
HOW MUCH IS TOO MUCH? THE FISCAL SPACE IN EMERGING MARKET ECONOMIES

Gustavo Ganiko, Karl Melgarejo and Carlos Montoro

7th Annual Conference of the Bilateral Assistance and Capacity Building for Central
Banks (BCC)

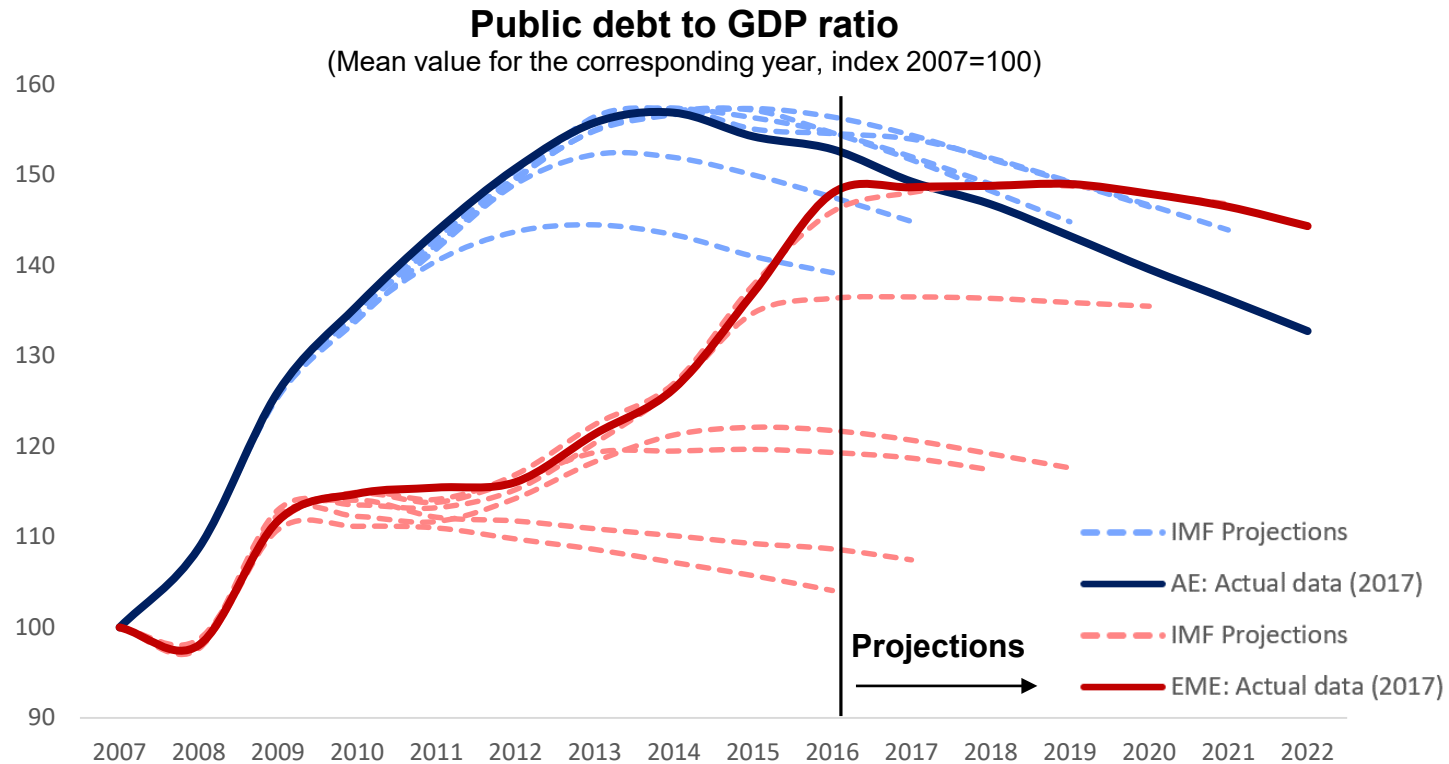
Interaction of fiscal and monetary policies

26-27 September, 2019

The views expressed in this paper are those of the authors and do not reflect necessarily the position of the Central Reserve Bank of Peru.

Motivation

Recent evolution of public debt around the world



Source: IMF

- How much is the fiscal space in Emerging Market Economies (EME)?
- Under what conditions the fiscal space would change?
- Which are the sustainable paths for public debt?

We need a threshold for public debt



How much is too much?

ANALYTICAL FRAMEWORK

- 1.- FINANCING COST
- 2.- FISCAL REACTION FUNCTION
- 3.- STOCHASTIC SIMULATION

Analytical framework

The analytical framework starts with the determinants of the public debt dynamics:

$$\Delta d_t = \phi_t d_{t-1} - pb_t$$

Where

d_t : debt ratio (gross public debt / GDP)

$\phi_t = \frac{r_t - g_t}{1 + g_t}$: effective financing cost of debt (growth-adjusted interest rate)

r_t : debt's nominal interest rate

g_t : nominal GDP growth rate

pb_t : primary balance as percentage of GDP

1.- Financing cost (effective):

$$\phi_t d_{t-1} = \left(\frac{r_t - g_t}{1 + g_t} \right) d_{t-1}$$

2.- Primary Balance (fiscal reaction function):

