Foreign Reserves and Capital Controls: Role of Financial Development

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August 27, 2024

EEA-ESEM at Erasmus University

Introduction

- Financial globalization $\rightarrow$ Countries are more subject to external shocks.
- Capital controls and foreign reserves as stabilization policy tools.
- Data: wide cross-country variation in these two policies.
- Questions:
  - Why do countries use both capital controls and foreign reserves?
  - What explains the cross-country variation in these two policies?

This Paper

- Empirical facts about cross-country variation:
  - Foreign reserve-to-GDP ratio is **non-monotonic** in financial development:
    Countries with **intermediate** development have high reserve-to-GDP ratio.
  - Capital control index **monotonically decreases** in financial development index.
- Small-open-economy model:
  - Size of rollover risk (proxy for financial development)
    $\rightarrow$ Explains the cross-country pattern of reserves and capital controls.

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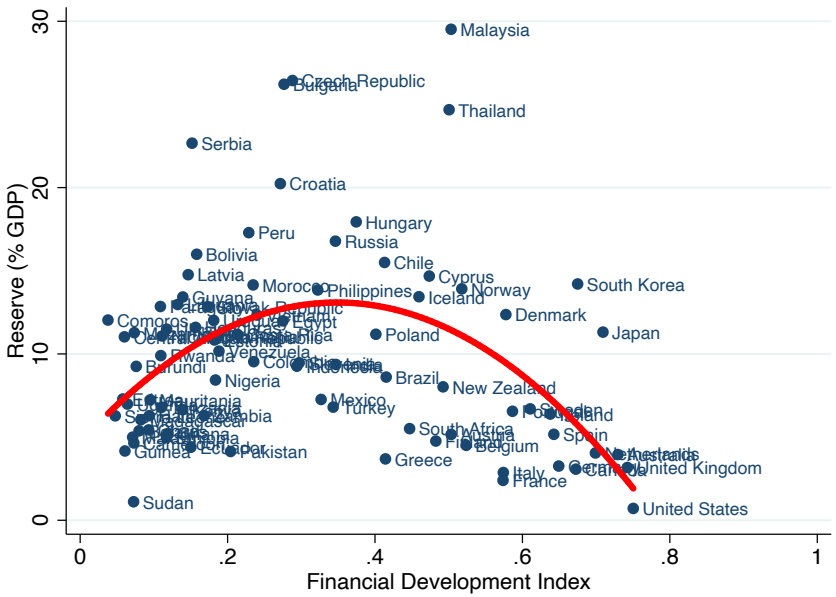
Literature

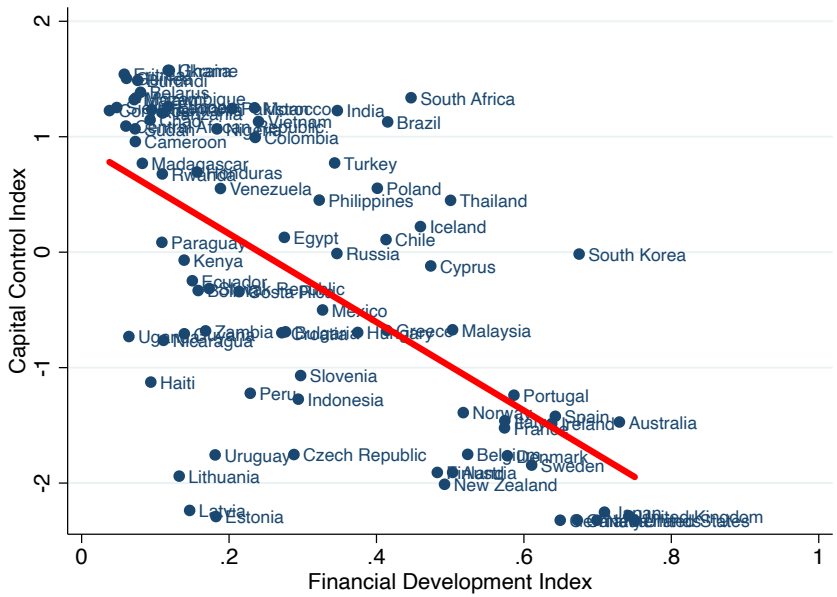
- Capital controls: Bianchi (2011), Benigno et al. (2013), Benigno et al. (2016), Bianchi and Mendoza (2018), Jeanne and Korinek (2020), Ma (2020).
- Foreign reserves: Jeanne and Rancière (2011), Hur and Kondo (2016), Cavallino (2019), Céspedes and Chang (2020), Bianchi and Sosa-Padilla (2020), Bocola and Lorenzoni (2020), Jeanne and Sandri (2020), Shousha (2021), Matsumoto (2022).
- Substitutes: Arce et al. (2019), Davis et al. (2021a), Davis et al. (2021b), Fanelli and Straub (2021).
- Combination: Amador et al. (2017), Lutz and Zessner-Spitzenberg (2022).
- Contribution of our work:
  - Explain observed **cross-country pattern** in policy and financial development.

Empirical Facts

Reserve-to-GDP Ratio and Capital Controls

- 85 countries, average over 1980-2019. Similar results for each decade.
- Financial development: IMF Financial Development Index.
- Capital control index: Chinn-Ito Index.





Regressions

	Reserve/GDP		Capital Control Index	
	(1)	(2)	(3)	(4)
Financial Development	0.48***	0.43***	-3.83***	-3.78***
	(0.12)	(0.12)	(0.52)	(0.44)
Financial Development^2	-0.69***	-0.62***		
	(0.15)	(0.16)		
Pop (log)		-0.00		0.09
		(0.01)		(0.09)
GDP per capita (log)		-0.01		-0.57***
		(0.01)		(0.13)
Private credit		0.03		0.39
		(0.02)		(0.40)
Trade		0.05***		-0.01
		(0.02)		(0.32)
Observations	85	85	83	83

Model

Firm-Households

- Utility function:

$$\mathbb{E}_0 \left[\sum_{t=0}^{\infty} \beta^t \ln(c_t) \right]$$

- Budget constraint:

$$c_t + \frac{b_t}{R_t} + \frac{s_t}{R^s} + z_t = a_t + b_{t-1} + s_{t-1} + q_t a_t^{\ell}$$

  - b_t: foreign bond (negative b_t is borrowing).
  - s_t: reserve holdings.
  - z_t: investment to accumulate productive assets.
  - a_t: productive assets and output, $y_t = a_t$. Accumulates through z_t.
  - $q_t a_t^{\ell}$: proceeds from asset liquidation (next page).

