Fiscal Rules and Macro Performance: World Evidence

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Ministry of Finance of Chile – IMF Conference

Enhancing Chile's Fiscal Framework:

Lessons from Domestic and International Experience

Santiago, 17-18 January 2019

Roadmap

1. **(Optimal) Fiscal Rules**
2. **World Distribution of Fiscal Rules (and Fiscal Councils)**
3. **Literature Review: Macro Effects of Fiscal Rules (and Fiscal Councils)**
4. **World Evidence: Adoption of Fiscal Rules**
5. **World Evidence: Fiscal Rules and Fiscal Performance**
6. **Conclusions**

1. (Optimal) Fiscal Rules
(joint work with I. Martínez and R. Soto)

Model objective and scope

- Model derives an optimal fiscal rule from a government loss function, which nests objectives of output stabilization of the GDP and fiscal solvency

- Subject to budget constraint, stochastic cyclical taxation, stochastic endogenous cyclical output, stochastic trend growth, and stochastic endogenous sovereign debt premium (SOE)

- The paper will present simulations for the behavior of government spending to various types of shocks

The model

Minimize loss function w.r.t. G and D:

$$\frac{1}{2} E_t \left[\sum_{s=t}^{\infty} \beta^s \left\{ \alpha \left(\frac{Y_s}{Y_s^*} \right)^2 + \delta \left(\frac{G_s}{Y_s^*} - \mu \right)^2 + \omega \left(\frac{D_s}{Y_s^*} - v \right)^2 \right\} \right]$$

subject to:

$$D_{s+1} - D_s = G_s - TA_s + r_s D_s$$

$$\left(\frac{TA_s}{Y_s^*} \right) = k \left(\frac{Y_s}{Y_s^*} \right) + \varepsilon_{1s}$$

$$\left(\frac{Y_s}{Y_s^*} \right) = \frac{\gamma}{\mu} \left(\frac{G_s}{Y_s^*} \right) - \eta r_s + \varepsilon_{2s}$$

$$\frac{Y_{s+1}^*}{Y_s^*} = 1 + \rho + \varepsilon_{3s}$$

$$r_s - r^* = \phi \left(\frac{D_s}{Y_s^*} - v \right) + \varepsilon_{4s}$$

The model

Minimize loss function w.r.t. G and D:

$$\frac{1}{2} E_t \left[\sum_{s=t}^{\infty} \beta^s \left\{ \alpha \left(\frac{Y_s}{Y_s^*} \right)^2 + \delta \left(\frac{G_s}{Y_s^*} - \mu \right)^2 + \omega \left(\frac{D_s}{Y_s^*} - v \right)^2 \right\} \right]$$

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$$\frac{Y_{s+1}^*}{Y_s^*} = 1 + \rho + \varepsilon_{3s}$$

$$r_s - r^* = \phi \left(\frac{D_s}{Y_s^*} - v \right) + \varepsilon_{4s}$$

Model Solution (1/2)

Policy functions for government spending ratio (g) and debt ratio (d) to trend output; steady state and short-run deviations:

$$g_{ss} = \mu = \frac{[\phi k \beta - (1 + \rho - (1 + r^*)\beta)(r^* - \rho)]\gamma}{\phi \beta (\gamma - \eta(r^* - \rho))}$$

$$d_{ss} = v = -\frac{[\phi k \beta - (1 + \rho - (1 + r^*)\beta)(r^* - \rho)]\gamma}{\phi \beta (r^* - \rho)(\gamma - \eta(r^* - \rho))} + \frac{k}{r^* - \rho}$$

$$\hat{g}_t = -\kappa_1 \hat{y}_t + \kappa_2 E_t[\hat{y}_{t+1}] + \kappa_3 E_t[\hat{g}_{t+1}] + \kappa_4 E_t[\hat{d}_{t+1}] + \kappa_5 E_t[\hat{r}_{t+1}] - \kappa_6 \varepsilon_{3t}$$

$$\hat{d}_{t+1} = \kappa_7 \hat{g}_t + \kappa_8 \hat{d}_t - \kappa_9 \varepsilon_{1t} - \kappa_{10} \varepsilon_{2t} - \kappa_{11} \varepsilon_{3t} + \kappa_{12} \varepsilon_{4t}$$

Model Solution (2/2)

- Steady-state solutions for government spending and debt: functions of exogenous variables and structural parameters

