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The First Law of Petropolitics

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We examine empirically the relationship between crude oil prices and the ebb and flow of democratic institutions, in order to test the hypothesis that high oil prices undermine democracy and sustain autocracy. We use a variety of time series and panel data methods over a wide range of country subsamples and time periods, finding strictly no evidence in favour of this so-called 'First Law of Petropolitics' (Friedman 2006).

INTRODUCTION

Might high oil prices undermine democracy? Autocrats ruling over oil-rich states and controlling oil resources may find it easier to sustain political power when oil prices are high. When oil prices are high, more resources are available to purchase political support by offering transfers to citizens. More resources are also available to carry out repressive actions in order to quell opposition through coercive means. The cost of giving up political power is greater when the economic value of this power is larger. For oil-rich countries, then, high oil prices may help to sustain autocratic regimes, and prevent transitions to democracy. They may also facilitate transitions away from weak democracy into autocracy by raising popular tolerance for autocracy. The hypothesized negative effect of high oil prices on democracy is often cited as a reason for advocating efforts to wean the USA from its reliance on foreign oil as a source of energy. Such a reliance is seen as implicitly supportive of autocratic regimes, and conducive to unwanted foreign entanglements that could exacerbate national security threats.

The deleterious effect of oil prices on political regime type was dubbed the 'First Law of Petropolitics' by columnist Tom Friedman in a *Foreign Policy* article (Friedman 2006). Friedman first hypothesized the negative relationship between democracy and oil prices by drawing lines on a napkin at lunchtime: 'I laid out my napkin and drew a graph showing how there seemed to be a rough correlation between the price of oil, between 1975 and 2005, and the pace of freedom in oil-producing states during those same years' (Friedman 2008b, p. 94).[1]

In this paper, we seek to go a little beyond paper-napkin econometrics. We look for systematic evidence regarding the First Law of Petropolitics (FLP) by pursuing a series of simple empirical tests. First, using data on real oil prices going back to 1861, and data on the democratic nature of institutions across the world, we examine whether oil prices and democracy are inversely related in a time series sense. We do so for the world as a whole, then restrict attention to oil-producing regions where the effect is most likely to be observed. We also examine whether any relationship might be stronger in the post-1925 and post-1960 periods, when oil became of increasing importance as a source of energy. Second, we use a panel data approach, regressing a country's level of democracy on an indicator of oil prices and country fixed effects. We also examine the determinants of regime transitions (in the direction of either democracy or autocracy), using a conditional logit fixed effects estimator. Third, we discuss a set of individual country cases to illustrate the large sample results. Under none of these empirical approaches do we find any empirical support for the FLP.

This paper is related to a vast and growing academic literature on the resource curse. Sachs and Warner (2001) argue empirically that resource rich countries suffer from inferior economic performance. A large body of work in political science and economics has sought to demonstrate that resource-abundant countries have worse institutions (notable references, among many others, include Ross 2001; Wantchekon 2002; Ramsay 2011; Tsui 2011). A recent contribution by Haber and Menaldo (2011), however, challenged this conventional wisdom, arguing that resource intensity is not associated with autocracy within countries across time, no matter how resource intensity and democracy are measured. All these papers measure resource intensity using quantity measures, such as the value of resources produced or exported as a percentage of GDP or total exports, or total oil revenues, which may be endogenous to domestic economic and political conditions. Existing contributions do not examine the effect of world prices in isolation.[2] In contrast, in this paper we focus only on the effects of the price of oil. Unlike quantity-based measures, oil prices are determined on world markets and are less likely to be endogenously affected by a single producer's domestic circumstances, particularly at the one-year frequency employed in this paper. This is an advantage when trying to identify the effect of the value of natural resources on regime type. The focus on prices also constitutes a strict empirical test of the FLP, as formulated by Friedman (2006, 2008a,b).

I. A Time Series Approach

Our first approach to evaluating the relationship between democracy and oil prices relies on standard time series methods, related to those in Haber and Menaldo (2011). While the past literature on the resource curse focused on cross-sectional analysis, these authors used textbook time series and panel data methods to analyse the relationship between resource abundance and democracy in a within-country sense. Using a historical dataset going back to a period that pre-dates most resource discoveries, they measured resource abundance using three indicators: the percentage of government revenues from oil or minerals, real windfall profits from oil and minerals per capita, and real gross oil revenues per capita. They did not, however, examine the role of oil prices in isolation. The volume of oil production, which enters into calculations of revenues and profits, is potentially endogenous to regime type. Thus a focus on oil prices in isolation constitutes a test of the resource curse that is more likely to escape endogeneity bias under the maintained assumption that countries take world oil prices as given.

Using data on crude oil prices for several time periods, and data on democracy averaged over countries in several regions, we examine the time paths of democracy and world oil prices. The data source for crude oil prices is the June 2008 issue of British Petroleum's *Statistical Review of World Energy*, the most comprehensive source of available data on oil production and historical oil prices. The crude oil price series covers the 1861 to 2007 period, with prices expressed in constant 2007 dollars.[3] While the discovery and use of petroleum date back to antiquity, oil refining was invented in Nova Scotia in 1846, the first commercial oil well was drilled in Romania in 1857 and the first oil refinery was built in Baku (Azerbaijan) in 1861. Thus the series on oil prices covers virtually the entire modern period of oil exploitation. Since oil played a limited economic role early in the period, we focus particularly on the post-1925 and post-1961 periods.

