

DOES CORRUPTION EXACERBATE INEQUALITY?

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Introduction

- Inequality has seen massive increases- in both the developed & developing world

Two Views-

- Inequality is the result of structure of capitalism itself
- Or, due to institutional features

Existing Literature

- The effects of corruption depend on the definition one chooses to take. (Rose-Ackerman,1997;Kaufmann & Wei,1999)
- Corruption has quadratic relationship with inequality. - Li,Xi & Xou (2000).
- High and low level of corruption lead to low inequality- intermediate level of it leads to high inequality. - Li,Xi & Xou (2000).
- Corruption is endogenous (Jong-Sung & Khagram,2005).

r-g Hypothesis

r-g is one of the central driving forces behind inequality in the long run

$$\textit{Capital Share of National Income} = r \cdot \frac{K}{Y}$$

$$\beta = \frac{s}{g}$$

$$\textit{Capital Share of National Income} = r \cdot \frac{s}{g}$$

However, many authors have questioned the theoretical assumptions of the model(constant savings as in Krusell& Smith(2015), the role of taxes Galbraith (2014) & empirical validity(Acemoglu& Robinson(2014))

Objectives

1. To build on and further the existing literature by examining non-linear effects of corruption on inequality using a panel of both developed and developing countries constructed from 2000 to 2011.
2. To contribute to the literature by testing the validity of the second fundamental law of capitalism and how it interacts with increasing levels of corruption, affecting inequality.

Key Variables of Interest

- **Gini Co-efficient** - Standard economic measure of income inequality, based on Lorenz Curve. A society that scores 0.0 on the Gini scale has perfect equality in income distribution.
- **Corruption Perception Index** - A ranking of countries according to the extent to which corruption is believed to exist. It is on a scale of zero to 100, with zero indicating high levels of corruption and 100 indicating low levels.
- **r-g** - Here the return to capital is defined as the real interest rate

Data

- Vast Majority of Macroeconomic Data collected from World Bank Datasets
- GINI Coefficients Collected from the Standardized World Income Inequality Dataset
- Corruptions Perceptions Index is sourced from Transparency International
- Democracy Index is sourced from the Polity IV dataset which is compiled by the Center for Systemic Peace. It is an 11 point scale from 0-11 based on democratic freedoms and institutional make-up.
- Fractionalization Data is collected from Quality of Governance Dataset.

Descriptive Statistics

	(1)	(2)	(3)	(4)	(5)
VARIABLES	N	mean	sd	min	max
CPI	462	46.01	21.96	13	97
Net Gini	462	38.08	9.185	21.94	68.16
GDP/capita	462	17,930	14,775	1,174	65,781
Inflation	462	5.832	4.761	-1.200	51.50
Govt. Spending(as % of GDP)	462	15.90	4.963	2.800	25.94
Trade Openness	462	84.37	38.33	22.14	210.4
Population Growth	462	0.927	1.072	-2.097	3.364
Unemployment rate	462	8.269	5.626	0.600	37.60
Fractionalization	462	0.641	0.182	0	0.914
Natural Resource rent(as % of GDP)	462	6.245	8.968	0	65.36
Tax Revenue(as % of GDP)	462	17.77	8.864	0.905	65.90
Year Since Independence	462	101.2	157.1	10	1,518
Gross Savings	462	21.47	7.223	2.430	52.69
r-g	462	1.941	9.554	-50.15	45.40
Number of country	74	74	74	74	74

Methodology

- 2SLS Panel is the primary estimation strategy.
- Time Dummies, Country level clustering were used and serial correlation was controlled for
- For Corruption we included its square term
- For some r-g specifications we utilized an interaction term between CPI & r-g
- Quantile Regressions were also utilized to observe the effects of our key variables at different levels of inequality

Instruments

Previously used IVs have some limitations with regard to their assumptions. Our chosen IVs are:-

- Regulatory Quality
- Government Fractionalization
- Government Effectiveness

Key Findings

- Corruption is a significant determinant of Inequality with the variables being stationary and corruption showing Granger causality toward Inequality.
- Inequality initially rises with declining corruption, but starts falling after a turning point of 64.4 (46.3 for Non-IV specification)
- r-g is also significant in most specifications, even after controlling for corruption
- However, the interaction term is not
- The effects of both r-g and corruption decrease at higher levels of inequality, with r-g being altogether insignificant as our Quantile Regressions show.

