

ONLINE APPENDIX for
Are Energy Endowed Countries Responsible for
Conditional Convergence?
The Energy Journal

Matthew Oliver and Gregory B. Upton Jr.

Table 1: Data Description and Sources

GDP: Output-side real GDP at chained PPPs (in mil. 2011USD). Penn World Tables 9.0.

Consumption: Real consumption of households and government, at current PPPs (in mil. 2011 USD). Penn World Tables 9.0.

Oil Endowments: Based on oil reserves data from 2018 BP Statistical Review of World Energy.

Natural Gas Endowments: Based on natural gas reserves data from 2018 BP Statistical Review of World Energy.

Coal Endowments: Based on annual coal production data from 2018 BP Statistical Review of World Energy.

Average protection against expropriation risk, 1985-1995: Risk of expropriation of private foreign investment by government, from 0 to 10, where a higher score means less risk.

Soil quality: Dummies for steppe (low latitude), desert (low latitude), steppe (middle latitude), desert (middle latitude), dry steppe wasteland, desert dry winter, and highland. Due to limited sample size, categorized into steppe (low latitude), desert (low latitude), and other.

Dummy for landlocked: Equal to 1 if country does not adjoin the sea.

Latitude: Absolute value of latitude of the country (i.e., a measure of distance from the equator) scaled to take values between 0 and 1, where 0 is the equator.

Capital Stock: Capital stock at current PPPs (in mil. 2011 USD). Penn World Tables 9.0.

Total Factor Productivity: TFP at constant national prices (2011=1). Penn World Tables 9.0.

Human Capital Index: Based on years of schooling and returns to education. Penn World Tables 9.0.

Employment: Numbers of persons engaged. Penn World Tables 9.0.

Population: Penn World Tables 9.0.

Total Natural Resource Rents (percentage of GDP): World Bank Development Indicators.

Table 2: Sample countries with FF Endowments

Country	Oil	Natural Gas	Coal
Algeria	✓	✓	
Angola	✓		
Argentina	✓	✓	
Australia	✓	✓	✓
Bahrain		✓	
Bangladesh		✓	
Bolivia		✓	
Brazil	✓	✓	✓
Bulgaria			✓
Canada	✓	✓	✓
China	✓	✓	✓
Colombia	✓	✓	✓
Congo, Rep.	✓		
Denmark	✓	✓	
Ecuador	✓		
Egypt	✓	✓	
Gabon	✓		
Germany		✓	✓
Greece			✓
Hungary			✓
India	✓	✓	✓
Indonesia	✓	✓	✓
Iran	✓	✓	
Iraq	✓	✓	
Israel		✓	
Italy	✓	✓	
Japan			✓
Kuwait	✓	✓	
Malaysia	✓	✓	
Mexico	✓	✓	✓
Mongolia			✓
Myanmar		✓	
Netherlands		✓	
New Zealand			✓
Nigeria	✓	✓	
Norway	✓	✓	
Oman	✓	✓	
Pakistan		✓	✓
Peru	✓	✓	
Poland		✓	✓
Qatar	✓	✓	

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Table 2 – continued from previous page

Country	Oil	Natural Gas	Coal
Saudi Arabia	✓	✓	
South Africa			✓
Spain			✓
Sudan	✓		
Syria	✓	✓	
Thailand	✓	✓	✓
Trinidad & Tobago	✓	✓	
Tunisia	✓		
Turkey			✓
United Arab Emirates	✓	✓	
United Kingdom	✓	✓	✓
United States	✓	✓	✓
Venezuela	✓	✓	✓
Vietnam	✓	✓	✓
Zimbabwe			✓
Number of Countries	37	40	26
Share of World Reserves Production			
1985-1989	90.3%	67.2%	77.8%
2013-2017	87.6%	67.3%	91.2%

Table 3: Correlation Matrix

	Coal	Natural Gas	Oil
Coal	1		
Natural Gas	0.328***	1	
Oil	0.233**	0.722***	1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Summary Statistics by Endowment Type

