

ONLINE APPENDIX to  
“Institutions and the ‘resource curse’:  
Evidence from cases of oil-related bribery”

**Contents**

<b>Appendix 1: Additional figures &amp; tables</b>	<b>1</b>
<b>Appendix 2: Defining and coding NOCs</b>	<b>23</b>
2.1. Institutional choice . . . . .	23
2.2. Pre-nationalization factors and sulfur content . . . . .	27
2.3. NOC reform in Kazakhstan: Additional details . . . . .	29
<b>Appendix 3: Addressing bias in the FCPA measure</b>	<b>36</b>
<b>Appendix 4: Primary data sources for NOC data</b>	<b>43</b>

# Appendix 1: Additional figures & tables

## Bayesian model specification

$$Y \sim \mathcal{N}(\mathbf{X}\beta, 1/\sigma)$$

$$\beta \sim \mathcal{N}(\mu_\beta, \sigma_\beta)$$

$$\sigma \sim \Gamma(a_\sigma, b_\sigma)$$

$$\mu_\beta = 0$$

$$\sigma_\beta = 5$$

$$a_\sigma = 0.01$$

$$b_\sigma = 0.01$$

Following Stan Development Team (2015, p. 53), I use weakly informative priors for the coefficients  $\beta$ . Given that all variables are standardized with zero mean and unit variance, the  $|\hat{\beta}|$  is not expected to be greater than five (such that a one standard deviation change in  $X$  would correspond to a five standard deviation change in  $Y$ ). As such, I use a weakly informative prior that each coefficient parameter is normally distributed with zero mean and standard deviation 5.

**Table 3: Case descriptions of prosecuted FCPA violations in the oil and gas sectors.**

Defendant	Year	Countries Involved	Description	Origin
ABB Vetco	2004	Nigeria	Bribes paid to NNPC subsidiaries	S
Applied PPO	1983	Mexico	Bribes paid to Pemex	W
Baker Hughes Inc.	2007	Kazakhstan, Uzbekistan	Bribes paid to Kazakhoil	W
C.E. Miller Corp	1982	Mexico	Bribes paid to Pemex	W
Chevron Corp.	2007	Iraq	Connected to Oil-for-Food Program (OFF)	J
Control Components	2009	Brazil, China, Indonesia, South Korea, Malaysia, United Arab Emirates	Bribes paid to multiple NOCs including CNOOC, KHNP, Petronas, NPCC, and Petrobras	P
Crawford Enterprises	1982	Mexico	Bribes paid to Pemex	W
Daniel Ray Rothrock	2001	Russia	Bribes paid to RVO Nesco (former USSR)	?
El Paso Corp.	2007	Iraq	Bribes connected to OFF	J
Fiat S.p.A.	2008	Iraq	Bribes connected to OFF	J
Flowserve Corp.	2008	Iraq	Bribes connected to OFF	J
GlobalSanteFe Corp.	2010	Angola, Equatorial Guinea, Gabon, Nigeria	Bribes paid to Sonangol and NNPC, and customs officials in Gabon & Eq. Guinea	J
Helmerich & Payne Inc.	2009	Argentina, Venezuela	Bribes to customs officials for oil rig imports	S
Innospec	2010	Iraq	Bribes paid to Oil Ministry, part of OFF	W
International Harvester	1982	Mexico	Bribes paid to Pemex	W
JGC Corporation	2011	Nigeria	Bribes paid to NNPC and Petroleum Ministry	P
Kellogg Brown & Root	2009	Nigeria	Halliburton subsidiary. Bribes paid to NNPC and Petroleum Ministry	W
Marubeni Corporation	2012	Nigeria	Bribes paid to NNPC and Nigeria-LNG	P
Mercator Corporation	2010	Kazakhstan	Bribes paid to Kazakh president and PM, former Mobil CEO was involved	W
Misao Hioki	2008	Argentina, Brazil, Ecuador, Mexico, Venezuela	Bribes to various (unidentified) NOC officials	J
Noble Corp.	2010	Nigeria	Bribes paid to Nigerian customs officials	J
Paradigm B.V.	2007	China, Indonesia, Mexico, Kazakhstan, Venezuela	Bribes paid to multiple NOCs including CNOOC, KazMunaiGaz, NNPC, Pemex, Pertamina	S
Parker Drilling Co.	2013	Nigeria	Bribes paid to Ministry of Finance	J
Pride International	2010	India, Kazakhstan, Mexico, Venezuela	Bribes paid to PDVSA, Indian judges, and Mexican & Kazakh customs agents	J
Royal Dutch/Shell	2010	Nigeria	Bribes paid to NNPC and Ministry of Finance	J
Ruston Gas Turbines	1982	Mexico	Bribes paid to Pemex	W
Siemens	2008	Iraq	Bribes paid to Oil Ministry, part of OFF	P
Snamprogetti	2011	Nigeria	Bribes paid to NNPC and Petroleum Ministry	P
Statoil ASA	2009	Iran	Bribes paid to NIOC officials	W
Technip S.A.	2010	Nigeria	Bribes paid to NNPC and Petroleum Ministry	P
Tidewater	2010	Azerbaijan, Nigeria, United Arab Emirates	Bribes paid to various (unidentified) Ministry of Finance officials	J
Total S.A	2013	Iran	Bribes paid to NIOC officials	P
Transocean Inc.	2010	Nigeria	Bribes paid to Nigerian customs officials	J
Triton Energy	1997	Indonesia	Bribes paid to Pertamina officials	J
Tyco International	2012	Congo, Egypt, Laos, Libya, Madagascar, Mauritania, Niger, Syria, Thailand, Turkey, Vietnam	Over \$26 mn in bribes paid to state officials to secure contracts for piping & flow control (note: this case also included non-oil contracts which are omitted from the data)	S
Tyco VCME	2012	Iran, Saudi Arabia, United Arab Emirates	Bribes paid to various (unidentified) NOC officials	S
Vetco Gray Controls	2007	Nigeria	Bribes paid to Ministry of Finance	P
Viktor Kozeny	2005	Azerbaijan	Bribes paid to SOCAR officials	W
Weatherford Int'l	2013	Algeria, Angola, Congo, Iraq, United Arab Emirates	Bribes through agents to Sonangol, Iraqi oil ministers, ADNOC officials, and various (unidentified) parties	W
Willbros Group	2008	Ecuador, Nigeria	Bribes to NNPC and PetroEcuador officials	W
Williams, James Bryan	2003	Kazakhstan	Executive at Mobil; Bribes to Kazakh officials	W

Information collected from case documents publicly available from DoJ and SEC websites. Origin column indicates the reason for initial investigation: *J* (initiated by DoJ or SEC), *P* (suspicion based on information revealed in a prior FCPA case), *S* (voluntary self-disclosure), *W* (whistle-blower).

Table 4: Results from Bayesian analysis of FCPA-related bribes in the oil sector

	Mean ( $\beta$ )	Std. dev.	2.5%	97.5%	$Pr(\beta > 0)$
Intercept	-0.202	0.143	-0.486	0.079	0.079
Regulatory NOC	0.510	0.253	0.006	1.012	0.976
GDP (logged)	0.054	0.171	-0.283	0.396	0.624
Oil income (logged)	0.324	0.164	0.007	0.644	0.976
Regime (Polity)	-0.043	0.239	-0.512	0.431	0.435
Press freedom	-0.003	0.259	-0.504	0.501	0.497
Population (logged)	0.494	0.134	0.236	0.751	1.000
UNGA-Percent Agree with US	-0.368	0.235	-0.831	0.099	0.058

*Posterior coefficients from Bayesian linear analysis: mean, standard deviation, 95% credible interval range, and probability that the coefficient is greater than zero (for positive  $\beta$ 's, 1 minus this probability can be compared to a p value in the frequentist framework). MCMC analysis performed using five chains with 1,000,000 iterations each, thinning every 1,000 iterations, and discarding the first 10,000 from each chain as burn-in. Full diagnostics will be available online upon publication.*

Table 5: **Results from Bayesian analysis of FCPA-related bribes, excluding established democracies**

	Mean ( $\beta$ )	Std. dev.	2.5%	97.5%	$Pr(\beta > 0)$
Intercept	-0.047	0.178	-0.400	0.310	0.395
Regulatory NOC	0.519	0.267	0.001	1.063	0.975
GDP (logged)	0.031	0.187	-0.341	0.390	0.566
Oil income (logged)	0.437	0.190	0.069	0.814	0.988
Regime (Polity)	-0.161	0.252	-0.642	0.321	0.264
Press freedom	-0.192	0.293	-0.759	0.384	0.257
Population (logged)	0.579	0.148	0.289	0.871	1.000
UNGA-Percent Agree with US	-0.020	0.322	-0.667	0.612	0.478

*Posterior coefficients from Bayesian linear analysis, excluding long-established democracies (Australia, Canada, Denmark, Netherlands, Norway, New Zealand, and the UK) from the sample as a robustness test to ensure that the results are not driven by the preponderance of developed democracies that vest regulatory authority in ministries as opposed to NOCs. Compare these findings to the main results in Table 4 which include long-established democracies.*

Table 6: **Results from Bayesian analysis of FCPA-related bribes including region fixed effects**

	Mean ( $\beta$ )	Std. dev.	2.5%	97.5%	$Pr(\beta > 0)$
Intercept	-0.107	0.223	-0.539	0.343	0.303
Regulatory NOC	0.509	0.259	-0.000	1.013	0.975
GDP (logged)	0.146	0.196	-0.234	0.528	0.769
Oil income (logged)	0.304	0.174	-0.032	0.644	0.961
Regime (Polity)	-0.168	0.281	-0.731	0.383	0.265
Press freedom	-0.069	0.270	-0.613	0.462	0.403
Population (logged)	0.541	0.138	0.274	0.815	1.000
UNGA-Percent Agree with US	-0.478	0.315	-1.102	0.135	0.066
Sub-Saharan Africa	0.146	0.393	-0.622	0.928	0.646
Middle East & North Africa	-0.394	0.381	-1.140	0.343	0.146
Latin America	-0.068	0.382	-0.836	0.689	0.432

*Posterior coefficients from Bayesian linear analysis, including region fixed effects. The excluded category is the set of countries in Asia and Europe. Compare to results in Table 4.*

Table 7: **Results from Bayesian analysis of Transparency International Corruption Perception Index**

	Mean ( $\beta$ )	Std. dev.	2.5%	97.5%	$Pr(\beta > 0)$
Intercept	-0.021	0.021	-0.062	0.019	0.152
Regulatory NOC	0.142	0.024	0.095	0.188	1.000
GDP (logged)	-0.023	0.011	-0.046	-0.001	0.022
Oil income (logged)	0.014	0.010	-0.006	0.035	0.916
Regime (Polity)	0.014	0.015	-0.017	0.044	0.821
Press freedom	0.023	0.016	-0.010	0.055	0.916
Population (logged)	-0.009	0.008	-0.025	0.008	0.147
UNGA-Percent Agree with US	0.110	0.084	-0.056	0.274	0.906

*Posterior coefficients from Bayesian linear analysis, using weighted TI CPI scores as a dependent variable, rescaled so that higher values correspond to greater perceived corruption. Compare to results in Table 4.*

Table 8: **Results from Bayesian analysis of FCPA-related bribes, controlling for state (NOC) control of production**

	Mean ( $\beta$ )	Std. dev.	2.5%	97.5%	$Pr(\beta > 0)$
Intercept	-0.147	0.165	-0.467	0.181	0.178
Regulatory NOC	0.539	0.256	0.026	1.039	0.980
GDP (logged)	0.084	0.183	-0.276	0.442	0.678
Oil income (logged)	0.345	0.169	0.013	0.673	0.979
Regime (Polity)	-0.086	0.244	-0.552	0.390	0.367
Press freedom	-0.033	0.264	-0.552	0.473	0.454
Population (logged)	0.528	0.144	0.248	0.809	1.000
UNGA-Percent Agree with US	-0.421	0.249	-0.915	0.069	0.046
NOC majority production	-0.199	0.283	-0.749	0.336	0.245

*Posterior coefficients from Bayesian linear analysis, including a dummy variable (NOC majority production) for whether the country's production of oil is controlled by the NOC. This category includes countries in which the NOC controls the majority (> 50%) of oil production. Note that a binary indicator is used because information on the exact share of production controlled by the NOC is not available for most of the sample. Data from (Mahdavi, 2018). Compare to results in Table 4.*



Table 9: **Results from Bayesian analysis of FCPA-related bribes, controlling for top 3 corrupt states**

	Mean ( $\beta$ )	Std. dev.	2.5%	97.5%	$Pr(\beta > 0)$
Intercept	-0.220	0.143	-0.498	0.059	0.065
Regulatory NOC	0.436	0.255	-0.069	0.941	0.951
GDP (logged)	0.106	0.179	-0.241	0.464	0.722
Oil income (logged)	0.271	0.168	-0.057	0.594	0.948
Regime (Polity)	-0.053	0.228	-0.501	0.392	0.406
Press freedom	0.022	0.252	-0.471	0.505	0.538
Population (logged)	0.441	0.136	0.172	0.703	1.000
UNGA-Percent Agree with US	-0.354	0.238	-0.808	0.115	0.065
Iran	0.631	0.816	-0.987	2.236	0.779
Iraq	0.853	0.814	-0.751	2.458	0.856
Nigeria	1.186	0.828	-0.424	2.837	0.926

*Posterior coefficients from Bayesian linear analysis, including a dummy variable for each of the major bribe-recipient countries. This includes Iran, Iraq, and Nigeria. Compare to results in Table 4.*

