

# Global spillovers: Managing capital flows and forex reserves

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(based on “**Capital flow management with multiple instruments**” w/ Arvind Krishnamurthy)

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# Outline

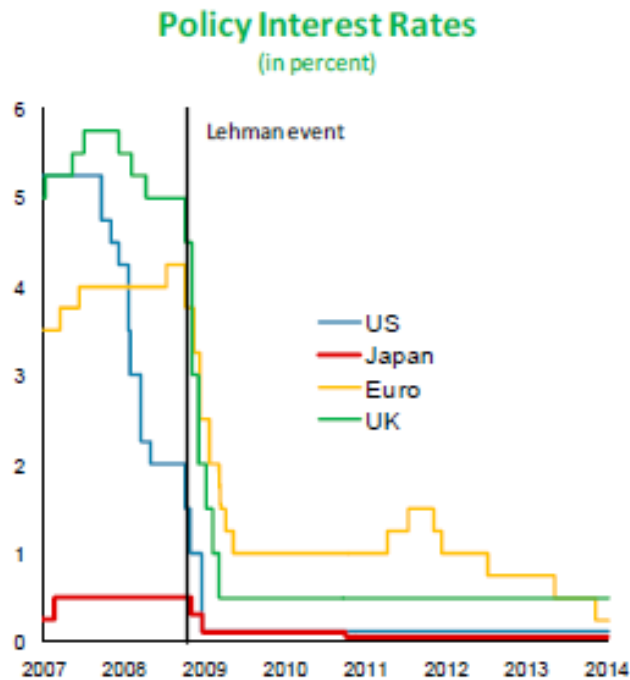
- Motivation – Sudden stops and reversals -> Forex reserves
  - Rey (2013), Obstfeld, Shambaugh and Taylor (2010).
- A measure of external sector resilience
  - (Foreign-reserves – Short-term external debt or flows)/GDP
- Reserves and capital controls are complements
  - De Gregorio (2010), Ostry *et al.* (2010), Aizenmann (2011), Jeanne and Ranciere (2011), Aizenman and Marion (2013),
- Key insights:
  - Foreign reserves do not work absent macro-pru/capital controls
    - Reserves undone by short-term external debt; can make things worse!
    - Macro-prudential comes first; makes reserves effective
  - FPI flows in domestic debt versus external debt
    - Tradeoff: Lower external issuance costs versus greater vulnerability
    - Arbitrage -> Need to tax both foreign debt and FPI in domestic debt
    - Greater the reliance on external debt, greater the needed reserves
  - Macro-prudential measures to deal with the tradeoff
    - Size limits, maturity of investors and investments, rationing the risky.

# **SUDDEN STOPS AND REVERSALS: THE TAPER “TANTRUM”**

# Monetary easing -> EM capital flows

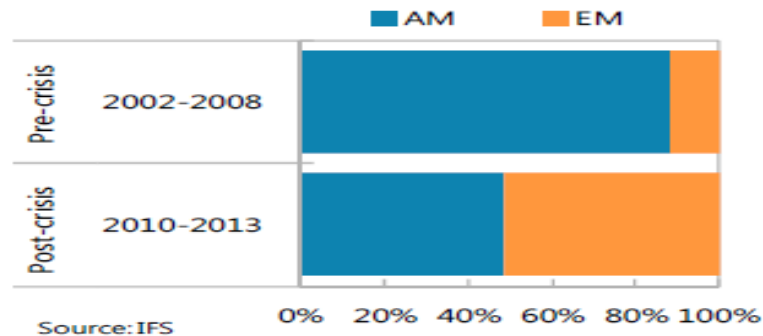
*Emerging markets received close to half of global inflows after the crisis compared with less than 20 percent before...*

*Rock-bottom interest rates...*



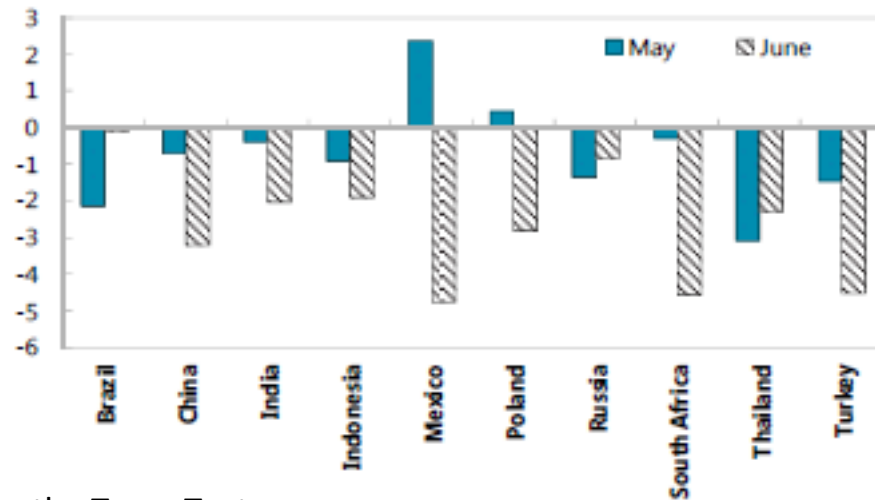
Source: IMF staff estimates.