The data on democracy are from the Polity IV project (Marshall and Jaggers 2009), covering an unbalanced panel of countries from 1800 to 2007. Using the combined Polity score, which ranges from −10 (most autocratic) to +10 (most democratic), we construct unweighted measures of average democracy across four regions: the world as a whole,

countries in the Middle East region, countries that were ever members of OPEC (after its founding in 1960), and countries that were major oil producers during the 1970–2000 period. To determine the latter set of countries, we use data on oil production from BP's June 2008 *Statistical Review of World Energy*, and isolate countries that produced more than 150 thousand barrels per day in each of 1980, 1990 and 2000. While this choice is admittedly somewhat arbitrary, results were not sensitive to changes in the criteria for what constitutes a major oil producer. For each of the 1861–2007, 1925–2007 and 1961–2007 periods, we then isolate countries from each region that had available Polity data continuously during the period, and compute the simple average of their democracy scores in each year—that is, averages are constructed from balanced panels within each period.[4] We ended up with 12 time series for average democracy (4 regions times 3 time periods). We expect that any relationship between oil prices and democracy should be more prevalent in more recent periods, and in regions that produce oil rather than the world as a whole.

To illustrate graphically the relationship between oil prices and democracy, Figure 1 displays the time path of the average Polity score for major oil producers and the time path of crude oil prices since 1961—the graphical analogue of Friedman's paper-napkin diagram. Table 1 displays simple time series correlation coefficients between our various measures of average democracy and oil prices since 1961. (Similar correlations for the 1861–2007 and 1925–2007 periods do not reveal a substantially different pattern.) The last row reveals either statistically weak or, in the case of OPEC countries, significantly *positive* correlations between oil prices and democracy, contrary to what would be implied by the FLP.

Our first formal econometric test is to examine the coefficient on crude oil price in a specification of the form

$$D_{rt} = \alpha + \beta p_t + \varepsilon_t, \tag{1}$$

where D_{rt} denotes the average democracy score for a given region r at time t, and p_t denotes the real price of crude oil. This test is the direct econometric analogue to Friedman's paper-napkin diagram. One difficulty is that oil prices, democracy or both might be non-stationary series, leading to spurious inferences from a level's specification. Table 2 presents conventional Augmented Dickey–Fuller (ADF) tests of the null

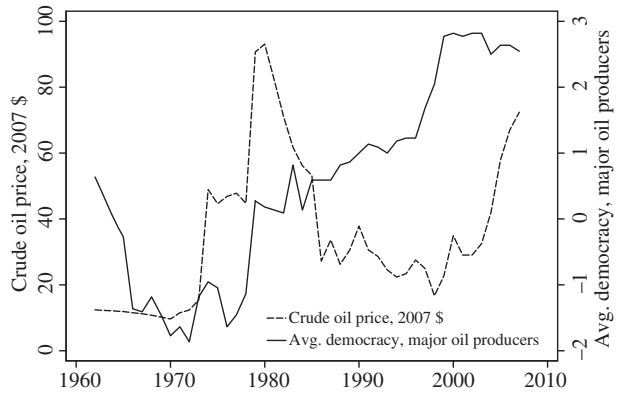

FIGURE 1. Oil prices and democracy for major oil producers, 1961–2007.

TABLE 1
SIMPLE TIME CORRELATIONS BETWEEN OIL PRICES AND WORLD/REGIONAL POLITY SCORES, 1961–2007

	Polity–World	Polity–Middle East	Polity–OPEC	Polity–Major oil producers
Polity–Middle East	0.8941*	1.0000		
Polity–OPEC	0.7816*	0.8503*	1.0000	
Polity–Major oil producers	0.9152*	0.9004*	0.9129*	1.0000
World price of crude oil, constant 2007 US$	0.0260	0.1997	0.3524*	0.2000

Notes
Correlations based on 47 observations (years).
*indicates significance at the 5% level.
World average of Polity2 index based on 99 underlying countries, Mideast average based on 7 underlying countries, OPEC average based on 8 underlying countries, and major oil producer average based on 22 underlying countries for which Polity3 and crude oil price data have been continuously available since 1961.

hypothesis that each of the series is non-stationary. For each series, we consider two specifications: a specification assuming a non-zero drift term under the null, and another allowing for both a non-zero drift term and a time trend under the null.[5] Our ADF tests include 4-period lagged differences in all specifications. (Results are not sensitive to the number of included lagged differences.) As Table 2 demonstrates, we find considerable evidence of non-stationarity for most variables in most periods. For instance, using the average World Polity score between 1961 and 2007, we find an ADF z-statistic of -2.7 with a McKinnon p-value of 0.236, so we fail to reject the null of non-stationarity for this series. In fact, out of 30 series being tested for non-stationarity, we fail to reject the null at the 5% significance level in 24 cases. Two exceptions where the average democracy series appear stationary are for major oil producers and OPEC countries when limiting the sample to 1961–2007.

Given the evidence that our series of interest are likely to be non-stationary, we next conduct tests of cointegration between oil prices and average democracy. If detected, such cointegration would indicate the presence of a significant long-term relationship between these variables. We conduct two sets of tests. The first set is based on conventional Engle–Granger cointegration tests, running ADF tests on residuals from an OLS regression of average Polity on crude oil prices at various periods and in various regions. (These tests allow for a drift term in the residuals, and include 4-period lagged differences.) The second set of tests is based on the VAR approach to cointegration (Johansen tests). Table 3 presents the results from both approaches.