**Table 10: Results from OLS analysis of FCPA-related bribes**

	<i>Dependent variable:</i>					
	Bribery (logged \$)					
	(1)	(2)	(3)	(4)	(5)	(6)
Regulatory NOC	0.971*** (0.237)	0.612** (0.242)	0.558** (0.245)	0.530** (0.250)	0.489* (0.248)	0.514** (0.247)
GDP per capita (logged)		-0.148 (0.143)	-0.075 (0.154)	-0.058 (0.158)	0.156 (0.219)	0.048 (0.169)
Oil income (logged)		0.455*** (0.141)	0.364** (0.160)	0.360** (0.161)	0.326* (0.168)	0.328** (0.160)
Population (logged)		0.451*** (0.117)	0.455*** (0.117)	0.428*** (0.125)	0.500*** (0.132)	0.493*** (0.130)
Regime (Polity)			-0.154 (0.129)	-0.035 (0.229)	-0.166 (0.240)	-0.039 (0.226)
Press freedom				0.149 (0.236)	-0.070 (0.281)	-0.003 (0.251)
TI - CPI score					0.307 (0.226)	
UNGA agreement						-0.366 (0.229)
Constant	-0.365** (0.148)	-0.214 (0.138)	-0.194 (0.139)	-0.185 (0.140)	-0.183 (0.139)	-0.204 (0.139)
Observations	59	59	59	59	58	59
R <sup>2</sup>	0.227	0.432	0.446	0.451	0.481	0.477
Adjusted R <sup>2</sup>	0.213	0.390	0.394	0.387	0.409	0.405

*Note:*

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

*OLS cross-sectional regression of FCPA-related bribes and ownership structure in the oil-producing states, disaggregated into two groups: contract-awarding vested in ministries and contract-awarding NOCs. The former case is captured by the constant term. Model 1 includes no control variables, showing the bivariate relationship between regulatory NOCs and bribery. Model 2 adds GDP and oil income, both per capita and in logged dollars, as well as logged population. Model 3 adds regime type (Polity index). Model 4 adds press freedom (Freedom House). Model 5 adds the Transparency International Corruption Perceptions Index (2012), rescaled so that higher values represent greater perceptions of corruption. Model 6 replaces TI-CPI score with the measure of a country's percentage agreement with the US at the UN General Assembly. All covariates are averaged across the 1997-2013 period. Compare the results from model 6 to the main results from the Bayesian model in Table 4.*

**Table 11: Results from OLS analysis of Transparency International Corruption Perceptions Index, all countries**

	<i>Dependent variable:</i>				
	Weighted CPI (rescaled: higher values = more corrupt)				
	(1)	(2)	(3)	(4)	(5)
Regulatory NOC	0.154*** (0.020)	0.139*** (0.023)	0.140*** (0.024)	0.135*** (0.024)	0.138*** (0.024)
Oil income (logged)		0.014 (0.010)	0.015 (0.010)	0.012 (0.010)	0.014 (0.010)
GDP per capita (logged)		-0.021** (0.009)	-0.022** (0.010)	-0.018* (0.011)	-0.017 (0.011)
Population (logged)		-0.005 (0.008)	-0.005 (0.008)	-0.005 (0.008)	-0.007 (0.008)
Regime (Polity)			0.003 (0.009)		0.017 (0.015)
Press freedom				0.005 (0.010)	0.020 (0.016)
Constant	0.0005 (0.008)	0.003 (0.009)	0.003 (0.009)	0.004 (0.009)	0.003 (0.009)
Observations	156	156	156	156	156
R <sup>2</sup>	0.275	0.305	0.305	0.306	0.312
Adjusted R <sup>2</sup>	0.271	0.286	0.282	0.283	0.284

*Note:*

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

*OLS cross-sectional regression of perceived corruption (CPI scores, weighted by oil reliance) and ownership structure in all states with available data. Note that this includes non-oil-producing as well as oil-producing countries. Compare to model results in Table 10 and to the Bayesian results in Table 7.*

**Table 12: Results from OLS analysis of Transparency International Corruption Perceptions Index, oil-producers only**

	<i>Dependent variable:</i>				
	Weighted CPI (rescaled: higher values = more corrupt)				
	(1)	(2)	(3)	(4)	(5)
Regulatory NOC	0.151*** (0.037)	0.101** (0.040)	0.103** (0.041)	0.094** (0.041)	0.077* (0.042)
Oil income (logged)		0.028 (0.024)	0.032 (0.027)	0.031 (0.027)	0.018 (0.028)
GDP per capita (logged)		-0.070*** (0.023)	-0.074*** (0.026)	-0.068** (0.026)	-0.066** (0.026)
Population (logged)		-0.002 (0.021)	-0.002 (0.021)	-0.012 (0.022)	-0.028 (0.025)
Regime (Polity)			0.007 (0.022)	0.049 (0.038)	0.051 (0.037)
Press freedom				0.053 (0.039)	0.048 (0.038)
FCPA-related bribes					0.031 (0.023)
Constant	-0.005 (0.023)	0.013 (0.023)	0.012 (0.023)	0.015 (0.023)	0.022 (0.023)
Observations	58	58	58	58	58
R <sup>2</sup>	0.233	0.351	0.353	0.375	0.398
Adjusted R <sup>2</sup>	0.219	0.302	0.290	0.302	0.314

*Note:*

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

*OLS cross-sectional regression of perceived corruption (CPI scores, weighted by oil reliance) and ownership structure in oil-producing states. Compare to model results in Table 10 and Table 12.*

**Table 13: Results from OLS analysis of FCPA-related bribes, excluding established democracies**

	<i>Dependent variable:</i>					
	Bribery (logged \$)					
	(1)	(2)	(3)	(4)	(5)	(6)
Regulatory NOC	0.863*** (0.260)	0.503** (0.245)	0.496* (0.249)	0.522** (0.254)	0.508* (0.258)	0.521** (0.257)
GDP per capita (logged)		0.015 (0.161)	0.024 (0.168)	0.024 (0.169)	0.045 (0.245)	0.027 (0.179)
Oil income (logged)		0.450*** (0.148)	0.433** (0.172)	0.444** (0.174)	0.471** (0.197)	0.440** (0.181)
Population (logged)			-0.029 (0.142)	-0.156 (0.240)	-0.180 (0.249)	-0.153 (0.247)
Regime (Polity)		0.536*** (0.122)	0.535*** (0.124)	0.580*** (0.142)	0.639*** (0.153)	0.580*** (0.143)
Press freedom				-0.188 (0.284)	-0.194 (0.298)	-0.188 (0.287)
TI - CPI score					0.035 (0.304)	
UNGA agreement						-0.022 (0.312)
Constant	-0.257 (0.173)	-0.055 (0.151)	-0.056 (0.153)	-0.042 (0.155)	-0.063 (0.160)	-0.047 (0.171)
Observations	52	52	52	52	51	52
R <sup>2</sup>	0.181	0.459	0.459	0.465	0.476	0.465
Adjusted R <sup>2</sup>	0.164	0.413	0.401	0.393	0.391	0.380

*Note:*

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

*OLS cross-sectional regression of FCPA-related bribes and ownership structure in the oil-producing states, excluding long-established democracies (Australia, Canada, Denmark, Netherlands, Norway, New Zealand, and the UK) from the sample. Compare to model results in Table 10 and to the Bayesian results in Table 5 using a sample that also excludes long-established democracies.*

**Table 14: Results from OLS analysis of FCPA-related bribes per dollar of oil income per capita**

	<i>Dependent variable:</i>					
	Bribes per dollar of oil income					
	(1)	(2)	(3)	(4)	(5)	(6)
Regulatory NOC	0.712*** (0.254)	0.611** (0.270)	0.493* (0.290)	0.549* (0.295)	0.554* (0.305)	0.566* (0.297)
GDP per capita (logged)		-0.084 (0.139)	-0.067 (0.139)	-0.097 (0.142)	-0.094 (0.207)	-0.146 (0.157)
Population (logged)		0.124 (0.136)	0.153 (0.138)	0.205 (0.147)	0.224 (0.160)	0.164 (0.157)
Regime (Polity)			-0.155 (0.138)	-0.394 (0.269)	-0.402 (0.287)	-0.398 (0.271)
Press freedom				-0.295 (0.286)	-0.286 (0.349)	-0.207 (0.310)
TI - CPI score					-0.014 (0.270)	
UNGA agreement						0.211 (0.280)
Constant	-0.272* (0.159)	-0.230 (0.163)	-0.186 (0.167)	-0.205 (0.168)	-0.213 (0.174)	-0.197 (0.169)
Observations	59	59	59	59	58	59
R <sup>2</sup>	0.121	0.146	0.166	0.182	0.183	0.191
Adjusted R <sup>2</sup>	0.105	0.099	0.104	0.105	0.086	0.097

*Note:*

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

*OLS cross-sectional regression of FCPA-related bribes and ownership structure in the oil-producing states, using bribes per dollar of oil income per capita as the dependent variable. This variable is constructed by dividing bribes by oilincome, and transforming to the log scale to account for skew. This allows for an “apples-to-apples” comparison of bribery across major oil producers such as Saudi Arabia and moderate oil producers such as Qatar to account for the possibility that the level of bribery is higher in countries with higher oil wealth. Compare to model results in Table 10 and Table 4.*

**Table 15: Results from OLS analysis of FCPA-related bribes, using trichotomous measure of institutions**

	<i>Dependent variable:</i>					
	Bribery (logged \$)					
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-0.655*** (0.204)	-0.221 (0.223)	-0.151 (0.230)	-0.131 (0.233)	-0.086 (0.232)	-0.005 (0.237)
Non-regulatory NOC	-0.074 (0.204)	-0.209 (0.201)	-0.228 (0.201)	-0.228 (0.202)	-0.257 (0.200)	-0.368* (0.211)
Regulatory NOC	0.606*** (0.181)	0.398** (0.183)	0.357* (0.185)	0.336* (0.189)	0.290 (0.187)	0.268 (0.188)
GDP per capita (logged)		-0.148 (0.144)	-0.071 (0.157)	-0.053 (0.160)	0.176 (0.224)	0.099 (0.176)
Oil income (logged)		0.452*** (0.159)	0.377** (0.171)	0.377** (0.172)	0.353* (0.177)	0.380** (0.168)
Population (logged)		0.449*** (0.129)	0.468*** (0.130)	0.443*** (0.136)	0.528*** (0.143)	0.567*** (0.148)
Regime (Polity)			-0.161 (0.134)	-0.039 (0.231)	-0.178 (0.243)	-0.055 (0.226)
Press freedom				0.155 (0.239)	-0.069 (0.283)	-0.021 (0.251)
TI - CPI score					0.321 (0.229)	
UNGA agreement						-0.469* (0.249)
Observations	59	59	59	59	58	59
R <sup>2</sup>	0.279	0.432	0.447	0.452	0.485	0.488
Adjusted R <sup>2</sup>	0.240	0.367	0.373	0.366	0.390	0.396

*Note:*

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

*OLS cross-sectional regression of FCPA-related bribes and ownership structure in the oil-producing states, disaggregated into three groups: no NOC (n = 18), non-regulatory NOC (n = 18), and regulatory NOC (n = 23). The no NOC case is the baseline. Note that in terms of regulatory design, the no NOC case and the non-regulatory NOC case are identical, given that contract-awarding authority in both cases is vested in ministries or other regulatory agencies.*

**Table 16: Results from OLS analysis of FCPA-related penalties in the oil sector**

	<i>Dependent variable:</i>					
	FCPA-related penalties (logged \$)					
	(1)	(2)	(3)	(4)	(5)	(6)
Regulatory NOC	0.775*** (0.266)	0.671** (0.272)	0.653** (0.275)	0.597** (0.279)	0.572** (0.279)	0.603** (0.282)
GDP per capita (logged)		−0.089 (0.189)	−0.023 (0.212)	0.029 (0.217)	0.272 (0.299)	0.070 (0.237)
Oil income (logged)		0.346* (0.178)	0.281 (0.201)	0.266 (0.201)	0.209 (0.206)	0.238 (0.212)
Population (logged)		0.398** (0.174)	0.422** (0.178)	0.410** (0.178)	0.465** (0.183)	0.411** (0.180)
Regime (Polity)			−0.102 (0.146)	0.104 (0.236)	−0.030 (0.262)	0.096 (0.239)
Press freedom				0.294 (0.267)	0.032 (0.348)	0.235 (0.298)
TI - CPI score					0.363 (0.310)	
UNGA agreement						−0.120 (0.263)
Non-oil FCPA penalties		0.397*** (0.122)	0.388*** (0.123)	0.358*** (0.126)	0.302** (0.134)	0.359*** (0.127)
Constant	−0.364* (0.182)	−0.408** (0.168)	−0.410** (0.169)	−0.406** (0.169)	−0.412** (0.168)	−0.412** (0.171)
Observations	49	49	49	49	49	49
R <sup>2</sup>	0.153	0.474	0.480	0.495	0.512	0.498
Adjusted R <sup>2</sup>	0.135	0.413	0.406	0.409	0.415	0.398

*Note:*

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

*OLS cross-sectional regression of oil FCPA-related penalties and ownership structure in oil-producing states. Penalties are assessed by the DOJ and SEC in proportion to the amount of bribes paid, with adjustments for firm and/or individual compliance during the investigation. Compare to model results in Table 10.*



