

Limiting Fiscal Procyclicality: Evidence from Resource-Rich Countries¹

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- Revisit this analysis with richer data set and address endogeneity concerns

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- These restrictions give for our sample a set of resource-rich countries very similar to that of other studies; last condition ensures importance of a restricted number of resource prices

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- All growth rates are calculated taking the difference of the natural logarithm.

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- Fiscal Rules: average of a dummy variable constructed by Schaechter et al. (2012) that takes the value 1 if in year t country i has imposed long lasting constraints on fiscal policy through numerical limits on budgetary aggregates - different types considered.

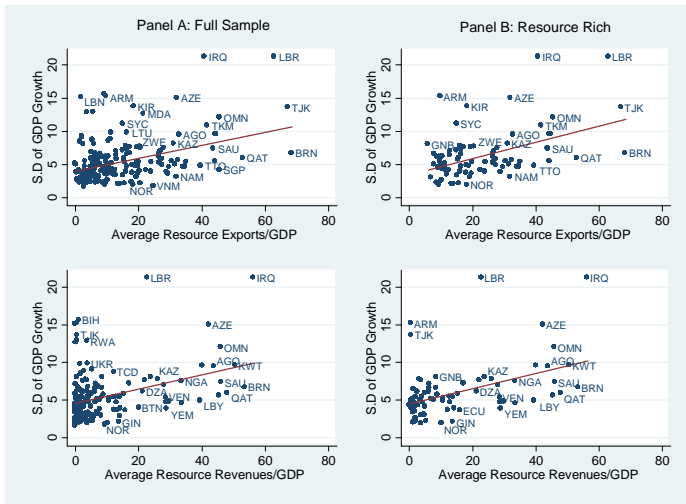
Descriptive Statistics

Table 1: Descriptive Statistics

Variable	Full Sample		Resource Rich		SWF		Fiscal Rules	
	mean	sd	mean	sd	mean	sd	mean	sd
GDP Growth	3.77	4.86	3.72	5.37	4.12	5.86	3.95	4.36
Real Government Consumption Growth	4.09	13.26	3.52	15.43	5.26	10.15	5.02	11.85
Government Consumption (% GDP) Growth	0.27	11.95	-0.20	13.93	-0.55	13.43	0.26	12.56
Price Growth of 1st Commodity	-	-	1.59	27.14	5.48	26.13	3.02	20.15
Price Growth of 2nd Commodity	-	-	0.71	25.40	2.68	24.33	3.86	21.32
Rest of Region GDP Growth	4.1	5.59	4.21	4.77	4.61	4.18	4.55	2.59
<i>Observations</i>	5334		2228		398		305	

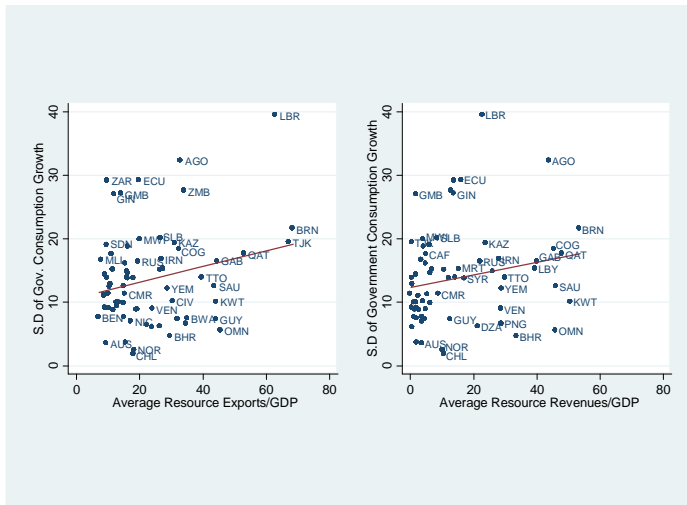
Motivation

Figure 1: Volatility of GDP Growth and Resource Dependency



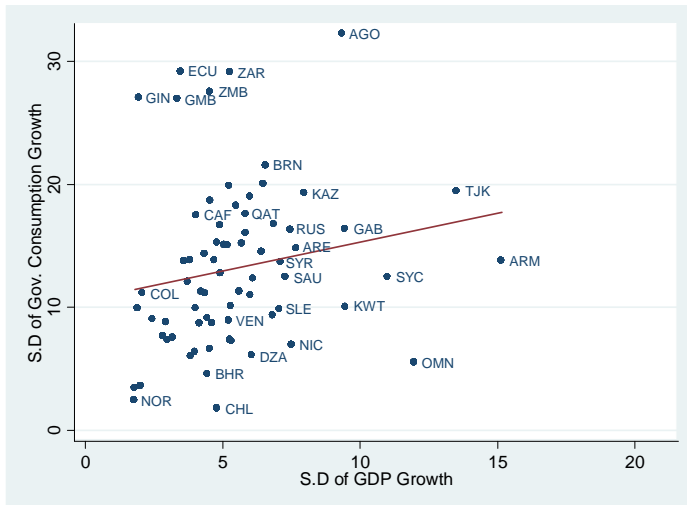
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Figure 2: Volatility of Real Government Consumption Growth and Resource Dependency