Liquidity Shock and Asset Liquidation

- At the beginning of each period, liquidity shock may hit the economy.
  - Need to repay θ fraction of debt b_{t-1} before new borrowing and production.
  - θ: size of roll-over risk. Proxy for the measure of financial development.
- Households repay debt $-\theta b_{t-1}$ by
  - Reserve holdings s_{t-1}.
  - Liquidating a_t^ℓ units of asset to obtain liquidity $q_t a_t^\ell$.
- Liquidation a_t^ℓ needs to cover the liquidity shortage $-\theta b_{t-1} - s_{t-1}$:

$$q_t a_t^\ell \geq -\theta b_{t-1} - s_{t-1}$$

  - Downward-sloping demand for a_t^ℓ from foreign buyers.
  - q_t declines in aggregate $a_t^\ell \rightarrow$ Fire-sale externality.

detail

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Cost and Benefit of Reserve Holdings

- Combining the Euler equations regarding b_t and s_t: FOCs

$$\beta(R_t - R^s)\mathbb{E}_t[u'(c_{t+1})] = \beta\mathbb{E}_t[(R^s - R_t\theta)\psi_{t+1}] + \nu_t$$

- LHS: opportunity cost of holding reserves due to the interest gap $R_t > R^s$.
- RHS: reserves have **liquidity advantage** over debt.
  - ψ_{t+1}: benefit of reducing liquidity shortage and asset fire-sale at $t+1$.
  - If $R^s > R_t\theta$, HHs can lower liquidity shortage $-\theta b_t - s_t$ by borrowing debt and accumulating reserves.
- Households choose b_t and s_t to equalize cost and benefit of holding reserves.

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Non-Monotonic Relation between θ and Reserves

$$\beta(R_t - R^s)\mathbb{E}_t[u'(c_{t+1})] = \beta\mathbb{E}_t[(R^s - R_t\theta)\psi_{t+1}] + \nu_t$$

Proposition 1

If $\theta = 0$, households do not hold reserves, $s_t = 0$.

$\theta = 0$ implies $\psi_{t+1} = 0$ for any states. No liquidity risk.

Proposition 2

If $\theta \geq R^s / R_t$, households do not hold reserves, $s_t = 0$.

No liquidity advantage of reserves.

- Intermediate $\theta \rightarrow$ Both liquidity risk and advantage are relatively high.

  $\rightarrow$ Reserve holdings become large.

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Social Planner's Solution

detail

- Social planner internalizes that q_t is decreasing in a_t^ℓ.
- Planner chooses b_t and s_t by internalizing the fire-sale externality.
  - Liquidity shortage $-\theta b_t - s_t$ is lower.
  - Fire-sale a_t^ℓ is lower, and liquidation price q_t is higher.
- Planner's allocation can be achieved by tax on debt and either of tax
  - subsidy on reserves, or
  - public reserve holdings with no private reserves.
- $\partial \tau_t^b / \partial \theta > 0$ can be analytically shown in a simplified two-period model.

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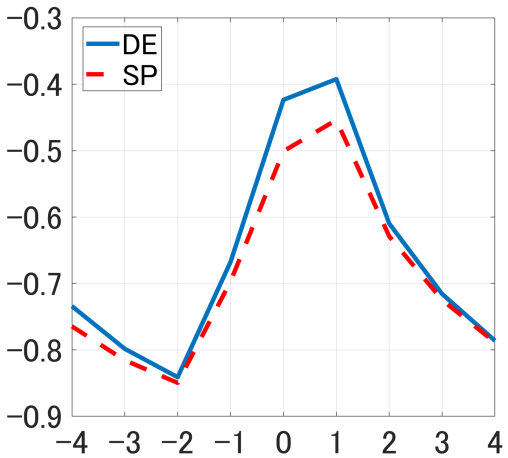
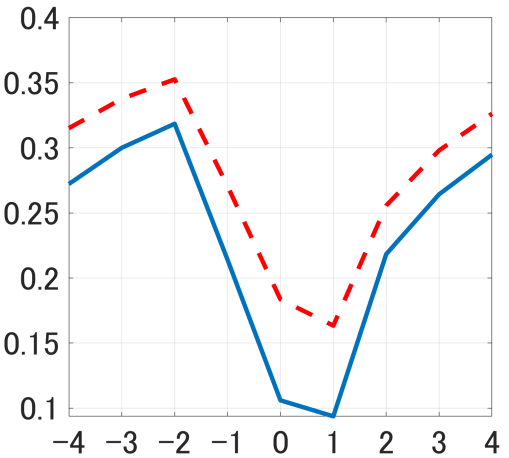
Quantitative Analysis

Crisis Dynamics under DE and SP ($\theta = 0.45$)