$$pb_t = f(\text{fiscal variables})$$

If $\phi_t d_{t-1} = pb_t$

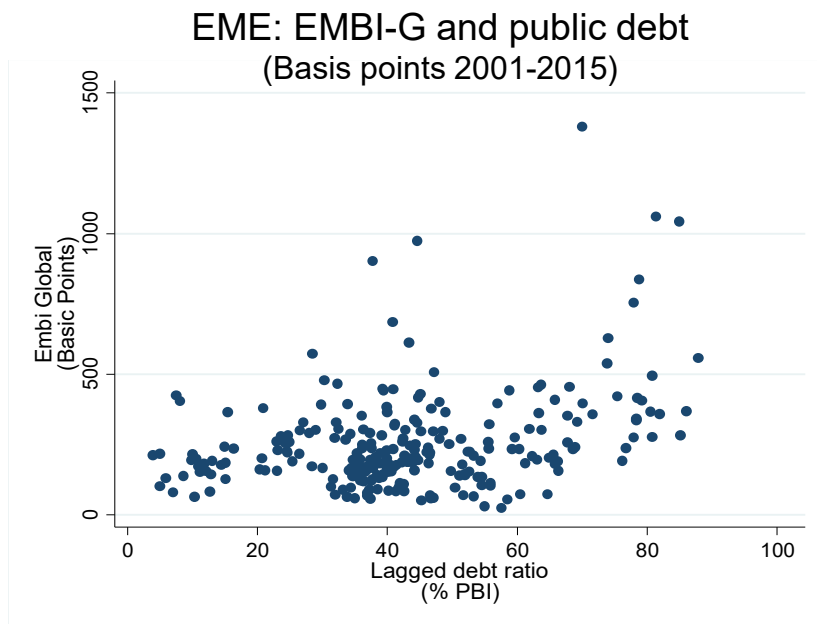
$$\Delta d_t = 0$$

d is in equilibrium

Some empirics: financing cost; primary balance Vs. past debt

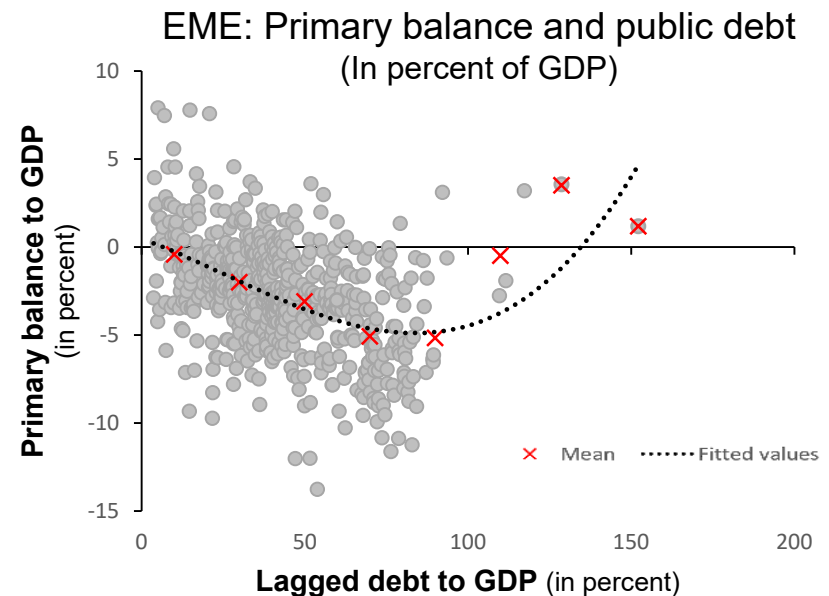
Financing cost Vs. past debt

- **AE:** Vast literature / positive effect (even non-linear) of debt ratio on Sovereign Yields.
- **EME:** Scarce literature / IMF (2016): +7.3 bps in Sovereign Yields due to +1% in debt ratio.



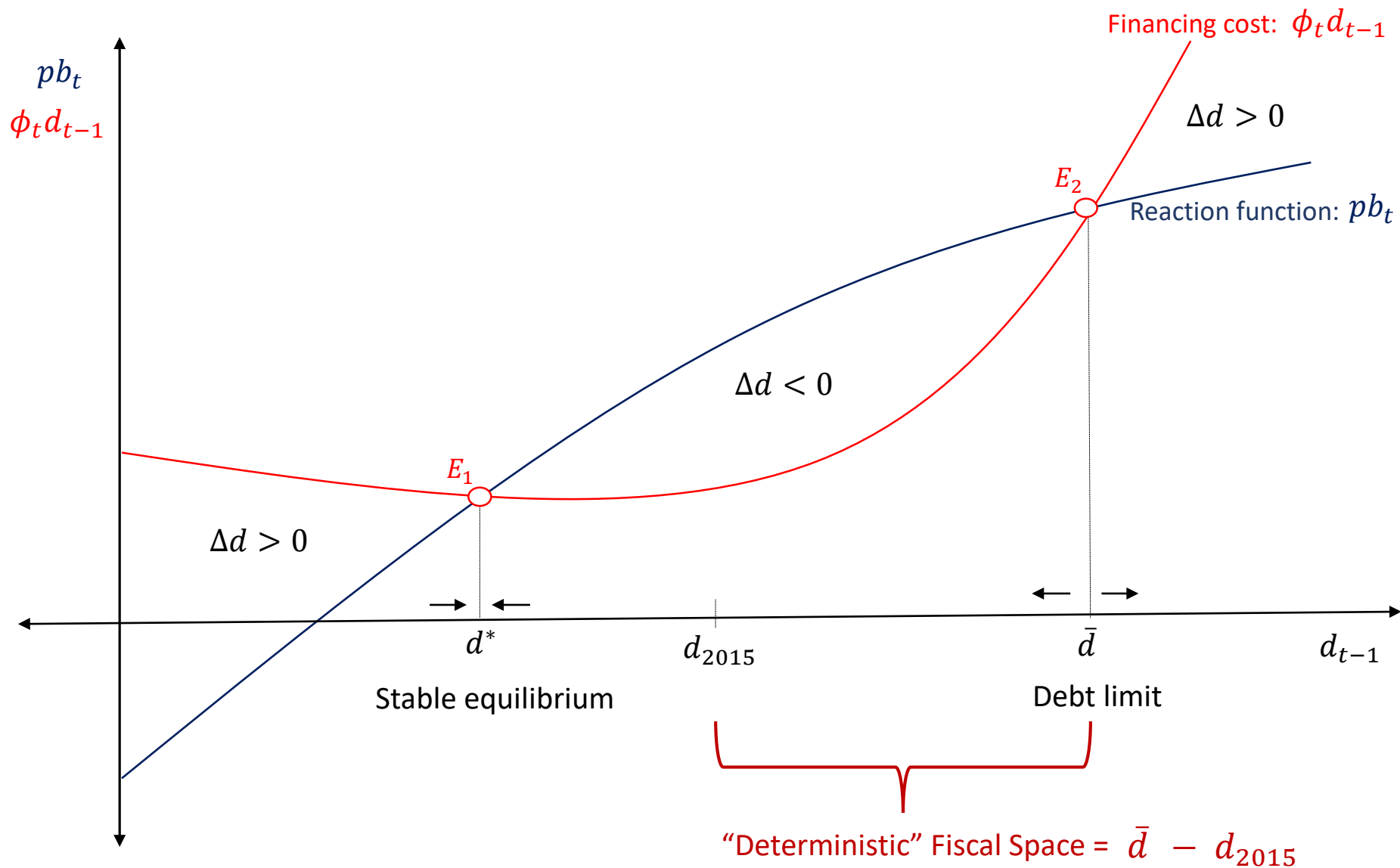
Primary Balance Vs. past debt

- **AE:** Bohn (2008): sustainability requires a positive reaction of primary balance to past debt / Gosh et al. (2013): non-linearity, reaction weakens when debt increases, i.e. FISCAL FATIGUE.
- **EME:** Scarce literature.

