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Abstract: We examine the effect of oil price fluctuations on democratic institutions over the 1960-2007 period. We also exploit the very persistent response of income to oil price fluctuations to study the effect of persistent (oil price-driven) income shocks on democracy. Our results indicate that countries with greater net oil exports over GDP see improvements in democratic institutions following upturns in international oil prices. We estimate that a 1 percentage point increase in per capita GDP growth due to a positive oil price shock increases the Polity democracy score by around 0.2 percentage points on impact and by around 2 percentage points in the long run. The effect on the probability of a democratic transition is around 0.4 percentage points.

Key Words: Democracy, Oil Price Shocks, Persistent Income Shocks
JEL Codes: P16, O10

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1. Introduction

The effect of natural resource wealth and income on political institutions is a central issue at the intersection of economics and political sciences. We contribute to this research by examining the effect of international oil price fluctuations on democratic institutions over the 1960-2007 period. We also exploit the very persistent response of aggregate income to oil prices to study the effect of persistent (oil price-driven) income shocks on democracy. Our results indicate that countries with greater net oil exports over GDP see improvements in democratic institutions following upturns in international oil prices. For example, positive oil price shocks lead to improvements in the Polity democracy score—as well as the subscores for executive constraints, executive recruitment, political competition—and a higher probability of a democratic transition. We estimate that an oil price-driven 1 percentage point increase in per capita GDP growth increases the Polity democracy score by around 0.2 percentage points on impact and by around 2 percentage points in the long run. The effect on the probability of a democratic transition is around 0.4 percentage points.

Our work relates to the literature on the link between political institutions and natural resource wealth and income. An influential early contribution is Lipset (1959) who documents that high-income countries tend to be more democratic. He argues that this positive correlation arises because higher per capita income is a symptom of the modernization of society, and that modernization also increases citizens' demand for political participation. The positive association between income and democracy has also been emphasized by Huntington (1991), who defends that higher per capita income was one of the key factors behind the so-called third wave of democratization, and by Przeworski et al. (2000), who argue that higher per capita income averts autocratic reversals. For further evidence on the positive association between income and democracy, see Barro (1999), Boix and Stokes (2003), Epstein et al.

(2006), Glaeser et al. (2007), and Papaioannou and Siourounis (2008a). Acemoglu et al. (2008, 2009) focus on the within-country association between income and democracy using a panel-data approach with country-specific fixed effects. This approach has the advantage of accounting for all fixed country characteristics that may affect both income and political institutions. Acemoglu et al. find no association between income and democracy once country-specific fixed effects are accounted for.

As is well understood, income fluctuations are driven by transitory shocks like monetary policy or rainfall shocks, as well as permanent shocks like technology or oil price shocks (e.g. Hamilton, 1994). The literature on the determinants of democracy suggests that it may be important to distinguish between the effects of transitory income shocks on democratic institutions and the effects of permanent income shocks. For example, Lipset's modernization hypothesis is probably best interpreted as a positive response of democratic institutions to permanent increases in income. On the other hand, Acemoglu and Robinson's (2001, 2006) theory of political transition yields that transitory positive income shocks may decrease the probability of a democratic transition. It is therefore interesting to ask how the effects of transitory and permanent income shocks on democracy can be distinguished empirically. One approach is to focus on different sources of income shocks.[1] For example, Brückner and Ciccone (2010) exploit within-country variation in rainfall as a source of transitory shocks to aggregate income in Sub-Saharan Africa. On the other hand, the response of aggregate income to oil prices is very persistent, and the response of democratic institutions to oil price-driven income shocks is therefore better thought of as the response of democracy to permanent income shocks.[2]

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1 Another approach is to examine the within-country association between income and democracy over different time spans. For example, Acemoglu et al. (2009) look at the year-to-year association, the association over 5-year time spans, and the association over 25-year time spans.

2 Ciccone (2008) discusses estimation of the effects of transitory and permanent income shocks in more

The literature on oil and democracy is closely related to the political science and economics literature on the effect of natural resources on political institutions and long-term growth (see Van der Ploeg, 2010, for a review). An important strand of this literature argues that natural resource abundance leads to less democratic institutions (e.g. Huntington, 1991; Karl, 1997). Several empirical studies have found that the cross-country association between indicators of oil wealth and political institutions is consistent with this argument, see Ross (2001, 2009), Collier and Hoeffler (2009), Ramsey (2009), and Tsui (2010) for example. For studies that question the negative cross-sectional relationship between natural resources on the one hand and institutions and long-term growth on the other, see Stijns (2006) and Alexeev and Conrad (2009). There are also studies of the within-country association between oil income and political institutions.[3] Haber and Menaldo (2010) examine the relationship between several measures of oil income and democracy going back as far as 1861. Their approach exploits the variation of oil prices as well as changes in oil production. Haber and Menaldo's main finding is that if anything, the data point to a positive rather than a negative effect of oil income on democracy. Wacziarg (2009) studies the time-series relationship between international oil prices and democratic institutions. This approach has the advantage of not relying on changes in oil production, which are endogenous and may respond to factors that also affect political institutions. Wacziarg finds a positive relationship between oil prices and democracy in OPEC countries but no link in his full sample. Our analysis differs from Wacziarg's in that we study the effect of international oil prices on democracy by examining the

detail.

3 For example, Burke and Leigh (2010) examine the within-country association between commodity prices and year-to-year rainfall variation on the one hand and democratic institutions on the other. Caselli and Tesei (2010) focus on the heterogeneous response of political institutions in democracies and autocracies to commodity price shocks and also study differences in the response among autocracies. For within-country results on natural resources and growth and human capital accumulation see Stijns (2006).

interaction between net oil exports over GDP and changes in oil prices over time. This approach allows us to control for common time effects to capture global factors like the end of the Cold War or the world business cycle that may affect both oil prices and democracy.

The remainder is organized as follows. Section 2 describes the data. Section 3 presents the estimating equations and Section 4 our main empirical results. Section 5 concludes.