**Table 17: Results from OLS analysis of FCPA-related bribes, using binary indicator of bribery as an outcome**

	<i>Dependent variable:</i>			
	Bribery dummy			
	<i>OLS</i>		<i>logistic</i>	
	(1)	(2)	(3)	(4)
Regulatory NOC (binary)	0.191 (0.124)		0.802 (0.971)	
Regulatory NOC (trichot.)		0.023 (0.169)		-0.960 (1.461)
GDP per capita (logged)	0.147 (0.111)	0.188 (0.114)	0.663 (1.293)	0.898 (1.295)
Oil income (logged)	0.138 (0.085)	0.173* (0.087)	2.006* (1.157)	2.757* (1.456)
Population (logged)	0.255*** (0.068)	0.307*** (0.076)	2.515*** (0.828)	3.332*** (1.168)
Regime (Polity)	-0.045 (0.121)	-0.059 (0.120)	0.022 (0.921)	-0.069 (0.990)
Press freedom	-0.054 (0.144)	-0.072 (0.143)	0.140 (1.221)	0.054 (1.338)
UNGA agreement	-0.171 (0.117)	-0.242* (0.126)	-1.073 (1.196)	-1.748 (1.194)
TI - CPI score	0.161 (0.115)	0.170 (0.114)	1.473 (1.168)	1.766 (1.219)
Constant	0.336*** (0.070)	0.474*** (0.118)	-1.509** (0.702)	-0.165 (1.012)
Observations	58	58	58	58
R <sup>2</sup>	0.484	0.506		
Adjusted R <sup>2</sup>	0.400	0.413		
Log Likelihood			-19.539	-18.196
Akaike Inf. Crit.			57.078	56.392

*Note:*

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

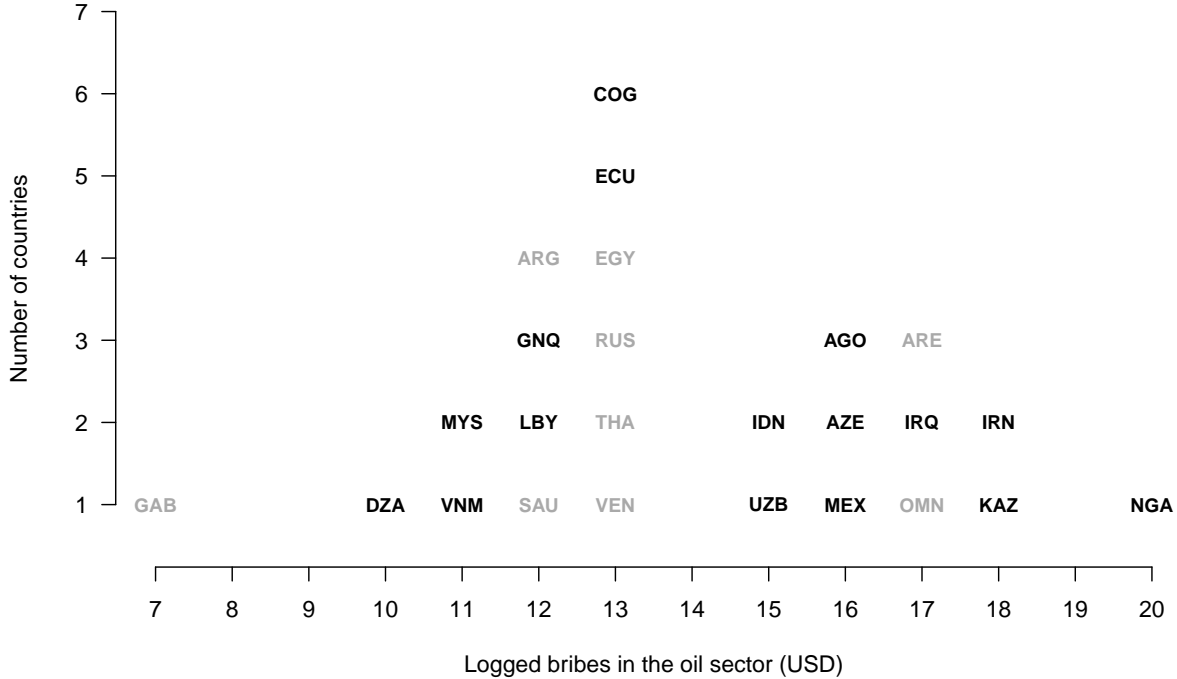
*OLS (1-2) and logit (3-4) cross-sectional regression of energy-sector FCPA-related bribes and ownership structure in the oil-producing states, using dichotomous bribe variable. Bribery = 0 if no bribes were recorded in a given country, and bribery = 1 otherwise. Compare to model results in Table 10 and Table 15.*

**Table 18: Results from instrumental variables analysis, controlling for oil income prior to nationalization**

	<i>Geology instrument</i>		<i>Placebo instrument</i>	
	Full sample (1)	Reduced sample (no established democracies) (2)	Full sample (3)	Reduced sample (no established democracies) (4)
<i>First stage results, DV: Regulatory NOC (binary)</i>				
Sulfur content (pct) (prior to nationalization)	-0.205** (0.0368)	-0.214** (0.0329)		
Sulfur content (pct) (2013)			-0.0372 (0.0285)	-0.0580 (0.0236)
GDP per capita (logged)	-0.109 (0.0875)	-0.117 (0.110)	-0.190 (0.102)	-0.127 (0.142)
Oil income (logged) (prior to nationalization)	0.0187 (0.0851)	0.0183 (0.123)	-0.0520 (0.145)	-0.103 (0.165)
Regime (Polity)	0.0154 (0.0941)	0.0269 (0.105)	0.107 (0.148)	0.0401 (0.168)
Press freedom	0.143 (0.102)	0.150 (0.105)	0.217 (0.114)	0.169 (0.0671)
Population (logged)	0.0262 (0.0321)	0.0117 (0.0240)	-0.0432 (0.0424)	-0.0138 (0.0257)
UNGA agreement	-0.0591 (0.0692)	-0.123 (0.198)	-0.00913 (0.0852)	0.360 (0.271)
Constant	0.529*** (0.0172)	0.497* (0.114)	0.542*** (0.0411)	0.759* (0.165)
Wald <i>F</i>	31.10	42.39	1.706	6.047
<i>Second stage results, DV: FCPA-related bribes (logged \$)</i>				
Regulatory NOC	0.957* (0.423)	0.844* (0.335)	-1.334 (3.256)	-0.749 (1.767)
GDP per capita (logged)	0.119 (0.0908)	0.0882 (0.0839)	-0.337 (0.508)	-0.114 (0.398)
Oil income (logged) (prior to nationalization)	0.565** (0.189)	0.700*** (0.137)	0.448 (0.562)	0.478 (0.413)
Regime (Polity)	-0.150 (0.199)	-0.156 (0.227)	0.116 (0.189)	-0.0745 (0.208)
Press freedom	-0.111 (0.178)	-0.0589 (0.255)	0.413 (0.645)	0.265 (0.314)
Population (logged)	0.718*** (0.165)	0.853*** (0.143)	0.612* (0.288)	0.817*** (0.190)
UNGA agreement	-0.273* (0.130)	-0.00748 (0.196)	-0.279 (0.165)	1.008* (0.462)
Constant	-0.355 (0.255)	-0.208 (0.236)	0.865 (1.812)	1.208 (1.131)
Observations	41	36	41	36

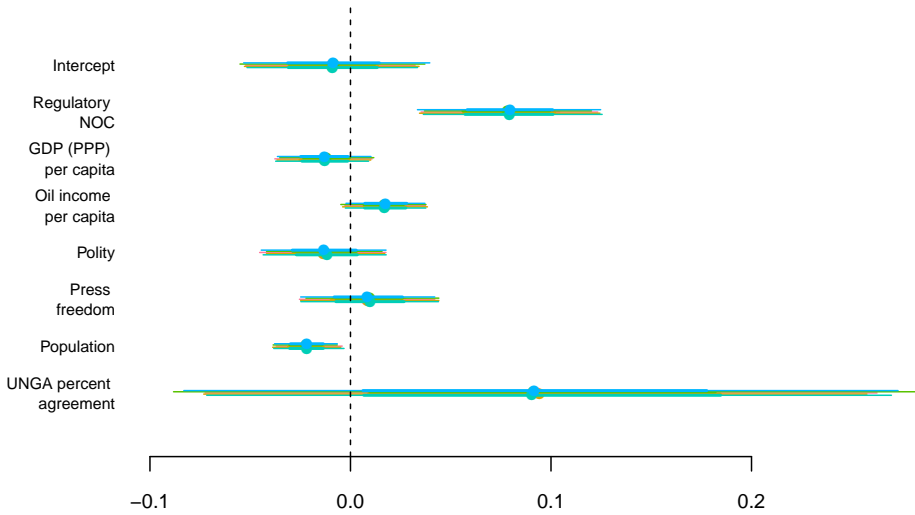
Note: Standard errors clustered by region in parentheses  
Note: \*p<0.05; \*\*p<0.01; \*\*\*p<0.001

Figure 7: Distribution of oil-related bribery among major producers, 1997-2013



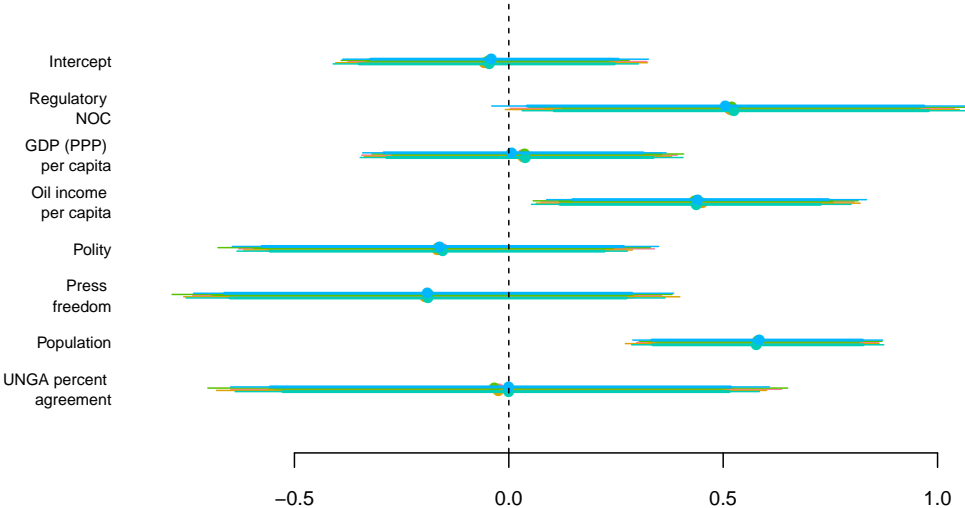
*Histogram of bribery with a bin width of 1 logged US dollar. Cases are labeled using World Bank three-letter codes: countries with regulatory NOCs are in black, countries with contract-awarding ministries in dark gray. Countries with zero bribes are omitted from the graph.*

Figure 8: Results from Bayesian linear analysis: Escresa Picci *PACI* measure



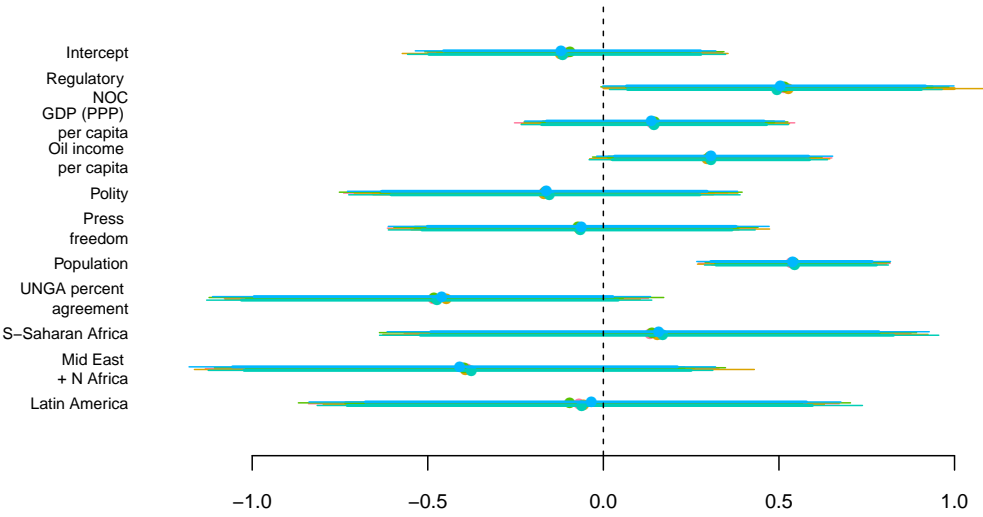
Posterior distributions of coefficients for the Bayesian linear model with the weighted Escresa-Picci *PACI* as the outcome measure, weighted using the WDI oil reliance (“oil rents % of GDP”) measure rescaled to 0–1. All variables except the Regulatory NOC indicator are standardized to allow for ease of comparison. The posterior medians from each of the five MCMC chains are plotted, along with 95% (outer) and 68% (inner) credible intervals. The sample ( $n = 117$ ) includes all countries, not just oil producers, with non-missing data on the weighted *PACI* measure.