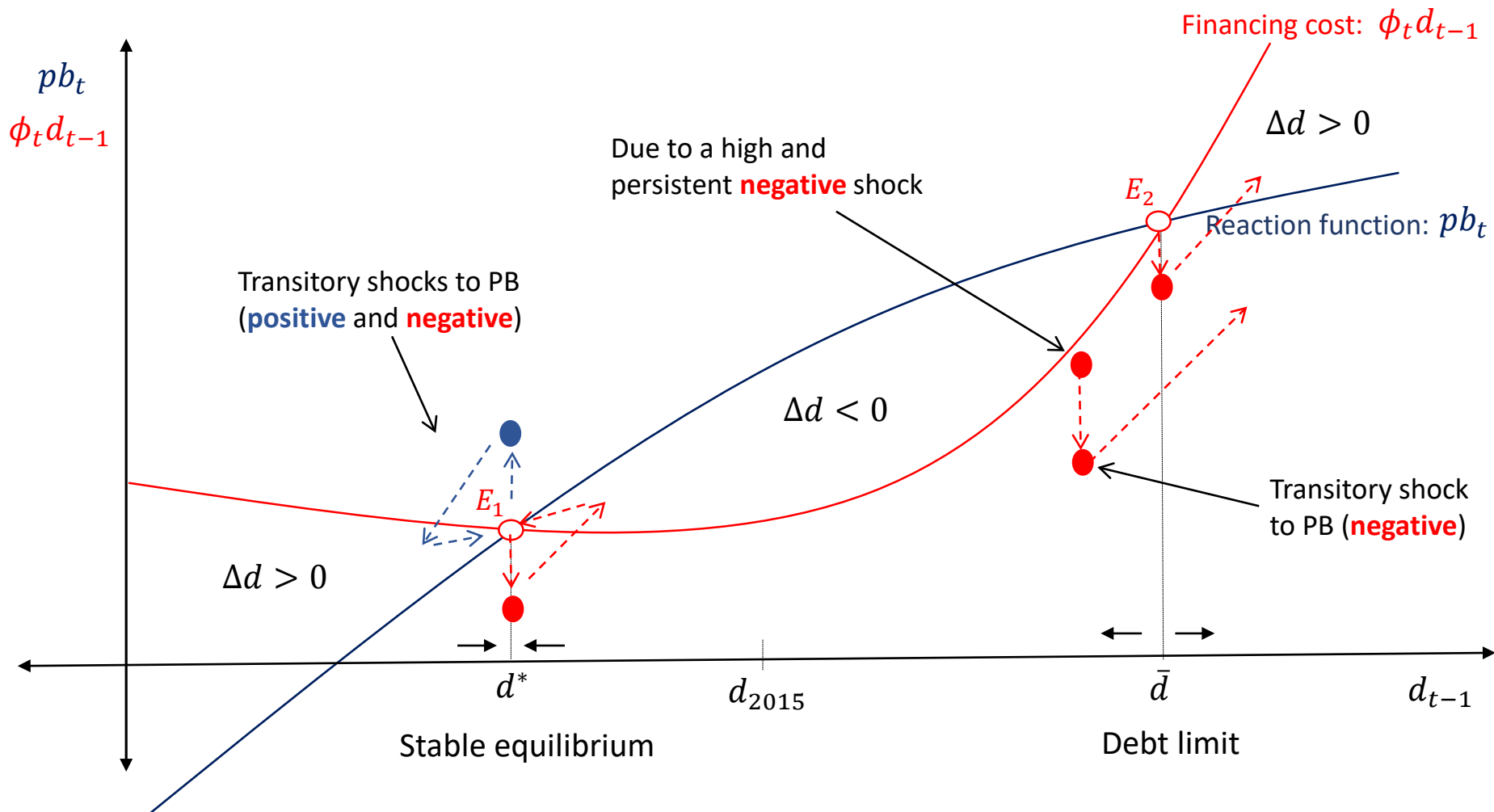


- Graphs show just a Bivariate Analysis (lots of problems)
- We need a Multivariate Analysis (control for other variables, even non observable)