2. Data

Annual data on international oil prices for the 1960-2007 period are from the United Nations Conference on Trade and Development Commodity Statistics (UNCTAD, 2009). Figure 1 graphs the evolution of the oil price level over the 1960-2007 period. The figure suggests that international oil price fluctuations are persistent. This is confirmed by several econometric diagnostics. For example, an AR(1) regression using the natural logarithm (ln) of the international oil price yields an auto-regression coefficient of 0.99 when controlling for a quadratic trend and an auto-regression coefficient of 1.00 when controlling for a linear trend. Moreover, the augmented Dickey-Fuller test does not reject the hypothesis of a unit root in oil price levels at the 90% confidence level (but rejects the hypothesis of a unit root in the first-differenced oil price at the 99% confidence level). The Kwiatkowski et al. (1992) test rejects the stationarity of oil price levels at the 95% confidence level (but does not reject the stationarity of the first-differenced oil price at the 90% confidence level).[4] And the Andrews and Zivot (1992) test, which allows for a structural break in the mean and the trend of oil price levels, fails to reject the hypothesis of a unit root in oil price levels at the 90% confidence level (but rejects the hypothesis of a unit root in the first-differenced oil price at the 99% confidence level). We therefore proceed under the assumption that there is a unit root in international oil prices but that first-differenced

4 The kernel bandwidth in the Kwiatkowski et al. test is based on the Newey and West (1994) automated bandwidth selection criteria and set equal to 5.

oil prices are stationary.

If there is a unit root in international oil prices, the change in oil prices over time corresponds to oil price shocks. Our indicator of the economic impact of international oil price shocks in country *c* is

$$OilPriceShock_{c,t} = \theta_c \Delta \ln OilPrice_t , \quad (1)$$

where θ_c is oil exports minus oil imports relative to GDP over the whole time period considered or at some point in time, and $\Delta \ln OilPrice_t$ is the ln-change in international oil prices over time. This formulation captures that the impact of international oil price shocks should be greater in countries with greater net oil exports over GDP. The data on oil exports and oil imports are from the NBER-United Nations Trade Database (Feenstra et al., 2004). The cross-country maximum (minimum) of θ_c calculated over the 1960-2007 period is 0.18 (-0.03) and the cross-country mean (median) is 0.009 (-0.001).

Our main measure of democracy is the revised combined Polity score (Polity2) from the Polity IV database (Marshall and Jaggers, 2009). The revised combined Polity score is based on subscores for constraints on the chief executive, the competitiveness of political participation, and the openness and competitiveness of executive recruitment. The Polity2 score ranges from -10 to +10. Higher values denote more democratic institutions. The Polity IV project also provides the subscores for constraints on the executive, political competition, and executive recruitment. The executive constraints subscore measures the extent of institutional constraints on the decision making powers of chief executives. The score ranges from 1 to 7, with higher values denoting stronger executive constraints. The political competition score measures the degree of institutionalization of political competition and the extent of government restriction on political competition. This score ranges from 1 to 10, with greater values denoting more political competition. The openness and competitiveness of executive recruitment score measures the ways in which social superordinates come to occupy their positions of political authority.

The score ranges from 1 to 8, with greater values indicating more open and competitive executive recruitment.[5] The Polity IV project codes times of interregnum (anarchy) as a Polity2 score of 0. This coding rule may give a misleading picture of progress toward democracy as autocracies with negative Polity2 scores that fall into anarchy improve their Polity2 scores. Moreover, the Polity2 score is interpolated during multi-year transitions following an interregnum (anarchy) period. To deal with these coding issues and also ensure comparability between the Polity2 score and the Polity subscores (which are missing for interregnum periods), our baseline results exclude country-years that correspond to interregnum periods or transition periods associated with interregnum. But we also examine results for Polity2 with interregnum and transition periods and results based on the Polity IV Regtrans variable, which is a discrete version of the Polity2 variable.

We also construct a democratic transition indicator that takes the value of 1 in year *t* if the country is a democracy in year *t* but was an autocracy in year *t*-1; and an autocratic reversal indicator that takes the value of 1 in year *t* if the country is an autocracy in year *t* but was a democracy in year *t*-1. Following the Polity IV project, countries are coded as democracies if their Polity2 score is strictly positive; otherwise countries are coded as autocracies.[6] Table 1 provides some summary statistics of our measures of democracy.

3. Estimation

5 The sample correlation of the within-country change in the executive constraints and political competition (executive recruitment) score is 0.63 (0.70). The sample correlation of the within-country change in the political competition and executive recruitment score is 0.63.

6 We also examined results for democratic transition and autocratic reversal indicators that treat interregnum periods as missing observations. This did not affect our main results.

Our main reduced form equation relates changes in countries' democracy score between *t*-1 and *t* $\Delta Democ_{c,t}$ to the oil price shock in (1),

$$\Delta Democ_{c,t} = a_c + b_t + d\, OilPriceShock_{c,t} + e_{c,t} \quad (2)$$

where a_c and b_t are country and year fixed effects; d the main coefficient of interest; and $e_{c,t}$ an error term that is clustered at the country level. The method of estimation is least squares. To examine whether oil price shocks induce a change in countries' democratic institutions through per capita GDP growth $\Delta \ln GDP_{c,t}$, we estimate

$$\Delta Democ_{c,t} = \alpha_c + \beta_t + \delta \Delta \ln GDP_{c,t} + \varepsilon_{c,t}, \quad (3)$$

where α_c and β_t are country and year fixed effects; δ the main coefficient of interest; $\varepsilon_{c,t}$ an error term that is clustered at the country level; and GDP growth is instrumented by oil price shocks. The method of estimation is two-stage least squares. The implicit exclusion restriction is that oil price shocks affect democracy exclusively through per capita GDP.

4. Main Results

Reduced Form Estimates Table 2 presents the reduced form effect of oil price shocks on our main measures of democratic institutions. Column (1) shows that a positive oil price shock in period *t* leads to a statistically significant increase in the Polity2 score. Oil price shocks in period *t*-1 and *t*-2 enter also with a positive coefficient but the effects are less precisely estimated. In column (2) we find that the average annual oil price shock between *t* and *t*-2 has a statistically significant positive effect on the Polity2 score. Figure 2 graphs the oil price and the Polity2 score for some countries that fit the pattern of the panel regressions. The reduced form effect of oil price shocks on the Polity subscores for executive constraints, executive recruitment and political competition is presented in columns (3)-(8). While the timing is different across subscores, all statistically significant effects point to a positive

effect of oil price shocks on democratic institutions. The table also shows results for the 3-year oil price shock defined as in (1) with the ln-change in oil prices between *t* and *t*-3. The effect of a positive oil price shock on democracy is positive and statistically significant for all scores except executive constraints. The size of the effect on the Polity2 score implies that a 10 percentage point increase in international oil prices increases the Polity2 score on impact by around 0.012 points for every 10 percentage point increase in net oil over GDP. This increase in the Polity2 score is approximately 0.06 percentage points of its range (which goes from -10 to +10).

Table 3 allows for slow adjustment of democratic institutions to 3-year oil price shocks by including the lagged Polity2 score as an additional explanatory variable. The method of estimation is least squares or system-GMM estimation (Blundell and Bond, 1998). The results indicate that the Polity2 score adjusts very slowly to shocks and that the long-run effect of a shock on the Polity2 score is around 10 times the effect on impact.[7] The long-run effect of the oil price shock on the Polity2 score implies that a 10 percentage point increase in international oil prices increases the Polity2 score on impact by around 0.9 percentage points of its range for every 10 percentage point increase in net oil over GDP.