Figure 9: Results from Bayesian linear analysis, removing established democracies



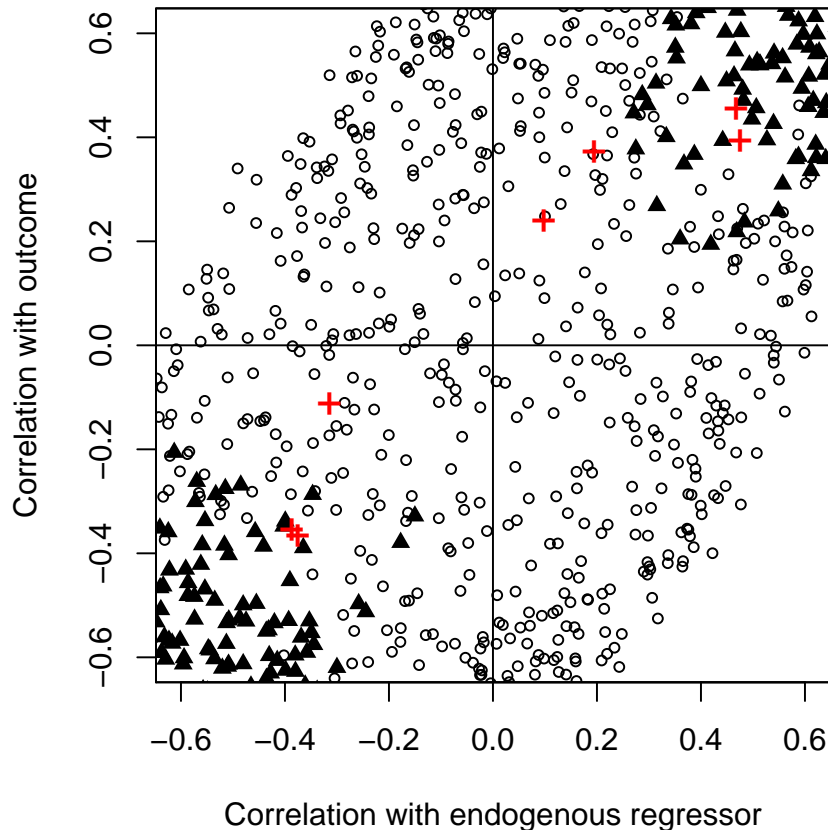
*Posterior distributions of coefficients from the Bayesian linear model, excluding established democracies from the list of major oil-producing states. The sample ( $n = 52$ ) excludes Australia, Canada, Denmark, Netherlands, Norway, New Zealand, and the United Kingdom.*

Figure 10: Results from Bayesian linear analysis, adding region fixed effects



*Posterior distributions of coefficients from the Bayesian linear model, including regional fixed effects dummies for Sub-Saharan Africa, Middle East and North Africa, and Latin America. There is little evidence for regional effects when compared to the baseline (Europe and Asia) on corruption not already captured by existing covariates. The sample (n = 59) includes all major oil-producing states excluding the USA.*

Figure 11: Sensitivity analysis for NOC-corruption regressions



Following Beber et al. (2014), this sensitivity analysis shows the extent to which the regulatory NOC effect on corruption is robust to unobserved potential confounders. Each point in the plot represents the addition to Model 6 in Table 10 of a simulated confounding variable, showing its correlation with both the outcome (*y-axis*) and the endogenous regressor (*x-axis*). The point is labeled as a circle if the inclusion in the model of a simulated confounder results in the continued statistical significance at the 90% level of the regulatory NOC variable coefficient. Otherwise, it is labeled as a triangle.

The sensitivity analysis in Figure 11 suggests that the results are not robust (at the 90% level) to the presence of simulated confounders that are correlated with the outcome and the NOC variable with a correlation coefficient above roughly 0.3 (in absolute terms). The red crosses in the plot show the correlations of the control variables between the outcome and the regulatory NOC variable. Three of these controls—Polity, UNGA agreement variable, and press freedom—have correlation coefficients higher than 0.3; this suggests that leaving variables such as these out of the model would subject the results to omitted variables bias. It is difficult to discern whether or not additional variables such as these exist that are currently omitted from the model; as such, the instrumental variables analysis in Table 3 is performed to address further concerns of endogeneity.

## Appendix 2: Defining and coding NOCs

The categorization of cases regulatory ministry and regulatory NOC is presented in Table 1 in the main text, disaggregated by broad region to allow for ease of geographical comparison. There is little geographical clustering of institution types, such that no one region dominates a specific regulatory structure nor does one regulatory structure dominate a given region. Nearly all Middle Eastern and African states have NOCs, though there is reasonable balance across both regulatory and non-regulatory NOCs in each region. Note that despite three categories of institutional design, the relevant grouping of interest is binary: countries with and without regulatory NOCs.

Nationalization is defined as establishment of a majority-state-owned SOE that is involved in the upstream oil sector. A country is coded as having a NOC if the government maintains a majority of voting shares ( $> 50\%$ ) in an entity that plays some role—production, regulation, or fiscal oversight—in the extraction of oil and gas within the country’s borders. This does not include countries with NOCs that are only involved in downstream operations such as refining and distribution. Partial privatizations, such as Norway’s sale of shares in the state-owned Statoil starting in 2001, do not disqualify a country from being coded as having a NOC unless the state loses its majority share ownership. Given the timeframe of the corruption database (1997–2013), the NOC coding is based on the majority of years of NOC status across the time period.

### 2.1. Institutional choice—what drives the decision to establish a regulatory vs non-regulatory NOC?

Conditional on nationalization, what factors might influence a state to choose a regulatory NOC over a non-regulatory NOC? While the case study in the text discusses this choice in detail for the NOC reforms in Kazakhstan, here I review selected examples of NOC formation to trace out the process of this institutional choice.

Consider the case of nationalization in the United Arab Emirates. When Sheykh Zeyed established the Abu Dhabi National Oil Company (ADNOC) in 1971, he and his council decided that contract-awarding authority would be vested in another agency and not ADNOC. This other agency was known as “The Petroleum Department” and managed both ADNOC and foreign oil companies partnered with the NOC in joint ventures and participatory agreements. In accordance with Law No. 8 of 1978, “all oil operations and relations with the operating companies of those which have concession agreements should be carried out” by the regulatory agency and not ADNOC. This agency was re-established as the Supreme Petroleum Council (SPC) by Law No. 1 of 1988, with decisions regarding contracts to be made in conjunction with both the monarch and the *Majlis al-Wattani al-Ittihad* (Parliament).

This was part of a broader agenda of what Zeyed called “partial nationalization” that would allow international oil companies to continue with favorable contracts and regulations, a choice which Rai and Victor attribute to the high geological risks inherent in the country’s nascent oil and gas fields (Rai and Victor, 2012). The largest of these was the offshore Umm Shaif field, nearly 9,000 feet below the seabed of the Persian Gulf (which for modern standards is not quite “ultra deep” but when the field was first discovered in 1958 drilling



presented formidable challenges). Things were not any easier in the Abu Dhabi's onshore fields: the Murban field was not only deep at 12,500 feet below the surface, but highly pressurized (natural for deeper wells) and rich in sulfur.<sup>1</sup>

In contrast, exploration and production in nearby Kuwait was not so risky given the history of commercial oil operations since 1934 (Ward, 1965). The process of nationalization was formalized by Emir Sabah III al-Sabah with the General Agreement on Participation in 1972 whereby companies would be compensated by the state to the tune of \$200 per barrel of oil capacity to gain state-owned equity shares. In Kuwait, the originally agreed upon 25% share was increased to 40% in 1972, to 60% in early 1974, and to 100% in mid 1974, when the Western-owned Kuwait Oil Company (KOC) and others became a fully state-owned company. After the nationalization of KOC, Emir Jaber al-Sabah established the Kuwait Petroleum Corporation (KPC) as both the lead producer of the country's oil fields and the regulator of all joint ventures and production-sharing agreements (Stevens, 2008). The petroleum law stipulates in particular that "the Board of Directors (of KOC) shall have powers for . . . takeover of existing companies, participating therein, or cooperating therewith in joint activities."<sup>2</sup>

Unlike the UAE, Kuwait's monarchs were not influenced by tough geological constraints which would have forced the state to adopt a strong regulatory agency to manage licenses to international firms (Zahlan, 1998). The country's largest producing field is Burgan, which holds nearly 70% of all of Kuwait's oil reserves, and despite high sulfur contents (between 2.5 and 3.1%) production prior to nationalization came from shallow (less than 3,500 ft.) wells with low pressure and moderate temperatures.<sup>3</sup>

It is interesting to note that the decision to vest regulatory authority in a NOC is not necessarily tied to a NOC's production capacity or its ability to participate in day-to-day operations. Table 19 shows a breakdown of 50 countries with NOCs as of 2012. There is a nearly-even split in production capacity of any kind between NOCs with regulatory authority (20) and NOCs without regulatory authority (21). When the bar is raised for what qualifies as production capacity—using a simple metric of producing the majority (> 50%) of the country's oil—the breakdown is similarly even across categories, with slightly *more* producing regulatory NOCs (15) than producing non-regulatory NOCs (11).

In Cameroon, for example, the nationalization of the French oil company Elf Aquitaine in 1980 led to the creation of the state-owned oil company, Société Nationale de Hydrocarbures (SNH). In contrast to ADNOC or KPC, SNH was not founded as an operator or producer of oil; the company only plays a regulatory role wherein SNH manages licensing contracts. Article 4 from Presidential Decree 13-3 of March 1981 stipulates that "the National Hydrocarbon Company (SNH) conducts all studies, collects all information, supervises the execution of contracts between the state and foreign oil companies, and undertakes the training of Cameroonian personnel relative to the petroleum industry."<sup>4</sup> While the state

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<sup>1</sup>See <http://www.geoexpro.com/articles/2011/03/the-abu-dhabi-oil-discoveries>.

<sup>2</sup>Decree Promulgating Law No. 6 Concerning the Establishment of the Kuwait Petroleum Corporation, amended 4 Sep, 1980.

<sup>3</sup>See <http://www.geoexpro.com/articles/2012/05/the-great-burgan-field-kuwait>. Drilling activity since the late 1980s has come from much deeper reservoirs within the Burgan, and coupled with the need for tertiary recovery, has increased geological risks in Kuwait.

<sup>4</sup>Translation from French provided in Mark D. DeLancey, Rebecca Mbuh, and Mark W. DeLancey (eds.)

decided against establishing a producing NOC, it opted for a NOC with contract-awarding authority to serve as an intermediary between the state and foreign oil companies in joint ventures (Gauthier and Zeufack, 2009). Given favorable geology, the NOC can monitor foreign operators with little information asymmetry, making licensing oversight a relatively straightforward endeavor without having to shift to a more established and intricate regulatory agency. Much of the country’s oil is offshore but in relatively shallow waters (less than 75 feet deep) and the quality of crude is high (around 34 API gravity and mostly free of sulfur).

**Table 19: Variation in institutional pathways, 2012**

		<i>Regulatory Authority</i>	
		<b>No</b>	<b>Yes</b>
<i>Production Capacity (any)</i>	<b>No</b>	3	6
	<b>Yes</b>	21	20

		<i>Regulatory Authority</i>	
		<b>No</b>	<b>Yes</b>
<i>Production Capacity (major)</i>	<b>No</b>	13	11
	<b>Yes</b>	11	15

*Disaggregation of 50 countries with NOCs with respect to production and regulatory capacity. The top table shows production capacity as defined as the ability of the NOC to physically extract and produce crude oil. The bottom table shows production capacity as defined more conservatively as a NOC which produces the majority of a country’s oil production. See Table 1 for the list of countries with NOCs; the table shown here also includes three countries with NOCs but without major commercial oil production: Chile, Poland, and South Africa.*

In neighboring Equatorial Guinea, the NOC (Gepetrole) similarly lacks operational capacity, which is handled exclusively by international oil companies. But here the geology is more complex than in Cameroon given the location of wells in deepwater offshore fields (Mobbs, 2001). As such, President Obiang opted for a structure wherein the NOC neither produces nor regulates but instead only serves to collect revenues from other operating firms (Victor et al., 2012). Because the state lacks even the capacity to discern the appropriate firms to explore and produce its oil, some contract-awarding authority is outsourced to Western oil services firms such as InSies Terra and Glencore (Silverstein, 2014; Soares de Oliveira, 2007). This makes for a non-regulatory and non-producing NOC where theft might be rampant (McSherry, 2006), but there is little opportunity for government agents to solicit bribes from operating firms.

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(2010), *Historical Dictionary of the Republic of Cameroon* (Lanham, MD: Scarecrow Press, p. 347).

While far from being an exhaustive list of cases, these four are representative of institutional choices in developing countries that have nationalized the oil sector. Political factors may drive the decision to nationalize (Jones Luong and Weinthal, 2010; Warshaw, 2012), but the specific institutional choices made by leaders upon nationalization appear driven to a larger extent by geological context and the timing of nationalization with respect to the country's oil production history. Further, countries with high levels of corruption prior to nationalization—such as Cameroon and Equatorial Guinea—opt for both regulatory and non-regulatory NOCs, providing preliminary evidence that even in countries with extremely high levels of corruption and generally poor governance, leaders are not embracing one NOC institutional choice over the other.

## 2.2. Pre-nationalization factors and sulfur content

A potential violation of the exclusion restriction in the instrumental variables analysis in the text is if the instrument, sulfur content (specifically hydrogen-sulfide, or  $\text{H}_2\text{S}$ ), is itself predicted by factors that determine the choice to establish a NOC in the first place. Beyond geology, these factors include population, regime type/state capacity, the size of the oil sector, and regional effects. I test for this violation by regressing sulfur content of oil production prior to nationalization on pre-nationalization population levels, various state capacity measures, oil production levels, and regional dummy variables. For example, to predict the sulfur content of Angola prior to the 1976 nationalization (0.17%  $\text{H}_2\text{S}$ ), I use covariates from 1975.

I collected data on population (Maddison, 2007), oil production levels (Ross, 2013), and use basic regional categories of Asia, Europe, Latin America, Middle East & North Africa, and Sub-Saharan Africa. Because state capacity can be measured in several different ways, I use four different variables in the analysis: GDP per capita (following Fearon and Laitin (2003); Data from WDI), regime type as measured by a semi-continuous variable (Marshall et al., 2011), regime type as measured by a binary democracy variable (Cheibub et al., 2010), and the age of the regime in power the in year prior to nationalization (Cheibub et al., 2010).

