Capital Flow Management with Multiple Instruments

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* Views are of the authors and do not in any way reflect the views of the Reserve Bank of India

Outline

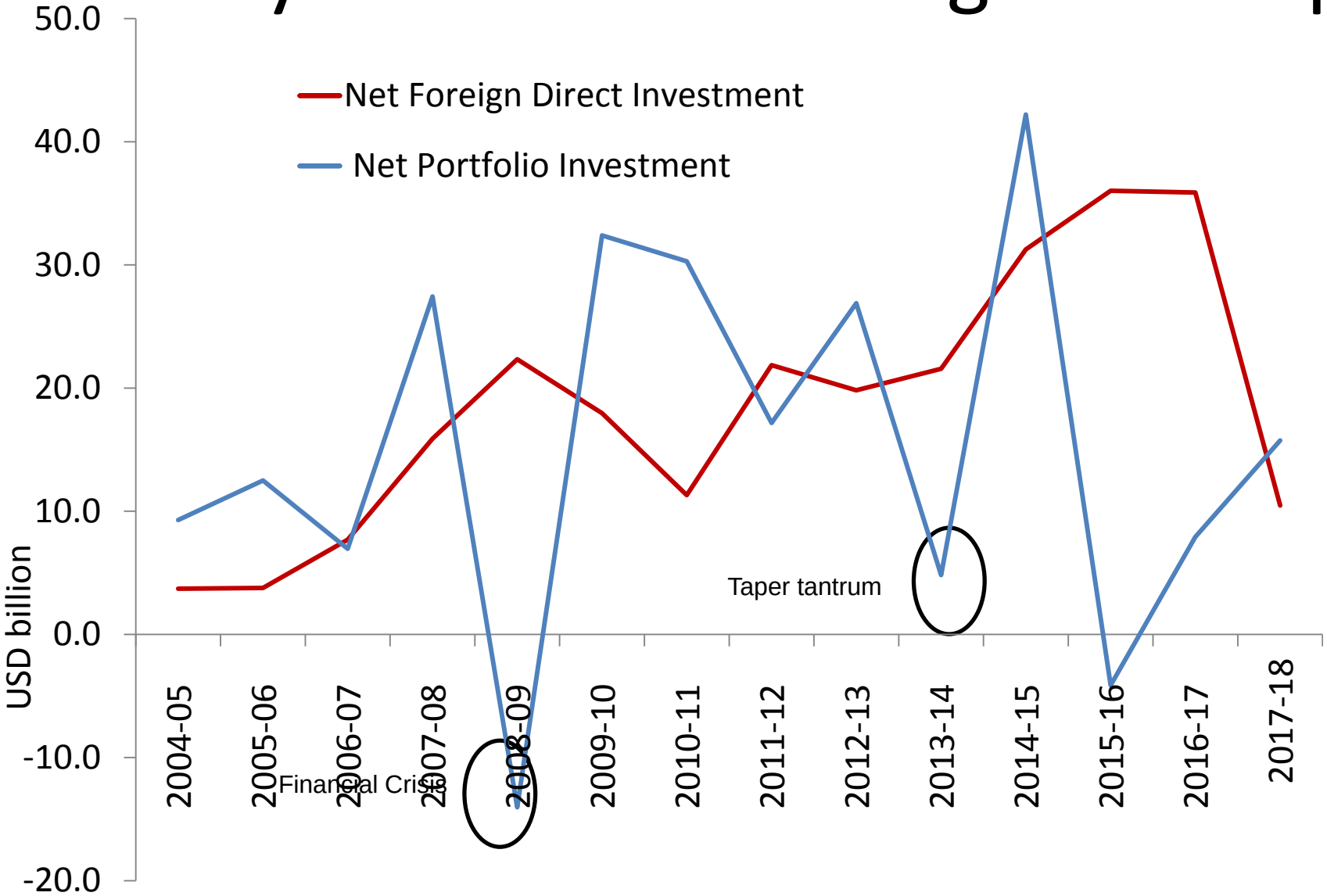
- Motivation:
  - Taper Tantrum, Sudden stops and reversals → Forex reserves
  - Rey (2013), Carstens (2016), Obstfeld, Shambaugh and Taylor (2010).

- Main result:
  - Reserves and capital controls are complements
  - Need for multiple instruments

- Case of India:
  - Multiple instruments

TAPER TANTRUM AND INDIA

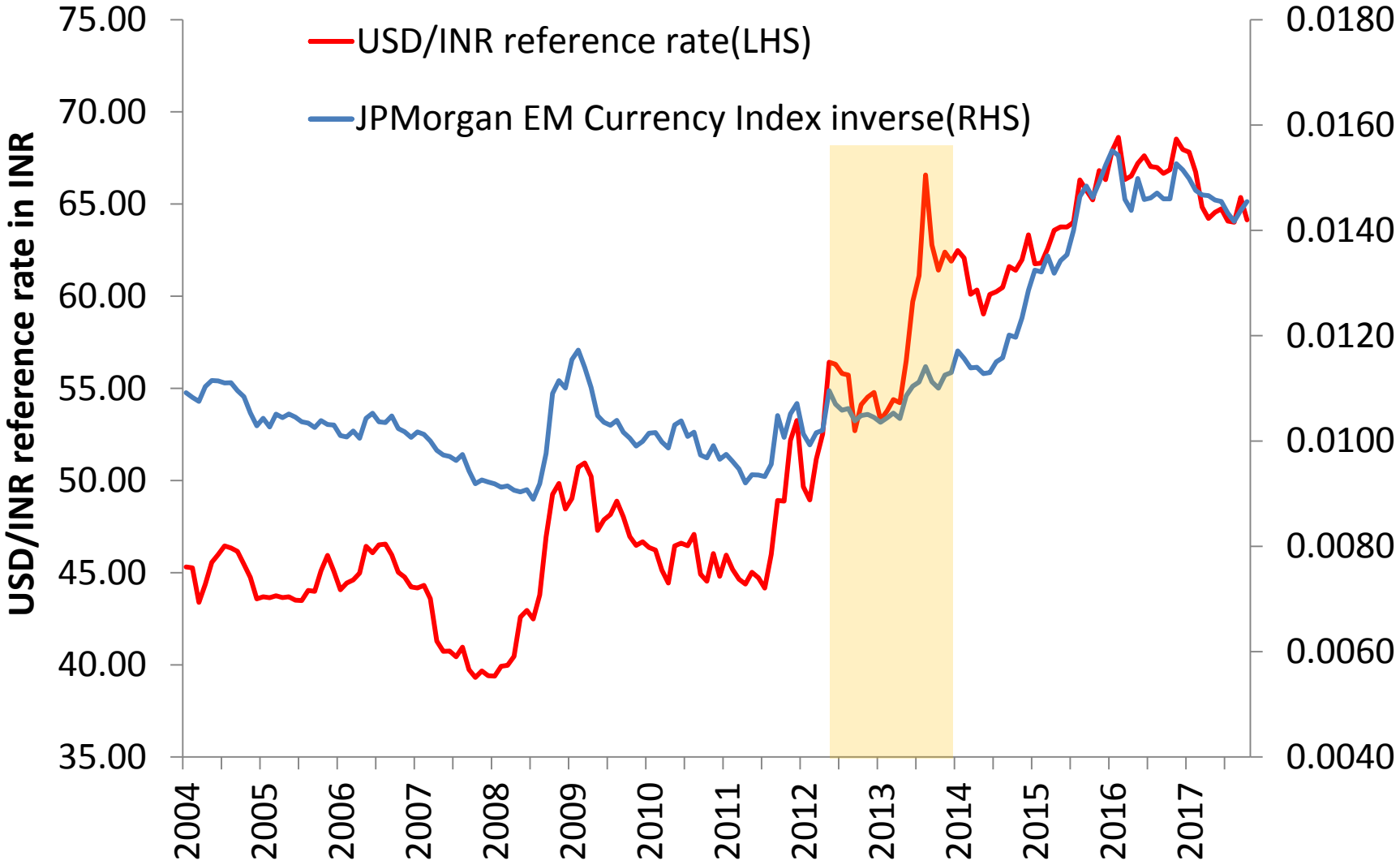
Volatility of FPI flows- ‘Surge’ & ‘Stop’