Turning first to Engle–Granger tests, the p-value on the ADF statistic, testing for the null hypothesis that the residuals from regressing the average Polity score on crude oil prices are non-stationary, generally leads to a rejection of the null. In only 3 out of 12 cases do we fail to reject the null. These cases are for the Polity score averaged over the whole world for periods 1861–2007 and 1961–2007, and for oil producers for 1961–2007. In only one of these cases does any evidence of cointegration remain when using the Johansen approach. Johansen's trace statistics suggest evidence of cointegration between oil prices and average democracy at the 95% level (but not at the 99% level) when average democracy is computed over all available countries in the world for the period 1861–2007. This is the period and region for which we least expected to see any evidence

TABLE 2
AUGMENTED DICKEY–FULLER TESTS OF NON-STATIONARITY FOR CRUDE OIL PRICES AND AVERAGE POLITY SERIES

Period	1861–2007	1861–2007	1925–2007	1925–2007	1961–2007	1961–2007
ADF specification	Drift	Drift + Trend	Drift	Drift + Trend	Drift	Drift + Trend
Crude oil price						
Observations	142	142	78	78	42	42
ADF *Z*-test statistic	−2.3790	−2.3860	−1.3370	−2.1680	−1.5710	−1.6300
McKinnon approximate *p*-value	0.0094	0.3870	0.0927	0.5080	0.0625	0.7800
R-squared	0.20	0.23	0.04	0.08	0.08	0.09
Polity–World						
Observations	142	142	78	78	42	42
ADF *Z*-test statistic	−0.3910	−1.4060	−0.1160	−1.8560	−0.7660	−2.7000
McKinnon approximate *p*-value	0.3480	0.8590	0.4540	0.6770	0.2240	0.2360
R-squared	0.05	0.07	0.12	0.18	0.41	0.5
Polity–Major oil producers						
Observations	142	142	78	78	42	42
ADF *Z*-test statistic	−1.3160	−2.3530	−0.9600	−2.1620	−0.6790	−4.3880
McKinnon approximate *p*-value	0.0952	0.4050	0.1700	0.5110	0.2510	0.0023
R-squared	0.18	0.20	0.11	0.16	0.05	0.39
Polity–OPEC						
Observations	142	142	78	78	42	42
ADF *Z*-test statistic	−1.3400	−2.8420	−1.7020	−2.7940	−1.5370	−4.0330
McKinnon approximate *p*-value	0.0913	0.1820	0.0465	0.1990	0.0665	0.0079
R-squared	0.03	0.07	0.06	0.12	0.09	0.34
Polity–Middle East						
Observations	142	142	78	78	42	42
ADF *Z*-test statistic	−2.7290	−2.7140	−2.1930	−2.1850	−1.2540	−2.4520
McKinnon approximate *p*-value	0.0036	0.2300	0.0158	0.4980	0.1090	0.3520
R-squared	0.05	0.05	0.06	0.07	0.06	0.17

Note
All ADF tests were performed with 4 lagged differences included in the specification.

TABLE 3
TESTS FOR COINTEGRATION BETWEEN OIL PRICES AND AVERAGE DEMOCRACY

	(1) 1861–2007	(2) 1925–2007	(3) 1961–2007
Average Polity–World			
Engle–Granger cointegration tests			
ADF *Z*-test statistic	−1.032	−1.459	−0.891
McKinnon approximate *p*-value	0.152	0.075	0.189
Johansen VAR approach			
Trace stat – null of 0 cointegration relation	19.46	11.09	5.933
Trace stat – null of 1 cointegration relation	1.749	1.406	0.229
Number of cointegration relations (99%)	0	0	0
Number of cointegration relations (95%)	1	0	0
Average Polity–Major oil producers			
Engle–Granger cointegration tests			
ADF *Z*-test statistic	−1.729	−2.033	−1.083
McKinnon approximate *p*-value	0.043	0.023	0.143
Johansen VAR approach			
Trace stat – null of 0 cointegration relation	14.690	10.730	5.865
Trace stat – null of 1 cointegration relation	0.041	0.005	0.092
Number of cointegration relations (99%)	0	0	0
Number of cointegration relations (95%)	0	0	0
Average Polity–OPEC			
Engle–Granger cointegration tests			
ADF *Z*-test statistic	−2.037	−2.538	−1.850
McKinnon approximate *p*-value	0.022	0.007	0.036
Johansen VAR approach			
Trace stat – null of 0 cointegration relation	13.48	9.083	5.634
Trace stat – null of 1 cointegration relation	1.421	1.534	1.962
Number of cointegration relations (99%)	0	0	0
Number of cointegration relations (95%)	0	0	0
Average Polity–Middle East			
Engle–Granger cointegration tests			
ADF *Z*-test statistic	−2.66	−2.183	−1.514
McKinnon approximate *p*-value	0.004	0.016	0.069
Johansen VAR approach			
Trace stat – null of 0 cointegration relation	14.835	6.925	5.712
Trace stat – null of 1 cointegration relation	6.845	2.508	2.111
Number of cointegration relations (99%)	0	0	0
Number of cointegration relations (95%)	0	0	0

Notes
Engle–Granger/ADF tests for cointegration include 4-period lagged differences.
VAR test specifications include 4 lags of the variables.
142 observations for 1861–2007 period, 78 observations for 1925–2007 period, 42 observations for 1961–2007 period.

of a long-term relationship between oil prices and regime type *a priori*, since for most of this period and most of the countries used, oil is an irrelevant part of the economy. To summarize, we find scant evidence of cointegration between oil prices and regime type.