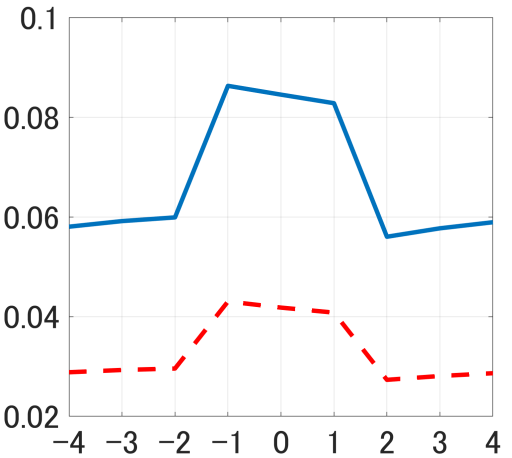
parameters



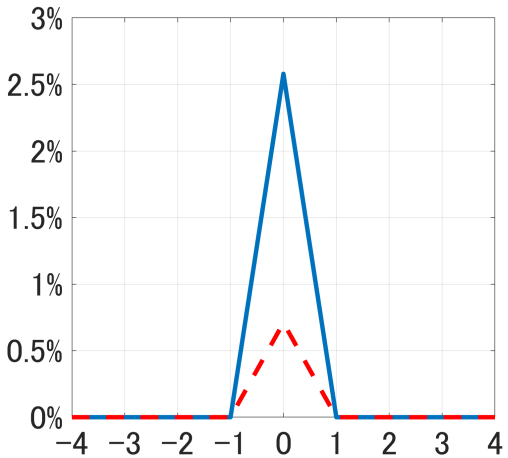
Debt-to-GDP



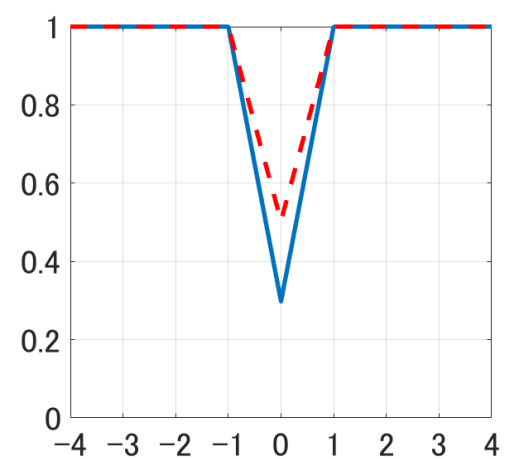
Reserve-to-GDP



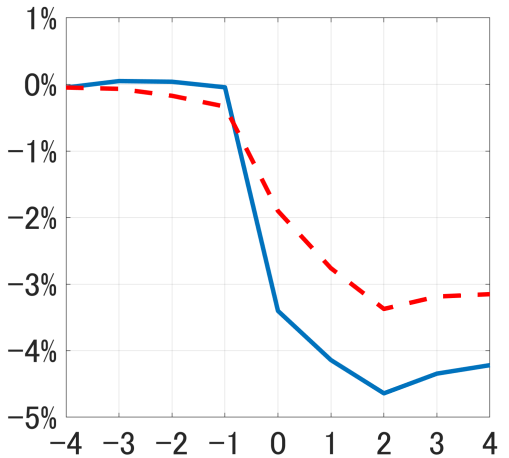
Liquidity risk $-\theta b_t - s_t$



Liquidated assets



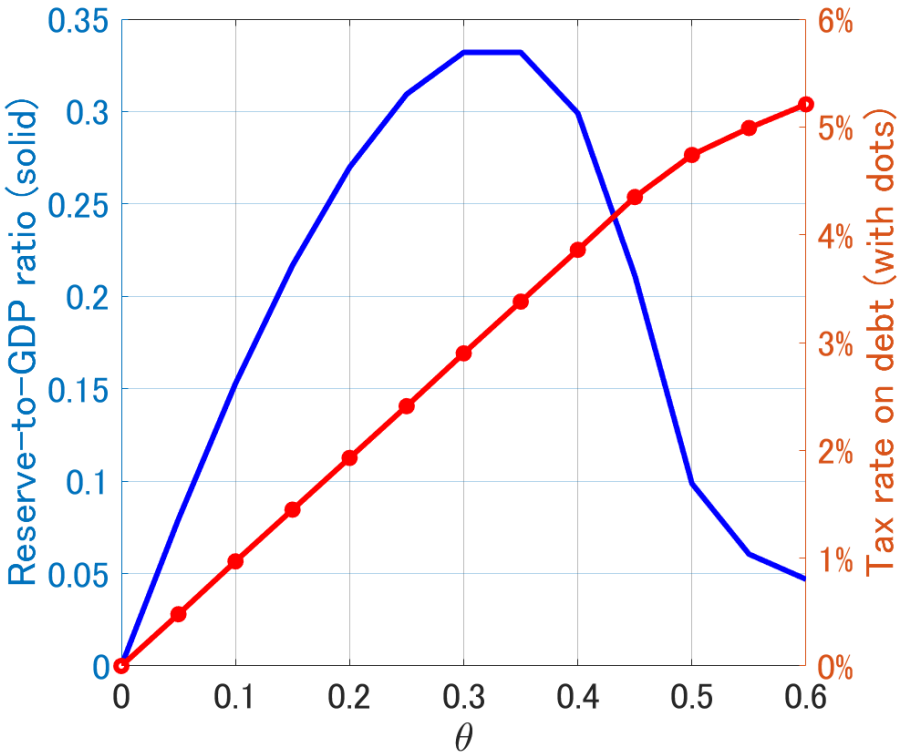
Fire-sale price

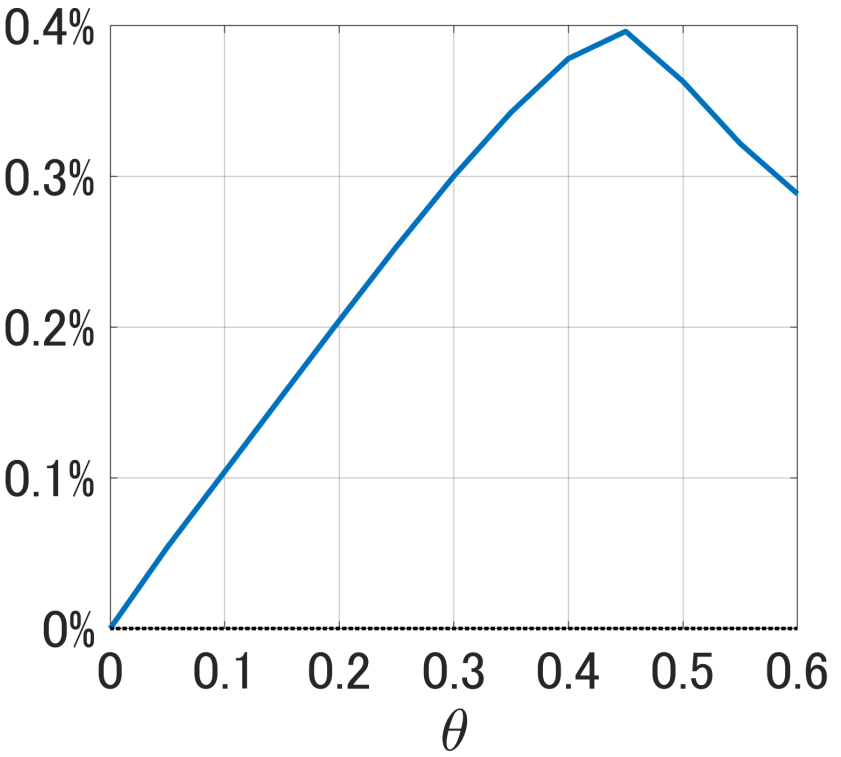


Output

Optimal Policies across Different θ

- Reserve-to-GDP is non-monotonic and peaks at 33% when $\theta = 0.30$.
- Capital controls monotonically increase in θ.
- Expected welfare gain: 0.4% higher permanent consumption when $\theta = 0.45$.





Conclusion

- Empirical facts on cross-country patterns of reserves and capital controls:
  - Reserve-to-GDP ratio is non-monotonic in financial development.
  - Capital controls monotonically decrease with financial development.
- Small-open-economy model with liquidity shock:
  - Reserve holdings are determined by two factors:

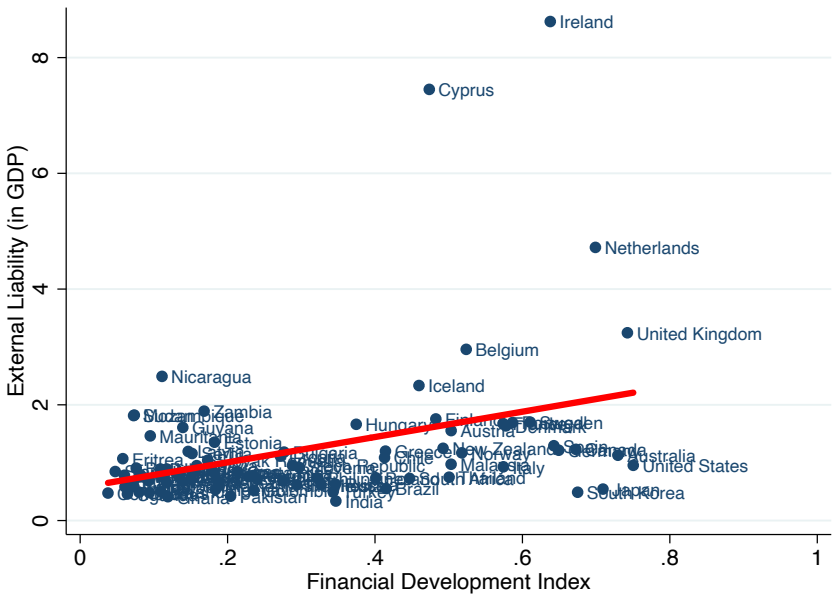
    Opportunity cost and liquidity advantage of reserves.
  - Fire-sale externality justifies joint use of capital controls and reserve policy.
- Model can explain the cross-country patterns of capital controls and reserves.

