Foreign Reserves, Fiscal Capacity, and Lender of Last Resort

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Build up in foreign reserves stock since the 90s

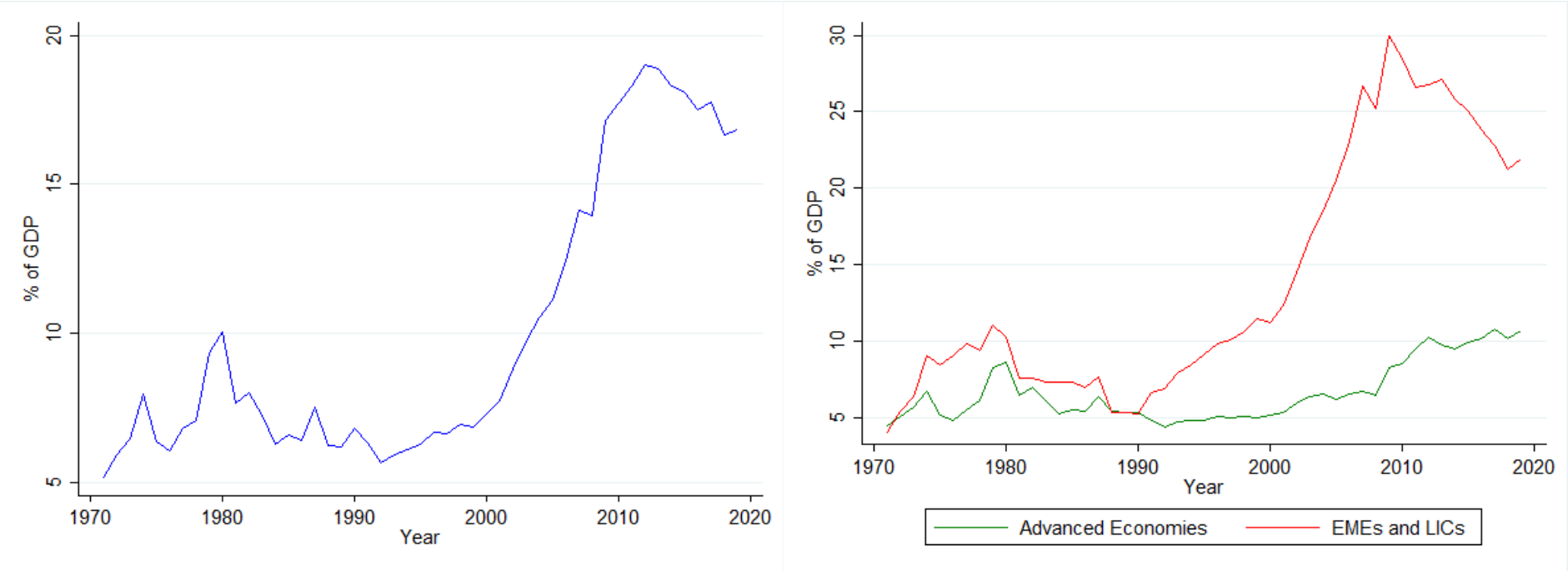

Figure: Official Foreign Reserves Holdings (% of GDP)

In this paper→ Precautionary role of reserves

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- ▷ Fiscal Capacity as a novel motive behind reserves accumulation
- ▷ Empirical supporting evidence - 98 countries (1991-2016)