- Short-term (first-order expansions around s.s.) solutions for government spending: reflects activist fiscal policy aiming at intertemporal smoothing, counter-cyclical spending, and fiscal solvency concern
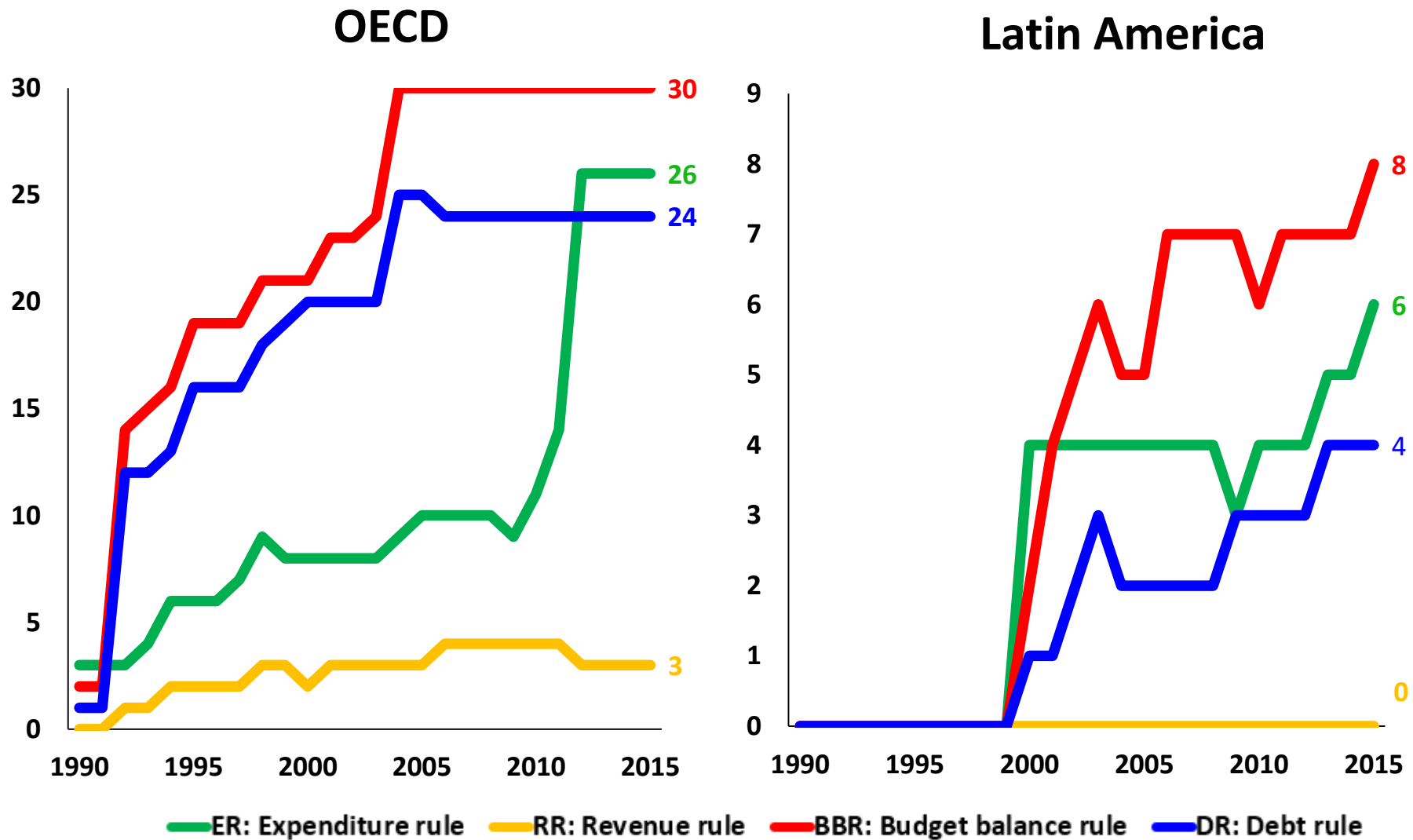
2. World Distribution of Fiscal Rules (and Fiscal Councils)