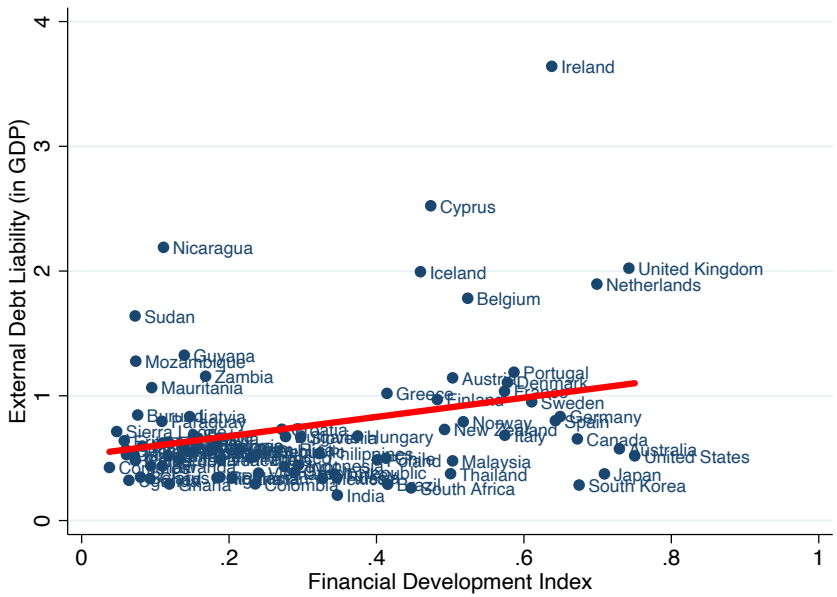
Appendix

External Liability and External Debt Liability

back

- Positive correlation between financial development and external liability.





Panel Regressions

back

	Reserve/GDP		Capital Control Index		External Liability/GDP		External Debt Liability/GDP	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Financial Development	0.78***	0.91***	-0.56***	-0.24**	0.89***	0.50**	0.64***	0.63***
	(0.15)	(0.24)	(0.08)	(0.11)	(0.11)	(0.21)	(0.10)	(0.22)
Financial Development^2	-0.22***	-0.23***						
	(0.07)	(0.09)						
GDP per capita (log)		-0.16		-0.28		-0.87***		-0.81***
		(0.35)		(0.26)		(0.32)		(0.29)
Trade (% GDP)		0.18		-0.24**		0.24***		0.08
		(0.13)		(0.09)		(0.08)		(0.11)
Institutional Quality		0.20		-0.55**		-0.39*		-0.26
		(0.26)		(0.21)		(0.21)		(0.25)
Peg		-0.06		0.00		-0.02		0.02
		(0.15)		(0.08)		(0.07)		(0.08)
CA (% GDP)		0.07		-0.02		-0.03		0.01
		(0.04)		(0.02)		(0.04)		(0.04)
Constant	0.16**	0.29**	0.04***	-0.04	-0.08***	0.16*	-0.08***	-0.01
	(0.06)	(0.14)	(0.01)	(0.07)	(0.01)	(0.10)	(0.01)	(0.08)
Year FE	N	Y	N	Y	N	Y	N	Y
Country FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	3212	1853	3141	1852	3137	1819	3138	1813
Adjusted R^2	0.480	0.681	0.685	0.869	0.533	0.747	0.504	0.697

Joint Dynamics of Debt and Reserves

back

Dep. Variables	Capital flows (% GDP)				Reserve flows (% GDP)	
	(1)	(2)	(3)	(4)	(5)	(6)
Reserve flows	0.57***	0.56**				
	(0.19)	(0.21)				
EMBI spread			-0.30***	-0.20***	-0.05**	-0.06**
			(0.09)	(0.07)	(0.02)	(0.03)
Population		13.76*		46.29**		2.10
		(7.01)		(19.22)		(4.94)
GDP per capita		7.33**		15.05***		-0.06
		(3.00)		(4.97)		(0.93)
Trade		-0.41		8.75*		5.97**
		(2.99)		(4.97)		(2.42)
Private credit		4.23		-7.83		-7.76***
		(3.23)		(7.92)		(2.68)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1269	961	663	574	664	575
Adjusted R^2	0.143	0.183	0.202	0.250	0.112	0.150

Asset Liquidation Price

back

- Foreign buyers produce tradable goods using a_t^ℓ and a_t^*:

$$\pi_t^* = \max_{a_t^\ell} (a_t^*)^\zeta (a_t^\ell)^{1-\zeta} - q_t a_t^\ell$$

  - a_t^* grows at a fixed rate $1 + \bar{g}$.

- FOC determines the asset liquidation price q_t:

$$q_t = (1-\zeta) \left(\frac{a_t^*}{a_t^\ell} \right)^\zeta$$

  - Liquidation price q_t declines as aggregate liquidation a_t^ℓ increases.

    But individual households take q_t as given $\rightarrow$ Fire-sale externality.

Maximization Problem

back

- Households' maximization problem, taking q_t as given:

$$
\begin{aligned}
& V(b_{t-1}, s_{t-1}, z_{t-1}, a_{t-1}; \Theta_t, a^*_{t-1}) \\
&= \max_{c_t, b_t, s_t, z_t, a^\ell_t, a_t} u(c_t) + \beta \mathbb{E}_t V(b_t, s_t, z_t, a_t; \Theta_{t+1}, a^*_t) \\
&- \lambda_t \left[c_t + \frac{b_t}{R_t} + \frac{s_t}{R^s} + z_t - a_t - b_{t-1} - s_{t-1} - q_t a^\ell_t \right] \\
&- \xi_t \left[a_t - a_{t-1} - \eta z^\gamma_{t-1} \left[(1-\kappa) a_{t-1} + \kappa a^*_{t-1} \right]^{1-\gamma} + a^\ell_t \right] \\
&+ \psi_t \left[q_t a^\ell_t + \theta_t b_{t-1} + s_{t-1} \right] \\
&+ \varphi_t q_t a^\ell_t \\
&+ \nu_t \frac{s_t}{R^s}
\end{aligned}
$$

  - $\theta_t = \{0, \theta\}$ is a liquidity shock.
  - Non-negativity constraints on liquidation a^ℓ_t and reserves s_t.

Firsr-Order Conditions by Households

back

$$u'(c_t) = \beta \frac{R_t}{1 + \psi_b \exp\left(-\frac{b_t}{a_t} - \bar{b}\right) \frac{b_t / a_t}{R_t}} \mathbb{E}_t \left[u'(c_{t+1}) + \psi_{t+1}\theta_{t+1}\right]$$

$$u'(c_t) = \beta R^s \mathbb{E}_t \left[u'(c_{t+1}) + \psi_{t+1}\right] + \nu_t$$

$$u'(c_t) = \beta \mathbb{E}_t \left[\xi_{t+1}\eta\gamma \left(\frac{z_t}{(1-\kappa)a_t + \kappa a_t^*}\right)^{\gamma-1}\right]$$

$$\xi_t = u'(c_t)\left[1 + \left(\frac{b_t / a_t}{R_t}\right)^2 \psi_b \exp\left(-\frac{b_t}{a_t} - \bar{b}\right)\right]$$

$$+ \beta \mathbb{E}_t \left[\xi_{t+1}\left\{\phi + \eta(1-\gamma)(1-\kappa)\left(\frac{z_t}{(1-\kappa)a_t + \kappa a_t^*}\right)^{\gamma}\right\}\right]$$

$$\psi_t + \varphi_t = \frac{\xi_t}{q_t} - u'(c_t)$$

First-Order Conditions w.r.t. Liquidation a_t^ℓ

back

$$a_t^\ell : \psi_t + \varphi_t = \frac{\xi_t}{q_t} - u'(c_t)$$

- When $a_t^\ell > 0$, liquidity constraint binds. $\psi_t > 0$ and $\varphi_t = 0$.
- When $a_t^\ell = 0$, non-negativity constraint binds. $\psi_t = 0$ and $\varphi_t > 0$.
- ψ_t: *private* value of one unit of liquidity when the liquidity constraint binds:
  - One unit of liquidity reduces liquidity shortage $-\theta b_{t-1} - s_{t-1}$ by one unit.
  - One unit of liquidity reduces liquidation by $1/q_t$ units, whose value is ξ_t/q_t.
  - It also reduces available resource by one unit, whose value is $-u'(c_t)$.