Source: RBI

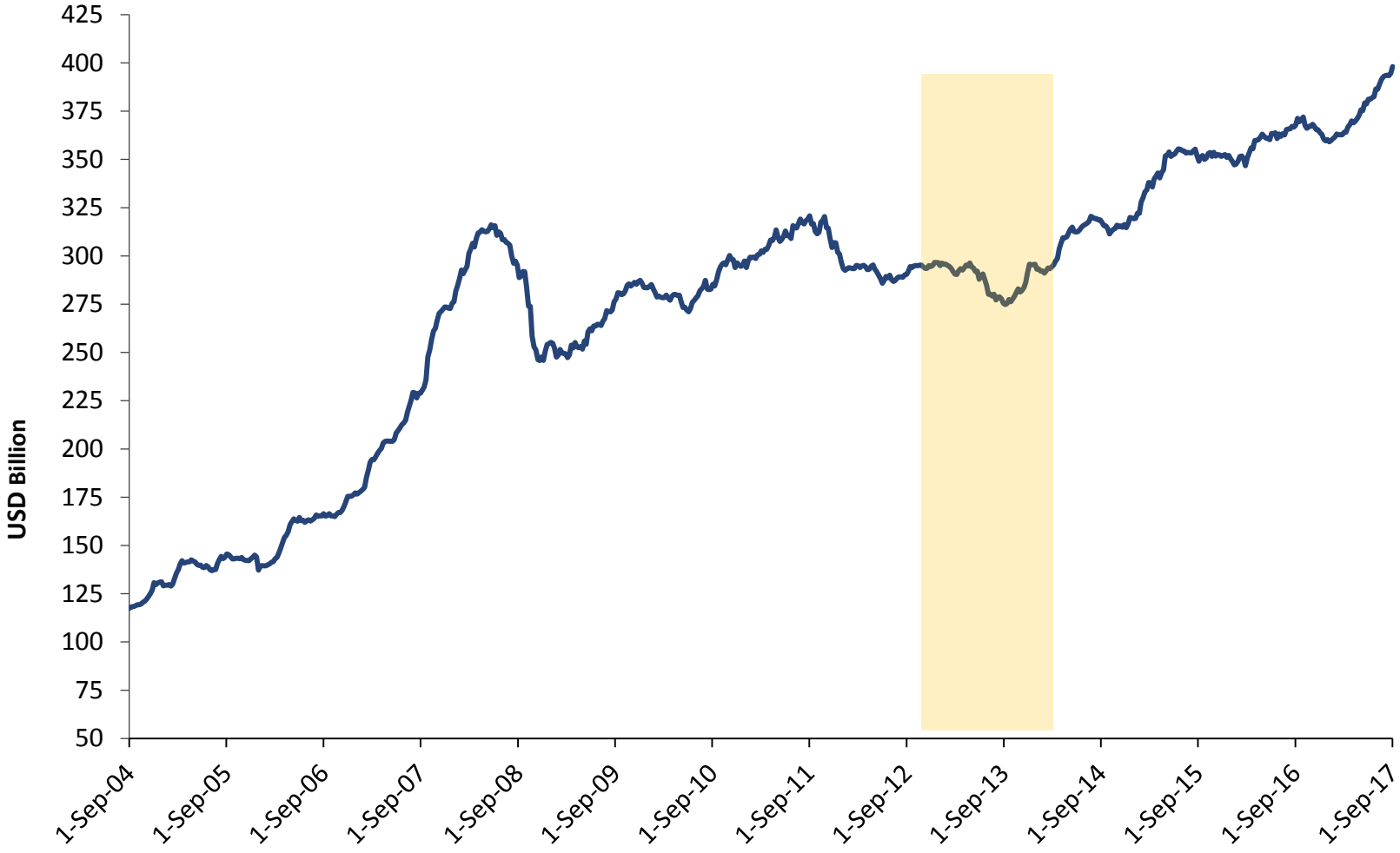
Data for 2017-18 updated till July 2017

Taper Tantrum and Exchange rate



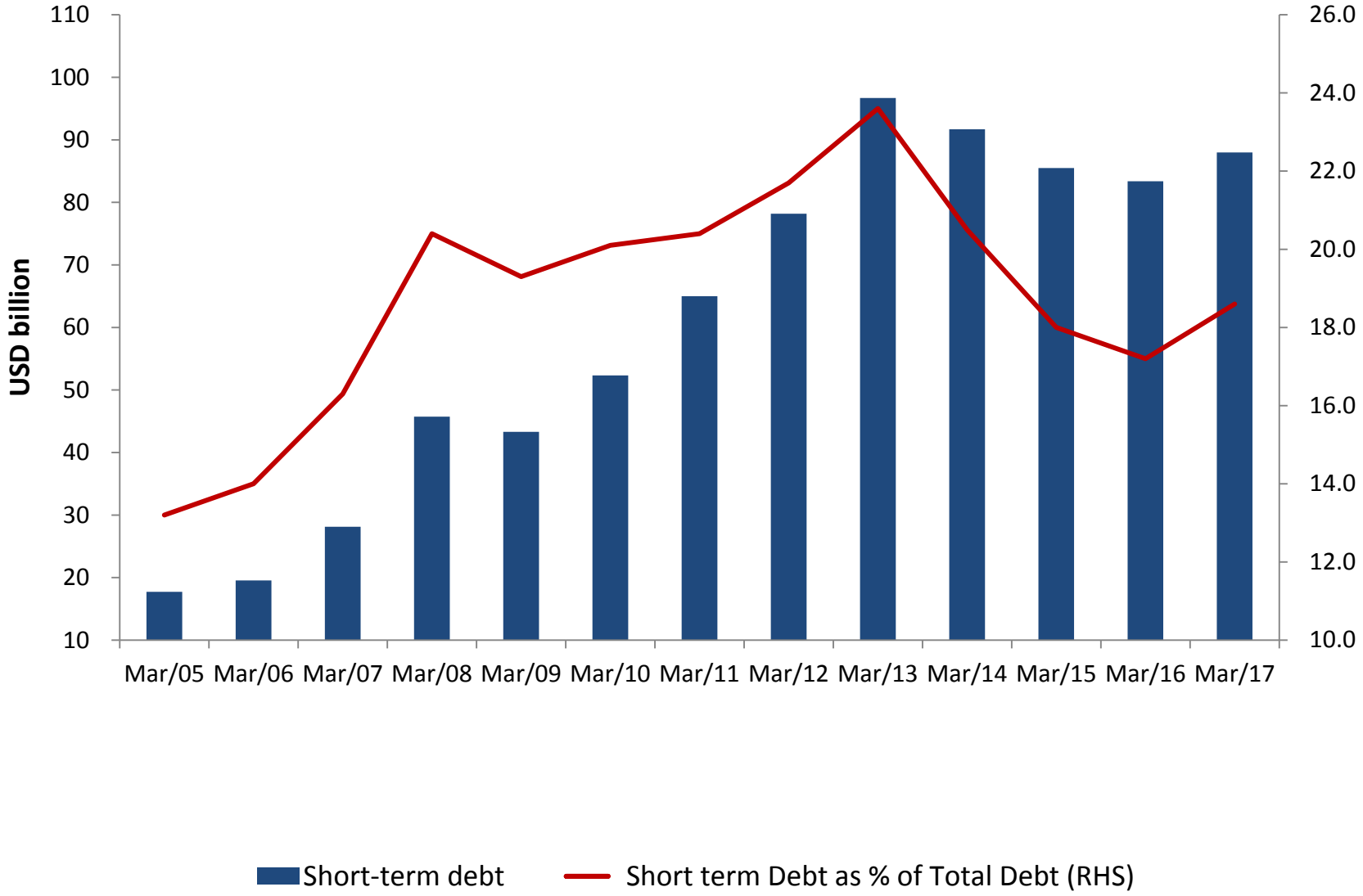
Source: Bloomberg and RBI

Trend in Forex Reserves for India

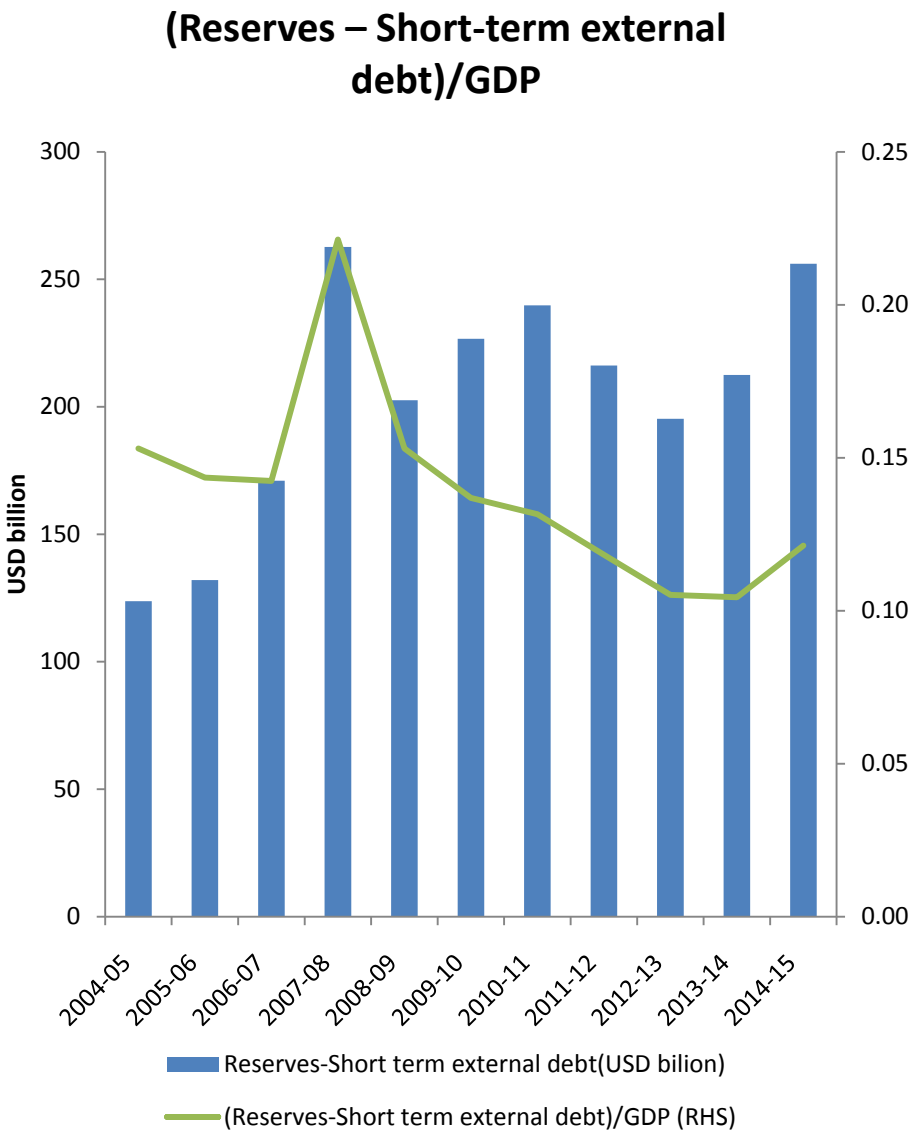


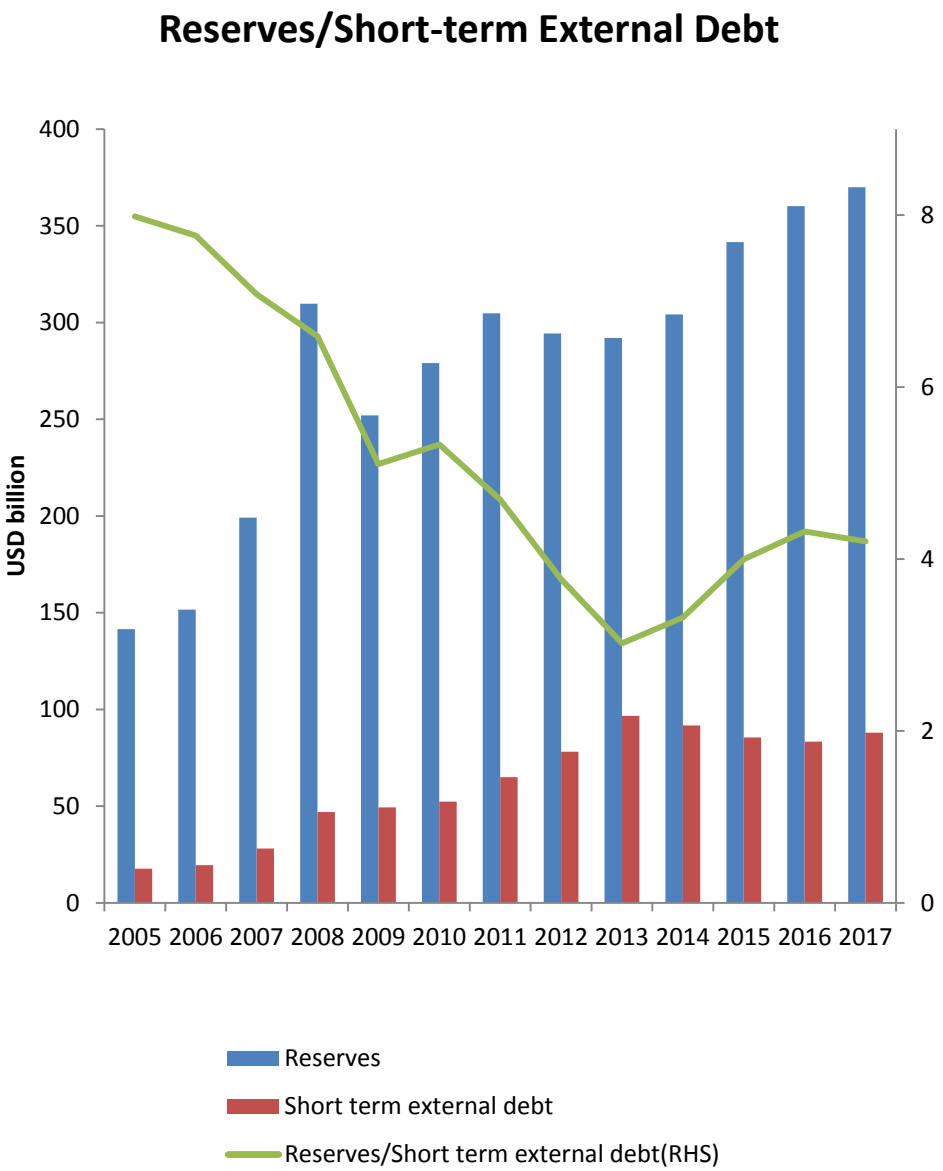
Source: RBI

Movement in Short term External debt