The sample size is 58 countries which have created national oil companies at some point since 1900, but data on sulfur content are missing for 8 of these countries due to the historically early year of nationalization or the small size of oil production levels. The list of missing countries, with nationalization year in parentheses, includes: Italy (1926), Bolivia (1936), France (1941), Poland (1944), Austria (1956), South Africa (1965), Japan (1967), and Jordan (1995). Note that of the countries on this list, only Bolivia qualifies as a major oil-producing state in the analyses presented in the main text.

Results from OLS regression with region fixed effects are presented in Table 20. All coefficients are statistically indistinguishable from zero at the 5% level, suggesting little correlation between sulfur content and pre-nationalization factors of NOC choice. At the 10% level, I find that in one model population is significant—indicating that smaller countries tend to have higher sulfur contents—but this result disappears once any additional covariate is added to the model. A closer look at the data suggests that this result is driven by three countries with high sulfur contents and low populations: Bahrain (2.50%  $\text{H}_2\text{S}$ ), Kuwait (2.89%), and Qatar (2.49%). In terms of NOC choice, Bahrain and Qatar adopted non-regulatory NOCs, while Kuwait adopted a regulatory NOC (see above).

In model 1, which only includes region dummies, I find that Asian producers tended to have lower sulfur contents prior to nationalization, while MENA producers tended to have higher levels. While the latter can also be chalked up to the Gulf states (plus Iraq at 2.62%  $\text{H}_2\text{S}$ ), the former is driven by the relatively sweet crudes of Brunei (0.08%  $\text{H}_2\text{S}$ ) and Indonesia (0.09%  $\text{H}_2\text{S}$ ). These results become statistically insignificant in all other models. There is also some evidence for lower sulfur levels in Sub-Saharan Africa, though these results are only significant in two models (and not in the region dummies-only model).

**Table 20: Results from OLS analysis of pre-nationalization sulfur content**

	<i>Dependent variable:</i>						
	Sulfur content (percent)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Population (logged)		-0.244* (0.145)	-0.205 (0.153)	0.092 (0.248)	0.142 (0.267)	0.114 (0.304)	0.125 (0.285)
Oil production (logged)			0.218 (0.145)	0.136 (0.153)	0.123 (0.156)	0.149 (0.213)	0.146 (0.219)
GDP per capita (logged)				0.383 (0.254)	0.428 (0.270)	0.417 (0.311)	0.429 (0.297)
Polity score					-0.114 (0.214)		
Democracy dummy (CGV)						0.049 (0.673)	
Regime age (CGV)							-0.006 (0.217)
Central and East Asia	-0.539* (0.316)	-0.387 (0.323)	-0.399 (0.322)	-0.459 (0.319)	-0.480 (0.325)	-0.582 (0.398)	-0.581 (0.403)
Europe	0.198 (0.358)	0.308 (0.357)	0.136 (0.382)	-0.221 (0.444)	-0.108 (0.496)	-0.298 (0.644)	-0.259 (0.557)
Latin America	0.079 (0.316)	0.076 (0.310)	0.158 (0.327)	0.153 (0.322)	0.215 (0.345)	-0.099 (0.688)	-0.060 (0.402)
Mid East and North Africa	0.457* (0.237)	0.313 (0.247)	0.290 (0.247)	0.409 (0.255)	0.349 (0.281)	0.433 (0.292)	0.437 (0.286)
Sub-Saharan Africa	-0.506 (0.316)	-0.527* (0.310)	-0.523* (0.308)	-0.222 (0.363)	-0.248 (0.369)	-0.231 (0.440)	-0.223 (0.425)
Observations	50	50	48	48	48	41	41
R <sup>2</sup>	0.175	0.225	0.276	0.315	0.320	0.283	0.283
Adjusted R <sup>2</sup>	0.084	0.119	0.153	0.178	0.164	0.081	0.081

*Note:*

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

*The intercept is omitted from all models to allow for estimation of all five regional dummies. All continuous variables are standardized for ease of interpretation.*

### 2.3. NOC reform in Kazakhstan: Additional details

At the time Kazakhoil was established in 1997, production came primarily from Tengiz (largest in terms of reserves) and other onshore fields. When development first began at Tengiz in 1979, geological complexities were plentiful: the field is onshore but 13,000 feet deep, highly sulfurous (up to 5% hydrogen-sulfide), and rich in carbon dioxide. From 1993 to 1997 Chevron, Tengiz's majority operator, constructed large-scale desulfurization plants and modernized oil processing facilities to ease extraction and subsequent pre-processing before the crude was transported to refineries outside the country.<sup>5</sup> With these upgrades, production costs for Tengiz dropped from \$10 per barrel in 1993 to less than \$3 per barrel in 1997 (Peck, 2004, 156). What had once been a formidable technical challenge during the Soviet era became "old reliable" once the field was opened to foreign investment after the Soviet collapse. Fields beyond Tengiz were easier to develop given low sulfur contents and relatively shallow deposits.<sup>6</sup> After an initial turbulent period wherein the head of Kazakhoil, Nurlan Balgimbayev, was promoted to prime minister to replace the outgoing PM, Nazerbayev decided in the summer of 1997 that the company would absorb the regulatory responsibilities of the Ministry of Oil and Gas, which would be dismantled until its re-establishment in the 2010 reform.

The prevailing notion was that the NOC, while staffed with novice domestic engineers and managers, could handle monitoring foreign firms operating these onshore fields given the ease of extraction from non-Tengiz fields and that concerns over complexity of Tengiz had been allayed by Chevron's upgrades (Ipek, 2007). Despite its *de jure* inclusion in joint ventures and production sharing agreements, Kazakhoil itself played less of a role in operations than it did in oversight.

Matters changed in the late 2000s with ongoing difficulties at the newly discovered but not yet operational offshore Kashagan field, one of the largest oil discoveries worldwide since the 1970s.<sup>7</sup> Because of its size and because of the projected decline in long-term production from Tengiz and others, Kashagan was to be the future of the industry: according to Nazerbayev, it would make Kazakhstan "bigger than Venezuela."<sup>8</sup> Production was supposed to begin by 2005, but was delayed because the deposits presented the greatest technical challenges to date in the country's oil sector: the field is 14,000 feet under the sea floor of the shallow but often-frozen waters of the northern Caspian Sea (compared to an average depth of 5,000 feet for other offshore Caspian fields), very highly pressurized, scathingly hot (up to 125 degrees Celsius), and extremely sulfurous (between 15 to 20% hydrogen-sulfide, which according to one report was at the time "the biggest concentration ever seen in the offshore oil industry").<sup>9</sup>

At the same time, Nazarbayev grew frustrated with the lack of domestic technical development at KMG, especially with offshore fields. A classified report commissioned by the

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<sup>5</sup> Accessed from Tengizchevroil website <http://www.tengizchevroil.com/about/milestones> on 19 July 2016.

<sup>6</sup> Oil from Kumkol, for example, averages 0.02% hydrogen-sulfide and 1km well-depth. *Lukoil Fact Book 2012*, pp. 38-39. Accessed from <http://www.lukoil.com/materials/doc/FactBook/2012/part03eng.pdf> on 19 July 2016.

<sup>7</sup> Holding an estimated 35 billion barrels, Kashagan's reserves are equivalent to 2.7% of global proven reserves. See "Kashagan oil field starts production." *Oil and Gas Journal*. 11 September 2013.

<sup>8</sup> "How a giant oil project went awry." *The Wall Street Journal*. 31 March 2014.

<sup>9</sup> "Giant oil field in Kazakhstan is a ticking time bomb" *Mondiaal Nieuws*. 29 January 2014.

president cited the company’s numerous engineering deficiencies, notably a “lack of technologies and work experience in increasing productivity of old fields”, “little experience in the work at the offshore fields”, and perhaps most damning, “[t]he company’s leadership does not have enough experience in managing such large oil and gas projects as Kashagan.”<sup>10</sup> Coupled with the geological complexity of recent discoveries, the need for enhanced oil recovery at Tengiz in the future created pressure on the NOC: no longer could it feasibly monitor IOCs while simultaneously managing its own operational capacity – and importantly having to focus its efforts on improving the domestic talent base among its managers and workers. Faced with this dilemma Nazarbayev decreed on March 12th, 2010, “the activities of KazMunaiGaz should be purely commercial” and that a newly resurrected Ministry of Oil and Gas would relieve KMG of its contract-awarding authority.<sup>11</sup>

### **Did the reform coincide with other major structural changes?**

What else spurred the decline in oil-related corruption besides the 2010 reform? It could be that transnational bribery was simply replaced with other forms of corruption, such as embezzlement of oil revenues by state officials. While this is difficult to test directly, one proxy for embezzlement of petro rents is the measurement of changes in offshore bank account deposits over time of individuals residing in petro-rich states. Andersen et al. (2017) employ Bank of International Settlements (BIS) locational banking statistics to track cross-border deposits of wealth into bank accounts in known tax haven countries such as Switzerland, the Cayman Islands, and the Isle of Man. Using this approach with BIS data on Kazakhstan results in the trend shown in Figure 12. There is a significant increase in offshore deposits into known tax havens between 2005 and 2009. This coincides not only with the global oil price increase, but also the ramp up in developing the Kashagan and Tengiz oil fields—both of which were involved in prosecuted bribery cases. However, there is no noticeable increase in offshore transfers after the 2010 reforms; there is instead a decline, with deposits not reaching the pre-2010 peak levels until 2017.

If not due to replacing bribery with other forms of corruption, could it be the case that the dropoff in transnational bribery in Kazakhstan’s oil sector was the result of forces beyond the NOC restructuring? In indicators presented in Table 21, I show there is little evidence of changes in other leading determinants of corrupt behavior before and after 2010. In short, political factors held constant: Nazarbayev continued his reign as personal dictator, with few changes in the irrelevance of state institutions in checking his power. Economic conditions (outside of 2008–09) and international integration were relatively stable, largely tracking the patterns of regional neighbors such as Azerbaijan, Kyrgyzstan, and Uzbekistan.

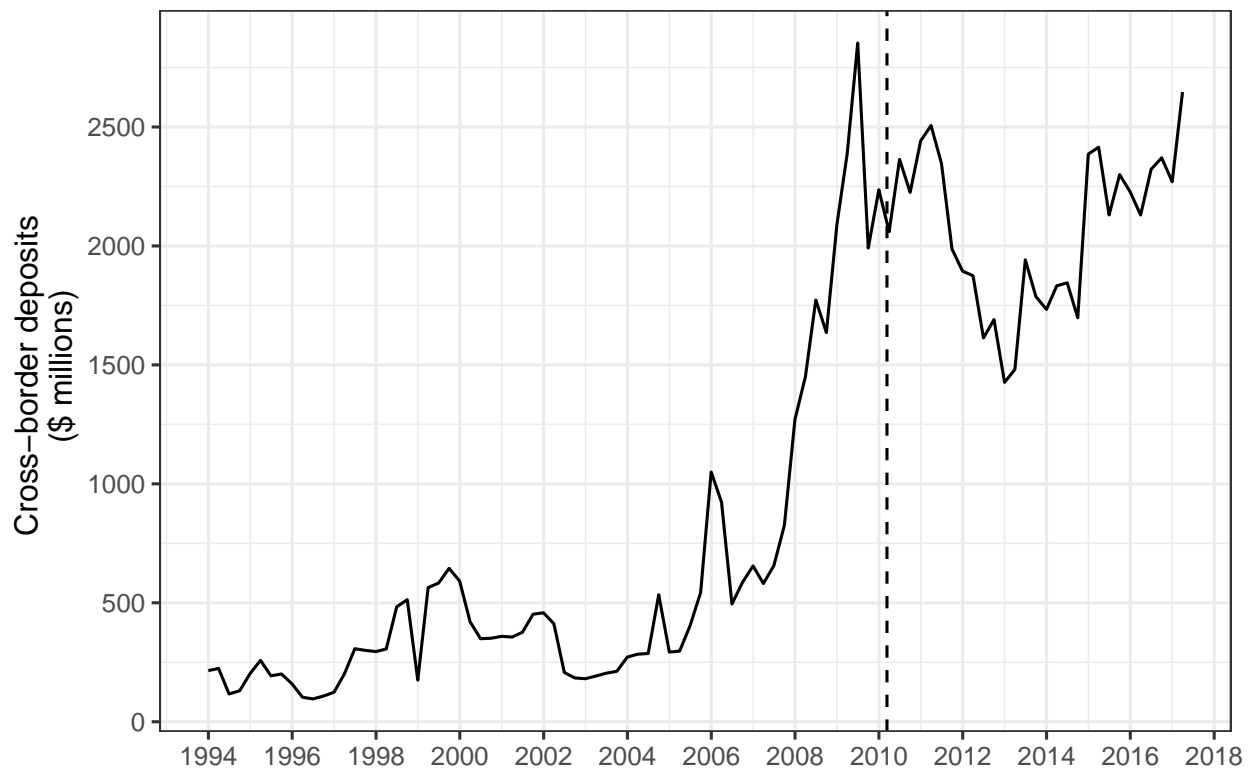
In terms of structural political factors, Nazarbayev remained in power as personalist dictator, institutions such as parliament and the judiciary maintained irrelevance in constraining

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<sup>10</sup> “The main problems and opportunities of KazMunaiGas in realization of its oil & gas projects” *Wikileaks* Attached File #177891, 10 May 2010 (Report dated February 2010). Accessed 3 July 2016.

<sup>11</sup> “Kazakhstan creates new oil and gas ministry in a major government reshuffle.” *Eurasia*. Accessed from <https://www.en.neweurasia.info/events-and-opinions/369-kazakhstan-creates-new-oil-and-gas-ministry-in-a-major-government-reshuffle> on 2 July 2016. For details on the reform, see the 2010 Subsoil Act and Chapter 3, Article 12 of the Law on Licensing of the Republic of Kazakhstan.