Table 02: Regression Results

	(2)	(4)	(6)
Variable	CPI Only [IV]	CPI with r-g [IV]	CPI with (r-g)*CPI [IV]
CPI	0.403**	0.420***	0.472***
	(0.172)	(0.157)	(0.157)
CPI ²	-0.00313*	-0.00359**	-0.00420**
	(0.00181)	(0.00167)	(0.00165)
(r-g)		0.0232**	0.0668**
		(0.0113)	(0.0300)
(r-g) × CPI			-0.00114
			(0.000724)
Lag GDP/capita	0.000560**	0.000410*	0.000396*
	(0.000275)	(0.000227)	(0.000229)
Govt. Spending (as % of GDP)	-0.242***	-0.252***	-0.255***
	(0.0722)	(0.0717)	(0.0723)
Trade Openness	-0.0225**	-0.0215**	-0.0241**
	(0.00983)	(0.00933)	(0.00953)
Natural Resource Rent (as % of GDP)	-0.0507*	-0.0536**	-0.0531*
	(0.0273)	(0.0270)	(0.0273)
Observations	457	457	457
Number of countries	69	69	69
rk Wald F-Stat	18.333	21.655	15.315
Stock & Yogo Critical Value	7.03	7.03	N/A

Quantile Findings

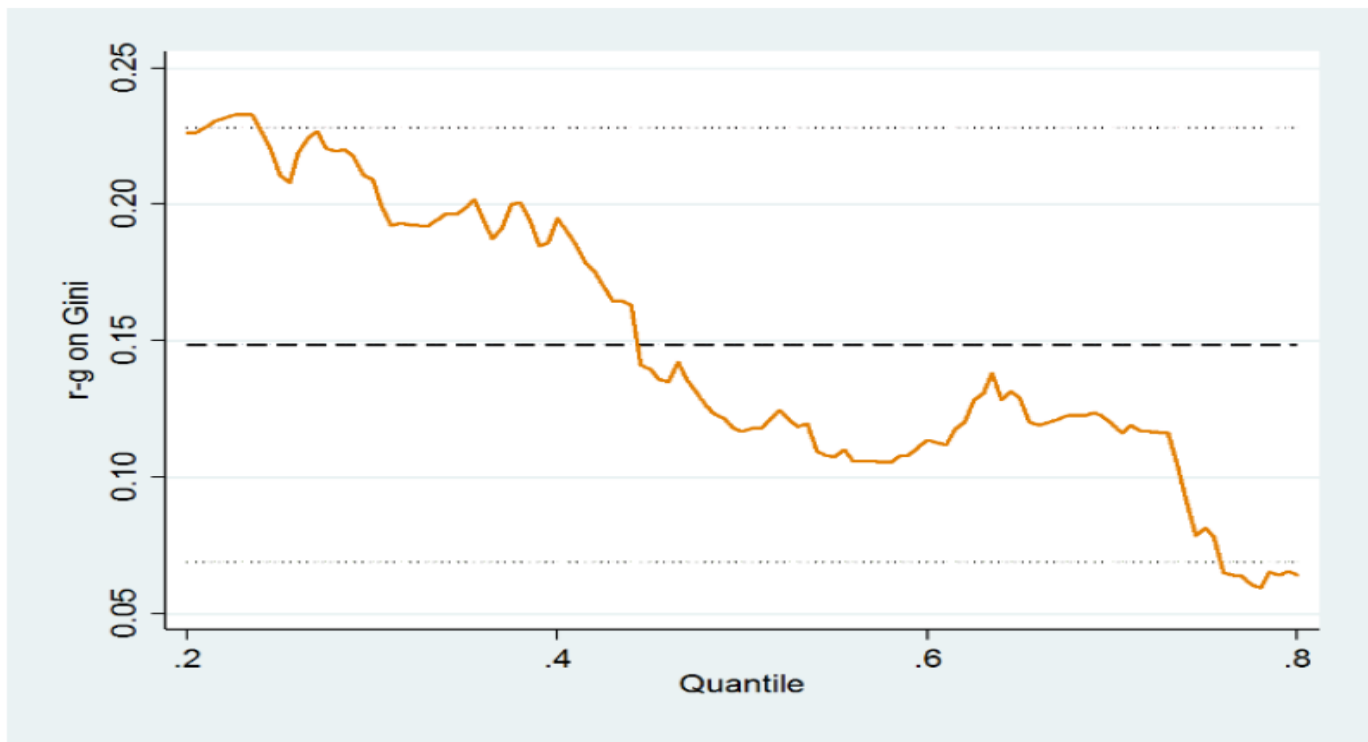


Fig. 1: Quantile regression estimates of r-g on inequality

Limitations

- Lack of availability of Time series Education data
- Gini is an synthetic and vague measure of Inequality
- Utilising interest rates for r might not capture the full picture for developed countries