Motivation

Figure 3: Volatilities of Real Government Consumption Growth and GDP Growth



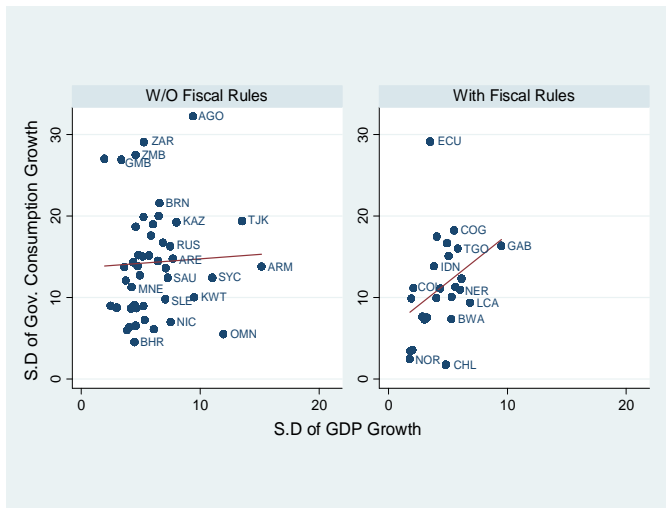
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Figure 4: Volatilities of Real Government Consumption Growth and GDP Growth with and without SWF



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Figure 5: Volatilities of Real Government Consumption Growth and GDP Growth with and without Fiscal Rules



- Baseline Specification

$$\begin{aligned}G_{it} &= \alpha_i + \mu_t + \beta Y_{it} + \gamma G_{it-1} + \varepsilon_{it} & (1) \\i &= 1, 2, \dots, N \\t &= 1, 2, \dots, T_i\end{aligned}$$

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- $\beta > 0$ when G_{it} is the growth rate of real government consumption implies that government consumption is procyclical
- $\beta > 0$ when G_{it} is the growth rate of the government consumption to GDP ratio implies that government consumption is strongly procyclical (moves in the same direction and by more than GDP)

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 - Two instruments considered: GDP growth of rest of the region; growth in the main commodity price
 - Tests point to the second as a better instrument in this case

Results: Fiscal Procyclicality

Table 2: Cyclicity of Real Government Consumption Growth

	(1)	(2)	(3)	(4)
	OLS	IV Prices	IV RR GDP	IV Prices + RR GDP
GDP Growth	0.778*** (0.057)	2.674*** (0.745)	3.806* (1.978)	2.615*** (0.721)
Real Government Consumption Growth (t-1)	0.103*** (0.019)	0.019 (0.040)	0.008 (0.051)	0.014 (0.037)
Observations	2317	2153	2275	2113
Number of Groups	76	72	74	71
Average Group	30.49	29.90	30.74	29.76
R ² overall	0.11	0.09	0.09	0.09
First Stage F	-	21.10	4.209	10.74
AP (p-value)	-	0.0000	0.0403	0.0000
Cragg-Donald F-statistic	-	21.10	4.209	10.74

Results: Strong Fiscal Procyclicality

Table 3: Cyclicity of Government Consumption (% of GDP) Growth

	(1) OLS	(2) IV Prices	(3) IV RR GDP	(4) IV Prices + RR GDP
GDP Growth	-0.319*** (0.0472)	1.124* (0.640)	0.396 (0.570)	1.058* (0.628)
Government Consumption (% of GDP) Growth (t-1)	-0.060*** (0.018)	-0.055** (0.024)	-0.071*** (0.024)	-0.071*** (0.024)
Observations	2980	2161	2889	2116
Number of Groups	80	72	78	71
Average Groups	37.25	30.01	37.04	29.80
R ² overall	0.02	0.006	0.004	0.005
First stage F	-	23.07	21.42	11.61
AP (p-value)	-	0.0000	0.0000	0.0000
Cragg-Donald F-statistic	-	23.07	21.42	11.61

- Augmented Specification

$$G_{it} = \alpha_i + \mu_t + \beta_1 Y_{it} + \beta_2 (Y_{it} * I_i) + \gamma G_{it-1} + \varepsilon_{it} \quad (2)$$