Figure 12: Offshore bank deposits from Kazakhstan into known tax havens, 1993–2017



*Cross-border deposits of funds originating in Kazakhstan and sent to banks in known tax haven countries. Per Andersen et al. (2017, 823) this includes The Bahamas, Bermuda, Cayman Islands, Netherlands Antilles, Panama, Bahrain, Hong Kong, Macao, Singapore, Austria, Belgium, Guernsey, Isle of Man, Jersey, Liechtenstein, Luxembourg, and Switzerland. The vertical dashed line indicates the timing of the NOC reform in March 2010.*

*Data source: Bank for International Settlements (BIS) locational banking statistics; accessed from <https://stats.bis.org/statx/srs/table/A6.2?c=KZ&p=> on 30 August 2018. See Andersen et al. (2017) for more details on the use of this measure as a proxy for embezzlement of natural resource wealth.*



the executive, and the institutional quality of bureaucracies across the political spectrum remained poor.<sup>12</sup> The government’s censoring of media outlets continued unabated, with state crackdowns on anti-regime political expressions a regular occurrence. Freedom House’s freedom of the press index (out of 100, higher scores are worse) averaged 77 across 2005-2010 and 83 across 2011-2016, with Kazakhstan’s press keeping its rank typically between the 170th and 181st least free out of 194-202 countries.

Economic fundamentals were similarly unchanged: total GDP growth continued at a pace of 4-7% since 2010, and growth was at similar levels prior to 2010 with the exception of the 2008-2009 global recession (WDI). Since 2010, unemployment remained constant between 5-6% and wages persisted at 3% of GDP (IMF Article IV reports; hereafter, ‘IMF’). The size of government remained flat relative to the economy: 11.1% of GDP in 2007 vs. 10.7% in 2014, and between 10.2-11.7% throughout the period (WDI).

Nor is it the case that corruption declined because the economy increased its ties to international networks of exchange and organization (Gerring and Thacker, 2005). From 2008 to 2014, the government joined a single additional international organization, the aforementioned EITI, to bring its total to 53 IOs,<sup>13</sup> and signed only three new bilateral investment treaties since 2010. Trade declined from 76% of GDP in 2009 to 63% in 2014 and has yet to recover from pre-recession highs of 91-94% (WDI). Since the 2010 reform, these figures suggest the economy remained at best moderately tied with the international community, largely tracking the patterns of regional neighbors such as Azerbaijan, Kyrgyzstan, and Uzbekistan.

In the oil sector, production grew at a modest but healthy 2.6% compound annual clip between 2005 and 2015, from 1.3 to 1.7 million barrels per day (2% of global production), while new reserves were being discovered within existing basins. Because of rising commodity prices, fiscal revenues from oil increased dramatically and then plateaued after the 2009 financial crisis—to the point that the government’s reliance on oil revenues grew from 23.6% in 2003 to 48.9% in 2010 to 47.6% in 2014 (IMF). Revenue from oil exports grew slightly from \$55.2 to \$56.6 billion inflation-adjusted dollars between 2010 and 2014, despite the drop in oil prices in mid 2014 (IMF). In the oil sector, despite the tougher geology of Kashagan and other new discoveries, production increased while export revenues remained constant. The number of upstream operators held steady from 2009 to 2014, and four new projects were commissioned out as partnerships with KMG after the reform. In terms of sectoral management, Nazerbayev continued making nepotistic appointments to the Ministry and KMG. Despite occasional “elite shuffling”, Nazarbayev staffed these institutions with men close to his son-in-law Timur Kulibaev and select members of the *neftyaniki* (‘oil men’) (Heinrich and Pleines, 2012). For example, Sauat Mynbayev, a member of the ‘Kulibaev group,’ served as oil minister from 2007 to 2013 (prior to the 2010 reform, his title was energy minister) and subsequently as president of KMG.<sup>14</sup>

Data on continuing operators show no such pattern, as the number of integrated upstream operators held constant at nine from 2009 to 2014,<sup>15</sup> while four new major projects

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<sup>12</sup>Freedom House *Freedom in the World* reports.

<sup>13</sup>CIA World Factbook. Kazakhstan ascended from observer to member at the WTO on 30 November 2015.

<sup>14</sup>See [http://www.kmg.kz/en/corporate\\\_management/board/sauat-muhametbaevich-mynbaev/](http://www.kmg.kz/en/corporate\_management/board/sauat-muhametbaevich-mynbaev/) Accessed 11 July 2016.

<sup>15</sup>These include: Agip, Total, Chevron, CNPC, ExxonMobil, Inpex, Shell, LukArco, ENI and Lukoil.

were commissioned out as joint ventures with KMG from 2011 to 2016.<sup>16</sup> There is also little evidence that increasing geological complexity prompted the exit of oil services firms. UK-based Petrofac, one of the companies implicated in the Unaoil scandal that had been operating in Kazakhstan in the 2000s, left the sector after 2009 but allegedly continued paying bribes in Iraq for developing and processing geologically-challenging fields.<sup>17</sup>

While the Kazakhstan case is unique in the timing of its regulatory reform—it is the only state that altered its regulatory institutions between the worldwide ramp up in FCPA violations starting in 2003, and the final year of data collection, 2013—it does not solely drive the statistical results presented in the main text. Specifically, removing Kazakhstan from the sample does not substantially alter the coefficient estimate for the relationship between having a Regulatory NOC and the level of FCPA-related bribery in the oil sector (Table 22). Reversing the coding for Kazakhstan such that it is coded as having a non-regulatory NOC throughout the 1997–2013 period does not alter the sign of the coefficient but does lead to a decrease in its magnitude, from 0.51 (see Table 4 for the main results) to 0.37 (Table 23), with the standard deviation of the posterior remaining roughly the same at 0.26.

But this decrease is to be expected given the measurement error imposed by recoding the case: measuring Kazakhstan as erroneously having a non-regulatory NOC for the first 13 years of the period (1997–2010)—when bribery was particularly high in the country under its regulatory NOC structure—will result in attenuation bias for the estimated coefficient. Indeed, the 27% drop-off in magnitude from 0.51 to 0.37 suggests that the variance in the measurement error is approximately two-fifths the variance of the observed regulatory NOC measure. Plugging in the sample variance of the observed regulatory NOC measure ( $\sigma_{RNOC}^2 = 0.24$ ), this implies that the variance of the measurement error imposed by erroneously recoding Kazakhstan is approximately 0.09.<sup>18</sup> In other words, although the recoding only results in a relatively small measurement error ( $\sigma_e^2 = 0.09$ ), the estimated attenuation bias is quite high because the observed regulatory NOC measure has such low variance (typical for a reasonably balanced binary variable). This is all to say that altering the coding of the Kazakhstan case does not meaningfully change the results from the baseline model once we account for the effects of measurement error imposed on the explanatory variable after recoding.

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See USGS *Minerals Yearbooks* and “2015: more defeats than victories.” *Petroleum: Kazakhstan Analytical Journal*. 98(2): April 2016. Accessed from <http://www.petroleumjournal.kz> on 19 July 2016.

<sup>16</sup>These include the Zhenis, I-P-2, Mugadzhar, and Isatai projects. Accessed from KMG’s website, <http://www.kmg.kz/en/manufacturing/reports/international/>, on 19 July 2016.

<sup>17</sup>The bids relate to service contracts worth \$793 million for the Badra, Rumaila, and Manjoon fields. All three have sulfur contents above 2% and involve enhanced oil recovery techniques, in addition to removing IEDs from the well surface. Accessed from Petrofac’s website, <http://www.petrofac.com/en-gb/regions/middle-east/projects/iraq-projects-overview/>, on 19 July 2016.

<sup>18</sup>This is calculated using the probability limit of  $\hat{\beta}$  in the context of measurement error, as noted by Wooldridge (2013, 321):  $\text{plim}(\hat{\beta}) = \beta \left( \frac{\sigma_{x^*}^2}{\sigma_{x^*}^2 + \sigma_e^2} \right)$ , where  $x^*$  refers to the observed measure that is measured with error and  $e$  refers to the measurement error such that  $e = x - x^*$ .

Table 21: Potential determinants of bribery: before and after the 2010 NOC reform

<b>Factor</b>	<b>Pre-reform</b>	<b>Post-reform</b>	<b>Source</b>
<i>Political institutions:</i>			
Regime type (dictatorship type)	Personalist	Personalist	Geddes-Wright-Frantz
Executive constraints (1-7; higher=more constraint)	2	2	Polity IV
Quality of government (0-1; higher=higher quality)	0.47	0.45	ICRG ( <i>via</i> QoG)
Press freedom (0-100; higher=less freedom)	76.4	81.6	Freedom House
<i>Domestic economic conditions:</i>			
GDP growth (%)	6.7	5.9	World Bank WDI
Unemployment (%)	7.3	5.4	World Bank WDI
Government size (% GDP)	10.9	10.7	World Bank WDI
<i>International trade:</i>			
International organization memberships (total)	52	52	CIA World Factbook
Bilateral investment treaties (total signed)	46	49	UNCTAD
<i>Oil sector:</i>			
Production (mn. barrels per day)	1.3	1.7	BP <i>Statistical Reviews</i>
Revenue from oil exports (\$ bn.)	55.2	55.6	IMF Article IV reports
Number of integrated upstream operators	9	9	USGS <i>Minerals Yearbooks</i>

*Note:* “pre-reform” indicators refer to 2005-2009 averages, “post-reform” refers to 2010-2014 averages.

Table 22: Results from Bayesian analysis of FCPA-related bribes in the oil sector, dropping Kazakhstan from the sample

	Mean ( $\beta$ )	Std. dev.	2.5%	97.5%	$Pr(\beta > 0)$
Intercept	-0.205	0.141	-0.478	0.068	0.073
Regulatory NOC	0.462	0.256	-0.026	0.977	0.967
GDP (logged)	0.048	0.170	-0.291	0.382	0.618
Oil income (logged)	0.325	0.164	0.001	0.644	0.975
Regime (Polity)	-0.010	0.233	-0.472	0.452	0.489
Press freedom	0.001	0.258	-0.505	0.512	0.497
Population (logged)	0.491	0.132	0.232	0.754	1.000
UNGA-Percent Agree with US	-0.400	0.233	-0.850	0.059	0.045

Posterior coefficients from Bayesian linear analysis: mean, standard deviation, 95% credible interval range, and probability that the coefficient is greater than zero. MCMC analysis performed using five chains with 1,000,000 iterations each, thinning every 1,000 iterations, and discarding the first 10,000 from each chain as burn-in. The sample excludes Kazakhstan, for a total sample size of 58.

Table 23: Results from Bayesian analysis of FCPA-related bribes in the oil sector, recoding Kazakhstan

	Mean ( $\beta$ )	Std. dev.	2.5%	97.5%	$Pr(\beta > 0)$
Intercept	-0.141	0.140	-0.413	0.138	0.156
Regulatory NOC	0.373	0.259	-0.143	0.875	0.927
GDP (logged)	0.026	0.176	-0.315	0.371	0.555
Oil income (logged)	0.350	0.166	0.016	0.670	0.979
Regime (Polity)	-0.044	0.240	-0.508	0.423	0.422
Press freedom	0.022	0.266	-0.494	0.548	0.529
Population (logged)	0.506	0.137	0.235	0.774	1.000
UNGA-Percent Agree with US	-0.358	0.240	-0.830	0.121	0.068

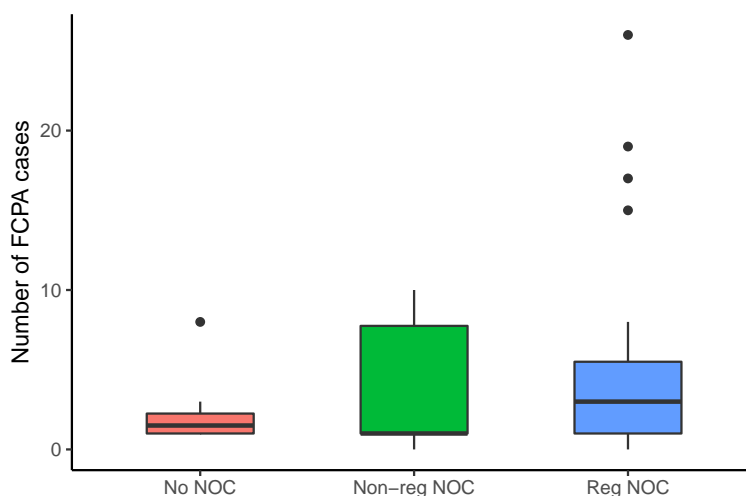
Posterior coefficients from Bayesian linear analysis: mean, standard deviation, 95% credible interval range, and probability that the coefficient is greater than zero. MCMC analysis performed using five chains with 1,000,000 iterations each, thinning every 1,000 iterations, and discarding the first 10,000 from each chain as burn-in. The sample recodes Kazakhstan from having a regulatory NOC to having a non-regulatory NOC. The sample size remains at 59 countries.

## Appendix 3: Are FCPA data too biased to use as an outcome measure?

Given the reliance on DoJ- and SEC-driven prosecutions and court documents to create the primary outcome measure, we should be concerned about measurement error in the dependent variable and, more importantly (for our estimated coefficients), selection bias. Specifically, FCPA prosecutions could be driven by factors that are conflated with oil-related institutions.

It could be the case, for instance, that US prosecution of corrupt behavior is politically easier when the bribe-recipient is not a formal government official, as is the case when NOC managers receive bribes instead of petroleum ministry officials. The DoJ and SEC may find it more difficult to prosecute FCPA violations against government ministers for fear of political backlash against US economic interests in oil-producing countries, while prosecuting NOC directors bears no such risk of retaliation given their non-governmental affiliations.