First-Order Conditions back

- First-order conditions:

$$a_t^\ell : \psi_t = \frac{\xi_t}{q_t} - u'(c_t)$$

$$b_t : u'(c_t) = \beta R_t \mathbb{E}_t \left[u'(c_{t+1}) + \psi_{t+1}\theta \right]$$

$$s_t : u'(c_t) = \beta R^s \mathbb{E}_t \left[u'(c_{t+1}) + \psi_{t+1} \right] + \nu_t$$

- ψ_t: *Private* value of liquidity when there is a liquidity shortage and $a_t^\ell > 0$.

  One unit of liquidity $\rightarrow 1/q_t$-unit reduction in asset liquidation.

- HHs can reduce liquidity shortage $-\theta b_t - s_t$.
  - Reducing debt $-b_t \rightarrow$ Reduce liquidity shortage by $R_t\theta$ units at $t+1$.
  - Increasing reserve $s_t \rightarrow$ Reduce liquidity shortage by R^s units at $t+1$.

Social Planner's Problem

back

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\begin{aligned}
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&= \max_{c_t, b_t, s_t, z_t, a^\ell_t, a_t} u(c_t) + \beta \mathbb{E}_t V(b_t, s_t, z_t, a_t; \Theta_{t+1}, a^*_t) \\
&- \lambda_t \left[c_t + \frac{b_t}{R_t} + \frac{s_t}{R^s} + z_t - a_t - b_{t-1} - s_{t-1} - q(a^\ell_t; a^*_t) a^\ell_t \right] \\
&- \xi_t \left[a_t - a_{t-1} - \eta (z_{t-1})^\gamma (a_{t-1} + \kappa (a^*_{t-1} - a_{t-1}))^{1-\gamma} + a^\ell_t \right] \\
&+ \psi^{SP}_t \left[q(a^\ell_t; a^*_t) a^\ell_t + \theta_t b_{t-1} + s_{t-1} \right] \\
&+ \varphi^{SP}_t q(a^\ell_t; a^*_t) a^\ell_t \\
&+ \nu_t \frac{s_t}{R^s}
\end{aligned}
$$

Social Planner's Solution

back

- Social planner internalizes that q_t is decreasing in a_t^ℓ.
- *Social* value of liquidity when there is a liquidity shortage:

$$\psi_t^{SP} = \frac{\xi_t}{q_t - \zeta q_t} - u'(c_t)$$

  - $(\partial q_t / \partial a_t^\ell) a_t^\ell = -\zeta q_t < 0$ is the fire-sale externality.
  - $\psi_{t+1}^{SP} > \psi_{t+1}$ implies households **overborrow** and hold **too little reserves**.
- Planner's allocation can be achieved by tax on debt and either of

tax

  - subsidy on reserves, or
  - public reserve holdings with no private reserves.

Social Planner's Euler Equations

back

- Planner's Euler equations:

$$u'(c_t) = \beta R_t \mathbb{E}_t \left[u'(c_{t+1}) + \psi^{SP}_{t+1} \theta_{t+1} \right]$$

$$u'(c_t) = \beta R^s \mathbb{E}_t \left[u'(c_{t+1}) + \psi^{SP}_{t+1} \right] + \nu_t$$

- $\psi^{SP}_{t+1} > \psi_{t+1}$ implies households overborrow and hold too little reserves.
- Planner's allocation can be achieved by tax on debt and either of:
  - subsidy on reserves, or
  - public reserve holdings with no private reserves.
- Propositions 1, 2, 3 hold under the planner's solution.
- $\partial \tau^b_t / \partial \theta > 0$ can be analytically shown in a simplified two-period model.

Tax on Debt

back

- Tax on debt:

$$u'(c_t) = \beta(1+\tau_t^b)R_t\mathbb{E}_t\left[u'(c_{t+1}) + \psi_{t+1}\theta_{t+1}\right]$$

with

$$1+\tau_t^b = \frac{\mathbb{E}_t\left[u'(c_{t+1}) + \psi_{t+1}^{SP}\theta_{t+1}\right]}{\mathbb{E}_t\left[u'(c_{t+1}) + \psi_{t+1}\theta_{t+1}\right]}$$

- $\partial\tau_t^b/\partial\theta > 0$ can be shown in a simplified two-period model.
  - As θ becomes higher, the size of liquidation a_t^ℓ becomes larger and q_t lowers.
  - Lower q_t increases the value of liquidity ψ_t and ψ_t^{SP}.
  - Internalizing effect of a_t^ℓ on q_t, ψ_t^{SP} increases proportionally more than ψ_t.

Externally Determined Parameter Values

back

- One period is one year. Utility function is $u(c_t) = \ln(c_t)$.

Parameter		Value	Source
β	Discount factor	0.91	Bianchi (2011)
R^b	Gross interest rate on debt	1.06	Standard
R^s	Gross interest rate on reserves	1	Standard
γ	Investment curvature	0.8	Comin and Gertler (2006)
$\bar{g}$	Foreign growth rate	0.0261	Data
ε^R	Interest rate shock	0.0196	Mendoza (2010)

- Three-state Markov process for shocks:
  - $(\varepsilon_t^R, \theta_t) = \{(\varepsilon^R, 0), (-\varepsilon^R, 0), (\varepsilon^R, \theta)\}$
  - In normal times, ε_t^R stays/changes with 54%/36%, and liquidity shock 10%.
  - In liquidity crisis, $(\varepsilon^R, 0)$ with 90%, and (ε^R, θ) with 10%.