Since we find no evidence of cointegration, the logical next step is to check for the presence of a long-term relationship between oil prices and democracy by running our basic specification of (1) in first differences:

$$\Delta D_{rt} = \beta \Delta p_t + \Delta \varepsilon_t. \quad (2)$$

This specification allows us to recover β, the coefficient that describes the relationship between oil prices and democracy. (In actual regressions, we allow for a constant term in the regression in first differences.) Table 4 presents the results. Again, we find no evidence of a long-term relationship between world oil prices and democracy, for any of the periods or any of the regions. In fact, in line with the raw correlations in levels displayed in Table 1, all of the coefficients are of the wrong sign, suggesting that when oil prices rise, so does average democracy. In all cases, these positive coefficients are

TABLE 4
REGRESSIONS IN FIRST DIFFERENCES

	(1) 1861–2007	(2) 1925–2007	(3) 1961–2007
Average Polity–World			
First difference of crude oil prices (2007 $)	0.0004	0.006	0.004
	[0.003]	[0.004]	[0.004]
Constant	0.064**	0.076**	0.102**
	[0.027]	[0.036]	[0.042]
Observations	146	82	46
R-squared	0.0002	0.02	0.025
Average Polity–Major oil producers			
First difference of crude oil prices (2007 $)	0.008*	0.015**	0.012**
	[0.004]	[0.007]	[0.005]
Constant	0.041	0.031	0.025
	[0.046]	[0.055]	[0.056]
Observations	146	82	46
R-squared	0.022	0.06	0.117
Average Polity–OPEC			
First difference of crude oil prices (2007 $)	0.022***	0.059***	0.034***
	[0.008]	[0.015]	[0.010]
Constant	0.037	0.048	0.013
	[0.077]	[0.123]	[0.112]
Observations	146	82	46
R-squared	0.055	0.163	0.191
Average Polity–Middle East			
First difference of crude oil prices (2007 $)	0.014*	0.035**	0.013*
	[0.007]	[0.014]	[0.007]
Constant	0.001	−0.029	0.011
	[0.075]	[0.114]	[0.071]
Observations	146	82	46
R-squared	0.024	0.074	0.08

Notes
Standard errors in brackets; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

significant at the 10% level, and in many cases at higher levels of significance, although their magnitude is generally small.

To conclude, a systematic time series analysis reveals no evidence of a negative relationship between oil prices and democracy in any of the periods and regions under consideration.

II. A Panel Data Approach

Country fixed effects results

The time series approach is the most direct test of the FLP, but also involves several drawbacks. It requires the use of a balanced panel to avoid biases due to composition effects in the computation of average Polity scores across periods and regions. It also fails to control for time-invariant, country-specific factors that might drive political regime type. In this section, we make us of the panel dimension in the data to evaluate the relationship between regime type and oil prices. We start from the specification

$$D_{it} = \gamma p_t + \mu_i + \eta_{it}, \tag{3}$$

where i denotes individual countries. μ_i is treated as a country fixed effect, accounting for all the variation in democracy scores attributable to time-invariant country characteristics, such as historical and geographical factors. γ captures the within-country, across-time relationship between crude oil prices and political regime type. Since we account for country fixed effects, we can estimate equation (3) on an unbalanced panel, in order to maximize the number of countries in the sample.[6]

We estimate equation (3) for subsamples characterized by different regions or periods, as defined in Section I, and in separate specifications we allow for interaction terms between crude oil prices and region/period indicators. Results are presented in Tables 5 and 6. In Table 5, we estimate equation (1) across different regions. For the world as a whole and for countries that were ever members of OPEC (columns 1 and 5), we find a *positive* relationship, inconsistent with the FLP. For major oil producers (column 3), the relationship is negative but with a small and statistically insignificant coefficient estimate. For Middle Eastern countries (column 7), the relationship is negative and statistically significant. However, in column 8, estimates on the interaction terms between oil prices and period dummies reveals that this negative effect in Middle Eastern countries is entirely driven by the 1861–1924 period, when oil prices were of minimal or no importance to these countries. (Oil was not discovered in Saudi Arabia until 1938, for instance.) In fact, looking across the columns of Table 5 reveals that statistically significant negative effects of oil prices on the combined Polity score arise only in the 1861–1924 period, raising suspicions that such negative effects are entirely spurious, since oil was of almost no economic significance to virtually every country in this period.

Table 6 shows results for distinct time periods rather than regions. The simple effect of oil prices is either significantly positive or statistically indistinguishable from zero for all time periods. Considering interactions with region dummies, it appears as before that oil prices may bear a negative relationship with the combined Polity score for major oil producers and Middle Eastern countries (and a positive one for OPEC countries). However, these effects disappear entirely when focusing on the 1961–2007 period, where we would most expect to see them appear strongly.

The regressions in Tables 5 and 6 control for country fixed effects. Thus they are equivalent to regressions in deviations from country means. While taking deviations from

TABLE 5
PANEL FIXED EFFECTS REGRESSIONS, BY REGION (UNBALANCED PANEL, COUNTRY FIXED EFFECTS)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Full sample		Oil producers		OPEC		Middle East	
Price of crude oil, constant 2007 prices	0.004		−0.004		0.016		−0.014	
	[0.002]*		[0.004]		[0.006]**		[0.004]***	
Crude oil price * 1861–1924 dummy		−0.034		−0.043		−0.019		−0.032
		[0.004]***		[0.007]***		[0.014]		[0.012]***
Crude oil price * 1925–1960 dummy		−0.006		0.080		−0.086		−0.027
		[0.040]		[0.066]		[0.119]		[0.084]
Crude oil price * 1961–2007 dummy		−0.001		0.009		0.017		−0.002
		[0.002]		[0.004]**		[0.007]**		[0.005]
1925–1960 dummy		0.292		−0.175		4.091		0.200
		[0.616]		[1.028]		[1.858]**		[1.340]
1961–2007 dummy		2.402		1.118		3.845		−1.502
		[0.184]***		[0.313]***		[0.592]***		[0.495]***
No. of observations	12,539	12,539	2725	2725	1015	1015	1006	1006
(no. of countries)	(167)	(167)	(29)	(29)	(14)	(14)	(16)	(16)

Notes
Standard errors in brackets; * significant at 10%, ** significant at 5%, *** significant at 1%.
Dummy for 1861–1924 omitted due to perfect collinearity.

