DETERMINANTS AND EFFECTS OF FISCAL STABILIZATION: NEW EVIDENCE FROM TIME-VARYING ESTIMATES*

XIV EPSE Conference--Fiscal policy challenges under the recent macroeconomic uncertainty

Banco de la Republica, Bogota' - October 20, 2017

Davide Furceri (IMF) and João Tovar Jalles (IMF)

*The usual disclaimer applies

Motivation (I)

- Several years after the GFC growth in many countries remains well below pre-crisis rates.
- Medium-term growth expectations have been steadily revised downward since 2011, highlighting uncertainties surrounding growth prospects (IMF, 2015).
- Public debt-to-GDP ratios have increased in many AEs and EMEs, reaching historical high levels in some of them.

How can fiscal policy contribute to higher medium-term growth?

Motivation (II)

- Output volatility can negatively affect growth through its effects on investment and productivity➔ Fiscal policy can foster medium-term growth by reducing aggregate macroeconomic volatility:

  - Fiscal policy can affect productivity growth by reducing incentive to cut productive-enhancing investment (R&D) versus short-term projects—Aghion et al. (2002);

  - This prediction finds empirical support in cross-country regressions (Aghion et al. 2005) as well as in studies based on sectoral- (Furceri and Jalles, 2017; Choi, Furceri and Jalles, 2017) and firm-level data (Berman et al. 2007).

- Fiscal policy has a stabilizing effect on the economy if the budget balance-to-GDP ratio increases when output growth increases and falls when output growth declines:

  (i) the more countercyclical government spending is, the higher the effect of FS;
  (ii) the more procylical taxes are, the higher FS will be.

Research questions

Q1: How stabilizing is *de facto* fiscal policy and how fiscal stabilization vary over time, between countries and across phases of the business cycle?

Q2: Which policy and structural variables determine the effectiveness of fiscal stabilizers?

Q3: How much does fiscal stabilization contribute to lower overall macroeconomic volatility?

Contribution

• This paper uses a novel empirical strategy and estimating time-varying measures of fiscal stabilization for an unbalanced panel of 53 advanced and emerging market economies from 1980 to 2014.

• The use of time-varying measures of fiscal stabilization overcomes the major limitation of existing studies assessing the drivers and the effects of fiscal stabilization that rely on cross-country regressions and, therefore, are not able to account for country-specific as well as global factors.

Literature Review

- Several studies have performed a similar analysis using cross-country regressions.

- Determinants of FS: government size has typically found to be the most important driver (Gali, 1994; Debrun et al. (2008); Debrun and Kapoor, 2011; Furceri, 2010; Afonso and Jalles, 2013), together with the degree of openness (Rodrik, 1998; Lane, 2003), capital account openness (Aghion and Marinescu, 2008), the quality of institutions and level of financial development (Talvi and Vegh, 2005; Frankel et al., 2011; Acemoglu et al., 2013; and Fatas and Mihov, 2013).

- Effects of FS on macroeconomic volatility: several studies seem to agree that a timely counter-cyclical response of fiscal policy to shocks is likely to deliver considerably lower output and consumption volatility (Van den Noord, 2000; Kumhof and Laxton, 2009; Debrun and Kapoor 2011; Fatas and Mihov, 2012).

MEASURING FISCAL STABILIZATION

Conceptual framework

- Measuring fiscal stabilization/budget counter-cyclicality (Beta)—static framework:

$$b_i = \alpha_i + \beta_i \Delta y_i + \varepsilon_i$$

- Allowing for time-varying fiscal stabilization:

$$b_{it} = \alpha_{it} + \beta_{it} \Delta y_{it} + \varepsilon_{it}$$

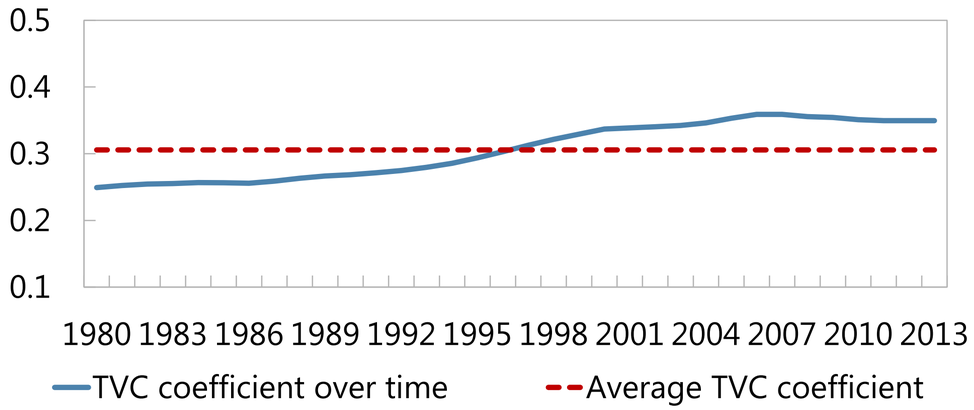
where:

$$\beta_{it} = \beta_{it-1} + v_{it}$$

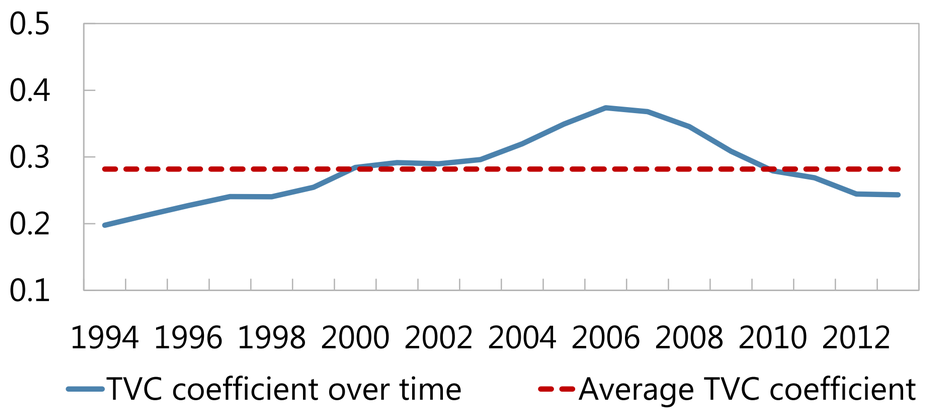
- Estimated using Kalman filter and MLH

Fiscal Stabilization over time (I)