Source: *INDIA'S EXTERNAL DEBT, A Status Report, 2016-17* by Government of India





Source: *INDIA'S EXTERNAL DEBT, A Status Report, 2016-17* by Government of India

Measuring external resilience

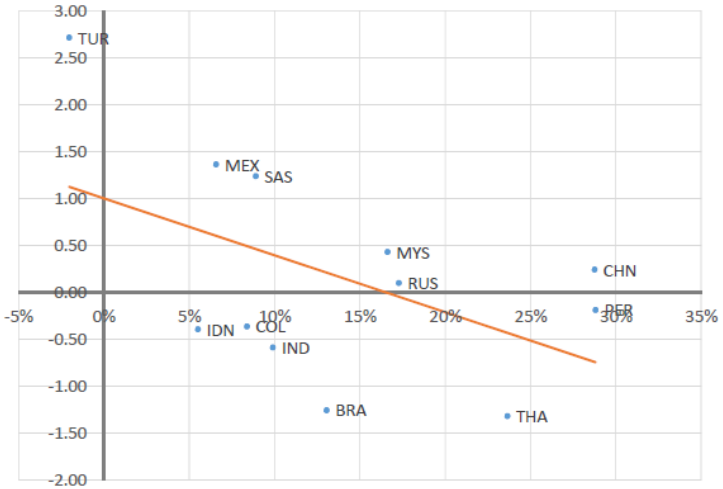
- <u>International or external-sector liquidity</u>
  - Country has issued net short-term (ST) debt claims to foreign investors
    - In the aggregate, should include all reversible "hot money" flows