Calibrated Parameter Values

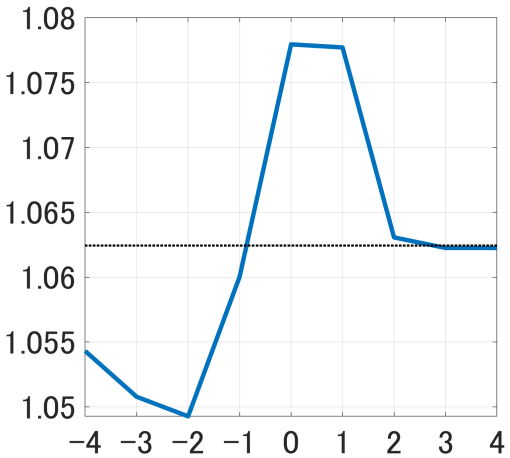
back

Parameter		Value	Target		Model
η	Investment efficiency	0.1085	Mean CA-to-GDP	-0.017	-0.017
κ	Productivity spillover	0.25	Fire-sale price/normal price	0.37	0.36
ζ	Share of foreign assets	0.46	Elasticity of fire-sale price	1.74	1.87
ψ_b	Debt-elasticity of spread	0.01	S.D. of CA-to-GDP	0.063	0.064
$\bar{b}$	Baseline debt-to-GDP	0.8	Mean debt-to-GDP	0.53	0.53
θ	Size of liquidity shock	0.45	Mean reserve-to-GDP	0.17	0.17

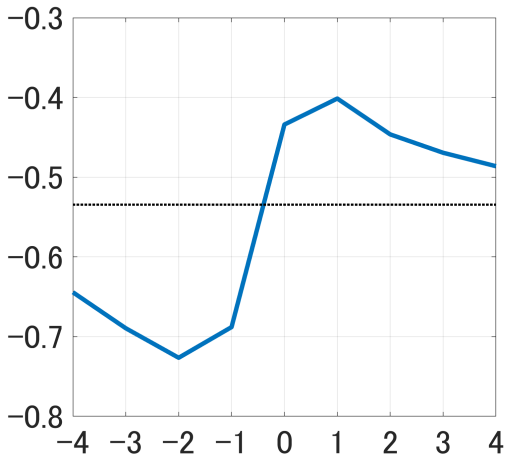
- Fire-sale price and elasticity are based on Aguiar and Gopinath (2005).
- Other moments are average of 47 emerging economies in 1987-2019.
- Baseline parameter is $\theta = 0.45$. Later study how the value of θ affects policy.

Crisis Dynamics in Decentralized Economy

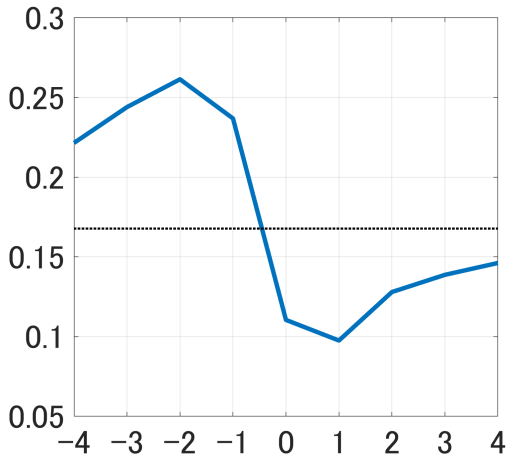
back



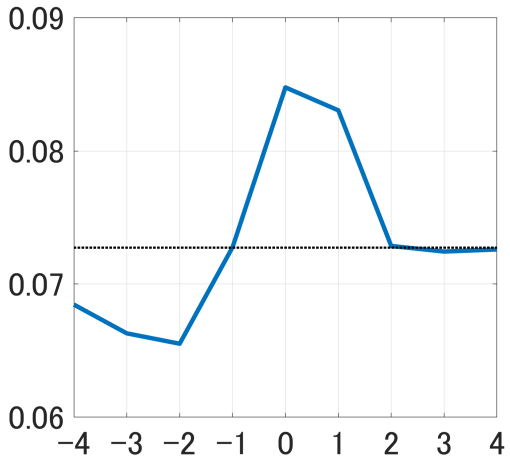
Interest rate



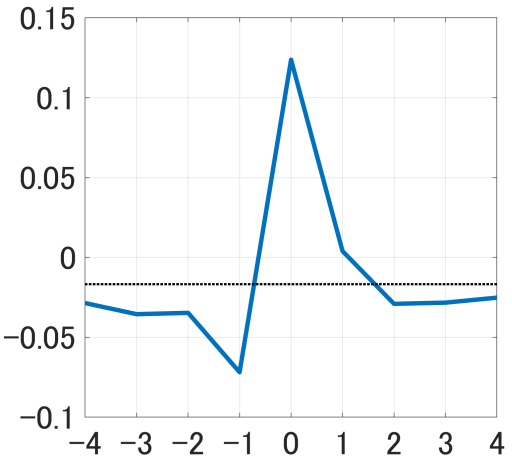
Debt-to-GDP



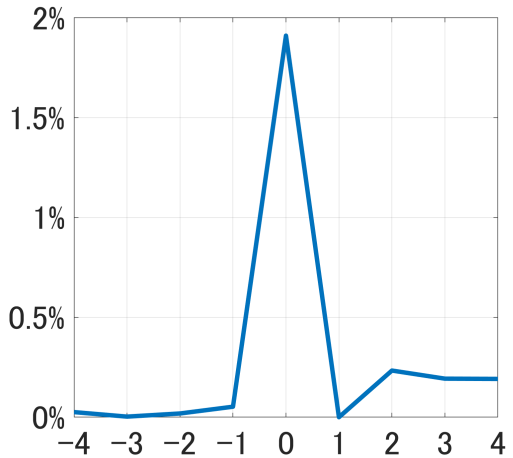
Reserve-to-GDP



Liquidity risk



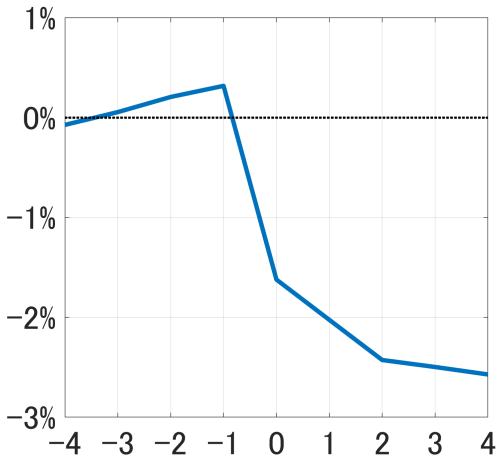
Current account-to-GDP



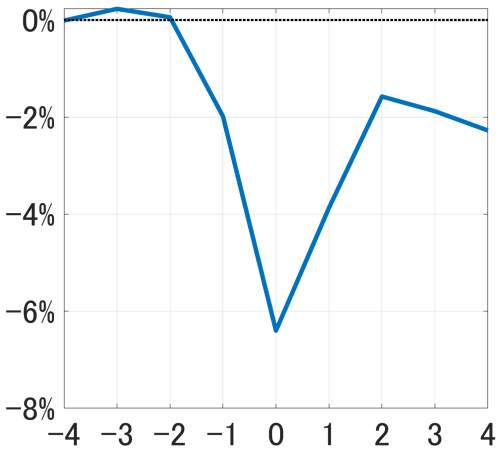
Liquidated assets

Crisis Dynamics in Decentralized Economy

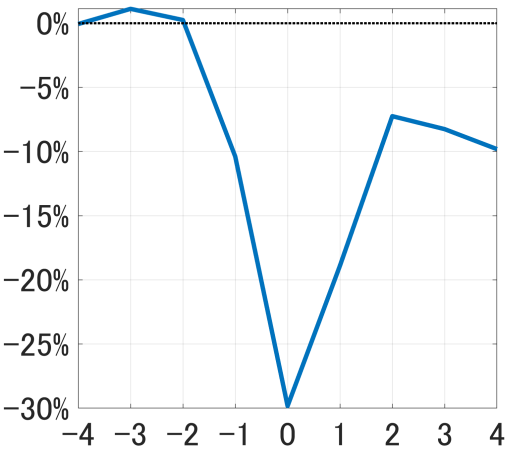
- Percentage deviations from pre-crisis 10-period log-linear trend.
- Persistent impacts are consistent with the empirical regularities of crises.