**Figure 13: Distribution of FCPA cases by regulatory structure**



*Distribution of the number of FCPA cases in the petroleum sector filed by the Department of Justice or Securities and Exchange Commission, 1997–2013, disaggregated by regulatory structure.*

If true, this explanation would suggest that the number of prosecuted cases should be greatest in countries with regulatory NOCs, irrespective of the magnitude of bribes and penalties associated with each case. The data on FCPA prosecutions across all oil-producing states do not show this pattern. As shown in Figure 13, there is no substantive difference in the number of FCPA cases between countries with the non-regulatory NOC structure versus those with the regulatory NOC structure. A  $t$ -test of the difference in means shows no statistical difference between the two groups. There is, however, a noticeable drop in the number of FCPA cases in countries without NOCs, though this is due to the inclusion of

established democracies such as Australia, Canada, and the UK, along with minor producers in Europe such as Croatia, Hungary, Romania, and the Ukraine.

It could also be the case that the DoJ and SEC go after bribery in certain countries based primarily on political motivations rather than actual corruption on the ground. For example, it is clear that the US maintains strong diplomatic and military ties with some oil producers but not others. As such, we might expect the DoJ to refrain from going after corruption occurring in places that are “friends of the US” while primarily prosecuting companies doing business in “unfriendly” places. We might also expect that countries with bilateral investment treaties with the US may also be spared from DoJ investigations, while companies operating in countries without BITs might be more subject to FCPA violations.

One could construct further arguments for why the FCPA measure of corruption suffers from this kind of selection bias, including the very arguments made about using perceptions-based measures such as the TI-CPI. If these factors were also to be strongly correlated with countries that have regulatory NOCs, then the main findings would indeed be biased by these and otherwise similar omitted variables.

While it is impossible to test against all such omitted variables, I use proxies to capture these constructs and include them as controls in the regression models in the main text. In addition, I model violations as a function of political motivations (again, using proxies) and use the residuals from this model as a dependent variable. The idea is to capture variation in FCPA-related bribes not due to political factors that would influence the DoJ and SEC in prosecuting a firm doing business in a given country. If the model is specified properly, then the resulting residuals should represent investigations driven by the presence of corrupt practices only, without any prosecutorial bias.

In the first step, I consider a number of possible explanations for why the DoJ and SEC would or would not target a given country for FCPA violations. These are proxied by the pattern of voting with the US (*Percent Agreement*) at the United Nations General Assembly (Bailey et al., 2016), the number of bilateral investment treaties with the US (Elkins et al., 2006), and whether or not the country has a defense pact with the US (from the Correlates of War project). After regressing these factors on oil-related bribes, I compute the residuals from the model and use them in a regression with the same model specification as the main analysis in the paper.

Results from this procedure are shown in Table 24, with the first step estimates in column 1 and the second step in column 2. While countries with high agreement with the US in the UNGA are predicted to have no bribes in the oil sector (and thus no prosecutions), accounting for this bias does not change the main result that countries with regulatory NOCs have higher FCPA-related bribes. Adding in perceptions of corruption as an additional covariate in the first step regression (column 3) nearly halves the UNGA coefficient, but similarly does not significantly alter the coefficient for regulatory NOC in the second step (column 4). As a robustness check, I run a model with all covariates in conventional one-stage OLS and the result for regulatory NOCs persists. Indeed, across all three models (2, 4, and 5) the coefficient for regulatory NOC is close to 0.51, the estimated coefficient from the main model in the text.

While the main result persists in these models, there is nonetheless evidence for prosecutorial bias present in FCPA investigations. If I plot the residuals from model 1 against the actual amount of bribery captured in FCPA investigations, I can discern where the model

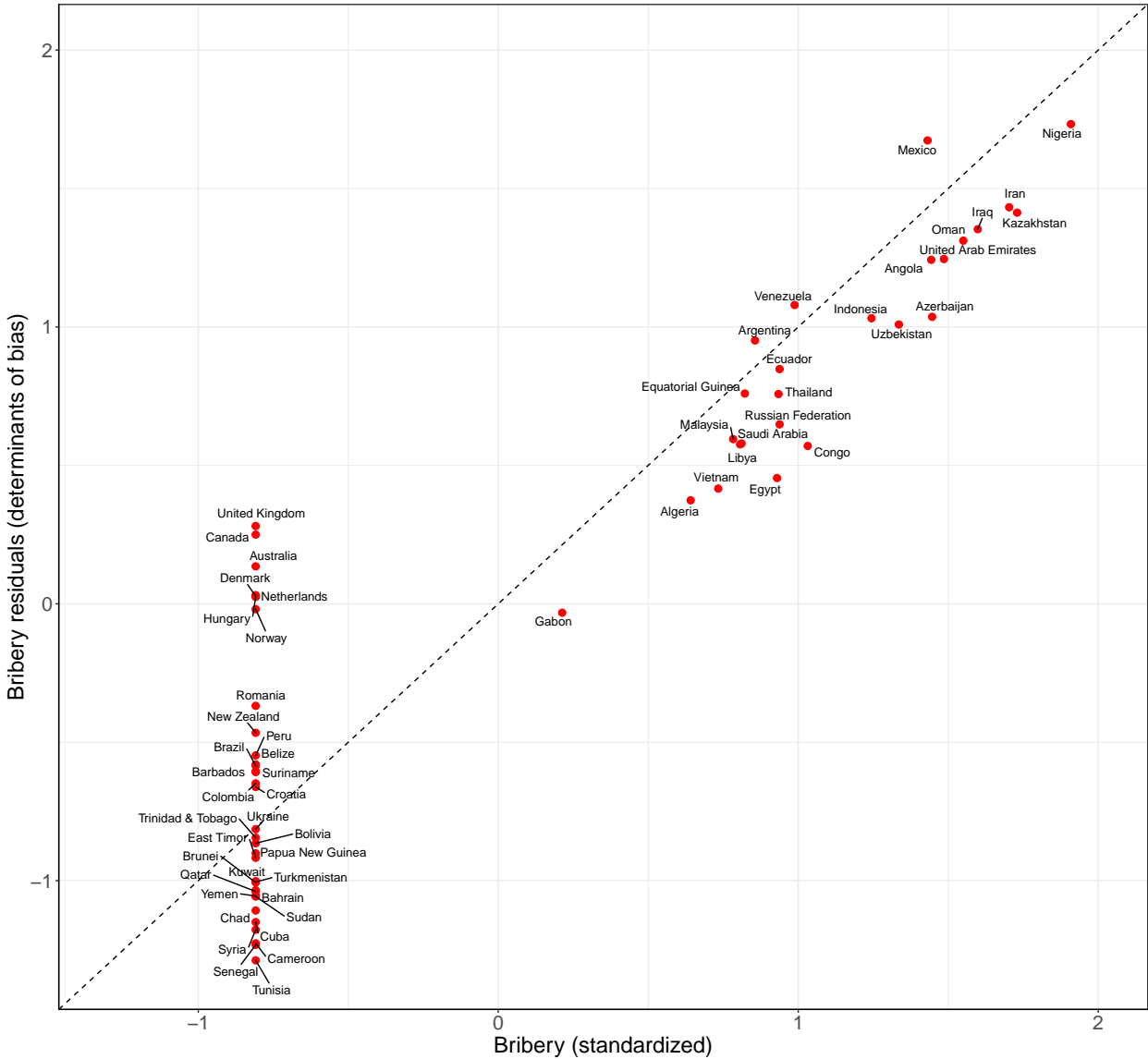
**Table 24: Modeling determinants of FCPA prosecutions**

	<i>Dependent variable:</i>				
	Bribery	Residuals	Bribery	Residuals	Bribery
	(1)	(2)	(3)	(4)	(5)
UNGA: Percent Agreement with USA	-0.396** (0.195)		-0.230 (0.248)		-0.361 (0.240)
BITs (count) with the US	0.253 (0.282)		0.119 (0.301)		0.243 (0.248)
Defense pact with the US	-0.351 (0.294)		-0.238 (0.307)		-0.299 (0.339)
Regulatory NOC		0.514** (0.241)		0.490** (0.237)	0.481* (0.247)
GDP per capita (logged)		0.116 (0.152)		0.201 (0.150)	0.264 (0.236)
Oil income (logged)		0.320** (0.155)		0.321** (0.154)	0.307* (0.170)
Regime (Polity)		0.019 (0.221)		-0.097 (0.218)	-0.095 (0.245)
Press freedom		-0.070 (0.227)		-0.143 (0.224)	-0.216 (0.304)
Population (logged)		0.504*** (0.121)		0.544*** (0.127)	0.569*** (0.138)
TI - CPI score			0.222 (0.184)		0.233 (0.242)
Constant	0.026 (0.178)	-0.179 (0.135)	0.045 (0.179)	-0.196 (0.134)	-0.168 (0.190)
Observations	59	59	58	58	58
R <sup>2</sup>	0.164	0.390	0.183	0.400	0.515
Adjusted R <sup>2</sup>	0.118	0.319	0.121	0.329	0.412

*Note:*

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Figure 14: Visualizing prosecutorial bias in FCPA-related bribery



Comparing actual FCPA-related bribery in the oil sector (used as the main dependent variable in the analysis) with residuals from a model accounting for potential sources of prosecutorial bias. Residuals based on results shown in column 1 in Table 24.

would suggest under-reporting of corruption based on prosecutorial bias—reflected in cases that are far above the 45-degree line—as well as over-reporting of corruption—reflected in cases far below the 45-degree line. I find that there is likely to be under-reporting of corruption in the long-established democracies (Australia, Canada, Denmark, Netherlands, and Norway), which is not surprising given strong economic ties with the US and fear of political backlash for DoJ-led investigations in these countries. This is one reason, among many oth-



ers, why I omit these cases in robustness checks of the regression analyses in the main text. Interestingly, there is no strong evidence of over-reporting of corruption, although cases such as Egypt and the Congo (Republic) are roughly 0.5-standard deviations from the fitted line. This would suggest that perhaps the DoJ is going after FCPA violations in these countries at a higher rate than otherwise. Indeed, both states are relatively small oil producers yet have high amounts of reported bribery, a fact that by itself is suggestive of possible over-reporting of corruption in the oil sector.

In addition to the two-step models above, I assess whether these factors of prosecutorial bias influence the decision to investigate an FCPA case in a given country using Heckman’s classic selection model. Here I use a binary variable to indicate whether or not a country was implicated in an FCPA case ( $D_i = 1$  if bribery is investigated and captured by the DoJ or SEC,  $D_i = 0$  otherwise):

$$D_i = \begin{cases} 1 & \text{if } Bribery_i > 0 \\ 0 & \text{if } Bribery_i = 0 \end{cases}$$

With this variable, I test the following selection and outcome models:

$$\Pr(D_i = 1) = \alpha_0 + \alpha_1 UN \text{ percent agree}_i + \alpha_2 BIT_i + \alpha_3 Defense \text{ pact}_i + \alpha_4 CPI_i + \epsilon_{1i}$$

$$Bribery_i = \beta_0 + \beta_1 Reg \text{ NOC}_i + \beta_2 GDP \text{ per capita}_i + \beta_3 Oil \text{ income per capita}_i + \beta_4 Polity_i + \beta_5 Press \text{ freedom}_i + \beta_6 Population_i + \epsilon_{2i}$$

where *Bribery*, *GDP per capita*, *Oil income per capita*, and *Population* are logged, and all continuous variables are standardized as in the main regressions. Note that the correlation between  $\epsilon_1$  and  $\epsilon_2$ , denoted by  $\rho$ , is estimated from the data (and not assumed to be fixed at zero). I include the TI-CPI scores here as well to assess the degree to which perceived corruption influences DoJ and SEC prosecutions. Results from various specifications of this model are presented in Table 25, with results from the model specification above presented in column 4.

The model including the covariates from the main regressions in the text, in this case column 4, shows that the regulatory NOC finding persists at statistically significant levels, though with coefficients estimated at smaller magnitudes (0.36, compared to the main regression finding of 0.51). As with the two-step models in Table 24, there is evidence that states with similar voting patterns to the US at the UN General Assembly (a proxy for “friends of the US”) are much less likely to be investigated by the DoJ and SEC for FCPA violations occurring within their borders. But again, even after controlling for this prosecutorial bias, my finding that regulatory NOCs have higher levels of corruption remains robust.

It should be noted, however, that the Heckman selection models for columns 1 and 3—where I find the strongest results for the percent agreement variable—may be improperly specified given the extremely high estimates of  $\rho$ .<sup>19</sup> Despite reasonable Mills ratios, these

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<sup>19</sup>Estimating  $\rho$  from the reported inverse hyperbolic tangent of  $\rho$  for these models gives values of  $\hat{\rho}$  close

results should thus be interpreted with caution.

Overall, there appears to be little support for the argument that the relationship between NOC structure and corruption is driven by politically-motivated probabilities of prosecution as estimated by two-step models as well as by the raw count of FCPA cases pursued by the DoJ and SEC in a given country. While political factors appear to drive the choice of investigation sites by the DoJ and SEC—notably refraining from investigations in countries with a high percentage of agreement with the US at the UN General Assembly—incorporating these determinants of bias does not change the main finding that regulatory NOCs foster environments with higher levels of bribery.

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to 1.