Table 4 indicates that positive oil price shocks have a statistically significant, positive, and persistent effect on purchasing-power-parity GDP per capita growth from the Penn World Tables.[8] Columns (1) and (2) show that the effect is statistically significant on impact. The size of the effect implies that a 10 percentage point increase in international oil prices increases per capita GDP growth by around 1 percentage point for every 10 percentage point increase in net oil over GDP. Columns (3)

7 The long-run adjustment can be obtained as the adjustment on impact multiplied by the inverse of the coefficient on lagged Polity2 multiplied by -1.

8 For information on the Penn World Tables GDP data see Heston et al. (2009).

and (4) show that the effect remains statistically significant after 3 years and that the strength of the effect is very similar to the effect on impact. Columns (5) and (6) show that the effect is also statistically significant after 5 years and that the strength of the effect continues to be similar to the effect on impact. The effect of oil price shocks on GDP growth over 10 years remains statistically significant and is about 2/3 of the effect on impact. Table 5 contains analogous results for the Polity2 score. Columns (1) and (2) show the effect on impact. The size of the effect implies that a 10 percentage point increase in international oil prices increases the Polity2 score by around 0.017 percentage points of its range for every 10 percentage point increase in net oil over GDP. Columns (3) and (4) show that the effect remains statistically significant after 3 years and is around 3 times stronger than the effect on impact. The effect after 5 and 10 years is still statistically significant and similar to the effect after 3 years.

Two-Stage Least Squares Estimates Table 6, Panel A presents two-stage least squares estimates that use oil price shocks as an instrumental variable for real per capita GDP growth. The specifications are analogous to the reduced-form specifications in Table 3 in all other regards.[9] We find positive and statistically significant effects on the Polity2 score as well as the subscores for executive constraints, executive recruitment, and political competition. The point estimate implies that a 1 percentage point increase in per capita GDP leads to an increase in the Polity2 score of 0.22 percentage points of its range on impact. The impact response of the Polity subscores for executive constraints and executive recruitment corresponds to 0.16 percentage points of their respective ranges and the response of the

9 All two-stage least squares regressions control for country and year fixed effects as well as the lagged democracy score (estimates are not reported). System-GMM results continue to be very similar to least squares results (see Tables 3-5) and are therefore no longer reported.

political competition subscore to 0.26 percentage points of its range.[10] The coefficient estimates and significance levels on the lagged democracy scores are very similar to those in Table 3, and the implied long-run effects therefore continue to be around 10 times the impact effects (see page 8). Hence, the long-run effect of a 1 percentage point increase in per capita GDP is an increase in the Polity2 score of 2.2 percentage points of its range. The table also reports the first-stage F-statistic; the statistic is around 45, substantially above the threshold of 10 recommended by Staiger and Stock (1997), which indicates that weak instruments should not be an important concern.

Table 6, Panel B reports least squares estimates of the effect of per capita GDP on democracy. Least squares estimates are positive but smaller than two-stage least squares estimates and statistically insignificant in most cases. This might be due to measurement error in GDP growth (e.g. Heston, 1994; Deaton, 2005; Johnson et al., 2009). If measurement error is classical and unrelated to oil price shocks, least squares estimates would be biased toward zero but two-stage least squares estimates would be unaffected. Least squares estimates could also be smaller because they end up capturing the effect of a GDP shock with 'average' persistence, as GDP is subject to permanent as well as transitory shocks.[11] On the other hand, two-stage least squares estimates using oil price shocks as an instrument capture the effect of very persistent GDP shocks. There could also be other reasons for the discrepancy between least squares estimates and two-stage least squares estimates. For example, oil-price-driven income shocks might have stronger effects on government tax revenues or the interpersonal income distribution

10 Dropping lagged democracy scores yields the following impact effects (t-statistics): 3.21 (2.55) for Polity2; 0.7 (1.31) for executive constraints; 0.93 (2.27) for executive recruitment; and 2.1 (3.37) for political competition. Hence, the effects continue to be statistically significant except for executive constraints.

11 Put differently, the discrepancy could be due to shocks with different degrees of persistence having different effects on democratic institutions. See Angrist and Pischke (2009) for more on instrumental-variables estimation in the presence of heterogeneous effects.

than other shocks to GDP.

Tables 7 and 8 implement tests of the overidentifying restriction that oil price shocks affect democracy only through GDP. The approach in Table 7 uses lagged GDP per capita levels as an additional instrument for GDP growth. Lagged GDP levels can be used as an additional instrument if they affect democratic institutions only through GDP growth. Table 7, Panel A reports the joint F-statistic for the first-stage effect of oil price shocks and lagged GDP levels on GDP growth, which indicates that weak instruments should not be an important concern. The table also reports the p-values of the Hansen test of overidentifying restriction. The Hansen test rejects the hypothesis that the overidentifying restriction is violated. Table 7, Panel B reports the effect of oil price shocks on democratic institutions conditional on per capita GDP growth instrumented by lagged GDP levels. The F-statistic for the first-stage effect of lagged GDP levels on GDP growth suggests that the instrument is quite strong. Our results indicate that the (direct) effect of oil price shocks is statistically insignificant. The effect of GDP growth conditional on oil price shocks is also statistically insignificant. One reason could be that the lagged GDP instrument captures mostly differences in GDP growth due to mean reversion and that such growth differences have a weaker or no effect on democratic institutions. Table 8 examines results using lagged savings rates as an instrument for income (e.g. Acemoglu et al., 2008).[12] Table 8, Panel A reports two-stage least squares estimates where per capita GDP growth is instrumented by both the change in the savings rate between *t*-1 and *t*-2 and the oil price shock variable. The first-stage regression yields a joint F-statistic of around 25 which indicates that weak instruments are again not a main concern. The effect of per capita GDP growth on democratic institutions is statistically significant and similar to our previous results. The Hansen test does not reject

12 The savings rate is calculated as 1 minus consumption over GDP using data from the Penn World Tables.

the overidentifying restriction. Table 8, Panel B examines the effect of oil price shocks and per capita GDP growth separately using the change in the lagged savings rate as an instrument for GDP growth. The first-stage F-statistic is now below the Staiger and Stock (1997) threshold of 10 and indicates that weak instruments are a concern. As weak instruments can lead to severe biases in the two-stage least squares standard errors (and derived t-statistics), we also report the p-values of the Anderson-Rubin test of statistical significance in square brackets. A key property of this test is robustness to weak instruments. 2SLS standard errors (and derived t-statistics), on the other hand, are not robust to weak instruments, and inference based on 2SLS standard errors can be very misleading as a result. See Andrews and Stock (2005) for a review of these issues.[13] Our results suggest that oil price shocks do not have a statistically significant (direct) effect on democratic institutions conditional on GDP growth. The effect of per capita GDP growth on the Polity2 score and the subscore for executive recruitment is positive and statistically significant at the 90% confidence level according to the Anderson-Rubin test but statistically insignificant according to the t-statistic based on the two-stage least squares standard errors. The effect of GDP growth on the subscores for executive constraints and political competition is positive but statistically insignificant according to the t-statistic based on the two-stage least squares standard errors and the Anderson-Rubin test.