	Oil		Natural Gas		Coal	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Country Characteristics						
Number of Countries	37		40		26	
OECD	8		12		13	
% World Population 1970-74	63.76%		70.42%		66.28%	
% World Population 2010-14	64.86%		72.01%		63.51%	
Landlocked	0		1		2	
Africa	8		3		2	
Asia	14		19		9	
Other Continent	1		1		2	
Resource Endowments						
% World Oil Reserves 1985-89	90.30%		89.57%		24.38%	
% World Oil Reserves 2013-17	87.63%		86.26%		34.93%	
% World Gas Reserves 1985-89	63.47%		67.19%		20.26%	
% World Gas Reserves 2013-17	65.82%		67.32%		16.59%	
% World Coal Production 1985-89	58.34%		70.57%		77.81%	
% World Coal Production 2013-17	83.47%		85.99%		91.17%	
Economic Growth						
GDP Per Capita 1970-74	\$19,057	\$39,949	37	\$19,097	\$38,391	40
GDP Per Capita 2010-14	\$27,405	\$29,376	37	\$28,996	\$28,514	40
<i>Average Growth Rate</i>	5.4%	5.3%	37	5.5%	5.2%	40
Consumption Per Capita 1970-74	\$7,658	\$9,124	37	\$8,129	\$8,881	40
Consumption Per Capita 2010-14	\$15,128	\$11,124	37	\$16,775	\$11,259	40
<i>Average Growth Rate</i>	5.2%	4.9%	37	5.4%	4.7%	40
Control Variables						
Abs. Value of Latitude	0.267	0.185	37	0.313	0.177	40
Protection Against Expropriation	7.18	1.79	37	7.37	1.73	39
Capital Stock per Worker	\$37,352	\$91,187	37	\$38,164	\$87,660	40
Human Capital Index	1.70	0.62	36	1.81	0.65	39

NOTE: Additional control variables include soil type categories and mineral mines. Summary statistics not listed for brevity.

Table 5: β -Convergence Test by Endowment Type

Panel A: GDP Per Capita						
	Oil		Natural Gas		Coal	
β	-2.541*** (0.522)	-5.057* (1.858)	-2.486*** (0.481)	-3.642* (1.470)	-3.361*** (0.815)	-4.608 (4.760)
Controls	No	Yes	No	Yes	No	Yes
N	37	35	40	37	26	25
R^2	0.396	0.772	0.414	0.757	0.484	0.958
Panel B: Consumption Per Capita						
	Oil		Natural Gas		Coal	
β	-2.883*** (0.658)	-6.368 (3.076)	-2.802*** (0.567)	-3.624 (2.068)	-2.282** (0.610)	-2.992 (5.241)
Controls	No	Yes	No	Yes	No	Yes
N	37	35	40	37	26	25
R^2	0.383	0.693	0.437	0.700	0.386	0.935

Standard errors in parentheses. Control variables include indicator variables for whether the country is landlocked, continent, soil type, number of gold, iron, silver and zinc mines, distance from equator, and average expropriation risk.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6: β -Convergence Tests - Interaction Robustness

	GDP Per Capita		Consumption Per Capita	
$\beta \times \text{FF}$	-2.358*** (0.468)	-3.044*** (0.987)	-2.431*** (0.538)	-3.413*** (1.183)
$\beta \times \text{Non-FF}$	0.260 (0.572)	-1.717 (1.127)	0.502 (0.411)	-1.677* (0.871)
$(\beta \times \text{FF}) - (\beta \times \text{Non-FF})$	-2.618*** (0.739)	-1.327 (1.146)	-2.934*** (0.677)	-1.736* (1.015)
Controls	No	Yes	No	Yes
N	127	101	127	101
R^2	0.184	0.478	0.230	0.477

Standard errors in parentheses. Control variables include indicator variables for whether the country is landlocked, continent, soil type, number of gold, iron, silver and zinc mines, distance from equator, and average expropriation risk.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7: Resource Rents - Interaction Robustness

	GDP Per Capita		Consumption Per Capita	
$\beta \times \text{FF}$	-2.178*** (0.723)	-3.431** (1.532)	-2.337*** (0.759)	-4.736*** (1.671)
$\beta \times \text{Non-FF}$	0.488 (0.742)	-2.248 (1.531)	0.788 (0.489)	-2.682** (1.215)
Resource Rents	0.019 (0.045)	0.074 (0.111)	0.012 (0.037)	0.095 (0.099)
$(\beta \times \text{FF}) - (\beta \times \text{Non-FF})$	-2.666** (1.098)	-1.184 (1.522)	-3.021*** (0.937)	-2.055* (1.172)
Controls	No	Yes	No	Yes
N	105	88	105	88
R^2	0.122	0.436	0.196	0.453

Standard errors in parentheses. Control variables include indicator variables for whether the country is landlocked, continent, soil type, number of gold, iron, silver and zinc mines, distance from equator, and average expropriation risk.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