    - If foreigners run, does the country have adequate FX reserves?
  - $Liquidity_i = \frac{FX\ Reserves_i - ST\ Ext\ Debt_i}{GDP_i}$
    - Akin to Guidotti-Greenspan (1999) rule

Does the measure work more broadly? Low Frequency Analysis

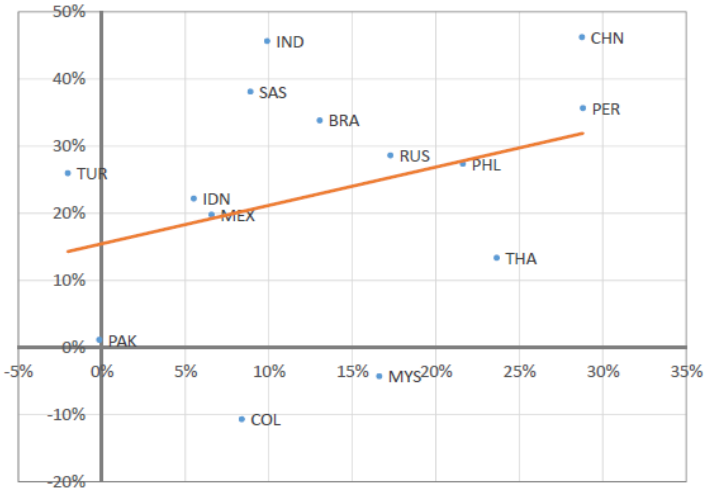
- <u>Cross-country outcomes</u> explained by liquidity

$$Liquidity_{i,2013} = \frac{Reserves_{i,2013} - ST\ Debt_{i,2013}}{GDP_{i,2013}}$$