Conclusion

- Combating Corruption can be a major step in reducing inequality
- However, the scale of improvement necessary may be out of reach
- Returns to Capital do have short term effects
- More efficient taxes on Capital are needed
- But large institutional changes are necessary

Appendix

Table 02: Regression Results

	(1)	(2)	(3)	(4)	(5)	(6)
Variable	CPI Only	CPI Only [IV]	CPI with r-g	CPI with r-g [IV]	CPI with (r-g)*CPI	CPI with (r-g)*CPI [IV]
CPI	0.148*** (0.0446)	0.403** (0.172)	0.149*** (0.0437)	0.420*** (0.157)	0.168*** (0.0424)	0.472*** (0.157)
CPI ²	-0.00160*** (0.000385)	- 0.00313 * (0.0018 1)	-0.00156*** (0.000365)	-0.00359** (0.00167)	-0.00176*** (0.000383)	-0.00420** (0.00165)
(r-g)			0.0146 (0.00865)	0.0232** (0.0113)	0.0631* (0.0307)	0.0668** (0.0300)
(r-g) x CPI					-0.00114 (0.000727)	-0.00114 (0.000724)
Gross Savings Rate (as % of GDP)	0.00900 (0.0152)	0.0206 (0.0226)	0.0118 (0.0161)	0.0138 (0.0214)	0.0174 (0.0147)	0.0180 (0.0217)
Lag GDP/capita	0.000150 (0.000197)	0.00056 0** (0.0002 75)	0.000144 (0.000186)	0.000410* (0.000227)	0.000128 (0.000186)	0.000396* (0.000229)
Inflation	-0.0387 (0.0261)	-0.0137 (0.0268)	-0.0347 (0.0279)	0.00878 (0.0208)	-0.0246 (0.0240)	0.0157 (0.0217)

Govt. Spending (as % of GDP)	-0.123	-	-0.135	-0.252***	-0.131	-0.255***
	(0.0726)	0.242***	(0.0762)	(0.0717)	(0.0783)	(0.0723)
Trade Openness	0.00103	-	0.000757	-0.0215**	-0.000865	-0.0241**
	(0.00874)	0.0225**	(0.00862)	(0.00933)	(0.00854)	(0.00953)
Unemployment Rate	-0.0207	0.0245	-0.0248	0.0109	-0.0153	0.0207
	(0.0366)	(0.0387)	(0.0347)	(0.0376)	(0.0335)	(0.0388)
Population Growth rate	0.853***	0.383	0.848***	0.434	0.878***	0.505
	(0.252)	(0.333)	(0.247)	(0.321)	(0.261)	(0.321)
Fractionalization Index	1.199	0.758	1.279	1.014	1.442	1.198
	(0.825)	(0.797)	(0.809)	(0.808)	(0.841)	(0.824)
Natural Resource Rent (as % of GDP)	-0.0785***	-0.0507*	-0.0769***	-0.0536**	-0.0782***	-0.0531*
	(0.0159)	(0.0273)	(0.0146)	(0.0270)	(0.0149)	(0.0273)
Tax Revenue (as % of GDP)	-0.00358	-0.0392	-0.00398	-0.0285	-0.00334	-0.0254
	(0.0108)	(0.0280)	(0.0112)	(0.0275)	(0.0118)	(0.0276)
Years Since Independence	0.318***	0.00876	0.318***	-0.0825	0.311***	-0.136
	(0.0139)	(0.306)	(0.0132)	(0.302)	(0.0147)	(0.305)
Observations	549	457	549	457	549	457
Number of countries	78	69	78	69	78	69
rk Wald F-Stat		18.333		21.655		15.315
Stock & Yogo Critical Value		7.03		7.03		N/A