Number of Countries with Fiscal Rules in Place, 1985-2015
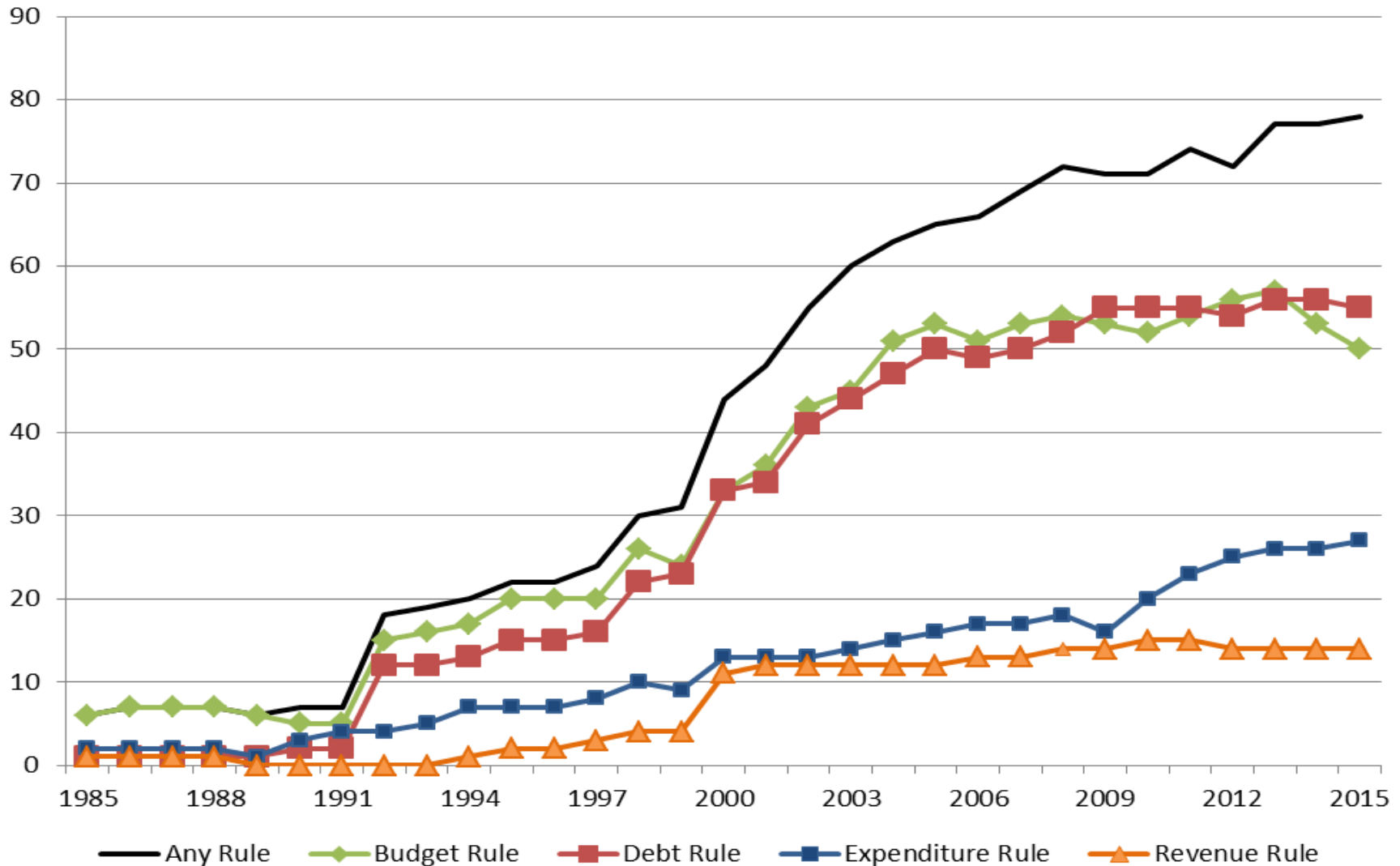
Source: IMF Fiscal Rules Dataset, 2016.
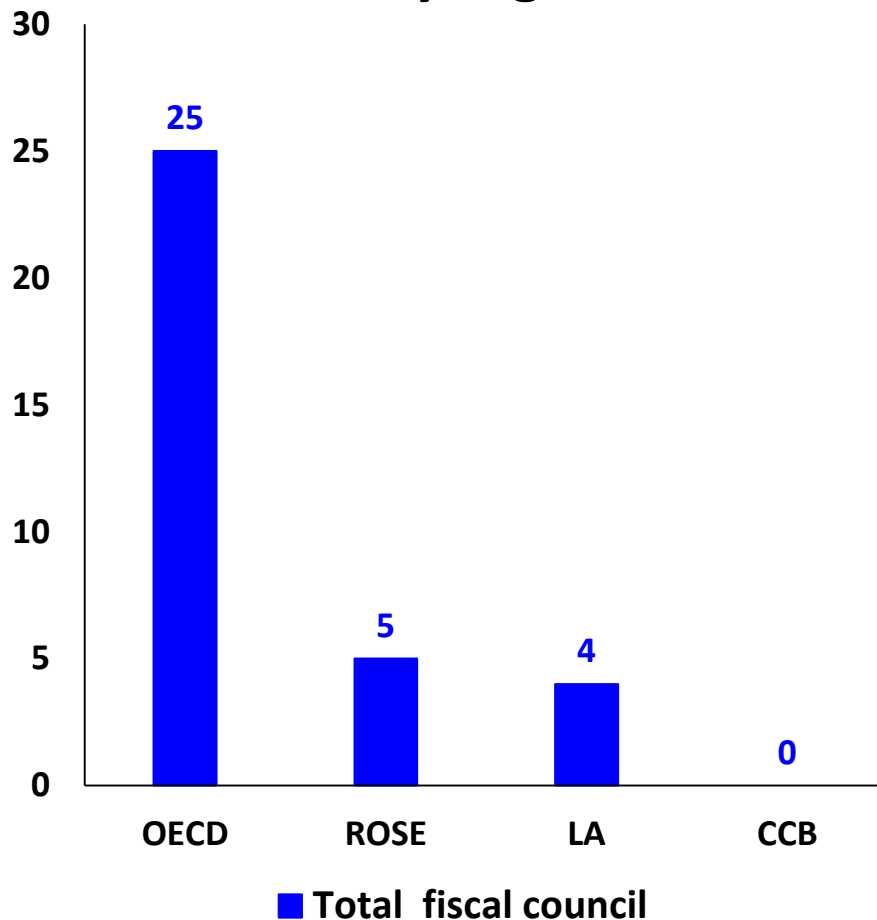
Number of countries with fiscal rules, by regions and types of rules, 1990-2015

OECD

Latin America

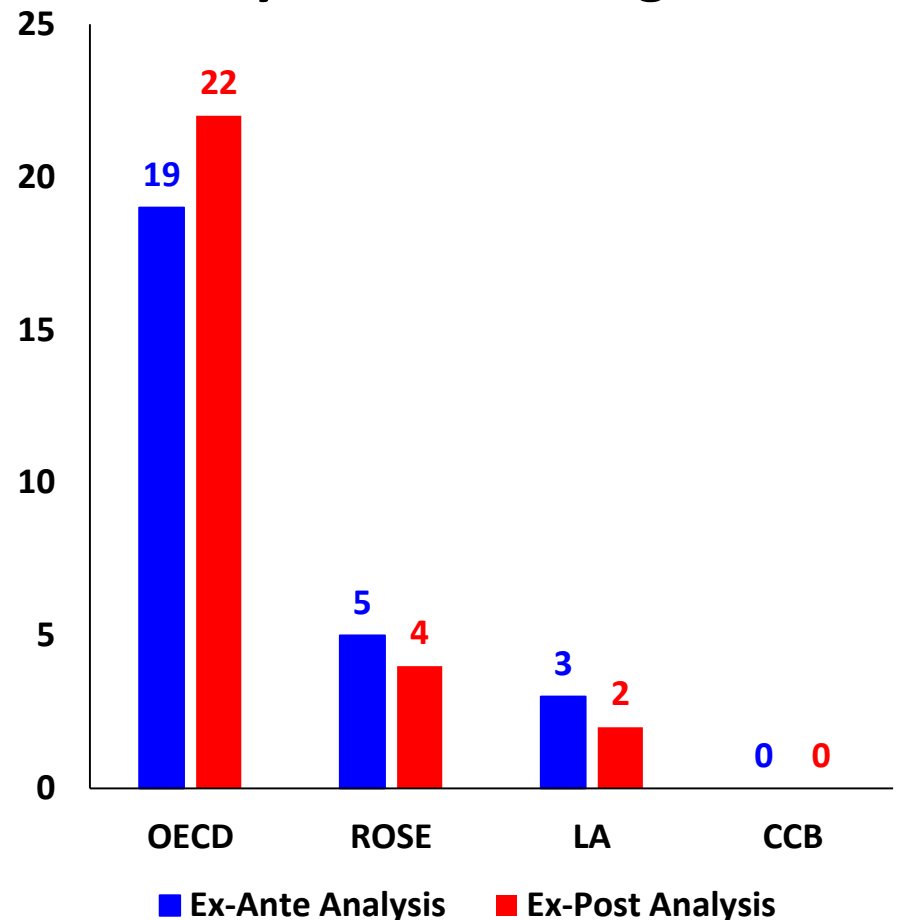ER: Expenditure rule RR: Revenue rule BBR: Budget balance rule DR: Debt rule