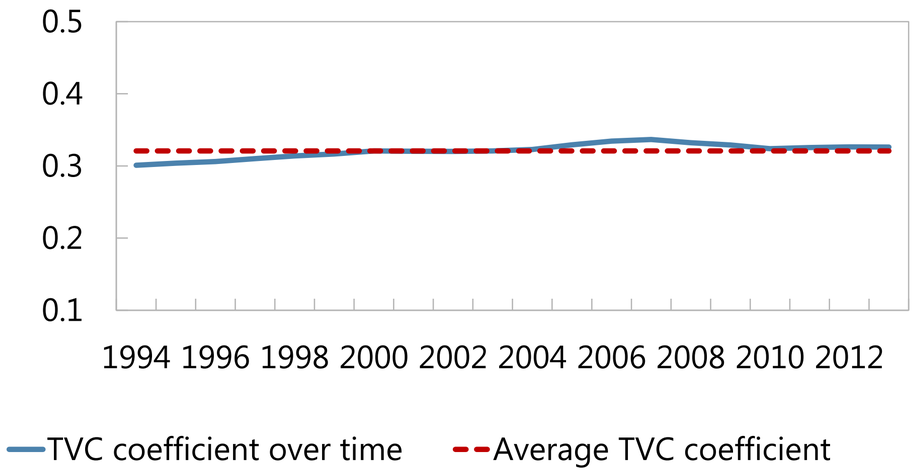
Advanced Economies, 1980-2013



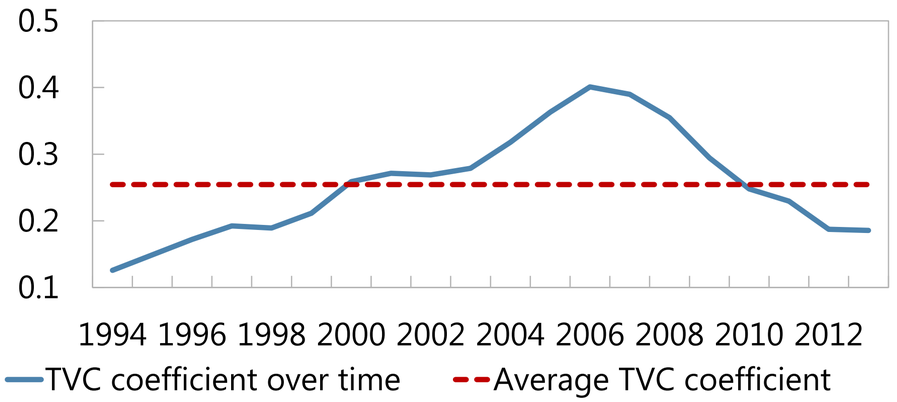
Overall, 1994-2013



Advanced Economies, 1994-2013

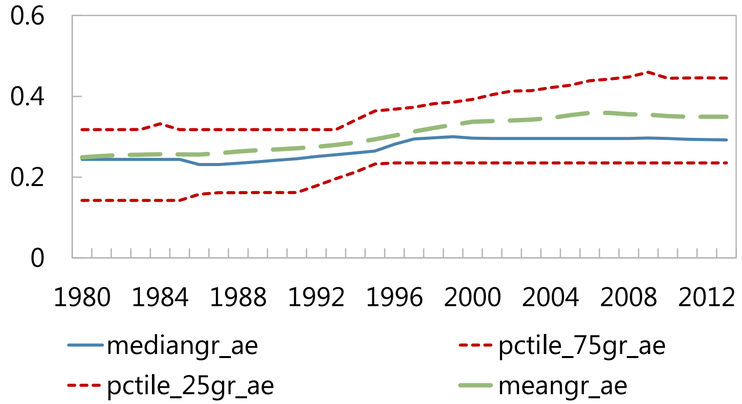


Emerging Market Economies, 1994-2013

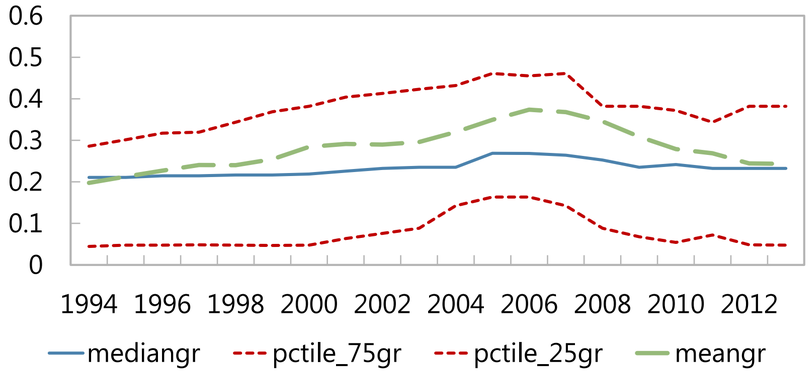


Fiscal Stabilization over time (II)