## Composition of Global Capital Flows (Share of total flows)



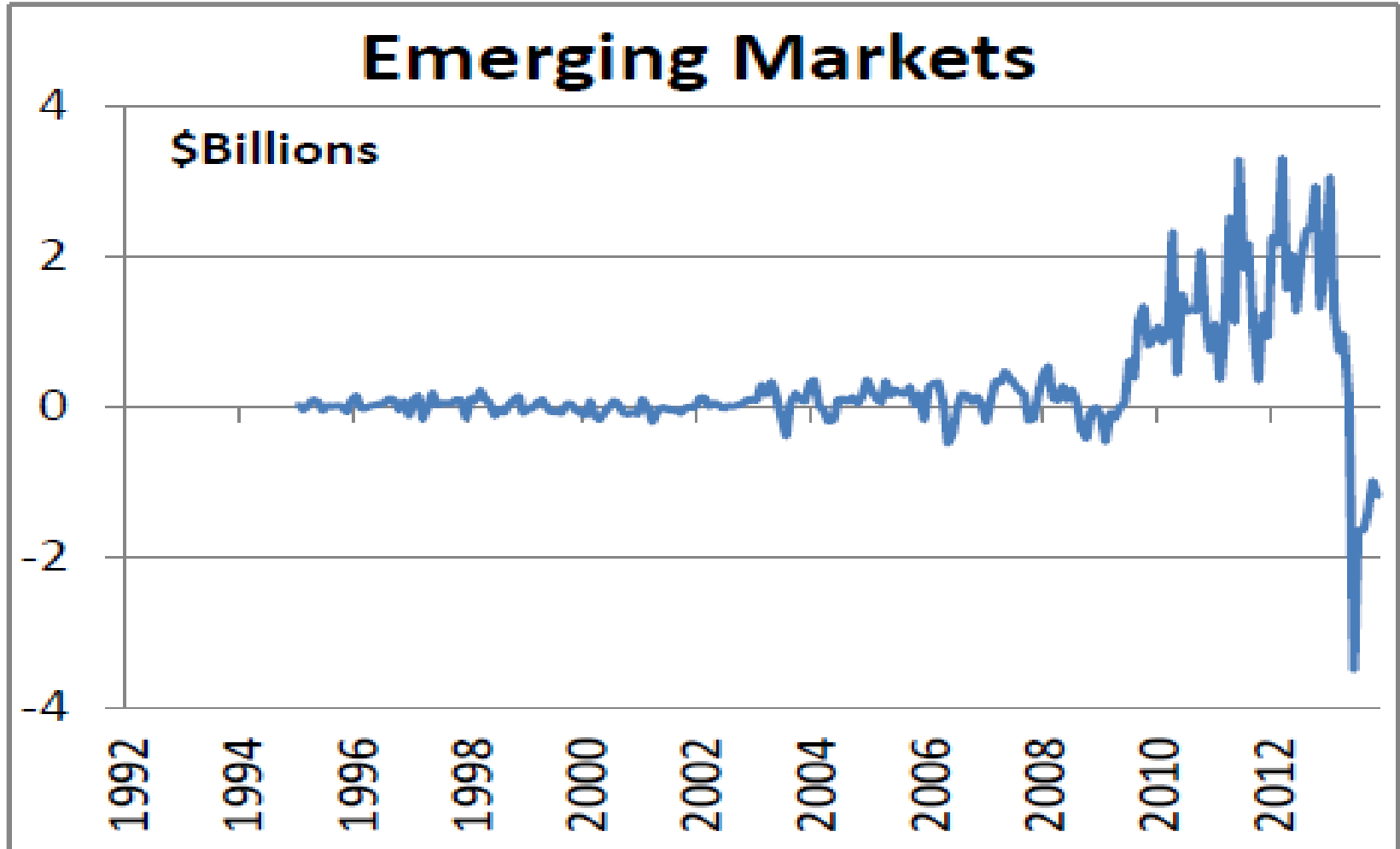
## Capital Flows (Bond & Equity)