Stylized framework: deterministic fiscal space

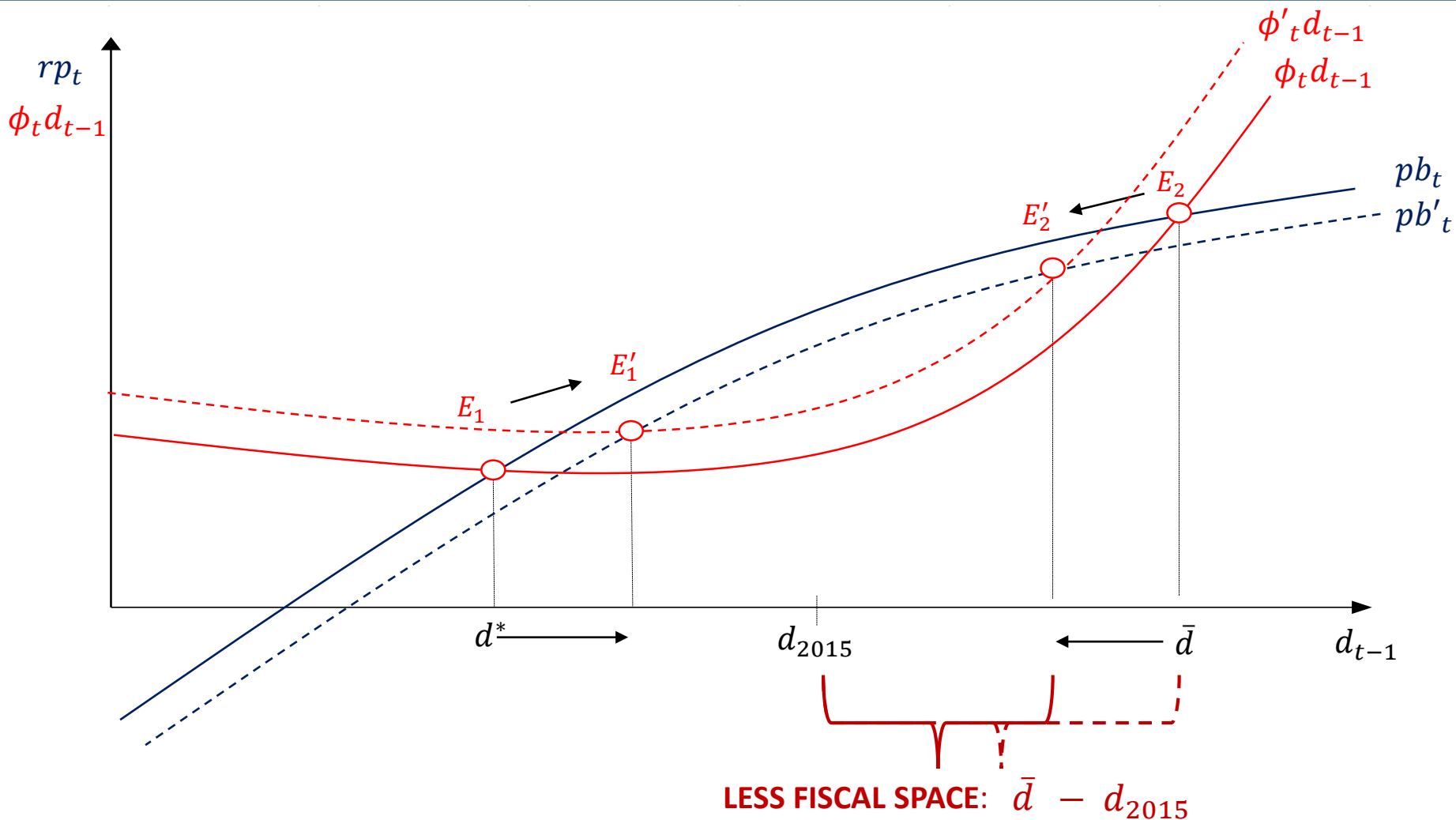


Stylized framework: some dynamics



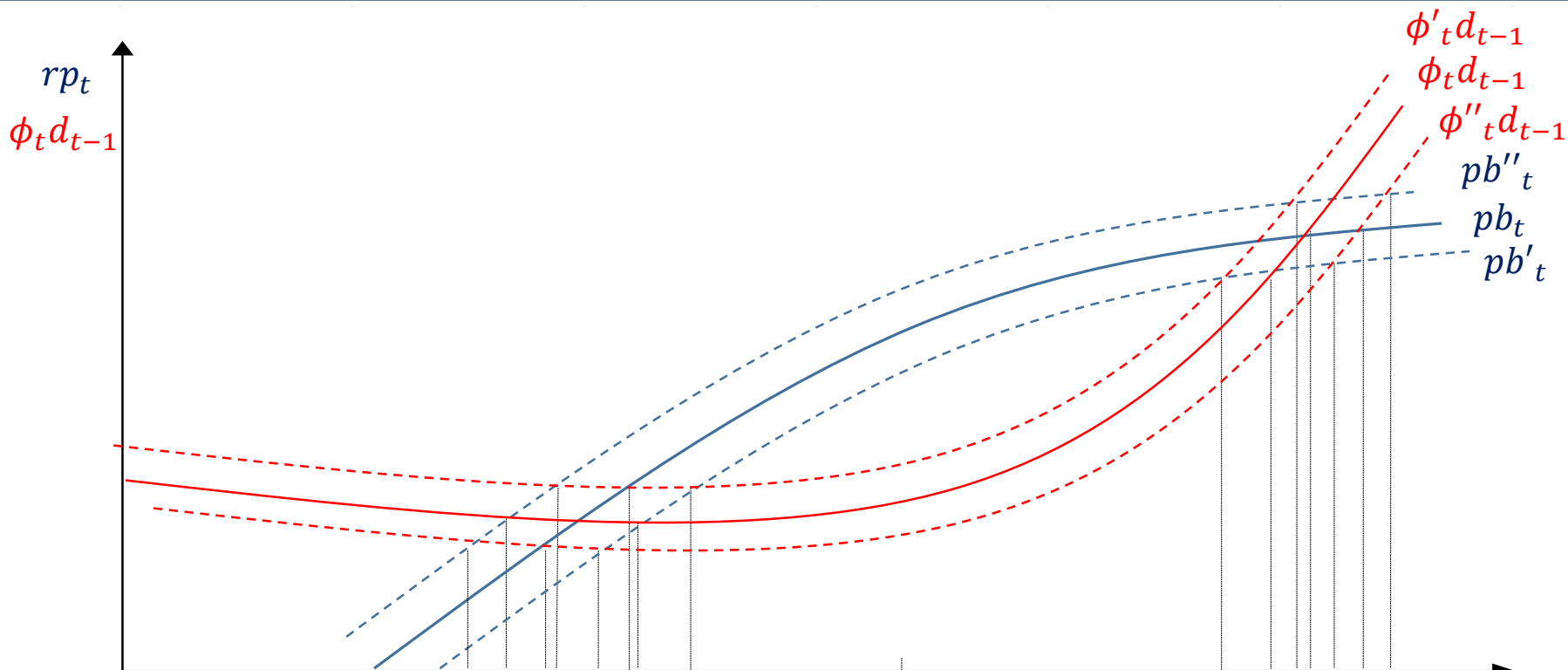
- If the economy is around E_1 , only a high and persistent negative shock will lead the debt ratio close to the explosive path (e.g. expansionary policy for many years).
- If the economy is in E_2 , or close to, even a small shock will cause problems

Stylized framework: uncertainty matters

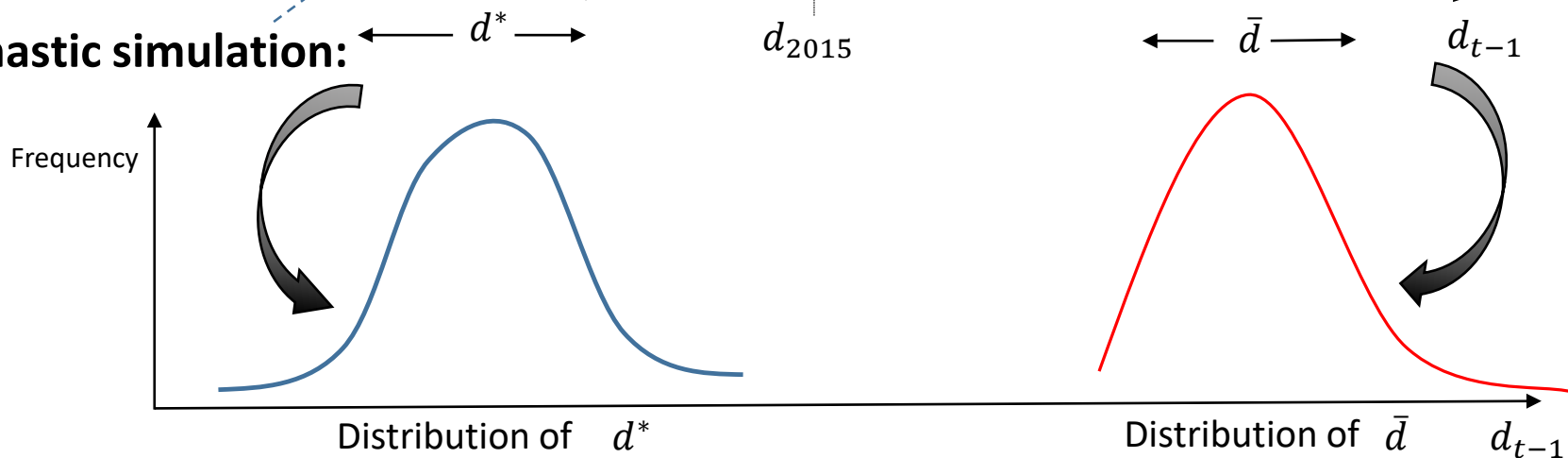


- Fiscal Space shrinks!
- The economy is more vulnerable: debt is more like to fall into the explosive path.
- If the economy was in E_2 , now debt is already in the explosive path.