TABLE 6
PANEL FIXED EFFECTS REGRESSIONS, BY PERIOD (UNBALANCED PANEL, COUNTRY FIXED EFFECTS)

	(1)	(2)	(3)	(4)	(5)	(6)
	1861–2007		1925–2007		1961–2007	
Price of crude oil, constant 2007 prices	0.004 [0.002]*	0.007 [0.002]***	0.016 [0.002]***	0.019 [0.003]***	−0.001 [0.002]	−0.003 [0.003]
Crude oil price * Oil producer dummy		−0.020 [0.006]***		−0.013 [0.007]*		0.007 [0.008]
Crude oil price * OPEC dummy		0.038 [0.009]***		0.035 [0.010]***		0.016 [0.011]
Crude oil price * Middle East dummy		−0.024 [0.008]***		−0.037 [0.008]***		−0.009 [0.009]
No. of observations	12,539	12,539	9246	9246	6643	6643
(no. of countries)	(167)	(167)	(167)	(167)	(167)	(167)

Notes
Standard errors in brackets; * significant at 10%; *** significant at 1%.

TABLE 7
FIRST DIFFERENCE PANEL FIXED EFFECTS REGRESSIONS, BY REGION, 1961–2007 PERIOD (UNBALANCED PANEL, COUNTRY FIXED EFFECTS)

	(1)	(2)	(3)	(4)
	Full sample	Oil producers	OPEC	Middle East
First difference of price of crude oil, constant 2007 prices	0.003 [0.002]	0.009 [0.004]**	0.019 [0.006]***	0.004 [0.004]
No. of observations	6575	1311	609	621
(no. of countries)	(167)	(29)	(14)	(16)

Notes
Standard errors in brackets; ** significant at 5%, *** significant at 1%.
The dependent variable is the first difference of the combined Polity score.

country means may help to eliminate non-stationarity from regime type and oil prices, it is possible that deviations of these variables from their country means remain non-stationary. To address this problem, Table 7 runs fixed effects regressions where regime type and oil prices are entered in first differences. This table focuses on the 1961–2007 period and examines the relationship for various geographic subsamples as defined previously. Again, we find no evidence of an inverse relationship between oil prices and democracy—in fact the relationship, if anything, appears to be positive.

In sum, much like the time series exercise, a panel data approach reveals no evidence of any significant association between crude oil prices and democracy levels.

Regime transitions

An alternative approach to explaining the Polity score itself is to examine whether variations in oil prices make regime transitions of various kinds more or less likely. It is

indeed possible that while high oil prices do not increase autocracy and reduce democracy, as established above, they might strengthen both autocratic and democratic regimes, reducing the likelihood of regime transitions in either direction. In other words, high oil prices could be a curse for autocratic regimes, by perpetuating the status quo, but they could also strengthen democracy, reducing the likelihood of transitions to autocracy. These offsetting effects would be consistent with a finding of no average effect of oil prices on democracy levels. If this were the case, we would expect high oil prices to perpetuate existing regimes, whether democratic or autocratic. This hypothesis is different from the FLP, which states that high oil prices actually foster autocracy and undermine democracy, but a finding that high oil prices reduce the likelihood of transitions to democracy would be consistent with the FLP. The idea in this subsection is to test whether there are more transitions from democracy to autocracy (and vice versa) during periods of low oil prices, during which the regime in place gains strength.[7]

To conduct this test we rely on the Polity IV definition of a regime transition towards democracy or towards autocracy, and seek to explain the likelihood of regime transitions in either democratic or autocratic directions as a function of oil prices. To this end we create two dummy variables taking on value 1 if a country experienced a change in the Polity score of three or more points over three years in the direction of either more autocracy or more democracy.[8] We then examine the effect of old prices in different regions and periods. The proper estimation method for this empirical test is a conditional logit fixed effects estimator, which allows us, as before, to control for country fixed effects. Tables 8

TABLE 8
CONDITIONAL LOGIT FIXED EFFECTS REGRESSIONS, BY PERIOD (DEPENDENT VARIABLE: REGIME TRANSITION DEFINED AS A TRANSITION TO AUTOCRACY)

	(1) 1861–2007	(2) 1861–2007	(3) 1925–2007	(4) 1925–2007	(5) 1961–2007	(6) 1961–2007
Price of crude oil, constant 2007 prices	−0.024 [0.004]***	−0.019 [0.004]***	−0.034 [0.005]***	−0.029 [0.005]***	−0.028 [0.006]***	−0.023 [0.006]***
Crude oil price * Oil producer dummy		−0.044 [0.025]*		−0.097 [0.043]**		−0.092 [0.044]**
Crude oil price * OPEC dummy		0.022 [0.031]		0.082 [0.047]*		0.072 [0.049]
Crude oil price * Middle East dummy		−0.015 [0.032]		0.009 [0.029]		0.012 [0.029]
No. observations	8438	8438	5643	5643	2773	2773
(no. of countries)	(97)	(97)	(93)	(93)	(65)	(65)

Notes
Standard errors in brackets; * significant at 10%, ** significant at 5%, *** significant at 1%.
Note that conditional logit estimation requires dropping countries for which no regime transition (as defined in the same way as the dependent variable) has occurred.
The dependent variable is a dummy for transition to autocracy, which takes value 1 if the Polity variable REGTRANS takes value −1 or −2 (i.e. if the Polity score decreases by 3 or more points over a period of 3 years), 0 otherwise.