**Table 25: Heckman selection models of FCPA prosecutions**

	(1)	(2)	(3)	(4)
<i>Second stage results, DV: FCPA-related bribes (logged \$)</i>				
Regulatory NOC	0.277* (0.153)	0.284* (0.164)	0.242 (0.193)	0.361** (0.177)
GDP per capita (logged)			-0.0376 (0.234)	-0.123 (0.166)
Oil income (logged)			0.0709 (0.116)	0.374** (0.164)
Regime (Polity)			-0.322 (0.224)	-0.370** (0.168)
Press freedom			-0.203 (0.347)	-0.489* (0.258)
Population (logged)			0.199*** (0.00871)	0.389*** (0.127)
Constant	0.502* (0.266)	0.799** (0.336)	0.444*** (0.0891)	0.594*** (0.218)
<i>First stage results, DV: Binary indicator for FCPA prosecution</i>				
UNGA: Percent agreement with the US	-1.055*** (0.363)	-0.889 (0.577)	-1.853*** (0.383)	-1.069 (0.670)
BITs with the US		0.241 (0.465)		0.305 (0.428)
Defense pact with the US		-0.300 (0.444)		-0.367 (0.441)
TI-CPI score		0.440 (0.291)		0.369 (0.308)
Constant	-0.397* (0.207)	-0.475 (0.358)	-0.793*** (0.236)	-0.528 (0.383)
<i>atanh <math>\rho</math></i>				
Constant	1.804 (1.277)	0.543 (1.055)	17.08 (264.8)	0.693 (0.816)
<i>ln <math>\sigma</math></i>				
Constant	-0.526* (0.301)	-0.879*** (0.311)	-0.596*** (0.134)	-1.040*** (0.296)
$\rho$	0.947	0.495	1.000	0.600
$\sigma$	0.591	0.415	0.551	0.353
$\lambda$ (Inverse Mills ratio)	0.560	0.206	0.551	0.212
$N$	59	58	59	58

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## Appendix 4: Primary data sources for NOC data

I code whether a country has a regulatory NOC or not based on primary documents such as petroleum laws, petroleum contracts, national oil company annual reports, and national oil company websites. I supplement this information at times with secondary accounts of the petroleum history of each country.

To assess the *de facto* institutional structure and to differentiate between contradictions in *de jure* institutional structure and oversight, I draw on accounts from the United States Geological Survey *Minerals Yearbooks* from 1932 to 2014, the International Comparative Legal Guides (ICLG), the Oil, Gas & Energy Law *Global Energy Law & Regulation Portal*, and the Natural Resources Governance Institute *Resource Governance Index* reports.

A full list of primary documents for each country is presented below, including countries which later privatized their national oil companies (Canada, Gabon, and the UK). Unless noted otherwise, all documents are printed and available in English. Petroleum contracts are indicted with brackets referring to the signing date, where available. All contracts are downloaded from the *OpenOil Repository* at [repository.openoil.net/wiki](http://repository.openoil.net/wiki).

Note that the list is not intended to be a comprehensive list of a country's petroleum laws or contracts, but rather indicates which documents were consulted to create the NOC database.

Upon publication of the paper and the database, the coding decisions to construct the NOC database will be publicly available in the form of a codebook of country-by-country vignettes.

### Algeria

Hydrocarbon Law, Law No. 86-14 of 19 August 1986

Algeria dd19891023 Exploration-Exploitation [Contract, signed 23 October 1989]

### Angola

Law No. 13/78: General Petroleum Activities Law (1978)

Law No. 10/04: Petroleum Activities Law (2004)

Decree 48-06 of 1 September (2006)

Angola Block-5-06 dd20061101 PSC [Contract, signed 1 November 2006]

### Argentina

Law 7059 of 6 September 1910

Hydrocarbons Act No. 17,319 (1967)

State Reform Act No. 23,696 (1989)

Hydrocarbons Sovereignty Act No. 26,741 (2012)

### Azerbaijan

Article 14, The Constitution of the Republic of Azerbaijan (1995)

State Oil Company of Azerbaijan Republic (SOCAR) Charter (2003)

## **Bahrain**

Law No. 12 (1975), translated from Arabic

## **Bolivia**

Law 21 of December 21st (1936)

Bolivia Block-XX-Tarija-Oeste dd20061028 Operation-Contract [Contract, signed 28 October 2006]

## **Brazil**

Decree-Law No. 395 of 29 April 1938

Decree-Law No. 538 of 7 July 1938

Petroleum Law, Law No. 9.478 (1997)

Pre-Salt Law, Law No. 12.351 (2010)

## **Brunei**

Brunei National Petroleum Company Order of 14 January 2002

Brunei Darussalam Block-L dd20060828 PSC [Contract, signed 28 August 2006]

## **Cameroon**

Article 4 from Presidential Decree 13-3 of March 1981

*Code Pétrolier* (1999), translated from French

Cameroon Kombe-Nsepe-Permit dd20080321 JOA [Contract, signed 21 March 2008]

## **Canada**

Bill C-8: An Act to Establish a National Petroleum Company, House of Commons (1975)

## **Chile**

*Ley Numero 1.208 Organica de la Empresa Nacional del Petroleo (ENAP)* (1950), translated from Spanish

*Ley Numero 18.575 Organica Constitucional de Bases Generales de la Administracion del Estado*, translated from Spanish

Article 19 No. 21, Political Constitution of the Republic of Chile

*Articolo 11, Ley Numero 18.196*, translated from Spanish

Articles 29 and 44, Decree Law No. 1,263 (1975)

Article 3, Decree Law No. 1,056 (1975)

## **China**

Mineral Resources Law, Sixth National People's Congress Standing Committee of the Fifteenth Meeting (1986)

Mineral Resources Law, Eighth National People's Congress Standing Committee of the Twenty-First Meeting "on the Edit *Mineral Resources Law's* decision" Correction (1996)

China Kongnan-Block-Dagang dd19970908 Petroleum-Contract [Contract, signed 8 September 1997]

## **Colombia**

Law 165 (1948)  
Decree No. 1760 of June 2003

### **Congo (Democratic Republic)**

*Decret-Loi No. 245 du 09 Aout 1999 Portant Creation et Statuts d'une Entreprise Publique Denommee la Congolaise des Hydrocarbures*, translated from French.

### **Congo (Republic)**

*Ordonnance-Loi No. 81-013 du 02 Avril 1981 Portant Legislation Generale sur les Mines et les Hydrocarbures*, translated from French.

- Amended by Law No. 82-039 of April 5, 1982
- Amended by Law No. 86-008 of December 27, 1986

### **Denmark**

“Sole Concession” of 8 July 1962  
Danish Subsoil Act, Act No. 27 of 19 February 1932  
- Amended by Act No. 960 of 13th September 2011  
- Amended by Act No. 535 of 29 April 2015  
Danish North Sea Fund, Act No. 587 of 24 June 2005  
- Amended by Order No. 710 of 21 June 2007

### **East Timor**

Section 95.1 and Article 139 of the Constitution of Timor-Leste  
Petroleum Act (2005)

### **Ecuador**

Decree 522 (1972)  
Hydrocarbon Law (1973)  
- Amended 1993  
- Amended 2010

### **Egypt**

Law No. 20/1976 Regarding the Egyptian General Petroleum Company (1976)

### **Equatorial Guinea**

Hydrocarbons Law No. 8/2006 of 3 November of the Republic of Equatorial Guinea (2006)

### **Gabon**

*Loi n. 14/82 du 24 Janvier 1983: Re??glementation des activite??s de recherche et d'exploitation des hydrocarbures*, translated from French

### **Indonesia**

Mining Law (Indische Mijnwet) of 1907  
Government Regulation No. 198 of 1961  
Government Regulation No. 199 of 1961

Petroleum and Mining Code (JDPA) of 2005

### **Iran**

Petroleum Act (Imperial Persia) of 1974

Petroleum Law (Islamic Republic of Iran) of 1987

- Amended 1998

- Amended 2009

### **Iraq**

“Defining the Exploitation Areas for the Oil Companies”, Law No. 80 (1961)

Law No. 101 (1976)

Oil and Gas Law of 2007

### **Kazakhstan**

Government Resolution No. 410 of 24 March 1997

Decree No. 454 of 20 May 2010

Law of Subsoil and Subsoil Use, Law No. 291-IV of 24 June 2010

### **Kuwait**

Public Tenders Law No. 37/1964

General Agreement on Participation in 1972

Decree Promulgating Law No. 6 Concerning the Establishment of the Kuwait Petroleum Corporation (1974-75)

- Amended 4 September 1980

Resolution No. 5/1979 of the Council of Ministers (Supreme Council for Petroleum)

- Amended by Resolution No. 1/2005

Issue No. 3: Kuwait Oil Company Policies and Regulations of Purchasing (2008)

### **Libya**

Royal Decree and Law No. 13 of 14 Apr 1968

Law No. 24 (1970)

Decision of the Secretary of Petroleum No. 89 (1979)

### **Malaysia**

Section 22 of The Companies Act (1965)

Act 95: The Petroleum Mining Act (1966)

Act 144: The Petroleum Development Act (1974)

- Amended by Act A290 (1975)

- Amended by Act A382 (1977)

- Amended by Act A613 (1985)

- Amended by Act A842 (1993)

### **Mexico**

*Nueva Ley Publicada en el Diario Oficial de la Federacion el 25 de noviembre de 1938*, translated from Spanish

Petroleum Law of 2008  
- Amended by Hydrocarbon Law of 2014

### **Netherlands**

Article 168 of the Mijnreglement 1964  
The Mining Act 02-12-1997  
- Amended 2003  
Mining Decree 2003 of 6 December 2002, State Gazette 604

### **Nigeria**

Petroleum Act of 27 November (1969)  
- Amended by Chapter 350 LFN / Chapter P10 (1990)

### **Norway**

“Ten Commandments of Norwegian Oil Industry”, Norwegian Parliament 1970, translated and abridged by Victor, Hults, and Thurber (2011)  
Parliamentary Report No. 25, 1974-1975  
Petroleum Tax Act of 1975  
Petroleum Act of 1996

### **Oman**

Oman Exploration and Production Sharing Agreement [Model contract]  
Petroleum Development Oman, “About us” <http://www.pdo.co.om/Pages/History.aspx>  
[Online, accessed 11 March 2014]

### **Peru**

Law No. 26221: Organic Law for Hydrocarbons (1993)  
Peru Block-Z-1 dd20011130 Exploration-Exploitation [Contract, signed 30 November 2001]

### **Qatar**

Emiri Decree No. 10 of 1974  
Decree-Law No. 4 of the year 1977, Concerning Conservation of Petroleum Wealth  
- Amended by Decree-Law No. 35 of 2002  
- Amended by Law No. 3 of 2007

### **Russia**

Law No. 2395-1 of 21 February 1992  
Resolution of the Supreme Soviet of the Russian Federation No. 3314-1 of 15 July 1992  
Federal Law 225-FZ Dated 30 December 1995 On Production Sharing Agreements

### **Saudi Arabia**

Royal Decree No. 25 of 22 November 1962  
Royal Decree No. M/8 of 14 November 1988  
Saudi Aramco, “Our History” <http://www.saudiaramco.com/en/home/about/history/>



1970s.html [Online, accessed 11 March 2014]

### **Sudan**

Petroleum Resources Act of 1972

Petroleum Wealth Act of 1998

### **Syria**

Legislative Decree No. 9 of 1974

Syria Block-IX dd20070920 Exp-Dev-Prod [Contract, signed 20 September 2007]

### **Trinidad**

The Petroleum Taxes Act of 1 January 1974

Petroleum Regulations (Competitive Bidding) Order, Legal Notice No. 40 (1999)

Trinidad Production Sharing Agreement [Model contract]

### **Tunisia**

Hydrocarbon Code, Law No. 99-93 of 17 August 1999

- Amended by Law No. 2002-23 of 14 February 2002

Tunisia Safx-offshore dd20050720 PSC [Contract, signed 20 July 2005]

### **Turkmenistan**

Petroleum Law of 1996

Nebit-Gaz, "Ministry of Oil and Gas" <http://www.oilgas.gov.tm/en/m/page/page/22> [Online, accessed 12 March 2014]

Nebit-Gaz, "Turkmen Oil State Concern" <http://www.oilgas.gov.tm/en/m/page/page/26> [Online, accessed 12 March 2014]

### **Uganda**

Petroleum Exploration and Production Act of 1985

- Amended by the Petroleum Exploration and Production Regulations of 1993

- Amended by the Petroleum Exploration, Development and Production Act of 2013

### **United Arab Emirates (Abu Dhabi)**

Law No. 7 of 27 November 1971: Establishing the Abu Dhabi National Oil Company

- Amended by Law No. 8 of 1978

- Amended by Law No. 1 of 1988

*The Petroleum Concession Agreements of the United Arab Emirates, 1939–1981 (Abu Dhabi)*, Dr. Mana Saeed al-Otaiba, Minister of Oil and Mineral Resources of the United Arab Emirates (Published in English in 1981 by Croom Helm, London & Canberra)

### **United Kingdom**

Petroleum Production Act of 1934

Petroleum and Submarines Pipelines Act of 1975 (to establish the British National Oil Company in 1976)

Petroleum Production Landward Areas Regulations, No. 1436 of 30 June 1995

### **Uzbekistan**

Oil and Gas Law, Presidential Decree of 28 April 2000

Uzbekistan North-Urtabulak dd19990819 Prod-Enhancement-Contract [Contract, signed 19 August 1999]

### **Venezuela**

Organic Law of Hydrocarbons of 1943

Organic Hydrocarbons Law, Special Official Gazette No. 5.453 of 24 March 2000

- Reprinted/amended in Official Gazette No. 38.506 of 23 August 2006

Venezuela dd20100917 Exp-Prod [Contract, signed 17 September 2010], translated from Spanish

### **Vietnam**

Petroleum Law of 1992

- Amended by Petroleum Law of 2000 of June 2000

- Amended by Revised Petroleum Decree of September 2000

### **Yemen**

Republican Decree No. 204 of 1997

Republican Decree No. 40 of 2000

Yemen Block-75 dd20070331 PSC [Contract, signed 31 March 2007]

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