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- where $Y_{it} * I_i$ is the interaction between the GDP growth and the time-invariant institutional variable I_i (corruption, democracy, checks, SWF, Fiscal Rules)
- $(\beta_1 + \beta_2 I_i)$ measures the fiscal cyclicity in country i , and may be different across countries to the extent that institutions are different depending on the significance of β_2

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 - Checks: Religion Fractionalization
 - SWF and Rules: Ethnic Fractionalization Index

Results: Fiscal Procyclicality and Institutions

Table 4b: Corruption, Democracy and Cyclicity of Real Government Consumption Growth - Instrumenting Corruption, Democracy, and Checks

	(1)	(2)	(3)
	IV	IV	IV
GDP Growth	4.987** (2.141)	2.687*** (0.544)	5.191*** (1.978)
GDP Growth x Control of Corruption (WGI)	-11.94 (7.462)		
GDP Growth x Democracy		-2.982** (1.369)	
GDP Growth x Checks			-1.124 (0.875)
Government Consumption (Real) Growth (t-1)	0.080** (0.033)	0.041 (0.034)	0.018 (0.042)
Observations	2129	2153	2087
Number of Groups	70	72	69
Average Group	30.41	29.90	30.25
R ² overall	0.03	0.05	0.07
F ₁ -statistic (first stage)	18.52	13.21	8.88
AP ₁ (p-value)	0.3124	0.0000	0.1595
F ₂ -statistic (first stage)	10.72	6.89	8.16
AP ₂ (p-value)	0.5099	0.0001	0.1848
Cragg-Donald F-statistic	2.233	6.513	5.026

Results: Strong Fiscal Procyclicality and Institutions

Table 5b: Corruption, Democracy and Cyclicity of Government Consumption (% of GDP) Growth – Instrumenting Corruption, Democracy, and Checks.

	(1) IV	(2) IV	(3) IV
GDP Growth	2.405 (1.996)	1.379*** (0.529)	4.210** (1.830)
GDP Growth x Control of Corruption	-6.571 (6.983)		
GDP Growth x Democracy		-3.850*** (1.435)	
GDP Growth x Checks and Balances			-1.407* (0.824)
Government Consumption (% GDP) Growth (t-1)	-0.052** (0.024)	-0.079*** (0.028)	-0.063** (0.029)
Observations	2137	2161	2095
Number of Groups	70	72	69
Average Group	30.53	30.01	30.36
R ² overall	0.002	0.0003	0.004
F ₁ -statistic (first stage)	18.64	13.72	9.71
AP ₁ (p-value)	0.3479	0.0000	0.1530
F ₂ -statistic (first stage)	10.91	6.35	8.61
AP ₂ (p-value)	0.5391	0.0001	0.1861
Cragg-Donald F-statistic	2.068	6.019	5.084

Results: Fiscal Procyclicality and Fiscal Policy Institutions

Table 6b: SWF and Fiscal Rules using additional instrument

	(1) IV	(2) IV	(3) IV	(4) IV	(5) IV
GDP Growth	2.701*** (0.769)	2.331*** (0.802)	2.318*** (0.797)	2.498*** (0.704)	2.427*** (0.733)
GDP Growth x Funds	-5.490** (2.651)				-4.146** (1.799)
GDP Growth x Rules (ER, BBR, DR)		1.223 (3.134)			
GDP Growth x Rules (ER, BBR)			1.319 (3.053)		
GDP Growth x Expenditure Rules				-0.852 (5.706)	
GDP Growth x Funds & Rules (ER, BBR)					2.677 (3.084)
Government Consumption (Real) Growth (t-1)	0.058* (0.035)	0.025 (0.039)	0.025 (0.039)	0.027 (0.040)	0.056* (0.033)
Observations	2129	2129	2129	2129	2129
Number of Groups	70	70	70	70	70
Average Group	30.41	30.41	30.41	30.41	30.41
R ² overall	0.0643	0.0891	0.0902	0.0895	0.0643
F ₁ -statistic (first stage)	10.21	7.36	7.39	7.39	9.61
AP ₁ (p-value)	0.0001	0.0002	0.0002	0.0000	0.0001
F ₂ -statistic (first stage)	6.08	6.78	8.43	10.70	11.33
AP ₂ (p-value)	0.0042	0.0003	0.0000	0.0000	0.0000
F ₃ -statistic (first stage)	-	-	-	-	19.67
AP ₃ (p-value)	-	-	-	-	0.0000
Cragg-Donald F-statistic	5.143	6.402	7.169	6.667	6.547

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- Transparency could be the key: SWF may convey more transparency by separating oil and non-oil revenues; fiscal rules may induce creative accounting
- More research in the characteristics of funds that render them more effective is warranted.