TABLE 9
CONDITIONAL LOGIT FIXED EFFECTS REGRESSIONS, BY PERIOD (DEPENDENT VARIABLE: REGIME TRANSITION DEFINED AS A TRANSITION TO DEMOCRACY)

	(1) 1861–2007	(2) 1861–2007	(3) 1925–2007	(4) 1925–2007	(5) 1961–2007	(6) 1961–2007
Price of crude oil, constant 2007 prices	0.005 [0.002]**	0.007 [0.002]***	0.004 [0.003]*	0.006 [0.003]**	0.003 [0.003]	0.003 [0.003]
Crude oil price * Oil producer dummy		−0.016 [0.011]		−0.009 [0.012]		−0.003 [0.014]
Crude oil price * OPEC dummy		0.005 [0.014]		0.002 [0.014]		−0.002 [0.016]
Crude oil price * Middle East dummy		−0.004 [0.011]		−0.001 [0.011]		0.006 [0.012]
No. of observations	9989	9989	6313	6313	4186	4186
(no. of countries)	(116)	(116)	(106)	(106)	(99)	(99)

Notes
Standard errors in brackets; * significant at 10%, ** significant at 5%, *** significant at 1%.
The dependent variable is a dummy for transition to democracy, which takes value 1 if the Polity variable REGTRANS takes value 1, 2 or 3 (i.e. if the Polity score increases by 3 or more points over a period of 3 years), 0 otherwise.

and 9 display the results of such regressions, for transitions to autocracy and to democracy, respectively.[9]

Table 8 shows that the effect of oil prices on the likelihood of a regime transition in the direction of autocracy is negative, consistent with the finding above that, if anything, high oil prices have a positive effect on democracy levels. Interestingly, the negative effect is stronger for oil producers (column 6), further falsifying the FLP. In Table 9, we find that oil prices actually have a positive effect on the probability of transitioning to democracy, although this effect is statistically insignificant for the most recent period. This is again consistent with the level results discussed earlier. In sum, we find no evidence that high oil prices strengthen autocracies, as Friedman postulated, but we do find some evidence that high oil prices are associated with democratic consolidation.[10]

Discussion of individual cases

Friedman (2006; 2008b, Ch. 4) presents simple time series graphs of crude oil prices against measures of economic or political freedom for Iran, Russia, Nigeria and Venezuela, along with a historical narrative describing the relationship between the two variables in the specific contexts of these countries. The chosen measure of freedom as well as the time period under consideration differ across each of these countries, so the graphs reveal what may appear to be a surprisingly strong inverse association between freedom and crude oil prices.[11] We can display the time path of democracy and oil prices for the same countries using the maximal number of years of available data, and with a consistent definition of political freedom (as before, the combined Polity score). We focus on the maximal number of years of available data in the post-1961 period, where the relationship is

most expected to appear. (For the Russian Federation, data are not available prior to 1992.)[12]

Figure 2 displays the time series relationship for these four countries. The correlation is *positive* across all these countries, suggesting that the inverse relationship between oil prices and democracy in Friedman's graphs was simply the result of an adequate choice

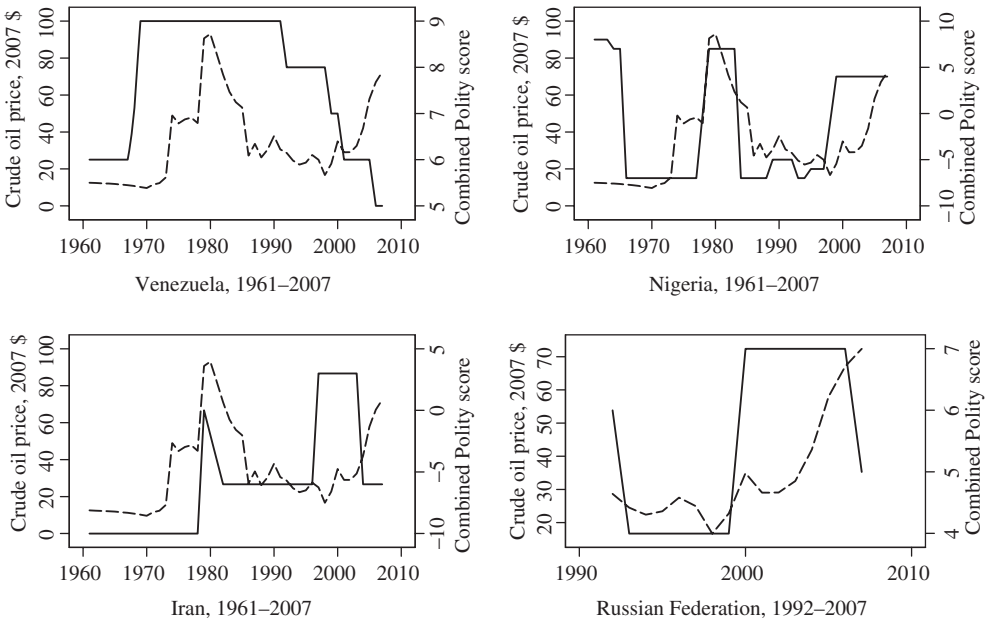

FIGURE 2. Friedman's country cases (dashed line = crude oil price; solid line = combined Polity score).