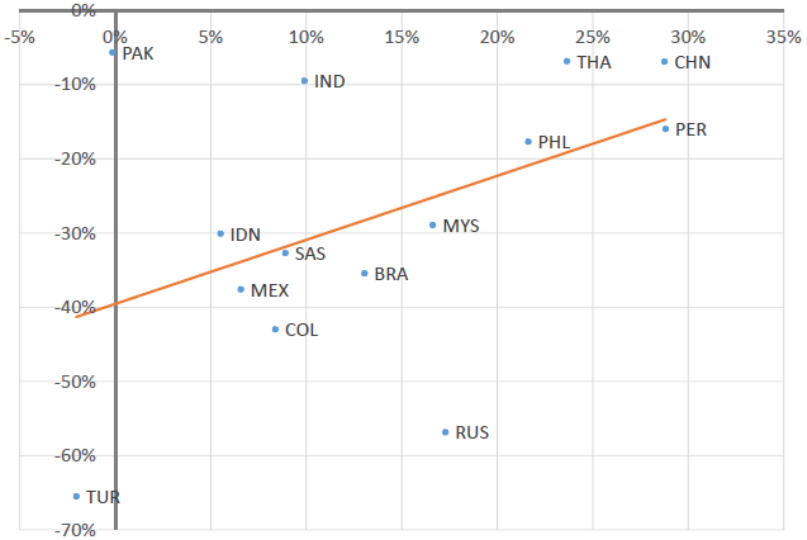
- Asset price changes from June ’13 to Oct ’17



(a) Change in Sovereign Bond Spread



(b) Stock Market Return



(c) Currency Appreciation

Source: *IMF*

Does the measure work more broadly? High Frequency Analysis

- Cross-country outcomes against global risk factors also explained by liquidity

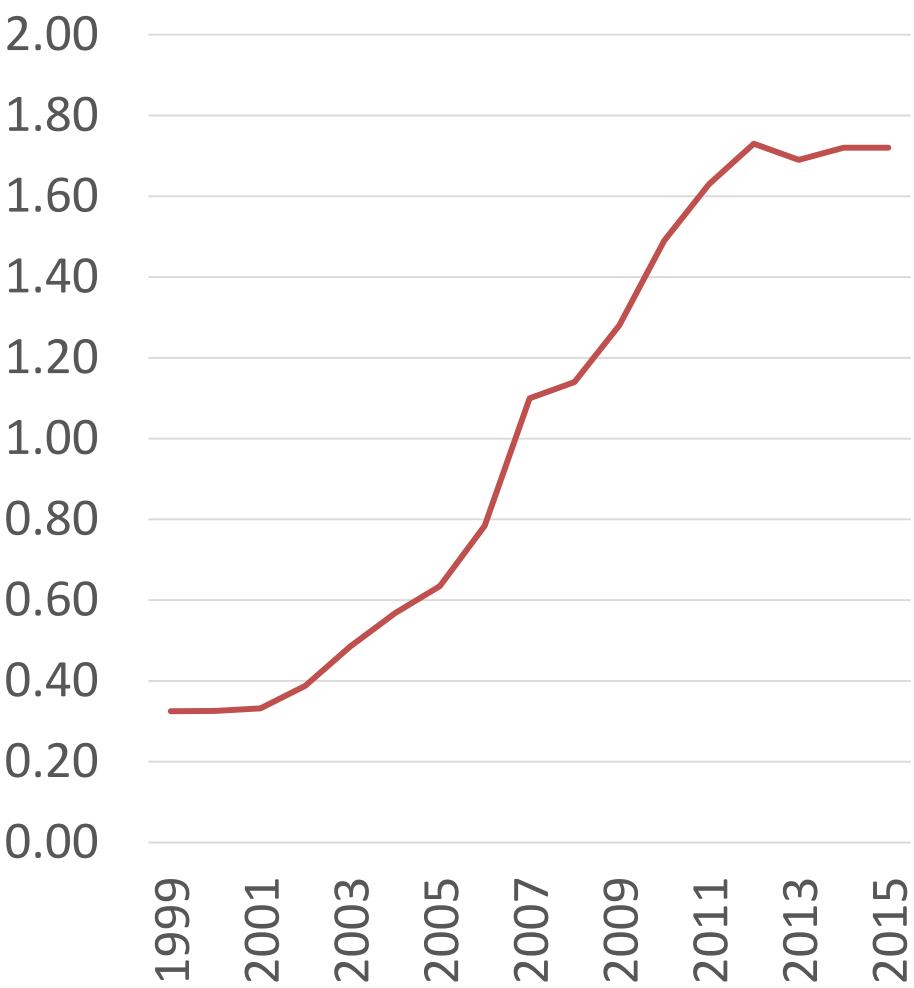
$$Liquidity_{i,2013} = \frac{Reserves_{i,2013} - ST\ Debt_{i,2013}}{GDP_{i,2013}}$$

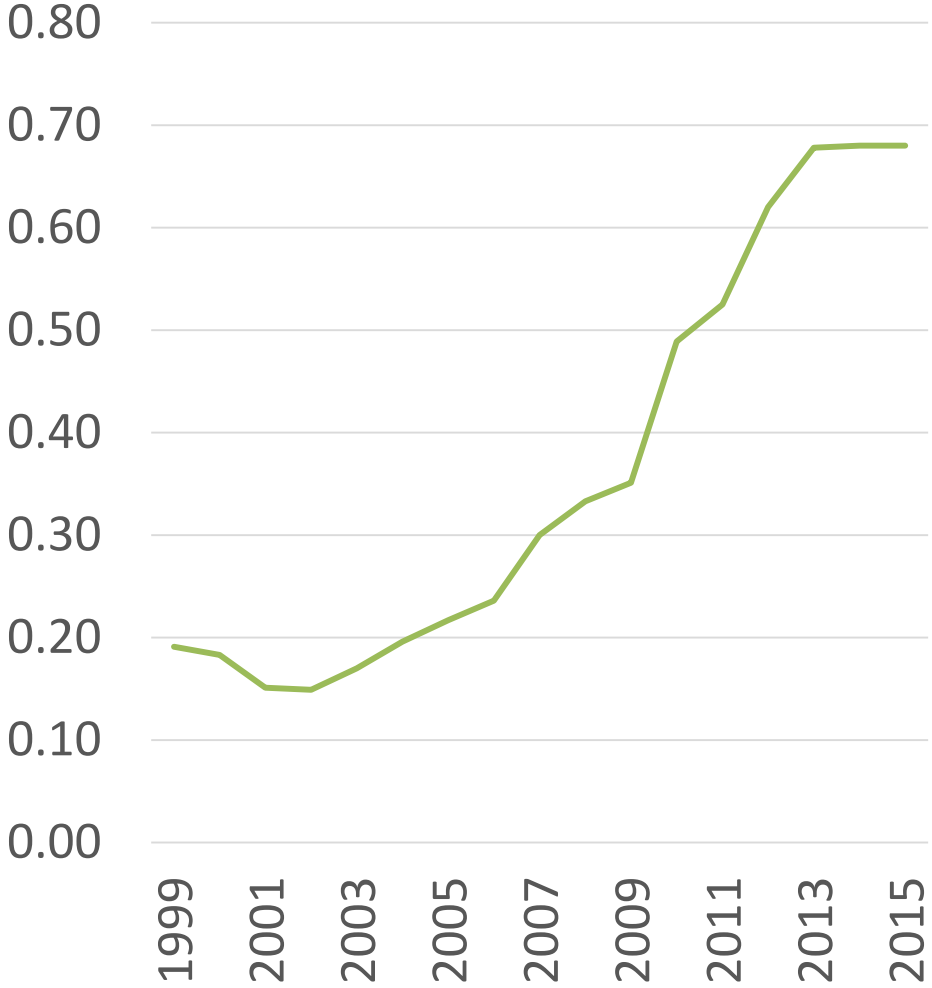
- <u>Global factor</u>: the first principal component of the time series of
  - 10 year US Treasury yields (Rey, 2013)
  - VIX (Rey, 2013)
  - S&P500 stock return
  - Return on the US dollar basket index
  - Return on the commodity price index