Non-linear relationship Reserves and Fiscal Capacity

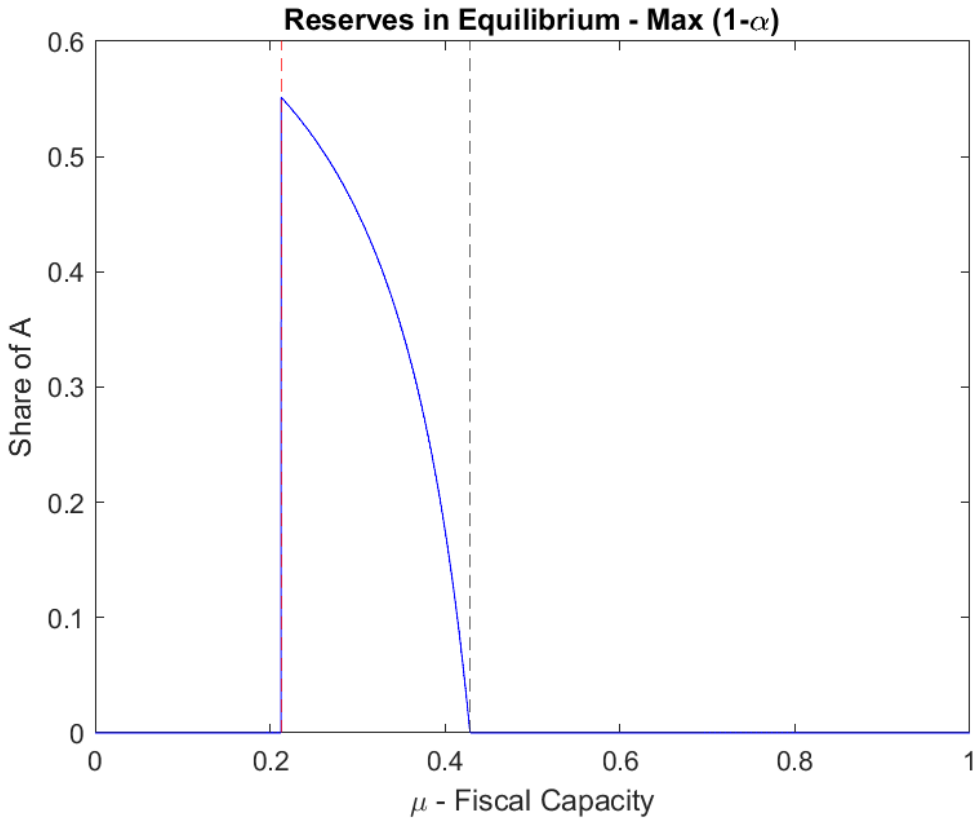

Figure: Foreign Reserves and Fiscal Capacity in Equilibrium

Sketch of Theoretical Framework

- Liquidity instrument $\rightarrow$ Liquidity literature (Holmström and Tirole, 1998) (Farhi and Tirole, 2012)
- *Small open economy* (SOE) borrows from international markets
- Global financial cycle drives international interest rates
- Financial Frictions
  - Wedge between total expected output and *pledgeable* expected output
- *High* international interest rates $\rightarrow$ *Sudden Stop* (SS) to this SOE
- Under SS: economy cannot finance production $\rightarrow$ domestic crisis

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▷ Why do *some* governments hoard liquidity in the form of reserves?

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  2. Crowding out Channel $\rightarrow$ As sovereign borrowing $\uparrow$, $\uparrow$ future taxes $\rightarrow \downarrow$ net pledgeable expected output to back up private borrowing

Summary of Theoretical Results

1. Governments *only* accumulate reserves if their fiscal capacity is *underdeveloped*
2. Governments with very low fiscal capacity $\rightarrow$ don't accumulate reserves (it is too costly)
3. Reserves $\rightarrow$ provide liquidity without *crowding out* private liquidity

Empirical Exercise

- Unbalanced sample of 98 countries between 1991-2016
- 29 AEs, 69 EMEs and LICs
- Data is publicly available: WDI, IFS, BIS, etc.

$$log(\frac{Res_{j,t}}{GDP_{j,t}}) = \beta_0 + \beta_1 log(\frac{IncTaxRev_{j,t-1}}{TotTaxRev_{j,t-1}}) + \beta_2 Z_{j,t-1} + \alpha_t + \varepsilon_{j,t} \quad (1)$$

- $log(\frac{IncTaxRev_{j,t-1}}{TotTaxRev_{j,t-1}}) \rightarrow$ Proxy for fiscal capacity ($\beta_1 < 0$)
- $Z_{j,t-1} \rightarrow$ Other motives for FX accumulation
  (Aizenman and Lee, 2007) (Obstfeld et al., 2010) (Ghosh et al., 2017)

Foreign Reserves and Fiscal Capacity - OLS Regression

	Whole Sample	EME	Pre-GFC	Post GFC	Balanced Panel	Euro Area
	(1)	(2)	(3)	(4)	(5)	(6)
Tax Revenue (% GDP, log)	-0.004	0.131	0.205	-0.428	0.413	2.081***
	(0.202)	(0.151)	(0.180)	(0.295)	(0.251)	(0.548)
Income Tax Revenue (% TR, log)	-0.161**	-0.146**	-0.175	-0.169**	-0.477***	-1.588**
	(0.081)	(0.064)	(0.108)	(0.081)	(0.114)	(0.503)
Observations	1681	1162	915	605	507	152
R^2	0.40	0.52	0.47	0.39	0.66	0.82
Countries	98	69	93	92	20	9

Note: *** p<0.01, ** p<0.05, * p<0.10. Standard errors in parenthesis. Observations clustered by country. Time fixed effects are not reported but are included in every regression.