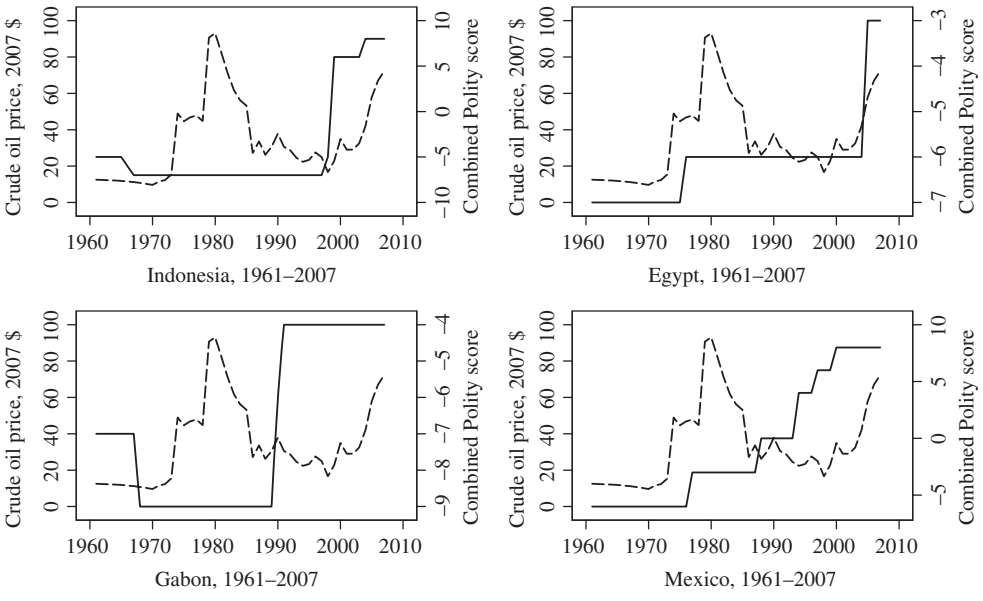

FIGURE 3. Other country cases (dashed line = crude oil price; solid line = combined Polity score).

of a shorter time span (for Venezuela and Iran) and/or of alternative measures of freedom (for Iran, Nigeria and the Russian Federation).[13] In addition, the choice of these countries was rather arbitrary, and the chosen cases were not representative of the larger sample results discussed above.

To further illustrate the lack of a relationship between oil prices and political regime type, we display the same relationship for Indonesia, Egypt, Gabon and Mexico, all major oil producers, in Figure 3. Again, if anything the relationship appears to be positive for three of these four countries.[14] If we were to display the same graph for Middle Eastern countries such as Saudi Arabia or the United Arab Emirates, no relationship would emerge as these countries had constant (and very low) Polity scores in recent decades. This null relationship is reflected in the large sample tests presented above.

III. Conclusion

This paper pursued a simple empirical strategy to evaluate the relationship between oil prices and political regime type. Using a variety of time series and panel data approaches, we evaluated the association between crude oil prices and a measure of democracy for a variety of regions and periods going back to 1861. None of these empirical tests led to any evidence of an inverse relationship between political freedom and oil prices, in particular for oil-producing nations post-1961, where a relationship, if any, would be most expected to exist.

We focused on the price of crude oil. There are ongoing debates on whether natural resource abundance, more broadly, adversely affects the nature of political institutions. If this were the case, we would expect swings in a relatively exogenous factor directly affecting the value of natural resources, such as the price of crude oil, to have some impact on a country's index of democracy. This hypothesis is not, however, supported empirically: there is no such thing as the 'First Law of Petropolitics'.

APPENDIX

Table A1
Sample of Countries, by Period and Region (Balanced Panel used for the Time Series Exercise)

Countries in 1861–2007 sample	Countries added for 1925–2007 sample	Countries added for 1961–2007 sample	
Argentina[a]	Albania	Belgium	Malaysia[a]
Austria	Australia[a]	Benin	Mali
Bolivia	Bhutan	Burkina Faso	Mauritania
Brazil[a]	Bulgaria	Cameroon	Morocco
Chile	Canada[a]	Central African Republic	Myanmar (Burma)
Colombia	Cuba	Chad	Netherlands
Costa Rica	Dominican Republic	China[a]	Nicaragua
Ecuador[a,b]	Egypt[a]	Congo	Niger
El Salvador	Finland	Cote d'Ivoire	Nigeria[a,b]
France	Greece	Cyprus[c]	Norway[a]
Guatemala	Honduras	Denmark	Pakistan
Iran[a,b,c]	Ireland	Ethiopia	Philippines

TABLE A1
CONTINUED

Countries in 1861–2007 sample	Countries added for 1925–2007 sample	Countries added for 1961–2007 sample	
Italy	Mexico[a]	Gabon[a,b]	Rwanda
Liberia	Mongolia	Ghana	Saudi Arabia[a,b,c]
Nepal	Panama	Guinea	Senegal
New Zealand	Peru	Hungary	Sierra Leone
Oman[a,c]	Poland	India[a]	Somalia
Paraguay	Romania	Indonesia[a,b]	Sri Lanka
Portugal	South Africa	Israel[c]	Sudan
Spain	Turkey	Jamaica	Syria[a,c]
Sweden		Japan	Taiwan
Switzerland		Jordan[c]	Tanzania
United Kingdom[a]		Korea	Thailand
Uruguay		Korea, Democratic Republic	Togo
USA[a]		Laos	Tunisia
Venezuela[a,b]		Libya[a,b]	Zaire
(*26 countries*)	(*46 countries*)	Madagascar	(*99 countries*)

Notes
[a] Major oil producers (as defined in text).
[b] Countries that were ever OPEC members.
[c] Countries in the Middle East.