(a) Change in Sovereign Bond Spread				
	(1)	(2)	(3)	(4)
Global Factor	-0.0753	-0.0627	-0.1228	-0.1162
	(3.94)***	(3.32)***	(7.35)***	(6.72)***
Global Factor × Liquidity			0.0748	0.0784
			(4.13)***	(3.21)***
Liquidity			0.0012	-0.03
			-0.03	-0.33
Country FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Restrict to Large Shock	N	Y	N	Y
R^2	0.01	0.04	0.01	0.05
N	21,331	2,188	13,733	1,413
(c) Currency Appreciation				
Global Factor	0.1539	0.1297	0.217	0.1828
	(4.84)***	(4.97)***	(3.68)***	(3.71)***
Global Factor × Liquidity			-0.0986	-0.0843
			(2.23)**	(2.28)**
Liquidity			0.0035	0.1021
			-0.18	(1.94)*
Country FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Restrict to Large Shock	N	Y	N	Y
R^2	0.07	0.21	0.08	0.24
N	27,615	2,848	17,823	1,843

** $p < 0.05$; *** $p < 0.01$.

EM foreign reserves and short-term debt





Source: IMF (in trillion USD)

Integrated approach

- Reserves *minus* ST debt
  - Not reserves and ST debt separately
- Comovement via capital flows
- And likely jointly determined:
  - Our model: Reserves *causes* ST debt

A MODEL OF RESERVES AND CAPITAL CONTROLS

Model

- Caballero-Krishnamurthy (2001, 2005), Caballero-Simsek (2016).
- Three dates: 0, 1, 2
- Domestic borrower, foreign lender, central bank
- Representative firm (bank or multinational or exporter) takes on liability *L* from foreign lender and Invests domestically at non-crisis exchange rate (=1)
- <u>Liability is short-term</u>, due at t=1; cash flows at t=2
- <u>Retrenchment risk (sudden stop/reversal)</u> w.p. ϕ

External Debt and Fire Sale

- Liability is short-term, due at t=1; cash flows at t=2
- Retrenchment risk (sudden stop/reversal) w.p. ϕ
- In case of retrenchment, the firm liquidates collateral *L* domestically, converts to foreign currency at rate

$$e < 1$$

Shortfall of $L\,(1 - e)$

- Leads to liquidation/bankruptcy cost

$$\beta\, L\,(1 - e)$$

- <u>Central bank has reserves</u> *X* that are used to act as buyer of last resort of domestic currency in the retrenchment state

$$e = \frac{X}{L}$$

- Eqm bankruptcy cost suffered $= \beta\,(L - X)$

Fire-sale externality

- Each firm is competitive; so does not internalize the impact of its short-term external liability on the price *e*
- <u>Price *e* increases in reserves *X* and decreases in aggregate short-term external debt *L*</u>
- Privately optimal *L*
  - Declines in ϕ, the likelihood of sudden stop
  - Increases as anticipated *e* increases, undoing the reserves ("moral hazard" channel of reserves)
- Socially optimal *L* takes into account the cost of reserves and internalizes the fire-sale externality
  - Reserves are a form of bailout

Can the central bank do better?

- An omniscient central bank can just limit *L* to the "right" level
  - Which is a function of reserves, X
- Or charge a Pigouvian tax:
  - Tax short-term external debt so firms internalize the cost of reserves and the fire-sale externality

Complementarity Result 1

Proposition 2. *(Complementarity between policy instruments I)*

- *If the central bank that can directly choose L^F via a borrowing limit or external borrowing tax, then it chooses X^F to solve (14). Call this maximized value X^F_{**}.*
- *If the central bank does not have instruments to directly affect L^F, then it chooses X^F to solve (13). Call this maximized value X^F_{*}. We then have that,*

$$X^F_{**} > X^F_{*}$$

- <u>Macro-prudential makes the reserves work!</u>
  - Macro-pru limits the moral hazard channel of reserves
  - Make larger reserves effective as a defense against stops

Heterogeneity among firms

- Suppose firm i faces liquidation in the retrenchment state w.p. ϕ_i
  - Lower ϕ_i captures the relative safety of a firm: larger, more stable, export-oriented firms
- Now,

$$e = \frac{X}{\int \phi_i \, L_i \, di}$$

- Riskier (safer) firms contribute more to the fire-sale externality and over (under) borrow
- Pigouvian taxation:

$$\frac{\tau_i}{\tau_{i'}} = \frac{\phi_i}{\phi_{i'}}$$

Domestic currency debt

- Borrowing in domestic currency debt (locally or abroad)
  - Added cost of s, due to frictions for foreign investors in bankruptcy
- Foreigners exit domestic markets in retrenchment state; not rolling over domestic debt (e.g., FPI outflow). Domestic rollover always possible.
- <u>"Twin crisis"</u>:
  - Kaminsky-Reinhart (1996), Chang-Velasco (2001)

$$e = \frac{X}{L^F + L^D}$$

- FPI's charge ex-ante for the fx risk they bear: $\phi\ (1 - e)$

$$r^D = s + \phi(1 - e)$$

- Firms trade off higher domestic spread against higher bankruptcy cost of borrowing externally and running into a foreign currency shortfall.

What can the central bank do?

- As before, to make the reserves effective, the central bank can "tax" issuance of short-term external debt
- However, firms have two margins to undo the central bank reserves
- If tax on foreign currency debt is high, then firms switch to domestic currency debt (in spite of higher cost)
  - And domestic currency debt also has externality

$$e = \frac{X}{L^F + L^D}$$

$$r^D = s + \phi(1 - e)$$

  - Optimal policy has central bank acting on <u>both</u> margins

Complementarity Result 2

Proposition 4. *(Complementarity between policy instruments II)*
Domestic borrowing taxes, external borrowing taxes and holdings of foreign reserves are complimentary policy tools. With the ability to level a tax on domestic borrowing, the central bank can decrease aggregate borrowing without distorting the balance between foreign and domestic borrowing, resulting in a higher welfare for the economy.