Source: IMF, Fiscal Rules Dataset 1985-2015.

Number of countries with fiscal councils, by regions and types of councils, 2016
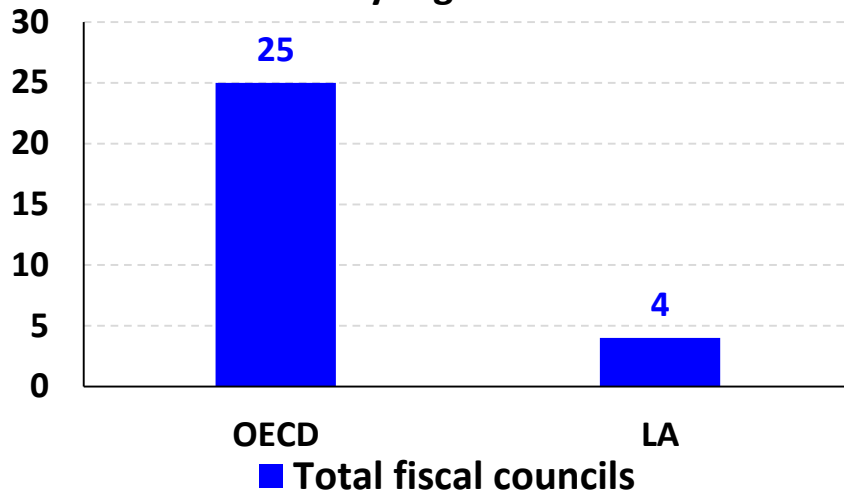
By regions

By council's obligations

Note: The vertical axis represents the number of countries with the corresponding fiscal council.
Source: IMF Fiscal Council Dataset, 2017.

Number of countries with fiscal councils, by regions and types of councils, 2016

By regions

- OECD: 25
- LA: 4

Total fiscal councils

By council duties

- OECD: Positive Analysis 25, Normative Analysis 12
- LA: Positive Analysis 4, Normative Analysis 2

Positive Analysis   Normative Analysis

By council's obligations

- OECD: Ex-Ante Analysis 19, Ex-Post Analysis 22
- LA: Ex-Ante Analysis 3, Ex-Post Analysis 2

Ex-Ante Analysis   Ex-Post Analysis

By type of independence

- OECD: Legal 22, Operational 20
- LA: Legal 2, Operational 1

Legal   Operational

Source: IMF Fiscal Council Dataset, 2017.
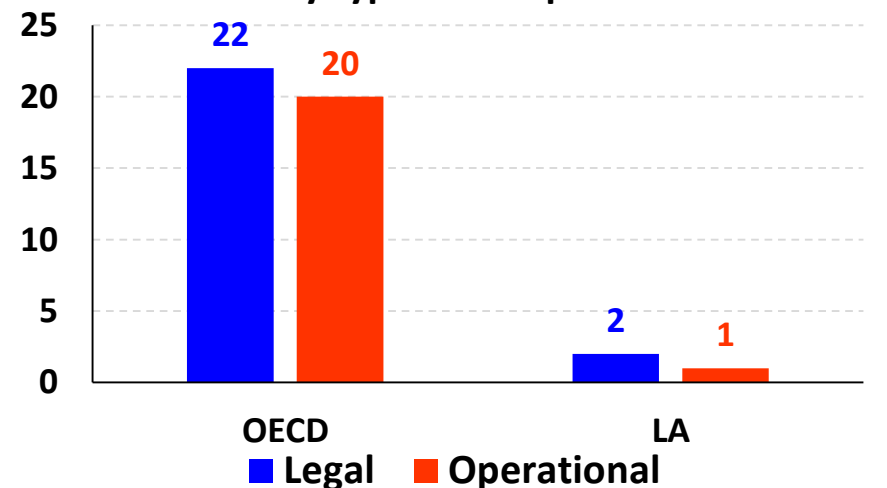
3. Literature Review: Macro Effects of Fiscal Rules (and Fiscal Councils)