Table 03: Quantile Regression Results

Variable	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
CPI	-0.168** (0.0733)	-0.114 (0.0758)	-0.0593 (0.0649)	-0.134*** (0.0416)	-0.0685* (0.0379)	-0.0657* (0.0361)	-0.0551* (0.0315)	-0.0761** (0.0350)	0.0208 (0.0784)
(r-g)	0.174 (0.194)	0.234*** (0.0828)	0.245*** (0.0450)	0.214*** (0.0470)	0.175*** (0.0418)	0.157*** (0.0419)	0.128*** (0.0318)	0.0646 (0.0417)	0.0221 (0.0402)
Gross Savings Rate (as % of GDP)	0.0379 (0.105)	0.0160 (0.0832)	0.0660 (0.0746)	0.0607 (0.0747)	0.0567 (0.0715)	0.00243 (0.0910)	-0.0743 (0.0982)	-0.148 (0.101)	-0.00914 (0.0954)
Lag GDP/capita	-0.000134 (0.000105)	-0.000195 (0.000120)	- 0.000317* **	- 0.000279 ***	- 0.000282* **	- 0.000303** *	- 0.000261***	-0.000230*** (4.56e-05)	-0.000395*** (0.000106)
Inflation	-0.0837 (0.189)	-0.0461 (0.142)	-0.0640 (0.116)	-0.128 (0.142)	-0.0536 (0.142)	-0.00407 (0.0997)	0.0534 (0.106)	0.0722 (0.124)	-0.00915 (0.0981)
Govt. Spending (as % of GDP)	-0.119 (0.148)	-0.177 (0.133)	-0.145 (0.103)	-0.156 (0.128)	-0.139 (0.139)	-0.241 (0.166)	-0.468** (0.188)	-0.544*** (0.173)	-0.0221 (0.321)
Trade Openness	-0.0426** (0.0195)	-0.0412** (0.0189)	-0.0447*** (0.0168)	- 0.0540*** (0.0125)	-0.0462*** (0.0116)	-0.0367*** (0.0117)	-0.0314*** (0.00884)	-0.0335*** (0.00960)	-0.0436*** (0.0147)
Unemployment Rate	0.102 (0.239)	0.212 (0.146)	0.104 (0.144)	0.111 (0.104)	0.205 (0.190)	0.386** (0.174)	0.554*** (0.156)	0.578*** (0.126)	0.489*** (0.142)
Population Growth Rate	2.732*** (0.617)	2.747*** (0.583)	2.422*** (0.687)	2.029** (0.789)	1.454** (0.577)	1.724*** (0.586)	2.010*** (0.524)	2.486*** (0.591)	3.100*** (0.590)
Fractionalization Index	-0.926	3.007	3.588	4.468	5.728*	5.396*	5.094	-0.432	-7.366

Table 04: Regression Results of Top 10 per cent Income Share

	(1)	(2)	(3)
VARIABLES	CPI Only [IV]	CPI with r-g [IV]	CPI with (r-g)*CPI [IV]
CPI	-0.607*	-0.609*	-0.650*
	(0.332)	(0.334)	(0.351)
CPI ²	0.00433	0.00433	0.00470
	(0.00289)	(0.00289)	(0.00298)
(r-g)		-0.0102	-0.0470
		(0.0271)	(0.0809)
(r-g) × CPI			0.000859
			(0.00172)
Gross Savings Rate (as % of GDP)	0.0242	0.0244	0.0179
	(0.0549)	(0.0550)	(0.0566)
Lag GDP/capita	0.000942	0.000966	0.000975
	(0.000647)	(0.000655)	(0.000662)

Inflation	0.151**	0.153**	0.144*
	(0.0733)	(0.0733)	(0.0778)
Govt. Spending (as % of GDP)	0.296*	0.299*	0.295*
	(0.155)	(0.157)	(0.158)
Trade Openness	-0.00818	-0.00848	-0.00722
	(0.0223)	(0.0223)	(0.0227)
Unemployment Rate	0.134	0.141	0.137
	(0.0882)	(0.0925)	(0.0935)
Population Growth rate	-0.700	-0.720	-0.768
	(0.563)	(0.566)	(0.575)
Fractionalization Index	-5.312**	-5.404**	-5.763**
	(2.552)	(2.586)	(2.776)
Natural Resource Rent (as % of GDP)	0.204***	0.201***	0.198***
	(0.0702)	(0.0707)	(0.0717)
Tax Revenue (as % of GDP)	0.0657	0.0642	0.0721
	(0.105)	(0.105)	(0.108)
Years Since Independence	0.122	0.130	0.131
	(0.640)	(0.640)	(0.645)
Observations	220	220	220
Number of countries	46	46	46
rk Wald F-Stat	12.269	12.278	7.543
Stock & Yogo Critical Value	7.03	7.03	N/A