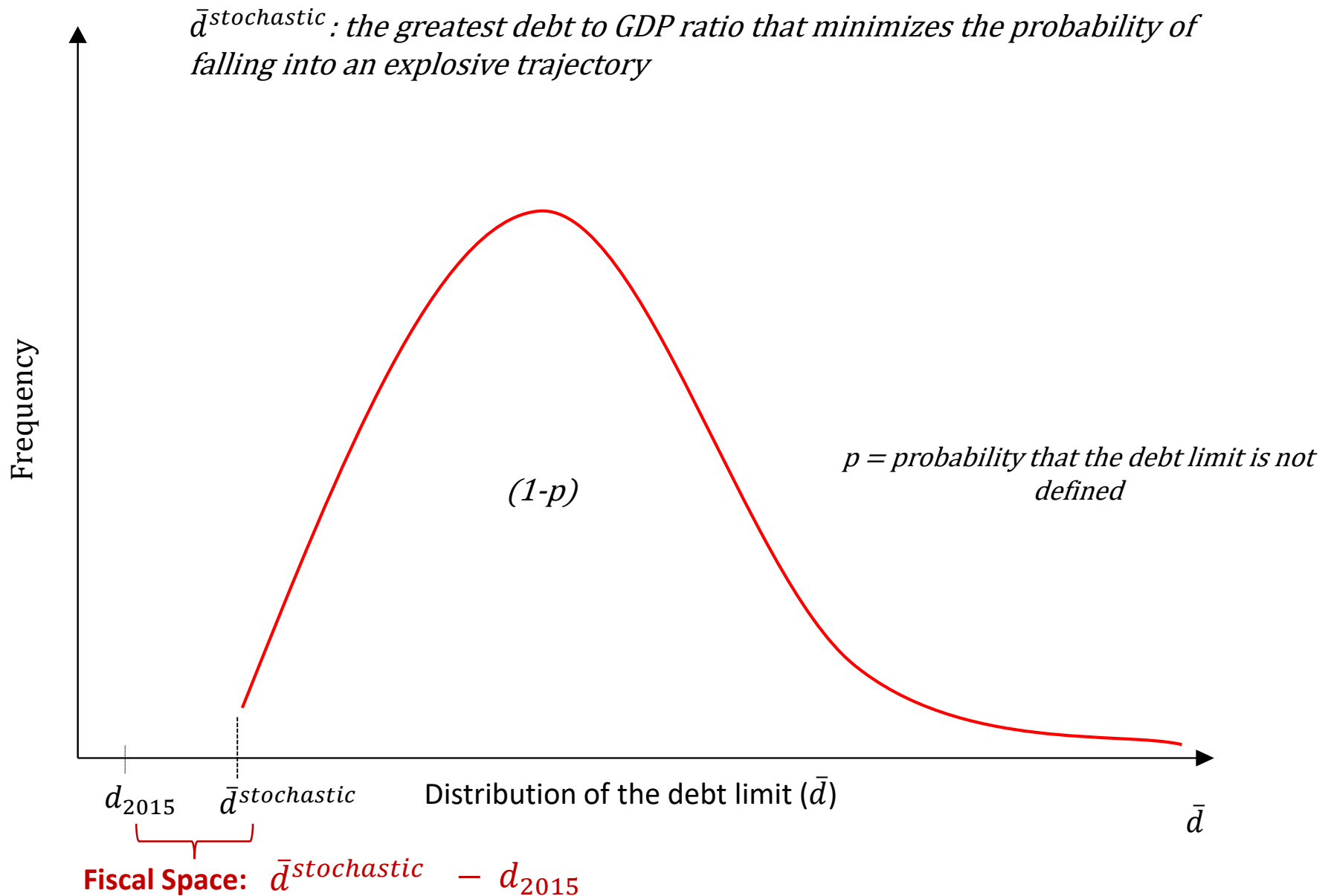
Stylized framework: let's allow more uncertainty



3.- Stochastic simulation:



Our proposal: Stochastic Debt Limit



RESULTS: ESTIMATING FISCAL SPACE IN EMES

Econometric strategy and estimated coefficients

1. **Financing cost (effective):** growth-adjusted interest rate ϕ_{it}

$$emb_{it} = f_1(d_{it-1}^2; X_{it}) + u_{it} \quad (1)$$

(+ 0.17)*** R² = 0.79

2. **Fiscal reaction function:** pb_{it} (fiscal fatigue?)

$$pb_{it} = f_2(d_{i,t-1}; d_{i,t-1}^2; X_{i,t}) + \varepsilon_{i,t} \quad (2)$$

(+ 0.081)* (- 0.2E-3)*** R² = 0.50

Sig. Levels: *15%; ***1%

- Each equation is estimated by using a panel data model with fixed effects and annual data for 26 emerging market economies over the 2000-2015 period

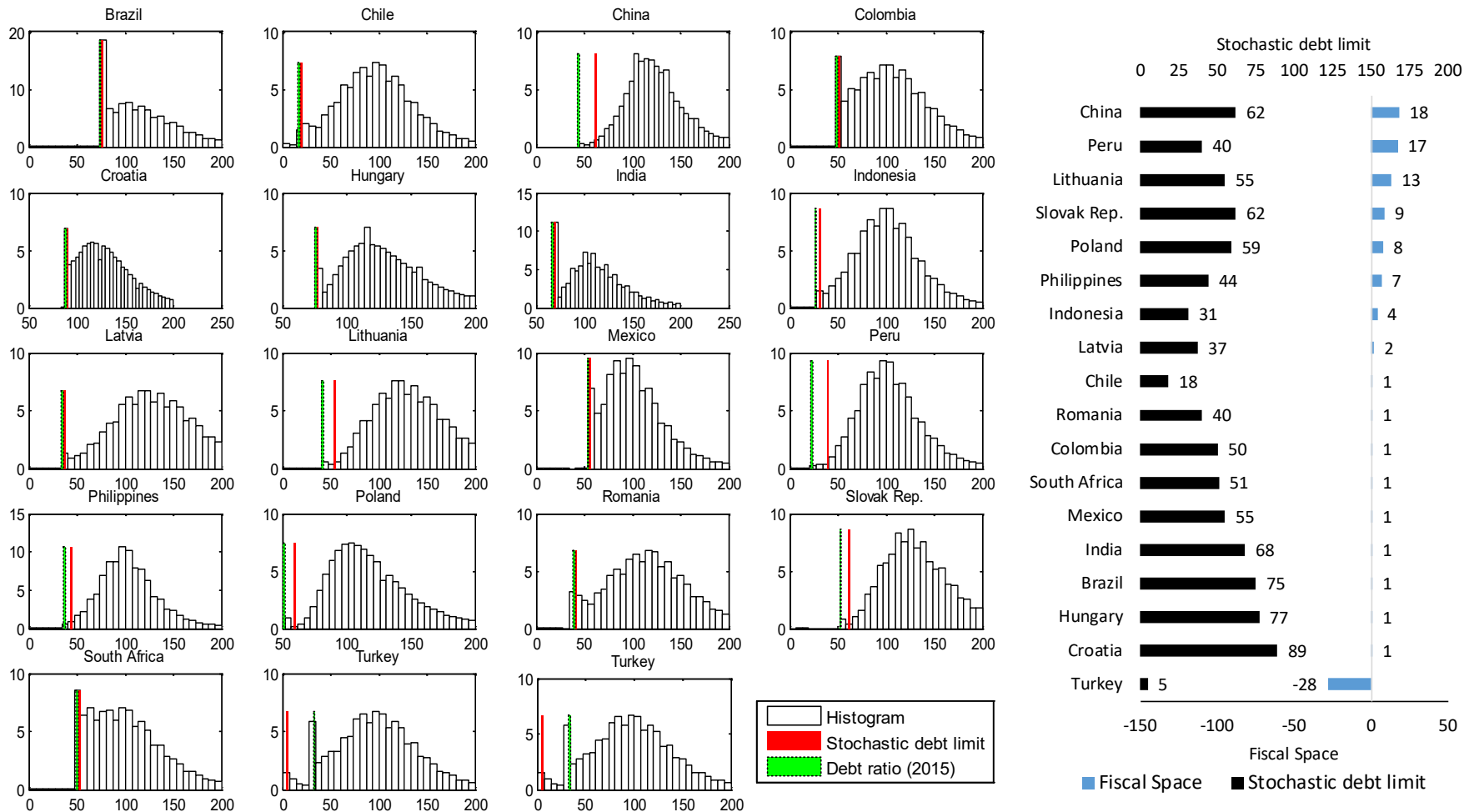
3. **Stochastic simulation:** two sources of uncertainty in our model