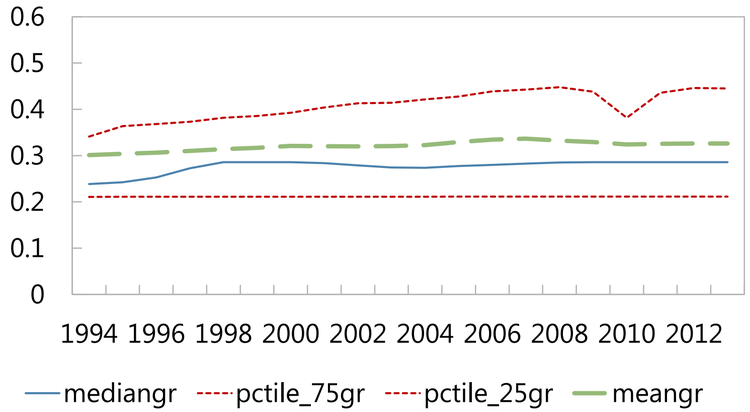
Advanced Economies, 1980-2013



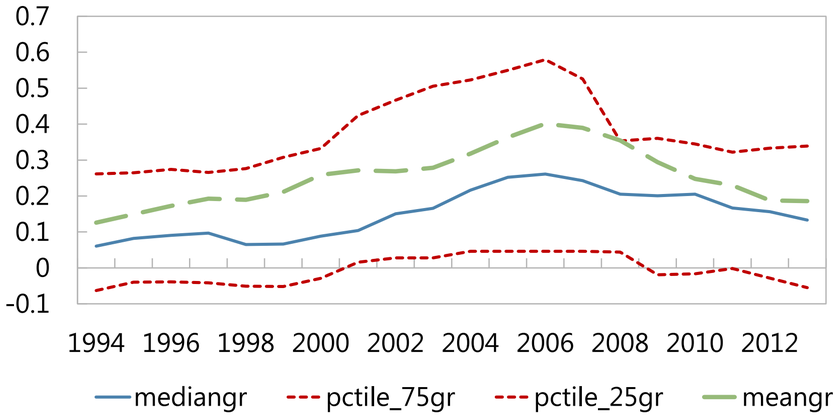
Overall, 1994-2013



Advanced Economies, 1994-2013

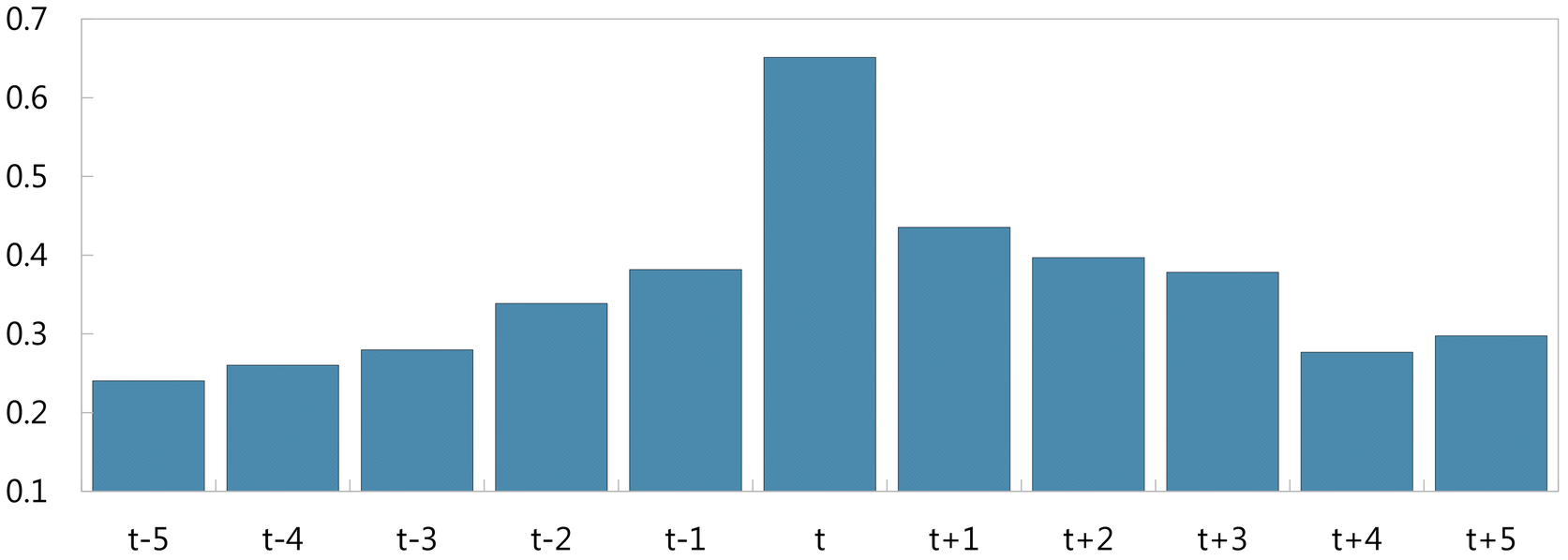


Emerging Market Economies, 1994-2013



Fiscal Stabilization over time (III)

Fiscal Stabilization over time (IV)



Note: Figure displays the average value of the TVC coefficient estimates from 5 years prior to the beginning of a given financial crises (“t”) to five years after it began. In each of the three panels averages were computed over a balanced sample.

DETERMINANTS OF FISCAL STABILIZATION

Empirical Methodology

- To test the importance of various macroeconomic and political factors in affecting the degree of fiscal stabilization, the following regression is estimated:

$$\beta_{it} = \delta_i + \gamma_t + \boldsymbol{\theta}'\boldsymbol{X_{it}} + \epsilon_{it} \qquad (4)$$

$\boldsymbol{X_{it}}$ is a vector of time-varying macroeconomic and political variables

Sample: balanced sample of 53 countries for which we have estimates of fiscal stabilization for at least 20 years

Estimation: WLS

Macroeconomic variables: Real GDP per capita, financial development (the credit–to-GDP ratio), trade openness (ratio of total exports and imports in GDP), capital account openness (the Chinn-Ito index of capital account openness), government size (government expenditure-to-GDP ratio), financial crises (Laeven and Valencia, 2010).

