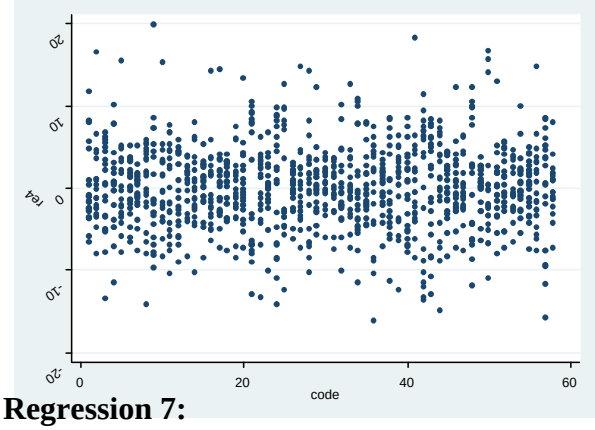
```
hausman fe 3SLS

                 ---- Coefficients ----
              |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
              |       fe           re         Difference          S.E.
--------------+----------------------------------------------------------------
      urbpop  |    .1052866     .0299791        .0753076        .0552704
        open  |    2.929799    -.4020985        3.331898        .8037365
  lagpolity2  |    .2519632     .7085973       -.4566341        .0184724
laglncurrent  |    3.014126     .1574392        2.856686        1.143504
    oilprice  |   -.2785029    -.2084463       -.0700566        .1677061
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from reg3
            B = inconsistent under Ha, efficient under Ho; obtained from reg3

    Test:  Ho:  difference in coefficients not systematic

                chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                        =       707.82
              Prob>chi2 =       0.0000
              (V_b-V_B is not positive definite)
```

Residuals by Country Code: Polity2 Dependent Variable



Regression 7:

```
xi:reg3 (polity2 i.country urbpop open lagpolity2 laglncurrent oilprice islam50 priceislam) (oilprice =  urbpop open
lncurrent ndisaster) (priceislam = islam50 *oilprice)
Three-stage least-squares regression
------------------------------------------------------------------------------
Equation           Obs  Parms        RMSE    "R-sq"       chi2         P
------------------------------------------------------------------------------
polity2           1159     63    9.445893    0.8610    2682.95    0.0000
oilprice          1159      4    7.493011    0.4211    1054.12    0.0000
priceislam        1159      5    3.630405    0.9344   15977.21    0.0000
------------------------------------------------------------------------------

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      polity2|
      urbpop |   .0631083   .0502055     1.26   0.209    -.0352926    .1615093
        open |   5.092793   1.622949     3.14   0.002     1.911872    8.273715
  lagpolity2 |   .2721386   .0398795     6.82   0.000     .1939762     .350301
laglncurrent |   1.513113   .6428484     2.35   0.019     .2531528    2.773072
    oilprice |   .7825262   .2186656     3.58   0.000     .3539495    1.211103
     islam50 |  (dropped)
  priceislam |  -2.409446   .6195995    -3.89   0.000    -3.623838   -1.195053
       _cons |   23.85044   12.32634     1.93   0.053    -.3087459    48.00963
-------------+----------------------------------------------------------------
oilprice     |
      urbpop |   .0096837   .0162734     0.60   0.552    -.0222116     .041579
        open |   .1614091    .563795     0.29   0.775    -.9436088    1.266427
   lncurrent |  -.5934246    .412097    -1.44   0.150     -1.40112    .2142708
   ndisaster |   2.89e-07   6.35e-08     4.54   0.000     1.64e-07    4.13e-07
       _cons |   31.91405   2.660828    11.99   0.000     26.69892    37.12917
-------------+----------------------------------------------------------------
priceislam   |
     islam50 |   28.30096   .2282691   123.98   0.000     27.85356    28.74836
    oilprice |   2.672252   4.106798     0.65   0.515    -5.376924    10.72143
       _cons |   48.49775   103.6244     0.47   0.640    -154.6022    251.5977
------------------------------------------------------------------------------
Endogenous variables:  polity2 oilprice priceislam
Exogenous variables:  urbpop open
     lagpolity2 laglncurrent islam50 lncurrent ndisaster
------------------------------------------------------------------------------
```

Hausman Test:

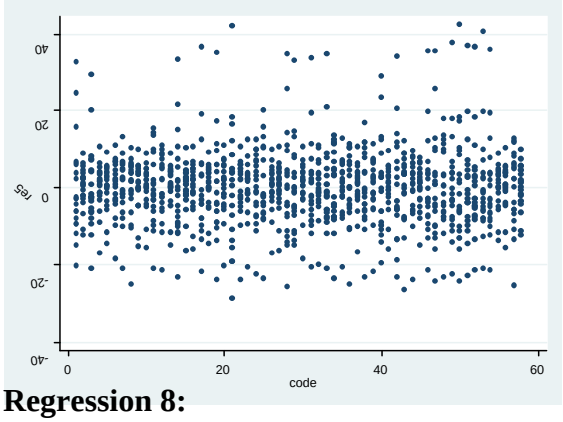
```
hausman fe 3SLS
```

```
                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |       fe           re         Difference          S.E.
-------------+----------------------------------------------------------------
      urbpop |     .086602     .0064692        .0801329        .0359725
        open |    3.151635     .2188908        2.932744        .6069401
  lagpolity2 |     .2443539    .7043183       -.4599643        .0165145
laglncurrent |    2.685352     .1836711        2.501681        .4530636
    oilprice |    -.0437299    -.0483356        .0046057              .
     islam50 |   -30.94857    -2.155071       -28.7935         3.630875
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from reg3
            B = inconsistent under Ha, efficient under Ho; obtained from reg3

    Test:  Ho:  difference in coefficients not systematic

                  chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =      803.05
                Prob>chi2 =      0.0000
                (V_b-V_B is not positive definite)
```

Residuals Country Code: Polity2 Dependent Variable



Regression 8:

```
xi:reg3 (polity2 i.country urbpop open lagpolity2 laglncurrent oilprice priceME priceAF middleeast africa) (oilprice =
urbpop open lncurrent ndisaster) (priceME= middleeast *oilprice) (priceAF = africa *oilprice) Three-stage least-squares
regression
```

```
------------------------------------------------------------------------------
Equation           Obs  Parms        RMSE    "R-sq"       chi2         P
------------------------------------------------------------------------------
polity2           1159     64    28.26772    0.6662    1515.26    0.0000
oilprice          1159      4    7.493011    0.4211    1054.12    0.0001
priceME           1159      5    2.620442    0.9335   18010.95    0.0000
priceAF           1159      5    3.706961    0.9360   18665.25    0.0000
------------------------------------------------------------------------------

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
polity2      |
      urbpop |   -.3536816   .1693809    -2.09   0.037     -.685662   -.0217012
        open |    21.10089   8.290666     2.55   0.011     4.851484     37.3503
  lagpolity2 |    .5296335    .133019     3.98   0.000     .2689211     .790346
laglncurrent |    5.415844   1.986993     2.73   0.006     1.521409     9.31028
    oilprice |    3.173327    .760293     4.17   0.000      1.68318    4.663474
     priceME |   -11.3287   2.830118    -4.00   0.000    -16.87563   -5.781774
     priceAF |  -4.140406   .9153627    -4.52   0.000    -5.934484   -2.346328
  middleeast |   (dropped)
      africa |   (dropped)
       _cons |  -161.5398   47.70342    -3.39   0.001    -255.0368    -68.0428
-------------+----------------------------------------------------------------
oilprice     |
      urbpop |    .0096498   .0162735     0.59   0.553    -.0222457    .0415452
        open |     .158775   .5637974     0.28   0.778    -.9462477    1.263798
   lncurrent |    -.593089   .4120997    -1.44   0.150     -1.40079    .2146115
   ndisaster |    2.88e-07   6.35e-08     4.54   0.000     1.64e-07    4.13e-07
       _cons |    31.91526   2.660847    11.99   0.000      26.7001    37.13043
-------------+----------------------------------------------------------------
priceME      |
  middleeast |    28.30249   .2119884   133.51   0.000       27.887    28.71798
    oilprice |    1.283012   2.657174     0.48   0.629    -3.924953    6.490977
       _cons |     25.8239   67.12139     0.38   0.700    -105.7316    157.3794
-------------+----------------------------------------------------------------
priceAF      |
      africa |    28.29724   .2115946   133.73   0.000     27.88252    28.71196
    oilprice |   -.0634039    6.33701    -0.01   0.992    -12.48372    12.35691
       _cons |   -22.72137   160.2703    -0.14   0.887    -336.8455    291.4027
------------------------------------------------------------------------------
Endogenous variables:  polity2 oilprice priceME priceAF
Exogenous variables: urbpop open
     lagpolity2 laglncurrent middleeast africa lncurrent ndisaster
------------------------------------------------------------------------------
```

Hausman Test:

```
hausman fe 3SLS

                 ---- Coefficients ----
              |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
              |       fe           re         Difference          S.E.
--------------+----------------------------------------------------------------
      urbpop  |     .086602     -.003003         .089605        .0018707
        open  |    3.151635     5.448125       -2.296491              .
  lagpolity2  |    .2443539     .9228048       -.6784509              .
laglncurrent  |    2.685352     .5448095        2.140542              .
    oilprice  |   -.0437299     6.276632       -6.320362              .
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from reg3
            B = inconsistent under Ha, efficient under Ho; obtained from reg3

    Test:  Ho:  difference in coefficients not systematic

                  chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =      287.78
                Prob>chi2 =      0.0000
                (V_b-V_B is not positive definite)
```

Residuals by Country Code: Polity 2 Dependent Variable