Coefficients: $\mathcal{B} \sim N(\hat{\beta}, \Phi) \quad (3)$

Controls: $X_i \sim N(\mu_i, \Sigma_i) \quad (4)$

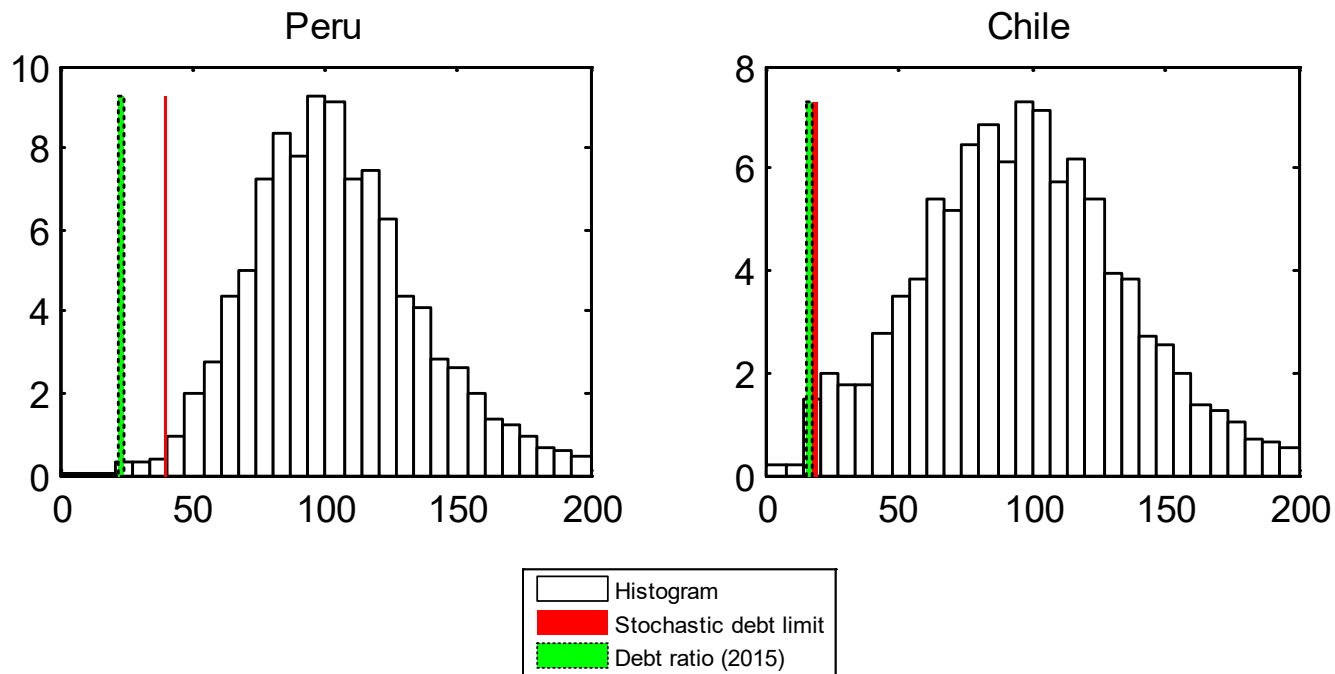
- We use a Multivariate Normal Distribution to simulate separately 1000 scenarios for the estimated coefficients and 1000 for the control variables.
- Therefore, we generate one million (10⁶) scenarios for each country.

Results: Stochastic Debt Limit in emerging economies



3. Stochastic debt limit: the greatest value of the debt ratio that minimizes the probability of an explosive trajectory, at 1% of statistic significance (1st percentile).

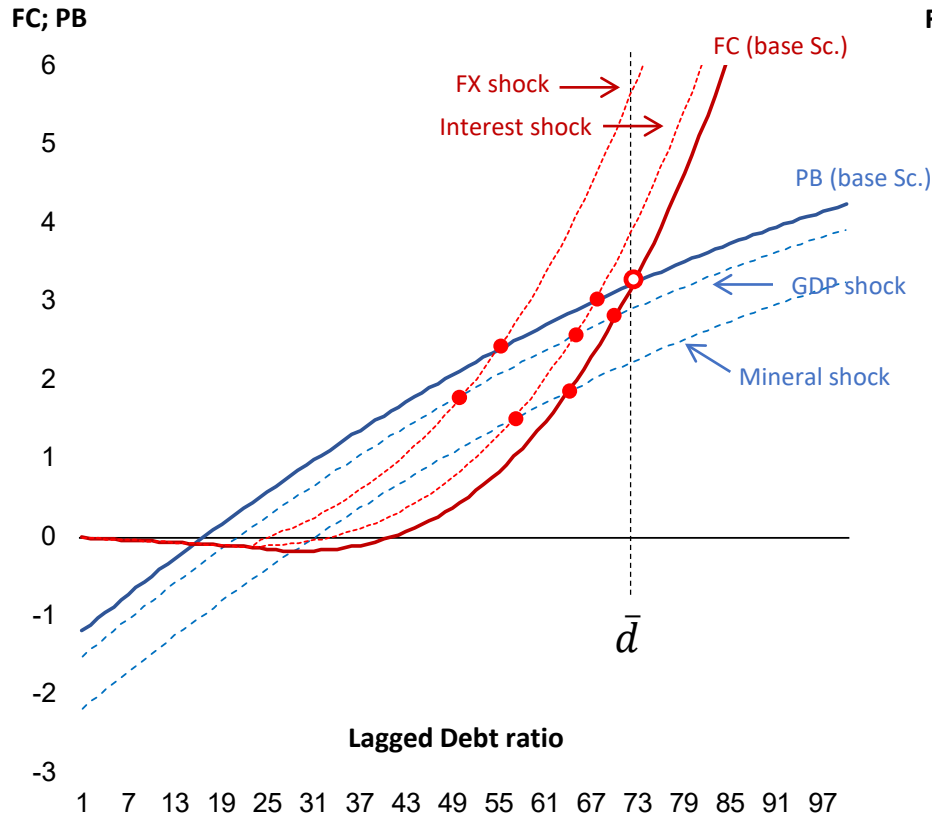
Results: Stochastic Debt Limit in Peru and Chile