Foreign Reserves, Fiscal Capacity and Original Sin - OLS

	Whole Sample	EME	Pre-GFC	Post GFC	Balanced Panel	Euro Area
	(1)	(2)	(3)	(4)	(5)	(6)
Original Sin Index (0-1)	1.617***	-1.150***	1.069**	2.076***	0.737	0.006
	(0.339)	(0.427)	(0.456)	(0.356)	(0.468)	(1.109)
Tax Revenue (% GDP, log)	-0.215	-0.108	-0.161	-0.414	0.809**	2.354***
	(0.238)	(0.213)	(0.258)	(0.276)	(0.383)	(0.544)
Income Tax Revenue (% TR, log)	-0.227***	-0.166**	-0.222**	-0.222**	-0.372***	-1.744***
	(0.085)	(0.074)	(0.103)	(0.087)	(0.129)	(0.396)
Observations	1029	606	397	505	312	144
R^2	0.54	0.56	0.62	0.53	0.67	0.84
Countries	84	55	69	80	20	9

Note: *** p<0.01, ** p<0.05, * p<0.10. Standard errors in parenthesis. Observations clustered by country. Time fixed effects are not reported but are included in every regression.

Challenge with Fixed Effects

$$log(\frac{Res_{j,t}}{GDP_{j,t}}) = \beta_0 + \beta_1 log(\frac{IncTaxRev_{j,t-1}}{TotTaxRev_{j,t-1}}) + \beta_2 Z_{j,t-1} + \alpha_j + \alpha_t + \varepsilon_{j,t} \quad (2)$$

- Non-linearity between reserves and fiscal capacity implies a challenge for fixed effects
- I classify country-year observation into 5 quintiles $\rightarrow$ fiscal capacity
- I run (2) whole-sample, then I exclude quintile 1, then quintile 1 and 2, so on.
- As I exclude lower quintiles, I expect $|\beta_1|$ to be larger and $\beta_1 < 0$.

Foreign Reserves, Fiscal Capacity - Fixed Effects

	Country Fixed Effects				
	(1)	(2)	(3)	(4)	(5)
	Q1-Q5	Q2-Q5	Q3-Q5	Q4-Q5	Q5
Tax Revenue (% GDP, log)	0.274***	0.509***	0.553***	0.210	0.358
	(0.084)	(0.121)	(0.146)	(0.160)	(0.239)
Income Tax Revenue (% TR, log)	-0.005	-0.076	-0.508***	-0.549***	0.631**
	(0.044)	(0.082)	(0.121)	(0.139)	(0.315)
Observations	1681	1344	1008	672	336
R2	0.24	0.19	0.24	0.34	0.06
R2-Between	0.23	0.14	0.11	0.28	0.06
R2-Within	0.23	0.23	0.28	0.42	0.48
Countries	98	90	78	56	35
Avg. Obs per country	17	15	13	12	10

Note: *** p<0.01, ** p<0.05, * p<0.10. Standard errors in parenthesis. Sample divided in quintiles according to fiscal capacity. Columns (1) and (6) are the results for the whole sample (1-5), Columns (2) and (7) for quantiles 2 to 5, Columns (3) and (8) for quantiles 3 to 5, Columns (4) and (9) for quantiles 4 and 5, and Columns (5) and (10) for quantile 5

Relation to the literature

1. Novel motive for foreign reserves accumulation:
   - Sudden Stops and Capital Outflows: Aizenman and Lee (2007); Obstfeld et al. (2010); Jeanne and Ranciere (2011)
   - Currency Mismatch: Chang and Velasco (2001); Eichengreen et al. (2003); International Monetary Fund (2011); Bocola and Lorenzoni (2020)
   - Sovereign Default: Alfaro and Kanczuk (2009); Bianchi et al. (2018)
   - Financial Frictions: Dominguez (2009); Céspedes and Chang (2019)
2. Fiscal Capacity to liquidity literature: Holmström and Tirole (1998) Farhi and Tirole (2012) Tirole (2011)
3. Fiscal Space and Crowding Out channels: Tirole (2002) Calvo (2016)

Policy Takeaways

- Links fiscal capacity with resilience to global shocks
- Domestic Perspective
  - Fiscal capacity $\neq$ Fiscal sustainability/space
  - Countries should not shy away from strengthening institutions for tax compliance
- Global Perspective
  - Low fiscal capacity$\rightarrow$ choice between reserves or sudden stops
  - Both options carry costs for international monetary system
  - International Financial Assistance – How should resources be used?

Thank you!

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