From fiscal policy framework to development

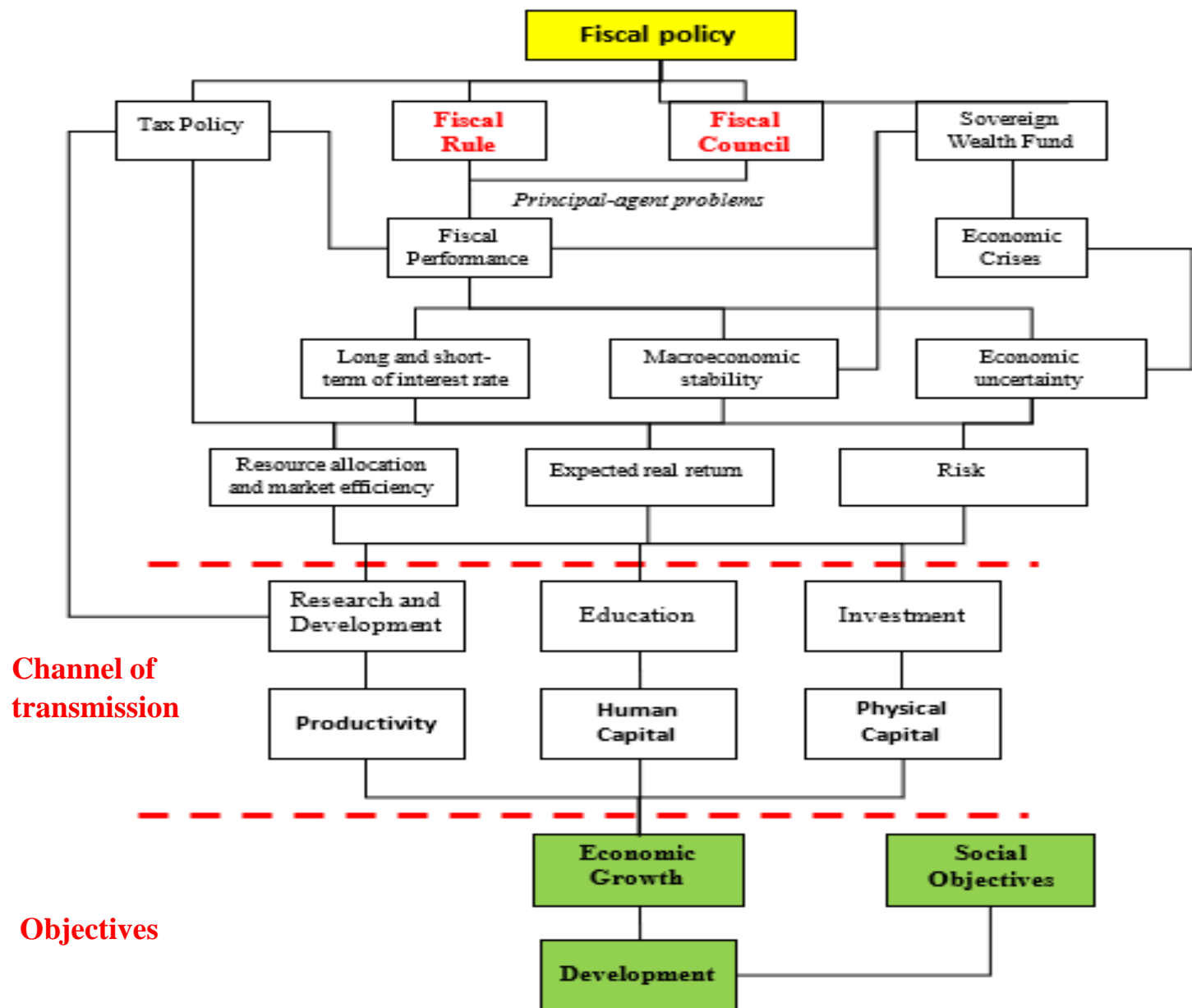# Effects of fiscal rules on macro variables (1)

Dependent variable	Independent variable	Empirical findings
Income and growth		
Growth of GDP per capita	Overall rule index	0 or + (6)
	Expenditure rule index	0 or + (6)
	Budget balance and debt rule index	0 or + (6)
	Supranational fiscal rules in Eastern Caribbean Currency Union	0 or + (3)
	Supranational fiscal rules in Central African Economic and Monetary Community	0 or + (3)
	National fiscal rule	0 or + (3)
	Budget balance rules in Low and Middle-Income Countries	0 or - (5)
	Maastricht Treaty (1997-2005)	+ (7)
Log GDP per capita	Index of fiscal discipline	+ (2)
Growth rate of GDP	Index of fiscal discipline	+ (2)
Fiscal performance		
Fiscal policy volatility	Budget balance rule	- (1)
Government budget balance (% of GDP)	Budget balance rule index	+ (4)
	Budget balance rule	+ (16)
	Debt rule	+ (16)
	Expenditure rule	0 (16)
Government deficit (% of GDP)	Budget balance rule	- (11); + (14)
	Legal enforcement* Budget balance rule	- (14)
	Expenditure rule	0 (11); 0 or + (14)
	Debt rule	- (14)
Real budget balance per capita	Fiscal rule	+ (13)
Cyclically-adjusted primary balance (% of GDP)	Fiscal rule overall index	0 or + (8)
	Fiscal rule coverage index	0 or + (8)
	Output gap * Fiscal rule dummy	+ (9)
Cyclical correlation between government expenditure and GDP	Budget balance rule	0 (16)
	Debt rule	0 (16)
	Expenditure rule	- (16)
Cyclical correlation between government budget balance and GDP	Budget balance rule	0 (16)
	Debt rule	0 (16)
	Expenditure rule	0 (16)
Government debt (% of GDP)	Budget balance rule	0 (16)
	Debt rule	0 (16)
	Expenditure rule	0 (16)
Other		
Government bond spread (10-year)	Balanced budget rule	0 or - (1)
	Fiscal rule index * Cyclical dummy	0 or - (10)
Government bond spread against the German Bund	Fiscal rules index	0 or - (12)
Standard deviation of the growth rate of real GDP per capita	Discretionary fiscal policy* Expenditure rule	0 or - (15)
	Discretionary fiscal policy* Revenue rule	0 or - (15)
	Discretionary fiscal policy* Budget balance rule	0 or - (15)
	Discretionary fiscal policy* Debt rule	0 or - (15)
	Discretionary fiscal policy* Fiscal rule	- (15)

Source: Schmidt-Hebbel, 2018a.