Political variables: constraints on the executive, elections, margin of majority, proportional representations and parliamentary regimes.

Results - baseline

	(I)	(II)	(III)	(IV)	(V)	(VI)
Credit to GDP (t-1)	0.0285***	0.0299***	0.0285***	0.0265***	0.0266***	0.0292***
	(4.9883)	(5.1180)	(4.9283)	(4.4760)	(4.4589)	(4.8660)
GDP per capita (t-1)	0.1840***	0.1767***	0.1737***	0.1888***	0.1762***	0.1644***
	(4.2328)	(3.9331)	(3.9594)	(4.3247)	(3.9893)	(3.7060)
Trade openness (t-1)	0.1213***	0.1129***	0.1125***	0.1254***	0.1162***	0.1187***
	(3.0063)	(2.6907)	(2.7799)	(3.0938)	(2.8550)	(2.9143)
Capital account openness (t-1)	0.0053	0.0073	0.0041	0.0066	0.0051	0.0058
	(1.0222)	(1.3561)	(0.7872)	(1.2497)	(0.9457)	(1.0723)
Government expenditure to GDP (t-1)	0.0053**	0.0052**	0.0050**	0.0050*	0.0048*	0.0052**
	(2.1380)	(2.0481)	(2.0207)	(1.9616)	(1.8940)	(2.0116)
Executive constraints			0.0245***		0.0233***	
			(3.3180)		(3.1308)	
Parliamentary regime			-0.0519		-0.0513	-0.0346
			(-1.5517)		(-1.5271)	(-1.0641)
Presidential election held			-0.0021		-0.0022	0.0024
			(-0.1543)		(-0.1573)	(0.1758)
Legislative election held			-0.0010		-0.0014	-0.0017
			(-0.1236)		(-0.1688)	(-0.2050)
Proportional representation			-0.0294		-0.0302	-0.0371
			(-1.0670)		(-1.0866)	(-1.3236)
Margin of majority			-0.0474*		-0.0477*	-0.0417
			(-1.6138)		(-1.6030)	(-1.3683)
Financial crises		0.0109				
		(0.6442)				
Expenditure rule				-0.0154	-0.0174	-0.0184
				(-0.9860)	(-1.1041)	(-1.1646)
Revenue rule				0.0338	0.0257	0.0298
				(1.5973)	(1.2106)	(1.4063)
Debt rule				-0.0206	-0.0153	-0.0103
				(-1.3218)	(-0.9796)	(-0.6526)
Political constraints						0.1060***
						(2.5962)
Country f.e.	Yes	Yes	Yes	Yes	Yes	Yes

Results - robustness

	(I)	(II)	(III)	(IV)
Credit to GDP (t-1)	0.0266***	0.0103***	0.0070	0.0167***
	(4.4589)	(2.7439)	(1.5137)	(3.2251)
GDP per capita (t-1)	0.1762***	0.0228***	0.0260***	0.0954***
	(3.9893)	(4.3173)	(4.3644)	(2.8242)
Trade openness (t-1)	0.1162***	0.1027***	0.0944***	0.0899**
	(2.8550)	(7.2485)	(6.2870)	(2.4565)
Capital account openness (t-1)	0.0051	0.0014	0.0031	0.0005
	(0.9457)	(0.2654)	(0.5460)	(0.0982)
Government expenditure to GDP (t-1)	0.0048*	0.0052***	0.0046***	0.0036
	(1.8940)	(3.8320)	(3.1396)	(1.4908)
Executive Constraints	0.0233***	0.0236***	0.0202***	0.0265***
	(3.1308)	(3.7227)	(3.1041)	(3.6316)
Parliamentary regime	-0.0513	0.0388*	0.0512**	-0.0526
	(-1.5271)	(1.8966)	(2.1614)	(-1.5891)
Presidential election held	-0.0022	0.0000	0.0042	-0.0029
	(-0.1573)	(0.0002)	(0.1975)	(-0.2178)
Legislative election held	-0.0014	-0.0090	-0.0103	-0.0010
	(-0.1688)	(-0.7358)	(-0.8055)	(-0.1294)
Proportional representation	-0.0302	-0.0803***	-0.0831***	-0.0452*
	(-1.0866)	(-5.8236)	(-5.8118)	(-1.6835)
Margin of majority	-0.0477*	-0.1220***	-0.1508***	-0.0384
	(-1.6030)	(-3.2449)	(-3.8349)	(-1.3625)
Expenditure rule	-0.0174	-0.0679***	-0.0702***	-0.0310**
	(-1.1041)	(-3.5348)	(-3.5085)	(-2.0425)
Revenue rule	0.0257	0.1145***	0.1140***	0.0234
	(1.2106)	(4.7537)	(4.6558)	(1.1159)
Debt rule	-0.0153	-0.0105	-0.0079	-0.0350**
	(-0.9796)	(-0.7400)	(-0.4733)	(-2.5525)
Country f.e.	Yes	No	No	Yes