Further Robustness Checks International oil prices could be affected by (anticipated) GDP growth or political change in large producer and consumer countries. Table 9 therefore presents two-stage least squares effects of GDP growth on democratic institutions in countries that produce or consume less

13 The Anderson-Rubin test also has good power properties (it is a uniformly most powerful unbiased test under certain conditions). We implement a version of the Anderson-Rubin test that is robust to heteroskedasticity and arbitrary within-country correlation of the residuals.

than 1 percent of world oil production.[14] (Anticipated) GDP growth or political change in these countries is unlikely to have significant effects on international oil prices. The estimates in Table 9 show that oil-price-driven GDP shocks continue to have a statistically significant effect on democratic institutions. The size of the effects is similar to our previous results except for executive constraints.

It is sometimes maintained that upturns in international oil prices are bad for economic and political development in countries where oil exports are an important share of GDP (e.g. Friedman, 2006, 2008). Table 10 examines this view after restricting the sample to countries that are net oil exporters. The effect of oil-price-driven per capita GDP growth on democratic institutions continues to be positive and statistically significant, and point estimates are somewhat larger than in previous tables. Table 11 examines whether the effect of oil-price-driven GDP growth on democratic institutions is significantly different in OPEC countries. The difference between the effect in OPEC countries and in non-OPEC countries is captured by the interaction effect. This effect enters positively but is statistically insignificant.[15]

In Table 12 we split the sample into two sub-periods with a similar number of observations. Panel A presents two-stage least squares estimates for the pre-1987 period, while Panel B shows estimates for the post-1987 period. Oil price shocks have a statistically significant effect on per capita GDP in both samples. The effect of oil-price-driven GDP growth on the Polity2 score is also statistically significant in both samples. The point estimates for the Polity2 score are similar, 2.60

14 The excluded countries according to the 1 percent criterion are: Algeria, Canada, China, Germany, Indonesia, Iran, Iraq, Italy, Kuwait, Libya, Mexico, Netherlands, Nigeria, Norway, Oman, Qatar, Russia, Saudi Arabia, United Arab Emirates, United Kingdom, United States, and Venezuela.

15 The first-stage effect of oil price shocks on GDP per capita for the OPEC oil exporters has a t-value of 7.6 while the first-stage effect for the remaining countries hast a t-value of 5.3.

before 1987 and 2.57 after 1987. The results for Polity subscores are stronger for the post-1987 period.

Table 13 estimates the effect of oil-price-driven GDP growth on democratic institutions for the period after 1970. The value for net oil exports over GDP used in the oil price shock in (1) now corresponds to the beginning of the sample period (1970) to preclude any effect of international oil price fluctuations after 1970 on our measure of oil exports.[16] Oil-price-driven GDP growth continues to have a significantly positive effect on democratic institutions, except for executive constraints.

Oil-price-driven GDP growth could lead to improvements in Polity2 scores because it increases the probability of countries transiting from autocracy to democracy (a democratic transition) or because it decreases the probability of countries transiting from democracy to autocracy (an autocratic reversal). Table 14, column (1) shows that oil-price-driven GDP growth has a significantly positive effect on the probability of democratic transitions. A 1 percent increase in real per capita GDP due to oil price shocks increases the probability of a democratic transition by around 0.4 percentage points. Column (2) shows that oil-price-driven GDP growth also decreases the probability of autocratic reversals. But the point estimate is not statistically significant, even though it is larger than the point estimate on the probability of a transition to democracy.[17] Column (3) shows that oil-price-driven GDP growth continues to have a significant effect on changes in the Polity2 variable when we include interregnum periods (see page 6 above). And column (4) shows that there is also a significant effect of oil-price-

16 Using average net exports over GDP after 1970 instead yields quantitatively and statistically stronger results.

17 The linear probability model is the usually preferred method in instrumental variables estimation (see e.g. Angrist and Krueger, 2001). To ensure that results are not driven by the linear probability specification, we have also estimated reduced form transition equations using the conditional logit fixed effects estimator. These also yield a significant positive effect of oil price shocks on the probability of a transition to democracy and a negative but insignificant effect of oil price shocks on the probability of a transition to autocracy.

driven GDP growth on the discretized Polity IV Regtrans variable.

All estimates so far were based on the democracy measures from the Polity IV project. Table 15 reports two-stage least squares estimates for alternative democracy measures. Column (1) reports the two-stage least squares effect of per capita GDP growth on the political rights score from Freedom House (2010). Column (2) reports the effect on the Freedom House trichotomous freedom indicator. Column (3) reports the effect on the Przeworski et al. (2000) binary democracy indicator, and column (4) reports the effect on the democracy indicator from Papaioannou and Siourounis (2008b). The main result is that oil-price-driven GDP growth leads to democratic improvements in all cases.

Table 16 uses constant-price GDP per capita growth data from the WDI (2010) instead of purchasing-power-parity GDP data from the Penn World Tables. The WDI data are entirely based on national income accounts and do not account for cross-country differences in prices, see Heston et al. (2009). Using WDI instead of Penn World Tables data on GDP growth leads to a drop in sample size of around 10%. Moreover, the first-stage F-statistics drop below 10, which indicates that weak instruments are a concern according to the Staiger and Stock (1997) criterion. We therefore report the p-values of the Anderson-Rubin test of statistical significance in square brackets in addition to the t-statistics based on two-stage least squares standard errors; see page 11 above for more on the Anderson-Rubin test and two-stage least squares standard error with weak instruments. Table 16 shows that oil-price-driven per capita GDP growth continues to have a statistically significant positive effect on the Polity2 score at the 90% confidence level. For the democracy indicator from Papaioannou and Siourounis (2008b), the effect is positive but statistically insignificant according to the Anderson-Rubin test and the t-statistic based on the two-stage least squares standard error. For the other democracy indicators the effects are positive and statistically significant at the 90% level according to the Anderson-Rubin test but statistically insignificant according to the t-statistic based on the two-stage least squares standard errors.