Output



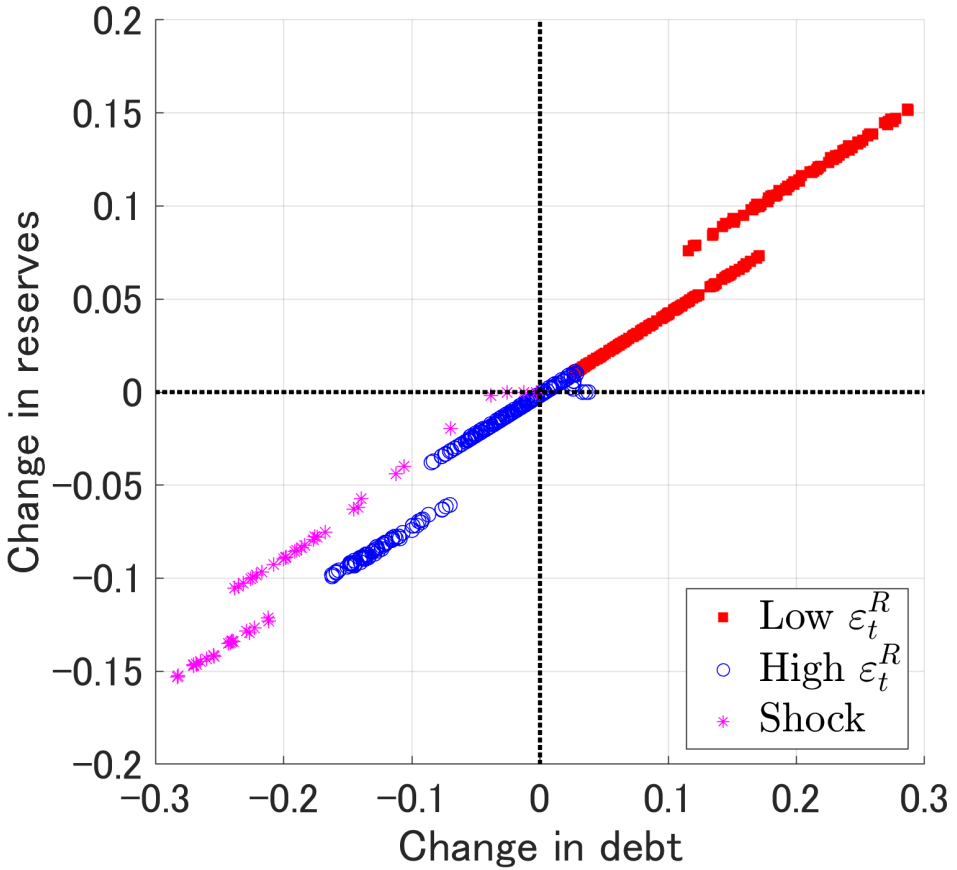
Consumption



Investment

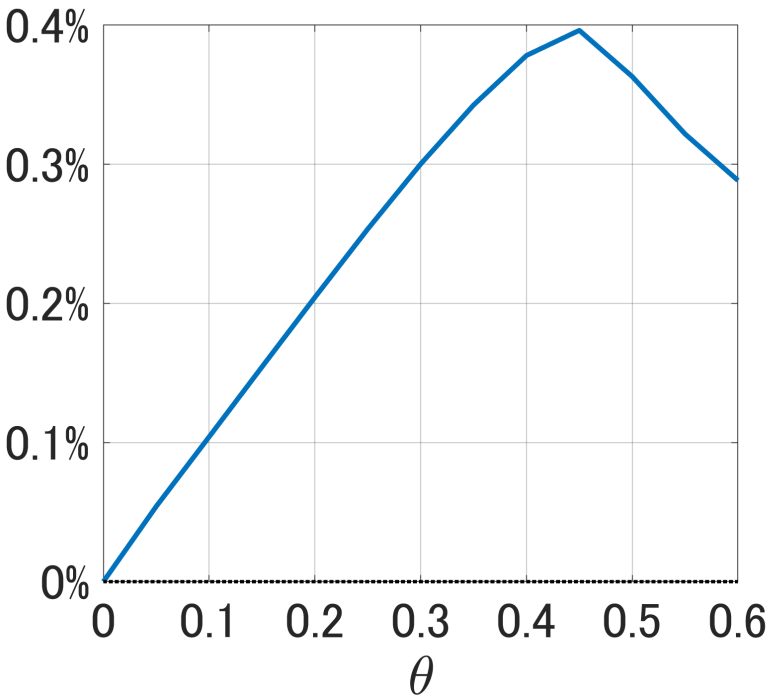
Business Cycle Correlations of Debt and Reserves

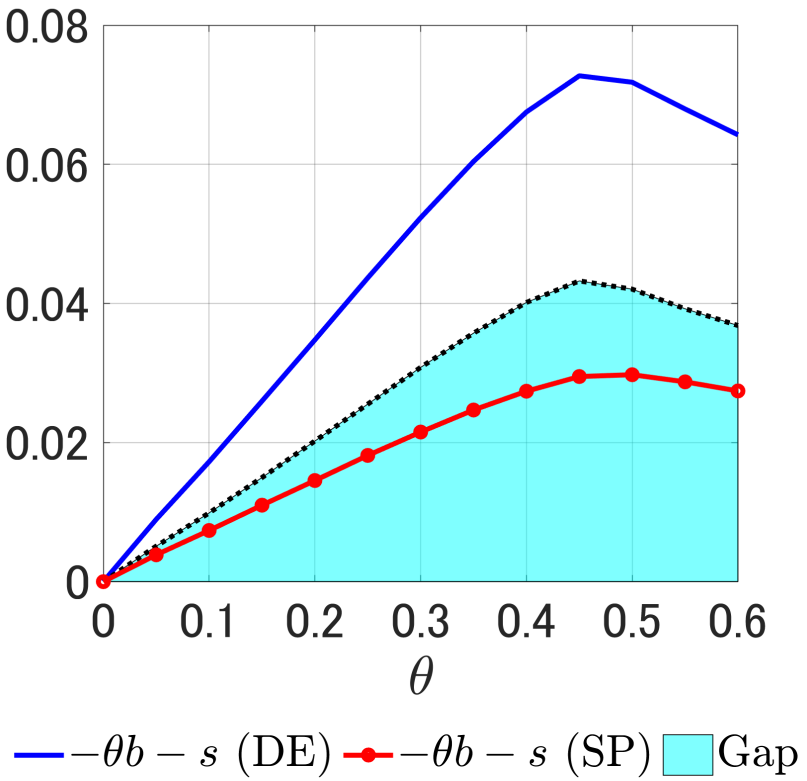
- Positive correlation between debt and reserve flows.
- Low interest rate $\rightarrow$ High debt and low opportunity cost $\rightarrow$ High reserves.



Welfare Gains across Different θ

- Expected welfare gain is the largest at 0.4% when $\theta = 0.45$.
- Excessive risk taking in decentralized economy peaks when $\theta = 0.45$.