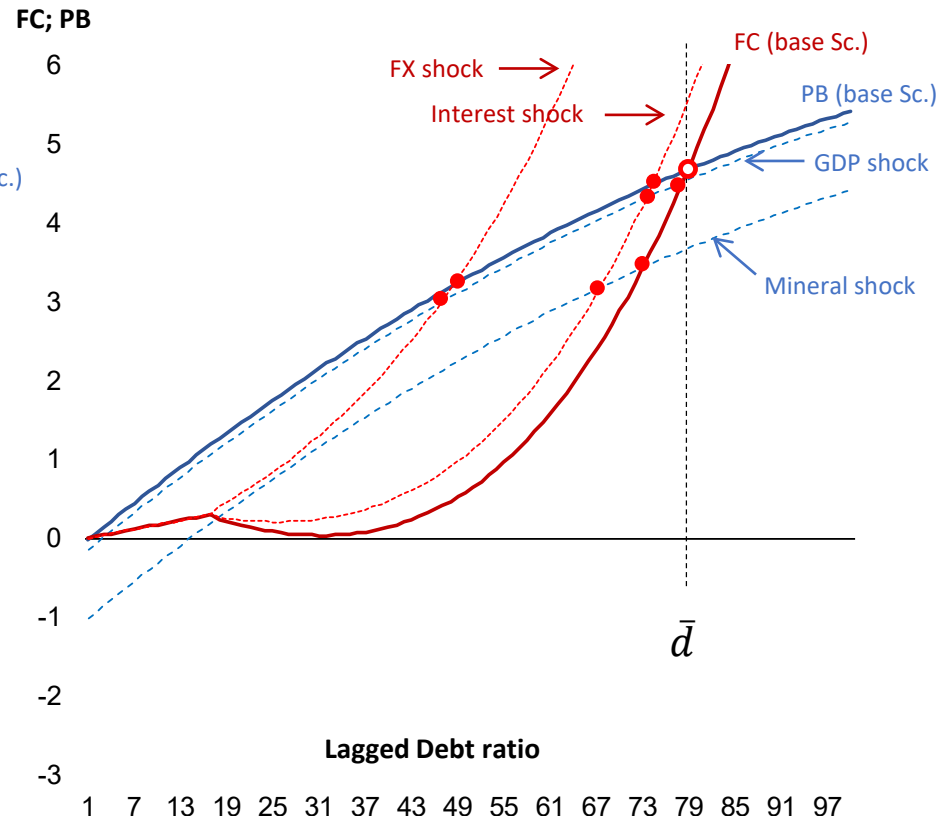
- **Stochastic Debt Limit:** 40% of GDP in Peru and 18% of GDP in Chile.
- **Fiscal Space:** 17% of GDP in Peru and 1% of GDP in Chile in 2016.
- Remember that the Fiscal Space is calculated by subtracting the debt ratio in 2015 to the stochastic debt limit.
- So **Fiscal Space** is higher in Peru than in Chile, why?

Results: Stochastic Debt Limit in Peru and Chile

PERU: Debt Limit values



CHILE: Debt Limit values



FC: Financial Cost (effective) ○ Deterministic equilibrium
 PB: Primary Balance ● Equilibria under uncertainty

- **Deterministic:** Debt limit is higher in Chile → Higher primary balance
- **Stochastic:** Debt limit is higher in Peru → Magnitude of shocks and ... covariances?

Results: Stochastic Debt Limit in Peru and Chile

PERU: Var-Cov matrix – Control Variables

	GDP gap	Infl.	VIX	REER	FX dep.	10Y Tr.	GDP gr.	Min.	Energ.	Gov. Exp.	FRR
GDP gap	0,2										
Infl.	0,3	2,7									
VIX	0,9	1,8	45,1								
REER	-0,5	-0,2	-12,5	18,8							
FX dep.	-1,1	-1,1	-7,7	13,6	24,1						
10Y Tr.	-0,2	-0,4	0,3	-2,7	-1,9	1,0					
GDP gr.	0,5	1,3	-4,8	-5,8	-10,1	1,2	12,1				
Min.	3,1	4,7	-10,4	-36,6	-38,8	6,5	37,6	194,6			
Energ.	0,6	1,2	-1,0	-5,0	-8,9	0,9	4,5	25,1	7,0		
Gov.Exp.	-0,2	-0,1	-0,2	2,6	2,4	-1,0	-1,0	-4,7	-0,9	1,5	
FRR	-0,2	-0,4	0,3	-2,7	-1,9	1,0	1,2	6,5	0,9	-1,0	1,0

CHILE: Var-Cov matrix – Control Variables

	GDP gap	Infl.	VIX	REER	FX dep.	10Y Tr.	GDP gr.	Min.	Energ.	Gov. Exp.	FRR
GDP gap	0,04										
Infl.	0,3	5,6									
VIX	-0,4	-1,6	45,1								
REER	0,5	2,2	2,3	30,1							
FX dep.	-0,5	-0,2	8,8	17,0	67,7						
10Y Tr.	0,0	0,3	0,3	-3,2	-3,6	1,0					
GDP gr.	0,2	0,5	-16,9	-10,5	-24,8	2,2	18,5				
Min.	2,1	18,7	-10,5	16,3	-53,7	6,5	28,5	197,8			
Energ.	0,0	0,2	-0,1	0,2	-0,7	0,1	0,2	1,8	0,03		
Gov.Exp.	0,0	-0,4	1,6	0,9	1,1	-0,2	-0,9	-1,7	0,0	0,2	
FRR	0,0	0,4	0,0	-3,4	-3,5	1,1	2,4	7,2	0,1	-0,3	1,2