5. Conclusion

Upturns in international oil prices raise GDP growth more in countries with greater net oil exports over GDP, and the implied growth differentials are very persistent. These economic effects of international oil price fluctuations lead us to ask two main questions. How do upturns in international oil prices affect democratic institutions? And what is the effect of oil price-driven (persistent) income shocks on democracy? We find that countries with greater net oil exports over GDP see improvements in democratic institutions following upturns in international oil prices. An oil-price-driven 1 percentage point increase in per capita GDP growth leads to an improvement in the main Polity democracy score by around 0.2 percentage points on impact and by around 2 percentage points in the long run. The effect on the probability of a democratic transition is around 0.4 percentage points.

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Table 1. Summary Statistics of Polity Measures

	Mean	Std. Dev.	Min	Max	Obs.
Revised Combined Polity score (Polity2)	0.40	7.59	-10	10	4782
Executive Constraints (Exconst)	3.99	2.36	1	7	4782
Executive Recruitment (Exrec)	5.48	2.40	1	8	4782
Political Competition (Polcomp)	5.20	3.73	1	10	4782
Polity2 Including Interregnum	0.38	7.45	-10	10	5020
Transition to Democracy Indicator	0.03	0.18	0	1	2649
Transition to Autocracy Indicator	0.02	0.16	0	1	2371
Regime Transition Indicator (Regtrans)	0.01	0.20	-1	1	5020

Table 2. Oil Price Shocks and Democracy

	ΔPolity2		ΔExconst		ΔExrec		ΔPolcomp	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Oil Price Shock, t	1.26**		0.52***		0.10		0.75***	
	(2.51)		(2.79)		(0.23)		(2.80)	
Oil Price Shock, t-1	1.25*		0.31		0.43**		0.80***	
	(1.83)		(0.86)		(2.40)		(2.69)	
Oil Price Shock, t-2	1.14		-0.03		0.51**		0.83**	
	(1.48)		(-0.08)		(2.08)		(2.47)	
3-Year Oil Price Shock		1.22**		0.26		0.35**		0.79***
		(2.49)		(1.31)		(2.24)		(3.45)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4782	4782	4782	4782	4782	4782	4782	4782

Note: The method of estimation is least squares; t-statistics shown in parentheses are based on Huber-robust standard errors that are clustered at the country level. The dependent variable in columns (1) and (2) is the change in the Polity2 score; columns (3) and (4) the change in the executive constraints score; columns (5) and (6) the change in the executive recruitment score; and columns (7) and (8) the change in the political competition score. The 3-year oil price shock is defined as in (1) in the main text with the ln-change in oil prices between *t* and *t*-3. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 3. Oil Price Shocks, Democracy, and Polity Convergence

	ΔPolity2		ΔExconst		ΔExrec		ΔPolcomp	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	LS	GMM	LS	GMM	LS	GMM	LS	GMM
3-Year Oil Price Shock	1.67***	1.70***	0.42**	0.36*	0.49***	0.48***	0.99***	0.96***
	(3.22)	(2.93)	(2.08)	(1.74)	(3.00)	(2.87)	(3.96)	(3.21)
Lagged Democracy (Level)	-0.10***	-0.09***	-0.12***	-0.07**	-0.12***	-0.10***	-0.10***	-0.09***
	(-8.98)	(-3.12)	(-9.43)	(-2.27)	(-9.62)	(-3.40)	(-8.86)	(-3.21)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4782	4782	4782	4782	4782	4782	4782	4782

Note: The method of estimation in columns (1), (3), (5), and (7) is least squares; columns (2), (4), (6), and (8) system-GMM (Blundell and Bond, 1998). t-statistics shown in parentheses are based on Huber-robust standard errors that are clustered at the country level. The dependent variable in columns (1) and (2) is the change in the Polity2 score; columns (3) and (4) the change in the executive constraints score; columns (5) and (6) the change in the executive recruitment score; and columns (7) and (8) the change in the political competition score. The p-value on the Hansen J-test (AR2 test) of the overidentifying restrictions for the system-GMM estimation in column (2) is 0.97 (0.52), column (4) 0.77 (0.49), column (6) 0.67 (0.25), and column (8) 0.99 (0.90). The 3-year oil price shock is defined as in (1) in the main text with the ln-change in oil prices between *t* and *t*-3. Lagged democracy refers to the Polity2 score at *t*-1 in columns (1) and (2), and to the relevant Polity sub-score at *t*-1 in columns (3)-(8). *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 4. Persistent Effects of Oil Price Shocks on GDP

	ΔLnGDP							
	Effect on GDP on Impact (t-->t)		Effect on GDP After 3 Years (t-3-->t)		Effect on GDP After 5 Years (t-5-->t)		Effect on GDP After 10 Years (t-10-->t)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	LS	GMM	LS	GMM	LS	GMM	LS	GMM
Oil Price Shock	0.96***	0.94***	0.95***	0.91***	1.00***	0.99***	0.64**	0.65**
	(4.73)	(4.90)	(5.82)	(4.96)	(5.32)	(5.01)	(2.25)	(2.60)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4782	4782	4625	4625	4409	4409	3829	3829

Note: The method of estimation in columns (1), (3), (5), and (7) is least squares; columns (2), (4), (6), and (8) system-GMM. t-statistics shown in parentheses are based on Huber-robust standard errors that are clustered at the country level. The dependent variable is the ln-change in real per capita GDP. Columns (1) and (2) show the effect of an oil price shock in year *t* on the ln-change in GDP between year *t*-1 and *t*, controlling for the level of real per capita GDP in year *t*-1. Columns (3) and (4) show the effect of an oil price shock in year *t*-3 on the ln-change in GDP between year *t*-4 and *t*, controlling for the level of real per capita GDP in year *t*-4. Columns (5) and (6) show the effect of an oil price shock in year *t*-5 on the ln-change in GDP between year *t*-6 and *t*, controlling for the level of real per capita GDP in year *t*-6. Columns (7) and (8) show the effect of an oil price shock in year *t*-10 on the ln-change in GDP between year *t*-11 and *t*, controlling for the level of real per capita GDP in year *t*-11. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 5. Persistent Effects of Oil Price Shocks on Democracy

	ΔPolity2							
	Effect on Polity2 on Impact (t-->t)		Effect on Polity2 After 3 Years (t-3-->t)		Effect on Polity2 After 5 Years (t-5-->t)		Effect on Polity2 After 10 Years (t-10-->t)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	LS	GMM	LS	GMM	LS	GMM	LS	GMM
Oil Price Shock	1.52***	1.80**	4.47***	4.68***	3.34*	4.55**	4.83**	3.77*
	(3.34)	(2.37)	(2.68)	(2.83)	(1.91)	(2.04)	(2.06)	(1.70)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4782	4782	4610	4610	4390	4390	3811	3811