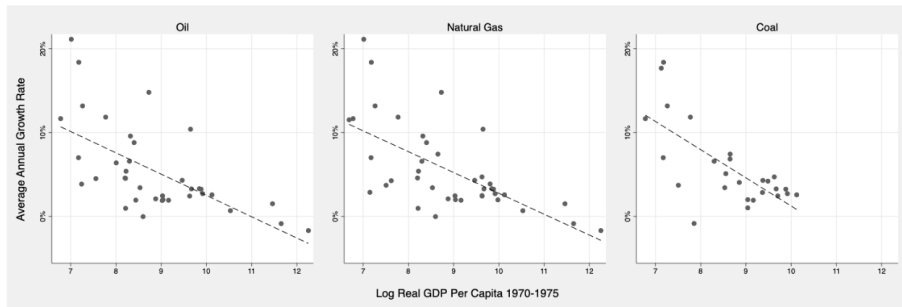
Table 8: Share Primary Products Export - Interaction Robustness

	GDP Per Capita		Consumption Per Capita	
$\beta \times \text{FF}$	-2.125*** (0.655)	-2.902** (1.207)	-2.250*** (0.706)	-3.845** (1.152)
$\beta \times \text{Non-FF}$	0.538 (0.810)	-1.956 (1.416)	0.820 (0.513)	-2.111* (1.110)
Share Primary Products	-1.366 (4.422)	-4.883 (5.774)	-1.499 (2.883)	-1.995 (4.800)
$(\beta \times \text{FF}) - (\beta \times \text{Non-FF})$	-2.663 ** (1.154)	-0.946 (1.434)	-3.070*** (0.905)	-1.733 (1.158)
Controls	No	Yes	No	Yes
N	104	91	104	91
R^2	0.159	0.457	0.214	0.439

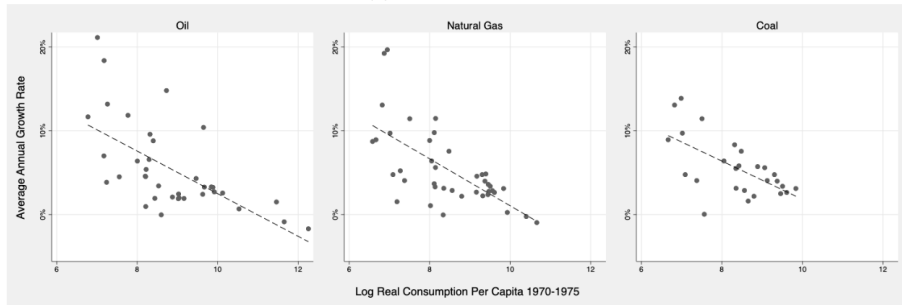
Standard errors in parentheses. Control variables include indicator variables for whether the country is landlocked, continent, soil type, number of gold, iron, silver and zinc mines, distance from equator, and average expropriation risk.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 1: β -Convergence By Resource Type



(a) GDP Per Capita



(b) Consumption Per Capita

Table 9: Growth Components - Interaction Robustness

	GDP		Capital		Human Capital		TFP	
	No	Yes	No	Yes	No	Yes	No	Yes
$\beta \times \text{FF}$	-0.921*** (0.177)	-1.193*** (0.260)	-1.198*** (0.224)	-0.189 (0.463)	-0.154** (0.060)	.007 (0.083)	-0.283* (0.163)	-0.707*** (0.188)
$\beta \times \text{Non-FF}$	0.266 (0.187)	-0.377 (0.254)	0.120 (0.280)	0.510 (0.448)	-0.01 (0.074)	0.281 (0.114)	0.194 (0.096)	-0.416** (0.213)
$(\beta \times \text{FF}) - (\beta \times \text{Non-FF})$	-1.187*** (0.258)	-0.816*** (0.233)	-1.318*** (0.358)	-0.699 (0.466)	-0.145 (0.095)	-0.274*** (0.059)	-0.478** (0.189)	-0.291** (0.140)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
N	78	76	78	76	78	76	78	76
R ²	0.776	0.782	0.874	0.926	0.364	0.234	0.803	0.699

Standard errors in parentheses. Control variables include indicator variables for whether the country is landlocked, continent, soil type, number of gold, iron, silver and zinc mines, distance from equator, and average expropriation risk.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 2: σ -Convergence By Resource Type