EFFECTS OF FISCAL STABILIZATION

Methodology

- The following regression is estimated:

$$S_{it} = \delta_i + \gamma_t + \vartheta\beta_{it} + \boldsymbol{\pi}'\boldsymbol{Z_{it}} + \epsilon_{it} \qquad (5)$$

- To reduce endogeneity, we include in the specification a set of control variables ($\boldsymbol{Z_{it}}$) that have been found in the literature and in the previous section to be relevant:

  (i) trade openness;
  (ii) capital account openness;
  (iii) credit-to-GDP ratio;
  (iv) GDP per capita;
  (v) GDP growth;
  (vi) population;
  (vii) government size.

- All the macroeconomic variables enter the specification with one lag to minimize reverse causality. Equation (5) is estimated by OLS with robust clustered standard errors.

Results - baseline

	(I)	(II)	(III)	(IV)	(V)	(VI)
Fiscal stabilization (t)	-1.117***		-1.481***		-1.383**	
	(-2.88)		(-2.85)		(-2.47)	
Fiscal stabilization (t-1)		-1.421***		-1. 814***		-1. 665***
		(-3.51)		(-3.29)		(-2.89)
Trade openness (t-1)			-0.010*	-0.012*	-0.010	-0.011
			(-1.73)	(-1.82)	(-1.50)	(-1.58)
Capital account openness (t-1)			0.074	0.075	0.113	0.119
			(0.76)	(0.77)	(1.01)	(1.07)
Credit to GDP (t-1)			0.009**	0.009**	0.007*	0.007**
			(2.65)	(2.65)	(1.84)	(1.82)
GDP per capita (t-1)			-0.335	-0.385	0.284	0.254
			(-0.72)	(-0.81)	(0.37)	(0.33)
GDP growth (t-1)					-0.005	-0.007
					(-0.11)	(-0.17)
Log population (t-1)					-4.636**	-4.573**
					(-2.11)	(-2.08)
Government expenditure to GDP (t-1)					0.033*	0.032
					(1.67)	(1.66)
Country f.e.	Yes	Yes	Yes	Yes	Yes	Yes
Time f.e.	Yes	Yes	Yes	Yes	Yes	Yes
N	1039	1023	823	811	689	689
R^2	0.32	0.33	0.36	0.35	0.39	0.39

Note: Output volatility measured as the absolute value of the output gap. Results obtained by estimating equation (5). t-statistics in parentheses based on clustered robust standard errors. ***,**,* denote significance at 1,5,10 percent level, respectively.

Results – robustness across time and samples

	(I)	(II)
Fiscal stabilization (t)* Post 2000	-2.275***	
	(-3.58)	
Fiscal stabilization (t)* Pre 2000	-0.633	
	(-1.14)	
Fiscal stabilization (t)* Post 2000*Advanced Economies		-4.231***
		(-2.57)
Fiscal stabilization (t)* Pre 2000*Advanced Economies		-2.669*
		(-1.72)
Fiscal stabilization (t)* Post 2000*Emerging Market Economies		-1.924***
		(-3.09)
Fiscal stabilization (t)* Pre 2000* Emerging Market Economies		0.402
		(0.51)
Country f.e.	Yes	Yes
Time f.e.	Yes	Yes
N	689	689
R^2	0.39	0.39

Note: Measure I= absolute value of the output gap; Measure II= standard deviation of the output gap on a five-year window; Measure III= standard deviation of GDP growth on a five-year window. Results obtained by estimating equation (5). t-statistics in parentheses based on clustered robust standard errors. ***,**,* denote significance at 1,5,10 percent level, respectively.