Note: The method of estimation in columns (1), (3), (5), and (7) is least squares; columns (2), (4), (6), and (8) system-GMM. t-statistics shown in parentheses are based on Huber-robust standard errors that are clustered at the country level. The dependent variable is the change in the Polity2 score. Columns (1) and (2) show the effect of an oil price shock in year *t* on the change in the Polity2 score between year *t*-1 and *t*, controlling for the level of the Polity2 score in year *t*-1. Columns (3) and (4) show the effect of an oil price shock in year *t*-3 on the change in the Polity2 score between year *t*-4 and *t*, controlling for the level of the Polity2 score in year *t*-4. Columns (5) and (6) show the effect of an oil price shock in year *t*-5 on the change in the Polity2 score between year *t*-6 and *t*, controlling for the level of the Polity2 score in year *t*-6. Columns (7) and (8) show the effect of an oil price shock in year *t*-10 on the change in the Polity2 score between year *t*-11 and *t*, controlling for the level of the Polity2 score in year *t*-11. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 6. Oil Price Shocks, Income, and Democracy

	ΔPolity2	ΔExconst	ΔExrec	ΔPolcomp
	(1)	(2)	(3)	(4)
	Panel A: 2SLS Estimates of the Effect of Oil Price Shocks on Democracy through GDP			
ΔLnGDP	4.39***	1.10**	1.31***	2.59***
	(3.27)	(2.09)	(3.10)	(3.94)
First-Stage F-statistic	45	45	45	45
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	4782	4782	4782	4782
	Panel B: OLS Estimates of the Effect that GDP has on Democracy			
ΔLnGDP	0.38	0.21**	0.07	0.13
	(1.43)	(2.17)	(0.67)	(1.05)
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Countries	4782	4782	4782	4782

Note: The method of estimation in Panel A is two-stage least squares; Panel B least squares. t-statistics shown in parentheses are based on Huber-robust standard errors that are clustered at the country level. The instrumental variable in Panel A is the 3-year oil price shock defined as in (1) in the main text with the ln-change in oil prices between *t* and *t*-3. The dependent variable in column (1) is the change in the Polity2 score; column (2) the change in the executive constraints score; column (3) the change in the executive recruitment score; and column (4) the change in the political competition score. The specification in column (1) controls for the Polity2 score at *t*-1, and the specifications in columns (2)-(4) for the relevant Polity sub-score at *t*-1. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 7. Oil Price Shocks, Income, and Democracy
(Test of Exclusion Restriction I)

	ΔPolity2	ΔExconst	ΔExrec	ΔPolcomp
	(1)	(2)	(3)	(4)
		Panel A: IV is Oil Price Shock and Lagged GDP		
ΔLnGDP	3.97***	1.10**	1.22**	2.07***
	(2.63)	(2.16)	(2.31)	(2.93)
Hansen J, p-value	0.74	0.93	0.85	0.46
First-Stage F-statistic	71	71	71	71
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	4759	4759	4759	4759
		Panel B: IV is Lagged GDP		
3-Year Oil Price Shock	0.34	0.03	0.07	0.37
	(0.32)	(0.09)	(0.19)	(0.76)
ΔLnGDP	3.58	1.06	1.14	1.65
	(1.45)	(1.27)	(1.31)	(1.44)
First-Stage F-statistic	40	40	40	40
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Countries	4759	4759	4759	4759

Note: The method of estimation is two-stage least squares. t-statistics shown in parentheses are based on Huber-robust standard errors that are clustered at the country level. The instrumental variable in Panel A is the 3-year oil price shock defined as in (1) in the main text with the ln-change in oil prices between *t* and *t*-3 and the lagged level of real per capita GDP; in Panel B the instrumental variable is the lagged level of real per capita GDP. The dependent variable in column (1) is the change in the Polity2 score; column (2) the change in the executive constraints score; column (3) the change in the executive recruitment score; and column (4) the change in the political competition score. The specification in column (1) controls for the Polity2 score at *t*-1, and the specifications in columns (2)-(4) for the relevant Polity sub-score at *t*-1. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 8. Oil Price Shocks, Income, and Democracy
(Test of Exclusion Restriction II)

	ΔPolity2	ΔExconst	ΔExrec	ΔPolcomp
	(1)	(2)	(3)	(4)
		Panel A: IV is Oil Price Shock and Lagged Savings Rate		
ΔLnGDP	5.15*** (3.53)	1.34** (2.51)	1.63*** (3.37)	2.69*** (3.86)
Hansen J, p-value	0.30	0.38	0.17	0.91
First-Stage F-statistic	25	25	25	25
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	4731	4731	4731	4731
		Panel B: IV is Lagged Savings Rate		
Oil Price Shock	-2.26 (-0.81)	-0.62 (-0.75)	-1.09 (-0.99)	-0.13 (-0.11)
ΔLnGDP	10.47 (1.43) [0.08]*	2.79 (1.28) [0.11]	4.22 (1.48) [0.08]*	3.01 (0.93) [0.30]
First-Stage F-statistic	7	7	7	7
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Countries	4731	4731	4731	4731

Note: The method of estimation is two-stage least squares. t-statistics shown in parentheses are based on Huber-robust standard errors that are clustered at the country level. In Panel B the p-values in square brackets are based on the Anderson-Rubin test of statistical significance. A key property of the Anderson-Rubin test is robustness to weak instruments (see for example Andrews and Stock, 2005). The instrumental variable in Panel A is the 3-year oil price shock defined as in (1) in the main text with the ln-change in oil prices between *t* and *t*-3 and the change in the savings rate between *t*-1 and *t*-2; in Panel B the instrumental variable is the lagged change in the savings rate between *t*-1 and *t*-2. The dependent variable in column (1) is the change in the Polity2 score; column (2) the change in the executive constraints score; column (3) the change in the executive recruitment score; and column (4) the change in the political competition score. The specification in column (1) controls for the Polity2 score at *t*-1, and the specifications in columns (2)-(4) for the relevant Polity sub-score at *t*-1. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence. When the asterisks are next to the test statistic, the confidence level applies to that test statistic only.