Effects of fiscal rules on macro variables (2)

- Fiscal rules tend to improve fiscal performance

- Several studies report positive and significant effects of different measures and types of fiscal rules on different measures of fiscal policy cyclicality and solvency

- One study reports positive effects of fiscal rules on government deficits, but effects turn negative when the fiscal rule interacts with its legal enforcement

- Government debt levels are not affected by fiscal rules

- Results on effects of fiscal rules on fiscal policy cyclicality are mixed

- Rules reduce government bond spreads

- Fiscal rules raise the standard deviation of per capita GDP growth (not reported in the table) but reduce it when rules are interacted with a measure of discretionary fiscal policy

Effects of fiscal councils

Dependent variable	Independent variable	Empirical findings
Forecast		
Absolute forecast error of GDP growth	Dummy: 1 if country has a fiscal council (FC)	- (3); 0 (6, 7)
	Dummy: 1 if country has a FC, legal independence	- (3); 0 (6)
	Dummy: 1 if country has a FC, safeguards on budget	- (3); 0 (6)
	Dummy: 1 if country has a FC, high media impact	- (3); 0 (6)
Forecast error of GDP growth	Dummy: 1 if country has a FC	0 or - (7)
	Fiscal council *Fiscal rule	+ (7)
Fiscal performance		
Absolute forecast error of primary balance	Dummy: 1 if country has a fiscal council (FC)	- (3, 6); 0 or - (7)
	Dummy: 1 if country has a FC, legal independence	- (3, 6)
	Dummy: 1 if country has a FC, safeguards on budget	- (3, 6)
	Dummy: 1 if country has a FC, high media impact	- (3, 6)
Primary balance	Fiscal council index* Fiscal Rule Index	+ (4)
Absolute value of the change in the cyclically-adjusted bud balance	Intensity of media reports (t-1): number of times the official name of the FC appears in a country 's national press	+ (2)
	Fiscal council index (t-1)	0 or + (5)
Cyclically-adjusted primary balance	Fiscal council index	0 or - (1)
Primary Balance	Dummy: 1 if country has a FC, legal independence	+ (6)
	Dummy: 1 if country has a FC, staff number	+ (6)
	Dummy: 1 if country has a FC, fiscal rule monitoring	+ (6)
	Dummy: 1 if country has a FC, costing of measures	+ (6)
	Dummy: 1 if country has a FC, forecast assessment	+ (6)
	Dummy: 1 if country has a FC, high media impact	+ (6)
Other		
Government compliance with numerical fiscal rule	Dummy: 1 if country has a FC in preceding period	0 or + (7)

Source: Schmidt-Hebbel, 2018a.

4. Adoption of Fiscal Rules
(joint work with Raimundo Soto)

Methodology

- World evidence on determinants of having fiscal rules in place

- Dependent variable: discrete variable of *a de jure* national fiscal rule taking value 1 if it is in place and 0 otherwise (IMF database on fiscal rules, 2015)

- Estimation by non-linear, discrete-variable panel data models: random-effects probit and conditional fixed-effects logit

- World sample: annual observations for 115 countries, 1975-2013

- Testing for the role of three types of fiscal rules in co-determining four indicators of fiscal cyclicality and solvency, controlling for 16 control variables (political, economic, demographic, other fiscal institutions)

- Robustness testing for different types of rules and *de facto* and *de jure* rules; nested testing for LAC and small countries

Baseline results for having any national fiscal rule in place, panel estimations, 1975-2013

	Random-effects probit estimation		Conditional fixed-effects logit estimation	
	(1)	**(2)**	**(3)**	**(4)**
Democracy	0.136 *** (0.048)	0.120 *** (0.036)	0.160 * (0.092)	0.163 ** (0.074)
Federalism	3.332 *** (0.868)	4.702 *** (1.400)	-	-
Political checks and balances	−1.296 * (0.798)	−1.028 * (0.511)	−0.784 (1.591)	−1.147 (0.954)
Government stability	0.169 *** (0.065)	0.080 ** (0.037)	0.238 * (0.128)	0.124 * (0.069)
Monetary union	0.070 (0.440)	0.470 (0.309)	0.578 (0.965)	0.568 (0.612)
Fixed exchange rate	−0.539 (0.410)	0.245 (0.239)	−0.020 (0.852)	0.712 (0.484)
Inflation targeter	0.583 (0.423)	1.528 *** (0.229)	-0.092 (0.792)	2.112 *** (0.416)
Capital account openness	1.430 ** (0.614)	1.929 ** (0.364)	1.969 * (1.235)	2.599 *** (0.730)
Financial development	0.578 ** (0.284)	0.319 * (0.199)	0.586 (0.647)	-0.168 (0.389)
Economic development	0.600 * (0.326)	1.369 *** (0.391)	−0.435 (1.887)	4.681 *** (0.957)
Sacrifice cost of fiscal rules I (based on fiscal revenue)	−0.458 (2.353)	-	0.591 (4.231)	-
Sacrifice cost of fiscal rules II (based on fiscal balance)	-	−7.415 * (4.480)	-	−12.8386 (8.549)
Government balance	−2.938 (3.065)	3.441 ** (1.726)	−8.673 (6.507)	4.290 (3.419)
Dependency ratio	−6.480 *** (2.444)	−9.106 *** (1.663)	−31.731 *** (8.733)	−19.477 *** (3.725)
Pro-cyclicality of government expenditures	−0.923 *** (0.303)	−0.407 ** (0.179)	−1.307 ** (0.537)	−0.706 ** (0.352)