- Marginal benefit of CB reserves holdings increasing in availability of both domestic and foreign tax instruments
- Marginal benefit of tax instruments increasing in reserve holdings

CAPITAL FLOW MANAGEMENT IN INDIA

Overview

1. Caps on external commercial borrowing (ECB) as well as domestic foreign portfolio inflows (FPI)
2. Caps vary by instrument
3. Caps vary by type of borrower
4. Arbitrage vis-à-vis domestic currency borrowing abroad

1. Caps on borrowing

- Three primary types of non-government debt
  - External Commercial Borrowings (ECB) in foreign currency, typically loans to Indian corporations
  - Foreign Portfolio Investment (FPI) in domestic currency debt (both Government of India securities at center and state level, as well as corporate bonds)
  - Rupee Denominated Bonds (RDB) or "Masala" bonds issued overseas, typically listed in London
- Current limits:
  - FPI G-sec: $39 bln; SDL: $6 bln; Corporate: $36 bln
  - ECB + Masala bonds: $130 bln

1. Caps on borrowing

- Three primary types of non-government debt
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- Current limits:
  - FPI G-sec: $39 bln; SDL: $6 bln; Corporate: $36 bln
  - ECB + Masala bonds: $130 bln
- <u>Caps are on flows not stocks</u>
- <u>Caps are not "macro-prudential"; e.g., depend on level of FX reserves</u>

2. Limits on maturity of investments

- Presently, FPIs are disallowed from investing in liquid short-term money-market instruments such Treasury bills or commercial paper (CP).
  - Prior to the taper tantrum, there was a carve-out for FPI investments in Treasury Bills and CP.

Type of securities	April-2013 $ bn	Jun-2013 $ bn	Nov-2013 $ bn
1. Government debt	25	30	30
a. T-bills within overall limit	5.5	5.5	5.5
b. Carved out limit for SWFs & other LT FIIs	-	5	5
2. Corporate bond	51	51	51
a. CPs within overall limit	3.5	3.5	3.5
b. Credit enhancement bonds within overall limit	-	-	5
3. Total Limit (1+2)	76	81	81

Source: DBIE, RBI.

2. Limits on investment maturity (cont'd)

- Since the taper tantrum
  - Residual maturity restrictions of investments by FPIs in debt holdings of minimum three years of maturity at origination or purchase.
  - In ECBs, borrower can take on debt up to $50 million with minimum average maturity (MAM) of 3 years; or up to $50 million if the maturity is 5 years
    - Foreign currency denominated under the so-called Track-I of ECB, or INR denominated under Track-III of ECB.
  - In contrast, no borrowing limits within the overall ECB limit is imposed for borrowings meeting a minimum average maturity of 10 years
    - Foreign currency denominated borrowing under Track-II.

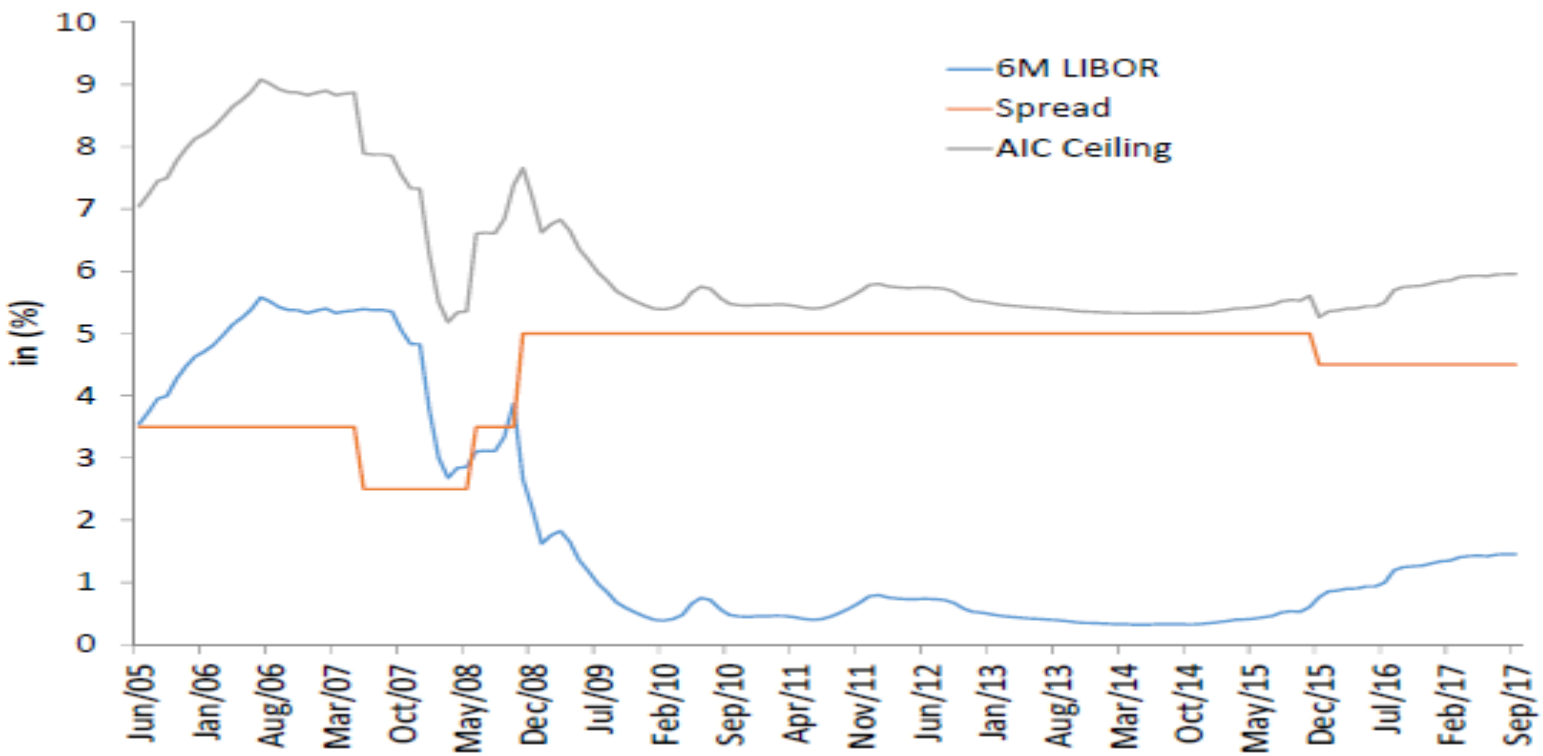
3. Rationing high-liquidity demanders

- Only relatively high credit quality borrowers can tap into ECBs:
  - Coupon or "all-in-cost" ceilings by debt issue
  - Imposing sub-limits on investments in risky instruments such as unlisted corporate bonds and security receipts (a form of distressed asset resolution instrument)
  - Ruling out excessive correlated liquidations by imposing investment sub-limits by sector.
- These restrictions limit ECBs to high-rated borrowers, as suggested by our model.
- On the other hand, this form of taxation does not exist for domestic debt issuances purchased by the FPIs