Table 9. Robustness I: Excluding Major Oil Producers and Oil Consumers

	ΔPolity2	ΔExconst	ΔExrec	ΔPolcomp
	(1)	(2)	(3)	(4)
ΔLnGDP	4.05**	0.28	1.60***	2.95***
	(2.63)	(0.36)	(2.84)	(3.44)
First-Stage F-Statistic	21	21	21	21
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	3957	3957	3957	3957

Note: The method of estimation is two-stage least squares. t-statistics shown in parentheses are based on Huber-robust standard errors that are clustered at the country level. The instrumental variable is the 3-year oil price shock defined as in (1) in the main text with the ln-change in oil prices between *t* and *t*-3. The dependent variable in column (1) is the change in the Polity2 score; column (2) the change in the executive constraints score; column (3) the change in the executive recruitment score; and column (4) the change in the political competition score. Excluded countries are those that produce or consume more than 1 percent of world oil production. These countries are Algeria, Canada, China, Germany, Indonesia, Iran, Iraq, Italy, Kuwait, Libya, Mexico, Netherlands, Nigeria, Norway, Oman, Qatar, Russia, Saudi Arabia, United Arab Emirates, United Kingdom, United States, and Venezuela. The specification in column (1) controls for the Polity2 score at *t*-1, and the specifications in columns (2)-(4) for the relevant Polity sub-score at *t*-1. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 10. Robustness II: Oil Exporters Only

	ΔPolity2	ΔExconst	ΔExrec	ΔPolcomp
	(1)	(2)	(3)	(4)
ΔLnGDP	6.91*	2.27*	2.01*	3.65**
	(1.95)	(1.77)	(1.75)	(2.38)
First-Stage F-Statistic	22	22	22	22
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	1518	1518	1518	1518

Note: The method of estimation is two-stage least squares. t-statistics shown in parentheses are based on Huber-robust standard errors that are clustered at the country level. The instrumental variable is the 3-year oil price shock defined as in (1) in the main text with the ln-change in oil prices between *t* and *t*-3. The dependent variable in column (1) is the change in the Polity2 score; column (2) the change in the executive constraints score; column (3) the change in the executive recruitment score; and column (4) the change in the political competition score. The oil exporting countries are Albania, Algeria, Angola, Argentina, Azerbaijan, Bahrain, Bolivia, Cameroon, Canada, Chad, Colombia, Democratic Republic of Congo, Ecuador, Egypt, Equatorial Guinea, Gabon, Indonesia, Iran, Iraq, Kazakhstan, Kuwait, Libya, Malaysia, Mexico, Niger, Nigeria, Norway, Oman, Papua New Guinea, Peru, Qatar, Republic of Congo, Russia, Saudi Arabia, Singapore, Trinidad and Tobago, Tunisia, Turkmenistan, United Arab Emirates, United Kingdom, Uzbekistan, Venezuela, Vietnam, and Yemen. The specification in column (1) controls for the Polity2 score at *t*-1, and the specifications in columns (2)-(4) for the relevant Polity sub-score at *t*-1. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 11. Robustness III: Is the Structural Relationship Different for OPEC?

	ΔPolity2	ΔExconst	ΔExrec	ΔPolcomp
	(1)	(2)	(3)	(4)
ΔLnGDP	3.30***	0.53	1.12***	2.31***
	(2.83)	(1.05)	(2.77)	(3.07)
ΔLnGDP*	1.43	0.74	0.24	0.37
OPEC	(1.11)	(1.32)	(0.70)	(0.60)
First-Stage F-Statistic	15	15	15	15
Marginal Effect in	4.73***	1.27**	1.36***	2.68***
OPEC Oil Exporters	(3.20)	(2.16)	(3.03)	(3.97)
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	4782	4782	4782	4782

Note: The method of estimation is two-stage least squares. t-statistics shown in parentheses are based on Huber-robust standard errors that are clustered at the country level. The instrumental variable is the 3-year oil price shock defined as in (1) in the main text with the ln-change in oil prices between *t* and *t*-3 and the 3-year oil price shock interacted with an indicator variable that is 1 if and only if a country is part of the Organization of Petroleum Exporting Countries (OPEC). The countries that are part of OPEC are Algeria, Angola, Ecuador, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates, and Venezuela. The dependent variable in column (1) is the change in the Polity2 score; column (2) the change in the executive constraints score; column (3) the change in the executive recruitment score; and column (4) the change in the political competition score. The specification in column (1) controls for the Polity2 score at *t*-1, and the specifications in columns (2)-(4) for the relevant Polity sub-score at *t*-1. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence. When the asterisks are next to the test statistic, the confidence level applies to that test statistic only.

Table 12. Robustness IV: Time Period Sample Split

	ΔPolity2	ΔExconst	ΔExrec	ΔPolcomp
		Panel A: Pre-1987 Period		
	(1)	(2)	(3)	(4)
ΔLnGDP	2.60*	0.73	0.64	1.50**
	(1.87)	(1.35)	(1.50)	(2.27)
First-Stage F-Statistic	61	61	61	61
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	2419	2419	2419	2419
		Panel B: Post-1987 Period		
	(1)	(2)	(3)	(4)
ΔLnGDP	2.57**	0.04	0.98*	2.33**
	(1.96)	(0.07)	(1.93)	(2.54)
First-Stage F-Statistic	22	22	22	22
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	2363	2363	2363	2363

Note: The method of estimation is two-stage least squares. t-statistics shown in parentheses are based on Huber-robust standard errors that are clustered at the country level. The instrumental variable is the 3-year oil price shock defined as in (1) in the main text with the ln-change in oil prices between *t* and *t*-3. The dependent variable in column (1) is the change in the Polity2 score; column (2) the change in the executive constraints score; column (3) the change in the executive recruitment score; and column (4) the change in the political competition score. The specification in column (1) controls for the Polity2 score at *t*-1, and the specifications in columns (2)-(4) for the relevant Polity sub-score at *t*-1. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 13. Robustness V: Using Net-Export Shares in 1970 and Restricting the Sample to Post-1970

	ΔPolity2	ΔExconst	ΔExrec	ΔPolcomp
	(1)	(2)	(3)	(4)
ΔLnGDP	2.55**	0.15	0.93***	1.90***
	(2.54)	(0.23)	(2.89)	(3.92)
First-Stage F-Statistic	59	59	59	59
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	3390	3390	3390	3390

Note: The method of estimation is two-stage least squares. t-statistics shown in parentheses are based on Huber-robust standard errors that are clustered at the country level. The instrumental variable is the 3-year oil price shock defined as in (1) in the main text with the ln-change in oil prices between *t* and *t*-3. The dependent variable in column (1) is the change in the Polity2 score; column (2) the change in the executive constraints score; column (3) the change in the executive recruitment score; and column (4) the change in the political competition score. The specification in column (1) controls for the Polity2 score at *t*-1, and the specifications in columns (2)-(4) for the relevant Polity sub-score at *t*-1. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 14. Robustness VI: Including Interregnum Periods and Using Transition Indicators