Country List

Albania	Egypt	Kenya	Russia
Armenia	Estonia	Laos	Rwanda
Australia	Fiji	Latvia	Sierra Leone
Bangladesh	Finland	Lithuania	Slovakia
Barbados	France	Madagascar	Slovenia
Belgium	Gambia	Malaysia	South Africa
Bhutan	Georgia	Malta	Spain
Bolivia	Germany	Moldova	Sri Lanka
Bosnia and Herzegovina	Greece	Morocco	Sweden
Brazil	Guatemala	Namibia	Switzerland
Bulgaria	Honduras	Nepal	Tanzania
Canada	Hungary	New Zealand	Thailand
Chile	Iceland	Nicaragua	Trinidad and Tobago
Colombia	India	Nigeria	USA
Costa Rica	Indonesia	Norway	Uganda
Croatia	Ireland	Panama	Ukraine
Cyprus	Israel	Paraguay	Uruguay
Czech Republic	Italy	Peru	Zambia
Denmark	Jamaica	Poland	
Dominican Republic	Jordan	Romania	

Column1	[2]		[4]		[6]		
Dependent Variable	CPI	CPI Squared	CPI	CPI Squared	CPI	CPI Squared	CPI*r-g
Government Effectiveness Square			2.109158** *	336.8297***	2.199984***	349.6867***	-32.14411**
			(0.623416 8)	(63.2108)	(0.6293806)	(63.72522)	(15.32942)
Government Effectiveness Square Lag 1	2.109717***	409.5144 ***					
	[0.6513298]	[112.1158]					
Regulatory Quality Lag 1	6.473218***	333.2804***	6.716646** *	418.5803***	6.558364***	396.1745***	-14.45015
	[1.095353]	(66.66741)	(1.066168)	(108.1032)	(1.076761)	(109.0228)	(26.22599)
Inter3					0.03002	4.24951	17.91806***
					(0.0287513)	(2.911093)	(0.700278)
r-g			- 0.0510238 **	-3.599748	-0.0560742**	-4.314663*	34.83315***
			(0.023386)	(2.371204)	(0.0238782)	(2.417682)	(0.5815856)
Gross Savings Rate (as % of GDP)	0.0574315	3.827551	0.068219	3.994306	0.0598115	2.804171	-0.4161346
	[0.0483194]	(4.945774)	(0.044954)	(4.558069)	(0.045664)	(4.623513)	(1.112209)
Lag GDP/capita	0.0009198	0.0686292	0.0009289 **	0.0552748	0.0009094*	0.0525163	-0.0112089
	[0.0005825]	(0.0596186)	(0.000472 9)	(0.0479524)	(0.0004732)	(0.0479159)	(0.0115264)
Inflation	-0.0606939	-8.322436	- 0.0658607	-6.986867	-0.0740241*	-8.142434*	2.021793**
	[0.0569161]	(5.825694)	(0.044188)	(4.4804)	(0.044869)	(4.543012)	(1.092844)
Govt. Spending (as % of GDP)	0.4332591** *	29.63064**	0.4491549 ***	27.95087**	0.450172***	28.09484**	3.508866
	[0.1289653]	(13.20036)	(0.125077 1)	(12.68208)	(0.1250655)	(12.66297)	(3.046141)