Marginal effects of the random-effects probit estimation

Panel A: discrete variables

	Country is federal	Country has fixed exchange rate	Country is in monetary union	Country uses inflation targeting	Country has an open capital account
Change in variable	From zero to one	From zero to one	From zero to one	From zero to one	From zero to one
Change in probability	7.5%	−0.1%	0.4%	4.9%	3%

Panel B: institutional continuous variables

	Democracy levels	Checks and balances	Government stability	Economic development	Dependency ratio	Financial development
Change in variable	From percentile 25% to percentile 75%	From percentile 25% to percentile 75%	From percentile 25% to percentile 75%	From percentile 25% to percentile 75%	From percentile 25% to percentile 75%	From percentile 25% to percentile 75%
Change in probability	0.2%	−1.4%	0.1%	2.8%	8.4%	0.2%

Panel C: government-related continuous variables

	Fiscal balance	Pro-cyclicality of gov. exp.	Cost of fiscal rule
Change in variable	From percentile 25% to percentile 75%	From percentile 25% to percentile 75%	From percentile 25% to percentile 75%
Change in probability	1.0%	−0.1%	−1.7%

Source: Schmidt-Hebbel and Soto, 2017a.

5. Fiscal Rules and Fiscal Performance
(joint work with Raimundo Soto)

Theory: Relations between different types of Fiscal Rules and Policy Objectives

	Macroeconomic Stabilization: Cyclicality of government spending (correlations with GDP)	Fiscal sustainability and solvency: Government deficit and debt levels (ratios to GDP)	Size of Government: Government expenditure and revenue levels (ratios to GDP)
1. Budget Balance Rules		(−)	
Current BBR (annual)	(+)	(−)	
Current BBR (average over the cycle)	(+), (0) or (−)		
Structural BBR (annual)	0		
Structural BBR (average over the cycle)	(−)		
2. Debt Rules		(−)	
Current DR (annual)	(+)		
Current DR (average over the cycle)	(+), (0) or (−)		
3. Expenditure Rules		(−)	(−)
Current ER (annual)	(0)		
Current ER (average over the cycle)	(−)		
4. Revenue Rules		(−)	(−)
Current RR (annual)			
Current RR (average over the cycle)			

Source: Schmidt-Hebbel and Soto, 2017b.

Methodology

- World evidence on the contribution of fiscal rules to fiscal performance

- Effects of three types of rules – expenditure, budget balance, and debt rules, using *de facto* and *de jure* measures – on four indicators of fiscal performance – cyclicality of government expenditure and fiscal balance, and levels of fiscal balance and government debt – controlling for 13 other determinants

- First stage: panel probit regression models for fiscal rules

- Second stage: dynamic panel data models for four fiscal performance measures (addressing potential endogeneity, dynamic responses, and unobserved heterogeneity

- World sample: annual observations for 115 countries, 1985-2015

- Robustness testing

Determinants of the Procyclicality of Government Expenditure

	Base Model (1)	Clean Model (2)	BBR Model (3)	DR Model (4)	ER Model (5)
1st Lag Expenditure Procyclicality	0.639*** (0.000)	0.665*** (0.000)	0.659*** (0.000)	0.664*** (0.000)	0.652*** (0.000)
2nd lag Expenditure Procyclicality	-0.203*** (0.003)	-0.195*** (0.002)	-0.190*** (0.003)	-0.188*** (0.003)	-0.194*** (0.004)
Development Level	-0.335** (0.028)	-0.210* (0.078)	-0.208* (0.070)	-0.205* (0.067)	-0.128 (0.273)
Government Stability	-0.0284 (0.110)	-0.0303* (0.089)	-0.0296 (0.117)	-0.0298* (0.096)	-0.0285 (0.142)
Business Cycles	6.000** (0.010)	6.800*** (0.005)	6.860*** (0.005)	6.910*** (0.004)	6.593*** (0.006)
Financial Openness	0.533*** (0.002)	0.401** (0.011)	0.406** (0.048)	0.406** (0.022)	0.522*** (0.005)
Price Instability	0.812 (0.108)	0.710 (0.102)	0.711 (0.100)	0.730* (0.091)	0.710 (0.111)
Revenue Instability	0.912** (0.017)	0.826** (0.046)	0.810* (0.054)	0.808* (0.058)	0.550 (0.188)
Exports Concentration	-0.241 (0.134)	-0.330** (0.031)	-0.325** (0.038)	-0.326** (0.039)	-0.332** (0.035)
Workers Remittances	0.0470 (0.151)				
Fixed Exchange Regime	-0.120 (0.225)				
Resource Rents Cycles	0.257 (0.298)				
Dependency Ratio	1.124 (0.174)				
Budget Bal. Rule			-0.0537 (0.905)		
Debt Rule				-0.0562 (0.944)	
Expenditure Rule					-1.434** (0.034)

Source: Schmidt-Hebbel and Soto, 2017b.