	Democratic Transition	Autocratic Reserval	ΔPolity2	ΔRegtrans
	(1)	(2)	(3)	(4)
ΔLnGDP	0.36***	-0.57	3.80**	0.70*
	(2.72)	(-1.52)	(2.62)	(1.89)
First-Stage F-Statistic	38	12	48	48
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	2649	2371	5020	5020

Note: The method of estimation is two-stage least squares. t-statistics shown in parentheses are based on Huber-robust standard errors that are clustered at the country level. The instrumental variable is the 3-year oil price shock defined as in (1) in the main text with the ln-change in oil prices between *t* and *t*-3. The dependent variable in column (1) is a *Democratic Transition Indicator* that takes on the value of 1 in year *t* if the country is a democracy conditional on being an autocracy in *t*-1. The dependent variable in column (2) is an *Autocratic Reversal Indicator* that takes on the value of 1 if the country is an autocracy in year *t* conditional on being a democracy in *t*-1. The dependent variable in column (3) is the change in the Polity2 score when including interregnum (anarchy) periods and transition periods that are associated with interregnum. The dependent variable in column (4) is the change in the regime transition indicator that is 1 if the country experiences democratic improvements according to the Polity IV Regtrans variable (i e. a 3 or more points increase in the Polity2 score over 3 years or less); -1 if the country experiences democratic deteriorations (i.e. a 3 or more points decrease in the Polity2 score over 3 years or less); or 0. The specification in column (3) controls for the Polity2 score at *t*-1 and the specification in column (4) for the Regtrans at *t*-1. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 15. Robustness VII: Alternative Democracy Indicators

	ΔPolitical Rights	ΔFH Indicator	Przeworski et al.	Papaioannou & Siourounis
	(1)	(2)	(3)	(4)
ΔLnGDP	1.92***	0.78**	0.26***	0.14***
	(3.54)	(1.98)	(2.64)	(2.71)
First-Stage F-Statistic	34	34	31	29
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	4263	4263	4573	4660

Note: The method of estimation is two-stage least squares. t-statistics shown in parentheses are based on Huber-robust standard errors that are clustered at the country level. The instrumental variable is the 3-year oil price shock defined as in (1) in the main text with the ln-change in oil prices between *t* and *t*-3. The dependent variable in column (1) is the change in the Freedom House political rights score. The political rights score ranges between 1 and 7, and is re-scaled so that larger scores denote more democratic institutions. The dependent variable in column (2) is the change in the Freedom House trichotomous freedom indicator. The freedom indicator is re-scaled so that larger values denote more democratic institutions. The dependent variable in column (4) is the change in the democracy indicator from Przeworski et al. (2000); column (4) the change in the democracy indicator from Papaioannou and Siourounis (2008b). The specification in column (1) controls for the political rights score at *t*-1, the specification in column (2) for the Freedom House trichotomous freedom indicator at *t*-1, the specification in column (3) for the Przeworski et al. (2000) democracy indicator at *t*-1, and the specification in column (4) for the Papaioannou and Siourounis (2008b) democracy indicator at *t*-1. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 16. Robustness VIII: World Bank GDP Data

	ΔPolity2	ΔPolitical Rights	ΔFH Indicator	Przeworski et al.	Papaioannou & Siourounis
	(1)	(2)	(3)	(4)	(5)
ΔLnGDP	9.82 (1.31) [0.07]*	5.58 (1.78)* [0.00]***	2.90 (1.49) [0.01]***	0.89 (1.59) [0.05]**	0.32 (1.29) [0.12]
First-Stage F-Statistic	8	8	8	9	7
Country FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	4507	3852	3852	4029	4154

Note: The method of estimation is two-stage least squares. The p-values in square brackets are based on the Anderson-Rubin test of statistical significance. A key property of the Anderson-Rubin test is robustness to weak instruments (see for example Andrews and Stock, 2005). The instrumental variable is the 3-year oil price shock defined as in (1) in the main text with the ln-change in oil prices between *t* and *t*-3. The dependent variable in column (1) is the change in the Polity2 score. The range of the Polity2 score is between -10 and 10 (larger values denote more democratic institutions). The dependent variable in column (2) is the change in the Freedom House political rights score. The political rights score ranges between 1 and 7, and is re-scaled so that larger scores denote more democratic institutions. The dependent variable in column (3) is the change in the Freedom House trichotomous freedom indicator. The freedom indicator is re-scaled so that larger values denote more democratic institutions. The dependent variable in column (4) is the change in the democracy indicator from Przeworski et al. (2000). The dependent variable in column (5) is the change in the democracy indicator from Papaioannou and Siourounis (2008b). The specification in column (1) controls for the Polity2 score at *t*-1, the specification in column (2) controls for the political rights score at *t*-1, the specification in column (3) for the Freedom House trichotomous freedom indicator at *t*-1, the specification in column (4) for the Przeworski et al. (2000) democracy indicator at *t*-1, and the specification in column (5) for the Papaioannou and Siourounis (2008b) democracy indicator at *t*-1. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Figure 1. Time Series Plot of the Oil Price 1960-2007

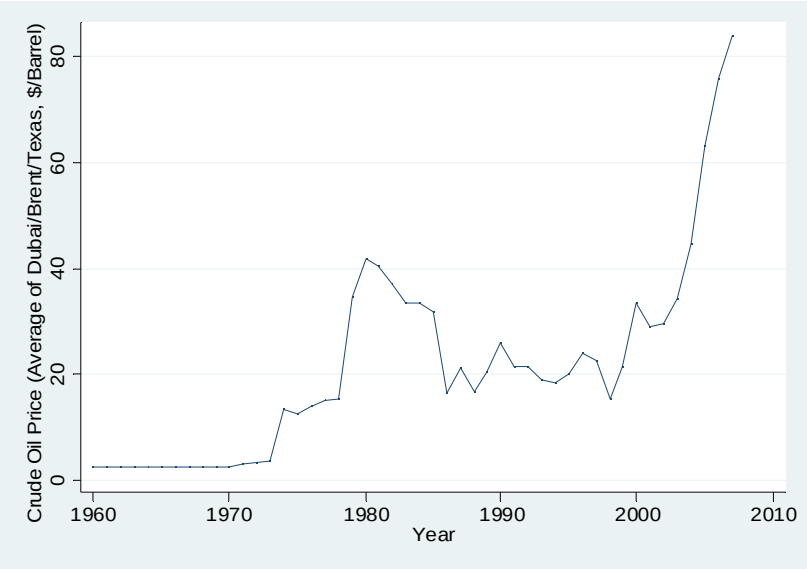


Figure 2. Time Series Plot of the Oil Price and Polity Change