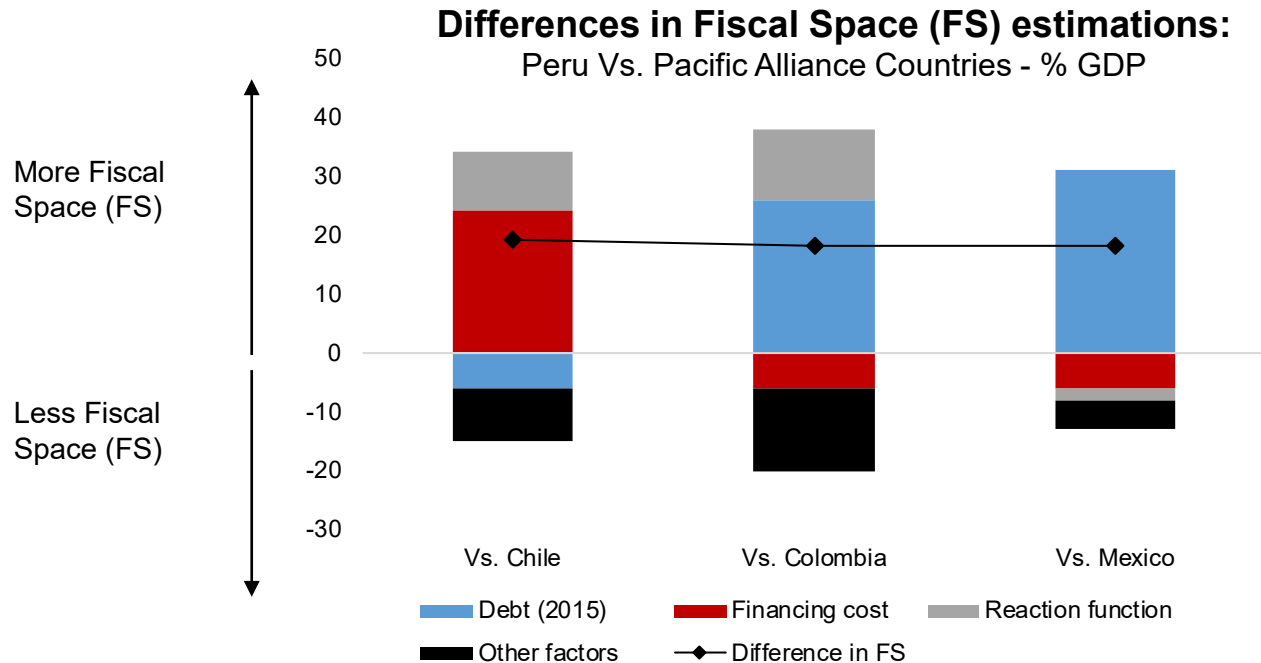
Positive Cov. 24
Negative Cov. 31

← Source of risk! →

Positive Cov. 33
Negative Cov. 22

- **Deterministic debt limit:** Only Expected Values matter.
- **Stochastic debt limit:** Expected Values but also Variance and Covariance Values matter.
- A **positive covariance** increases the effect of shocks, makes debt histograms wider and therefore reduces the **stochastic debt limit** and also the **fiscal space**.
- A negative covariance has the opposite effect.
- Can we compute the effect of these moments all together?

Results: counterfactual analysis



- **Variables that increase Fiscal Space in Peru:** FX depreciation (financing cost); Mineral prices (primary balance) with respect to Chile; and the current level of debt (just with respect to Mexico and Colombia).
- **Variables that reduce Fiscal Space in Peru:** The current level of debt, with respect to Chile.
- In this analysis, expected values, variances and covariances matter.

Conclusions:

- **Estimates of Stochastic Debt Limits:** between 5% and 89% of GDP in EME in 2016 (less than estimates for AE: 150%-200% in other papers).
 - **Estimates of Fiscal Space:** 11 countries have no fiscal space and the highest value is 18% of GDP in China.
 - **Richer framework:** Expected values, variances and covariances determine the level of Stochastic Debt Limit.
 - **Policy implications:** Fiscal Space estimates should be considered as fiscal buffers to be used only in extreme situations.
1. **In economic booms:** the debt ratio should be reduced (or kept in the stable equil.) to increase our Fiscal Space → Strengthens the capacity to implement Expansionary fiscal policy when is needed.
 2. **In economic crisis:** the cost of an economic recession could overcome the benefits of a sound fiscal stance → Expansionary fiscal policy is needed.

Our paper can be downloaded form this [link](#) or from the CF web page (www.cf.gob.pe)

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Appendix: estimated coefficients

1. Financing cost function:

Dependent variable: EMBI-G (Basic Points)	(1)	(2)	(3)	(4)
Debt (% of GDP) squared (Lagged)	0,12 *** (0,02)	0,17 *** (0,02)	0,17 *** (0,02)	0,17 *** (0,02)
R ²	0,4595	0,6691	0,7859	0,807
Number of control variables	3	4	5	8
Sample (TxN)	280	239	239	191
Countries (N)	26	21	21	19

Standard error in parenthesis. Significance levels: *10%, **5%; ***1%.

2. Fiscal reaction function:

Dependent variable: Primary balance (% of GDP)	(1)	(2)	(3)	(4)
Debt (% of GDP) (Lagged)	0,160 *** (0,03)	0,081 *** (0,03)	0,120 *** (0,04)	0,146 *** (0,03)
Debt (% of GDP) squared (Lagged)	-0,001 *** (0,00)	-0,0002 * (0,00)	-0,001 ** (0,00)	-0,001 *** (0,00)
R ² adj.	0,3	0,5	0,3	0,3
Number of control variables	3	4	4	4
Sample (TxN)	384	384	354	384
Countries (N)	26	26	26	26

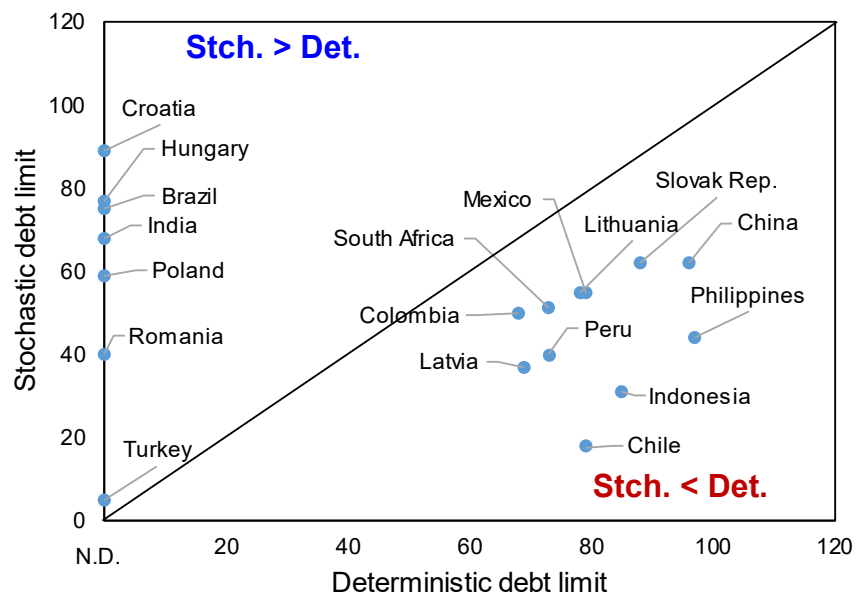
Standard error in parenthesis. Significance levels: *10%, **5%; ***1%.

Control variables:

- GDP gap and growth; FX; US Treasury Yield; VIX; Minerals and Energy prices (index); Gov. Exp.; among others.

Appendix: deterministic and stochastic debt limits in EME

Deterministic and stochastic debt limit
(% GDP)



Stochastic debt limit and 2015 debt ratios
(% GDP)