Trade Openness	0.0499343	3.100015	0.0567069 ***	3.586042*	0.0596967***	4.009269**	0.2087735
	[0.0197609]	(2.022646)	(0.018476 9)	(1.873449)	(0.0186952)	(1.892904)	(0.4553476)
Unemployment Rate	0.0690857	0.5901571	0.074413	0.217789	0.0546848	-2.574848	0.0767495
	[0.0817281]	(8.365345)	(0.079674 2)	(8.078497)	-0.0818744	(8.289841)	(1.994163)
Population Growth	0.7490147	168.8757	0.8121514	186.4553***	0.8067026	185.684***	-5.134602
	[0.5942816]	(60.8282)	(0.58267)	(59.07931)	(0.5826217)	(58.99086)	(14.19055)
Fractionalization Index	-1.919289	-133.7238	-2.560369	-150.3516	-2.67336	-166.3462	58.42764
	[1.69985]	(173.9896)	(1.697316)	(172.0978)	(1.700554)	(172.1823)	(41.41931)
Natural Resource Rent (as % of GDP)	-0.0716435	-4.512005	-0.066498	-3.417058	-0.0657146	-3.306153	-0.2734472
	[0.0573442]	(5.869513)	- 0.0568763	(5.766923)	(0.0568743)	(5.758559)	(1.38525)
Tax Revenue (as % of GDP)	0.2230177** *	24.23961***	0.2312616 ***	25.16183***	0.2312524***	25.16054***	-0.3937804
	[0.0509157]	(5.21152)	(0.048135 3)	(4.880638)	(0.0481294)	(4.873136)	(1.172257)
Years Since Independence	-0.1563179*	-19.49337**	- 0.1830463 **	-20.8568**	-0.1833968**	-20.90641**	-4.861396**
	[0.0908793]	(9.302023)	(0.085937 1)	(8.713518)	(0.0859272)	(8.70019)	(2.092874)
Constant	39.5317***	2713.763	41.05952** *	2777.028***	41.31491***	2813.18***	448.9871**
	[9.232713]	(945.022)	(8.713954)	(883.5437)	(8.716316)	(882.5331)	(212.2978)
Wald F-Stat	18.333		21.655		15.315		

VARIABLES	(1) Developed
CPI	0.755** (0.355)
CPI ²	-0.00569* (0.00304)
(r-g)	0.0315* (0.0164)
Gross Savings Rate (as % of GDP)	0.00619 (0.0393)
Lag GDP/capita	-7.35e-05 (0.000242)
Inflation	0.0100 (0.0292)
Govt. Spending (as % of GDP)	-0.512*** (0.136)
Trade Openness	-0.0382*** (0.0144)
Unemployment Rate	0.0309 (0.0519)
Population Growth rate	0.745* (0.437)
Fractionalization Index	3.748*** (1.433)
Natural Resource Rent (as % of GDP)	-0.0112 (0.0498)
Tax Revenue (as % of GDP)	-0.0358 (0.0340)
Years Since Independence	0.204
Gross Savings Rate (as % of GDP)	(0.448)

Observations	318
R-squared	-0.074
Number of country	45
Stock & Yogo Critical Value LIML	5.44
Wald F-Stat	6.855

VARIABLES	(1) CPI only	(2) CPI & r-g	(3) CPI & r-g w/ Interaction Term
CPI	0.279** (0.131)	0.347** (0.146)	0.430*** (0.153)
CPI ²	-0.00240** (0.00117)	-0.00299** (0.00137)	-0.00377** (0.00143)
(r-g)		0.0338 (0.0326)	0.242* (0.129)
(r-g) × CPI			-0.00431 (0.00259)
Secondary Education Completion(as % of Population)	0.00550 (0.0385)	0.00800 (0.0412)	-0.00651 (0.0416)
Gross Savings Rate (as % of GDP)	0.0657 (0.0762)	0.0541 (0.0878)	0.118 (0.0947)
Lag GDP/capita	-5.43e-05 (0.000397)	0.000223 (0.000447)	3.38e-05 (0.000456)
Inflation	-0.00409 (0.0612)	-0.0553 (0.0666)	-0.0156 (0.0700)
Govt. Spending (as % of GDP)	-0.0643 (0.193)	-0.426** (0.212)	-0.331 (0.218)
Trade Openness	-0.00158 (0.0198)	-0.0109 (0.0227)	-0.00977 (0.0225)
Unemployment Rate	-0.0706 (0.0994)	-0.132 (0.131)	-0.0804 (0.133)
Population Growth rate	0.917 (0.676)	1.377* (0.800)	1.689** (0.812)
Fractionalization Index	4.145* (2.235)	1.814 (2.487)	3.020 (2.562)

Natural Resource Rent (as % of GDP)	-0.172**	-0.111	-0.117
	(0.0801)	(0.0852)	(0.0843)
Tax Revenue (as % of GDP)	-0.102	-0.0960	-0.0891
	(0.0634)	(0.0735)	(0.0728)
Years Since Independence	-0.00881	-0.0285	-0.0111
	(0.0532)	(0.0589)	(0.0592)
Constant	30.54***	39.78***	31.61***
	(7.792)	(7.881)	(9.206)
Observations	206	162	162
R-squared	0.177	0.275	0.303
Number of country	89	74	74