TABLE A2
SAMPLE OF COUNTRIES, BY REGION (UNBALANCED PANEL USED IN THE PANEL DATA ANALYSIS)

Afghanistan	Ghana	Panama
Albania	Greece	Papua New Guinea
Algeria[a,b]	Guatemala	Paraguay
Angola[a,b]	Guinea	Peru
Argentina[a]	Guinea Bissau	Philippines
Armenia	Guyana	Poland
Australia[a]	Haiti	Portugal
Austria	Honduras	Qatar[a,b,c]
Azerbaijan	Hungary	Romania
Bahrain[c]	India[a]	Russian Federation
Bangladesh	Indonesia[a,b]	Rwanda
Belarus	Iran[a,b,c]	Saudi Arabia[a,b,c]
Belgium	Iraq[a,b,c]	Senegal
Benin	Ireland	Serbia/Montenegro
Bhutan	Israel[c]	Sierra Leone
Bolivia	Italy	Singapore
Bosnia	Jamaica	Slovakia
Botswana	Japan	Slovenia
Brazil[a]	Jordan[c]	Solomon Islands
Bulgaria	Kampuchea, Democratic	Somalia
Burkina Faso	Kazakhstan	South Africa
Burundi	Kenya	Spain

TABLE A2
CONTINUED

Cameroon	Korea	Sri Lanka
Canada[a]	Korea, Democratic Republic	Sudan
Central African Republic	Kuwait[a,b,c]	Swaziland
Chad	Kyrgyzstan	Sweden
Chile	Laos	Switzerland
China[a]	Latvia	Syria[a,c]
Colombia	Lebanon[c]	Taiwan
Comoros	Lesotho	Tajikistan
Congo	Liberia	Tanzania
Costa Rica	Libya[a,b]	Thailand
Cote d'Ivoire	Lithuania	The Gambia
Croatia	Macedonia	Togo
Cuba	Madagascar	Trinidad and Tobago[a]
Cyprus[c]	Malawi	Tunisia
Czech Republic	Malaysia[a]	Turkey
Czechoslovakia	Mali	Turkmenistan
Denmark	Mauritania	Uganda
Djibouti	Mauritius	Ukraine
Dominican Republic	Mexico[a]	United Arab Emirates[a,b,c]
Ecuador[a,b]	Moldova	United Kingdom[a]
Egypt[a]	Mongolia	Uruguay
El Salvador	Morocco	USA[a]
Equatorial Guinea	Mozambique	USSR
Eritrea	Myanmar (Burma)	Uzbekistan
Estonia	Namibia	Venezuela[a,b]
Ethiopia	Nepal	Vietnam
Fiji	Netherlands	Yemen, Arab Republic[c]
Finland	New Zealand	Yemen, People's Democratic Republic[c]
France	Nicaragua	Yemen, Republic
Gabon[a,b]	Niger	Yugoslavia
Georgia	Nigeria[a,b]	Zaire
German Democratic Republic	Norway[a]	Zambia
Germany	Oman[a,c]	Zimbabwe
Germany, Federal Republic	Pakistan	(*167 countries*)

Notes
[a] Major oil producers (as defined in text).
[b] Countries that were ever OPEC members.
[c] Countries in the Middle East.

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NOTES

1. The hypothesis was reiterated in a recent New York Times op-ed and a recent book (Friedman 2008a, b). Taibbi (2009) provides an entertaining review.
2. A recent paper by Guriev *et al.* (2011) examines the impact of oil prices on nationalizations in the oil sector in a panel of countries, finding that high oil prices lead to more nationalizations. They do not investigate the effect of crude oil prices on regime type.
3. The data were retrieved in January 2009 from http://www.bp.com/statisticalreview.
4. The 1925 and 1961 cut-off dates for the two more recent periods were chosen to maximize the number of countries included for the computation of the average democracy scores for each period—more countries are covered with each subsequent year in the Polity IV data, with clear breaks in coverage in 1925 and in 1961. Table A1 in the Appendix describes the sample of countries used to compute average democracy scores for each region and period.
5. Conventionally, these correspond to cases 3 and 4 in Hamilton (1994, p. 529). We also considered a specification assuming that for each series, the drift term is zero under the null of a unit root (case 2 in Hamilton 1994), and the results were not materially different.
6. The 167 countries used for the panel analysis are listed in Table A2 of the Appendix.
7. We thank an anonymous referee for this excellent suggestion.
8. These definitions are those of Polity IV, not the author's. We rely on the variable REGTRANS, which codes various forms of regime transitions. The Polity IV codebook (Marshall and Jaggers 2009) provides further details.
9. These tables are analogous to Table 6 in that we run separate regressions per period, controlling for the interaction between oil producer/OPEC/Middle East dummies and oil prices. Similar results are obtained using an approach analogous to Table 5, where separate regressions are run for different regions, controlling for interactions of crude oil prices with time period dummies. For the sake of space we do not report the latter.
10. We also examined whether variation in oil prices could explain regime transitions of any kind—democratic or autocractic. Not surprisingly given the results just discussed, we found no evidence of a systematic effect of oil prices on the probability of any regime transition, as defined by the REGTRANS variable in Polity IV.
11. For Iran and Nigeria, in particular, Friedman's chosen measures of 'freedom' were measures of freedom to trade and of economic freedom, instead of measures of political freedom, or democracy.
12. In a recent paper, Townsend (2009) reexamined these four case studies in detail at the individual country level, expanding the sample period and critically assessing the choice of Friedman's measures of political freedom, reaching conclusions broadly similar to ours.
13. The raw correlations between crude oil price and the combined Polity score for available years of data between 1961 and 2007 were 0.183 (Venezuela), 0.396 (Nigeria), 0.231 (Iran) and 0.476 (Russian Federation).
14. The raw correlations between crude oil price and the combined Polity score from 1961 to 2007 were 0.153 (Indonesia), 0.553 (Egypt), −0.146 (Gabon) and 0.174 (Mexico).

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