Results – robustness measures, frequency and estimators

	Annual			5-year average		
	(I)	(II)	(III)	(IV)	(V)	(VI)
	Measure I	Measure II	Measure III	Measure I	Measure II	Measure III
Fiscal stabilization (t)	-1.383** (-2.47)	-0.708*** (-2.03)	-0.006** (-2.01)	-1.284** (-2.06)	-1.305*** (-2.06)	-0.017** (-2.07)
Country f.e.	Yes	Yes	Yes	Yes	Yes	Yes
Time f.e.	Yes	Yes	Yes	Yes	Yes	Yes
N	689	669	686	284	266	279
R^2	0.39	0.60	0.57	0.49	0.56	0.54

Note: Measure I= absolute value of the output gap; Measure II= standard deviation of the output gap on a five-year window; Measure III= standard deviation of GDP growth on a five-year window. Results obtained by estimating equation (5). t-statistics in parentheses based on clustered robust standard errors. ***,**,* denote significance at 1,5,10 percent level, respectively.

Results – robustness measures, frequency and estimators

	(I)	(II)	(III)	(IV)
	OLS	WLS	IV1	IV2
Fiscal stabilization (t)	-1.383** (-2.47)	-2.533*** (-2.93)	-1.731*** (-2.66)	-1.922*** (-2.88)
Country f.e.	Yes	Yes	Yes	Yes
Time f.e.	Yes	Yes	Yes	Yes
Kleibergen-Paap p-value			0.00	0.00
N	689	689	670	675
R^2	0.39	0.36	0.37	0.42

Note: Output volatility measured as the absolute value of the output gap. Results obtained by estimating equation (5). IV1= lagged fiscal stabilization and political constraints as instruments; IV2= lagged fiscal stabilization and polconv as instruments t-statistics in parentheses based on clustered robust standard errors. ***,**,* denote significance at 1,5,10 percent level, respectively.

Summary of Results

<u>The key findings of the paper are:</u>

- Fiscal policy can influence growth through its support to macroeconomic stability.
- Using time-varying estimates of fiscal stabilization the paper find that fiscal policy by acting counter-cyclically can significantly reduce output volatility.

<u>More specifically:</u>

1. fiscal stabilization has increased over time for many economies over the last two decades;

2. fiscal stabilization is positively associated with financial deepening, the level of economic development, trade openness, government size as well as political constraints on the executive;

3. fiscal stabilization significantly reduces output volatility: an increase of 0.5 in the coefficient of FS (about 2 standard deviations) reduces output volatility by about ½-1½ pp., which translated in terms of effects on medium-term growth of about ¼-½ pp.

DETERMINANTS AND EFFECTS OF FISCAL STABILIZATION: NEW EVIDENCE FROM TIME-VARYING ESTIMATES*

XIV EPSE Conference--Fiscal policy challenges under the recent macroeconomic uncertainty

Banco de la Republica, Bogota' - October 20, 2017

Davide Furceri (IMF) and João Tovar Jalles (IMF)

*The usual disclaimer applies

Descriptive Statistics

Variables	Observations	Mean	Standard Deviation	Minimum	Maximum
Fiscal Stabilization	1156	0.240	0.275	-0.929	1.481
Credit to GDP	1229	12.147	2.942	-2.364	20.903
GDP per capita	1335	10.818	2.028	6.415	16.130
Trade openness	1172	0.741	0.512	0.101	4.380
Capital account openness	1181	0.652	1.539	-1.855	2.455
Government expenditure to GDP	1335	16.207	5.664	3.814	43.813
Executive constraints	1295	5.851	1.812	1	7
Political Constraints	1330	0.594	0.264	0	0.894
Parliamentary regime	1335	0.638	0.481	0	1
Presidential election held	1335	0.081	0.274	0	1
Legislative election held	1335	0.251	0.434	0	1
Proportional representation	1335	0.728	0.445	0	1
Margin of majority	1335	0.616	0.168	0.117	1
Financial crises	1210	0.052	0.234	0	1
Expenditure rule	1335	0.127	0.333	0	1
Revenue rule	1335	0.059	0.237	0	1
Debt rule	1335	0.265	0.441	0	1
Population	1276	49.802	158.049	0.218	1241.492