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Dependency Ratio	1.124 (0.174)				
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Debt Rule				-0.0562 (0.944)	

Expenditure Rule

-1.434
(0.034)

Source: Schmidt-Hebbel and Soto, 2017b.

Determinants of Fiscal Balance

	Base Model (1)	Clean Model (2)	BBR Model (3)	DR Model (4)	ER Model (5)
1st Lag Fiscal Balance	0.376*** (0.006)	0.508*** (0.000)	0.526*** (0.000)	0.515*** (0.000)	0.513*** (0.000)
2nd lag Fiscal Balance	-0.109* (0.062)	-0.143** (0.013)	-0.131** (0.016)	-0.139*** (0.009)	-0.132** (0.019)
Development Level	0.374 (0.719)	-0.0334 (0.961)	-0.524 (0.419)	-0.396 (0.537)	-0.504 (0.478)
Government Stability	0.277** (0.026)	0.363*** (0.003)	0.370*** (0.003)	0.360*** (0.003)	0.356*** (0.004)
Fixed Exchange Regime	1.874** (0.018)	2.591*** (0.000)	3.088*** (0.000)	2.723*** (0.000)	2.611*** (0.000)
Business Cycles	48.65*** (0.001)	67.70*** (0.000)	69.09*** (0.000)	67.15*** (0.000)	68.05*** (0.000)
Cycles in Resource Rents	4.772*** (0.002)	4.531*** (0.005)	5.214*** (0.002)	4.831*** (0.003)	4.971*** (0.002)
Price Instability	6.523* (0.064)	7.588** (0.039)	8.859** (0.021)	8.949** (0.013)	8.490** (0.026)
Workers Remittances	-0.316 (0.104)	-0.477** (0.036)	-0.410** (0.048)	-0.503** (0.019)	-0.421* (0.051)
Dependency Ratio	0.364 (0.961)				
Exports Concentration	0.249 (0.788)				
Revenue Instability	-3.020 (0.269)				
Financial Openness	0.490 (0.709)				
Budget Bal. Rule			5.595** (0.031)		
Budget Bal. Rule* Small State			-21.05 (0.103)		
Debt Rule				7.985** (0.022)	
Debt Rule* Small State				-39.83** (0.044)	
Expenditure Rule					6.774* (0.095)
Expenditure Rule* Small State					-20.64 (0.524)

Source: Schmidt-Hebbel and Soto, 2017b.

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Business Cycles	48.65*** (0.001)	67.70*** (0.000)	69.09*** (0.000)	67.15*** (0.000)	68.05*** (0.000)
Cycles in Resource Rents	4.772*** (0.002)	4.531*** (0.005)	5.214*** (0.002)	4.831*** (0.003)	4.971*** (0.002)
Price Instability	6.523* (0.064)	7.588** (0.039)	8.859** (0.021)	8.949** (0.013)	8.490** (0.026)
Workers Remittances	-0.316 (0.104)	-0.477** (0.036)	-0.410** (0.048)	-0.503** (0.019)	-0.421* (0.051)
Dependency Ratio	0.364 (0.961)				
Exports Concentration	0.249 (0.788)				
Revenue Instability	-3.020 (0.269)				
Financial Openness	0.490 (0.709)				
Budget Bal. Rule			**5.595** (0.031)		
Budget Bal. Rule* Small State			-21.05 (0.103)		
Debt Rule				**7.985** (0.022)	
Debt Rule* Small State				-39.83** (0.044)	
Expenditure Rule					**6.774** (0.095)
Expenditure Rule* Small State					-20.64 (0.524)

Source: Schmidt-Hebbel and Soto, 2017b.

Summary of Results

Fiscal Outcomes	Budget Balance Rule		Debt Rule		Expenditures Rule	
	de jure	*de facto*	*de jure*	*de facto*	*de jure*	*de facto*
Procyclicality of government expenditures						
Is there any effect on procyclicality?	No	No	No	No	Reduced	Reduced
Small states are more/less procyclical?	No	No	No	No	No	No
LAC countries are more/less procyclical?	No	No	No	No	No	No
Procyclicality of fiscal balances						
Is there any effect on procyclicality?	No	No	No	No	No	No
Small states are more/less procyclical?	More	No	No	No	No	No
LAC countries are more/less procyclical?	No	No	No	No	Less	No
Fiscal Balance						
Do fiscal balances improve?	Yes	Yes	Yes	Yes	Yes	No
Small states have higher/lower balances?	No	No	Lower	No	No	No
LAC countries have higher/lower balances?	No	No	No	No	No	No
Government debt						
Is debt reduced?	No	No	No	No	No	No
Small states have higher/lower debt?	Lower	No	No	No	No	No
LAC countries have higher/lower?	No	No	No	No	No	Higher

Source: Schmidt-Hebbel and Soto, 2017b.

6. Conclusions

Conclusions

(1) Best-practice fiscal frameworks comprise complex institutional arrangements that include fiscal rules

(2) Theory: different types of rules have different (often contradictory) effects on the cyclicality of spending, fiscal balance, and debt. But different rules contribute to fiscal sustainability (lower deficit and debt levels)

(3) Fiscal rules (fiscal councils) are adopted massively since the 1990s (since the GFC)

(4) World empirical evidence: adoption of fiscal rules can be explained by several key political, institutional, economic, and fiscal performance variables

(5) World empirical evidence: there is evidence that some rules affect fiscal performance: ERs lower expenditure pro-cyclicality; BBRs, DRs, and Ers raise the fiscal balance.

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Ministry of Finance of Chile – IMF Conference

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Santiago, 17-18 January 2019