Model with Endogenous Maturity Choice

- Endogenize θ as a choice of maturity composition:
  - θ_t: Share of short-term debt that is subject to liquidity shock.
- New assumption on the interest rate:
  - Short-term interest rate R_t is the same as the baseline model.
  - Long-term interest rate R_t^L is increasing in the share of long-term debt:

$$R_t^L = R_t + \Gamma(1-\theta_t)^2$$

- Low (high) Γ is high (low) financial development:
  - Broner et al. (2013) show that emerging economies pay higher risk premium on long-term bonds than on short-term bonds.
  - Empirical evidence on cross-country correlations across financial development, maturity, and interest rate. Qian and Strahan (2007), Bae and Goyal (2009).

Model Modifications and First-Order Conditions

- Households' budget constraint is now:

$$c_t + \frac{\theta_t b_t}{R_t} + \frac{(1-\theta_t) b_t}{R_t^L} + \frac{s_t}{R^s} + z_t = a_t + b_{t-1} + s_{t-1} + q_t a_t^\ell$$

- First-order conditions regarding b_t and θ_t:

$$b_t\text{: } u_c(t)\left[\frac{\theta_t}{R_t} + \frac{1-\theta_t}{R_t^L}\right] = \beta \mathbb{E}_t\left[u_c(t+1) + \psi_{t+1}\theta_t\right]$$

$$\theta_t\text{: } u_c(t)\left[\frac{1}{R_t} - \frac{1}{R_t^L} - (1-\theta_t)\frac{1}{(R_t^L)^2}\frac{\partial R_t^L}{\partial \theta_t}\right] = \beta \mathbb{E}_t\left[\psi_{t+1}\right]$$

  - LHS: Increasing θ_t lowers the average interest rate and R_t^L.
  - RHS: Increasing θ_t increases the liquidity risk next period.
  - Socially too high debt b_t and short-term debt share θ_t because $\psi_{t+1} < \psi_{t+1}^{SP}$.

Choosing b_t^S and b_t^L Separately

- Alternatively, households choose b_t^S and b_t^L separately:

$$c_t + \frac{b_t^S}{R_t} + \frac{b_t^L}{R_t^L} + \frac{s_t}{R^s} + z_t = a_t + b_{t-1} + s_{t-1} + q_t a_t^\ell$$

- First-order conditions regarding b_t^S and b_t^L:

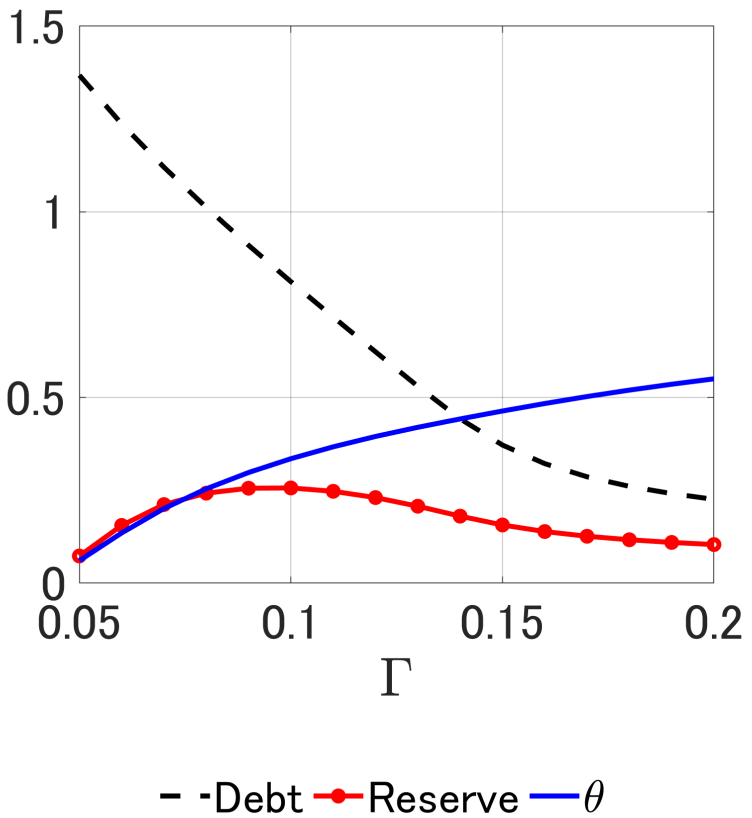
$$b_t^S\text{: } u'(c_t)\left[\frac{1}{R_t} - \frac{b_t^L}{(R_t^L)^2}\frac{\partial R_t^L}{\partial b_t^S}\right] = \beta \mathbb{E}_t\left[u'(c_{t+1}) + \psi_{t+1}\right]$$

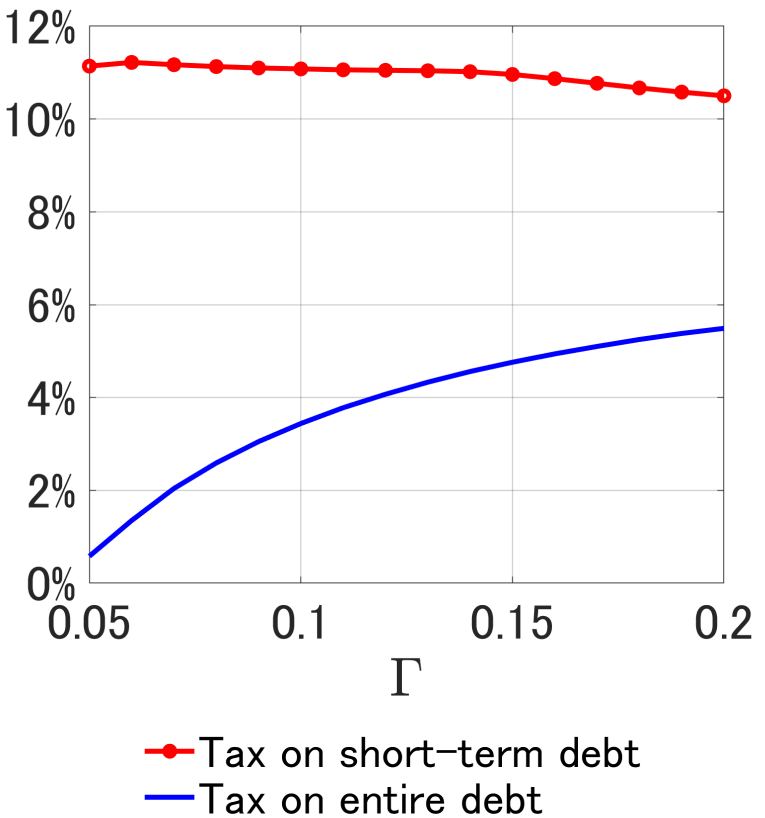
$$b_t^L\text{: } u'(c_t)\left[\frac{1}{R_t^L} - \frac{b_t^L}{(R_t^L)^2}\frac{\partial R_t^L}{\partial b_t^L}\right] = \beta \mathbb{E}_t\left[u'(c_{t+1})\right]$$

  - Households overborrow short-term debt b_t^S, but no distortion regarding b_t^L.
  - If tax on short-term debt is available, policy to correct θ_t is not necessary.

Optimal Policies across Different Γ

- Low Γ (better financial development) is associated with low θ.
- Reserves are non-monotonic in financial development Γ.
- Capital controls on the entire debt monotonically increase in Γ.





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