Table 5: Evolution of AIC spread (in bps) over Libor-6 month/Swap

Minimum average maturity	3 year to 5 year	More than 5 year
2004-05	200 bps	350
2007-08	150	250
2008-09	200	350
2009-10	300	500
2011-12	350	500
2015-16	300	450

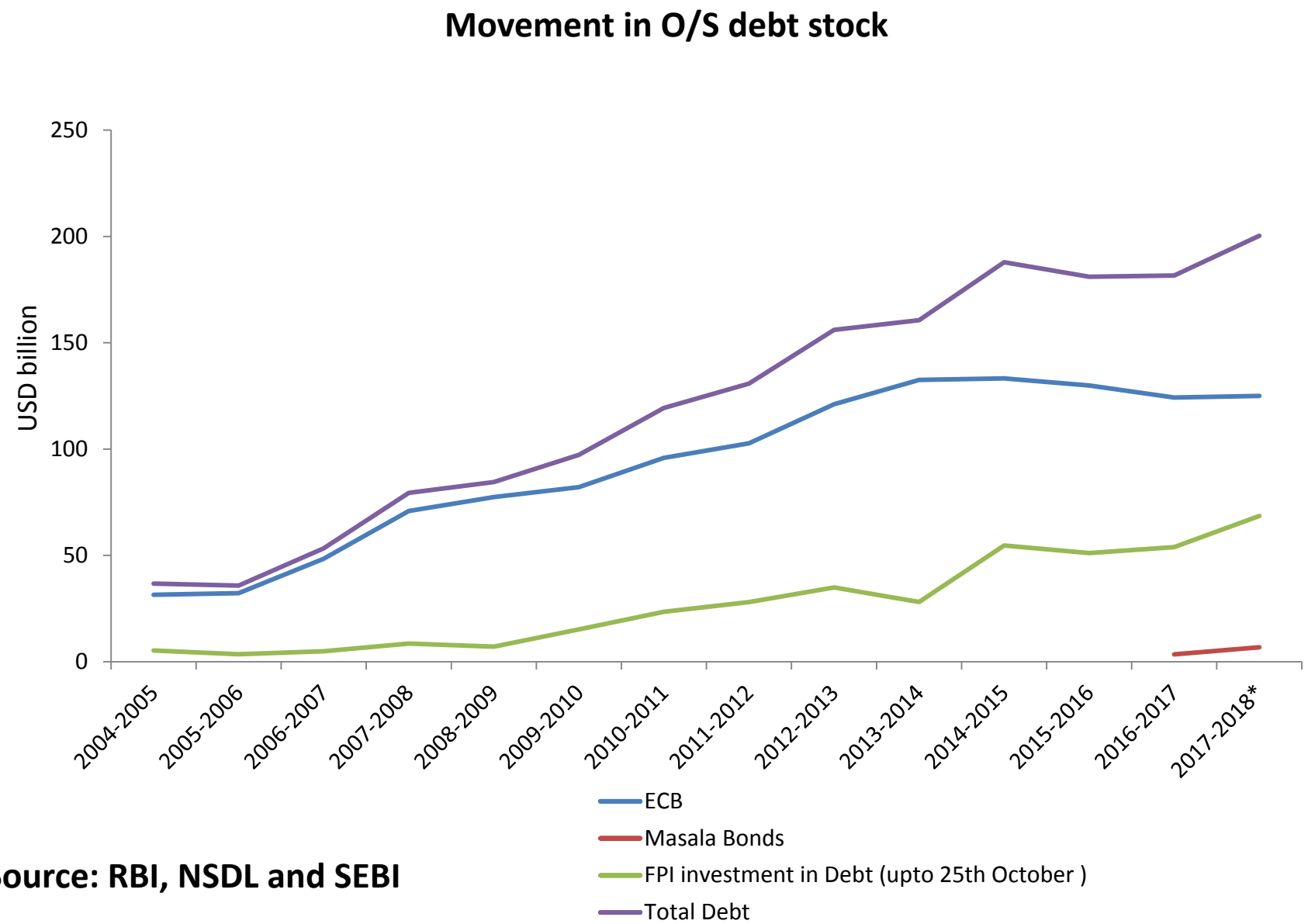
Source: DBIE, RBI.



4. Harmonizing ECB and Masala Bonds

- Masala Bonds envisioned to provide wider access for Indian entities to international debt markets without currency risk
- Guidelines were more relaxed than ECB norms: No restrictions on investors; any corporate eligible to issue; no cost ceiling
- <u>Masala Bonds route gained popularity in the past year as "arbitrage" over ECB and FPI in domestic corporate bonds</u>
  - Used by related parties to circumvent ECB/FDI; Rates not linked to market
  - Used to camouflage ECBs
- Recent Measures to address macro-prudential concerns:
  - June 2017: Restrictions on 'related party' transactions
  - All-in-costs ceilings of G-Sec + 300 bps imposed
  - Minimum tenor which was originally 5 years aligned to ECB
    - Upto USD 50 mn: 3 years; above USD 50 mn: 5 years

4. Arbitrage



Source: RBI, NSDL and SEBI

Summary

- Reserves and capital flow measures are complementary policy tools
  - Not either/or, but both
  - More of one increases efficiency of the other

2*. Limits by investor horizon

- FPI limits by Long Term vs General investors:
  - Long Term includes Insurance firms, Endowments and Pension Funds, Sovereign Wealth Funds, Central Banks, and Multilateral Agencies

	Central Government Securities			State Development Loans		
Effective for Quarter	General	Long Term	Total	General	Long Term	Total
2017-18 Q3	29.29	9.31	38.60	4.63	1.44	6.07

	Corporate Bonds		
Effective for Quarter	Long term FPIs infrastructure	General	Total
2017-18 Q3	1.47	33.64	35.10

Source: RBI, DBIE.

2*. Limits by investor horizon (cont'd)

- FPI limits by Long Term versus General investors:
  - Long Term includes Insurance firms, Endowments and Pension Funds, Sovereign Wealth Funds, Central Banks, and Multilateral Agencies
- <u>FPI restrictions in the past also included</u>
  - Sub-limits for 100% debt funds as against minimum 70:30 equity-debt investment ratio funds.
  - Minimum lock-in periods of up to three years
- Counter to our theoretical analysis, long-term investors were not allowed by India to be eligible lenders to ECBs until 2015!
  - Domestic banks not allowed to refinance ECBs