Taper Tantrum (May-June 2013)



Source: Emerging Market Volatility – Lessons from the Taper Tantrum, IMF Staff Discussion Note, September 2014

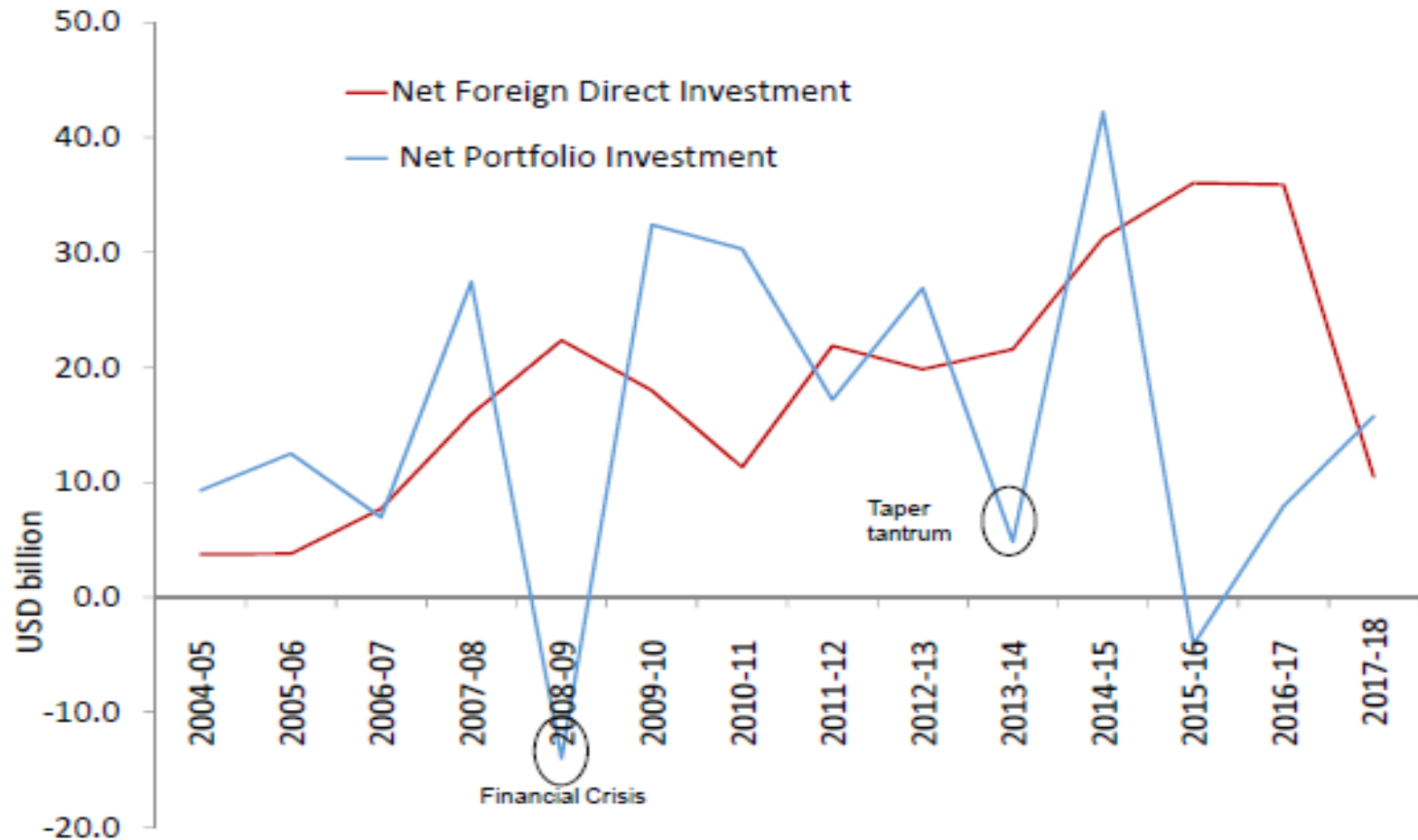
# QE, Taper Tantrum, EM MF Flows



Source: Market Tantrums and Monetary Policy by Feroli, Kashyap, Schoenholtz and Shin (Feb 2014)

# **TAPER TANTRUM AND INDIA**

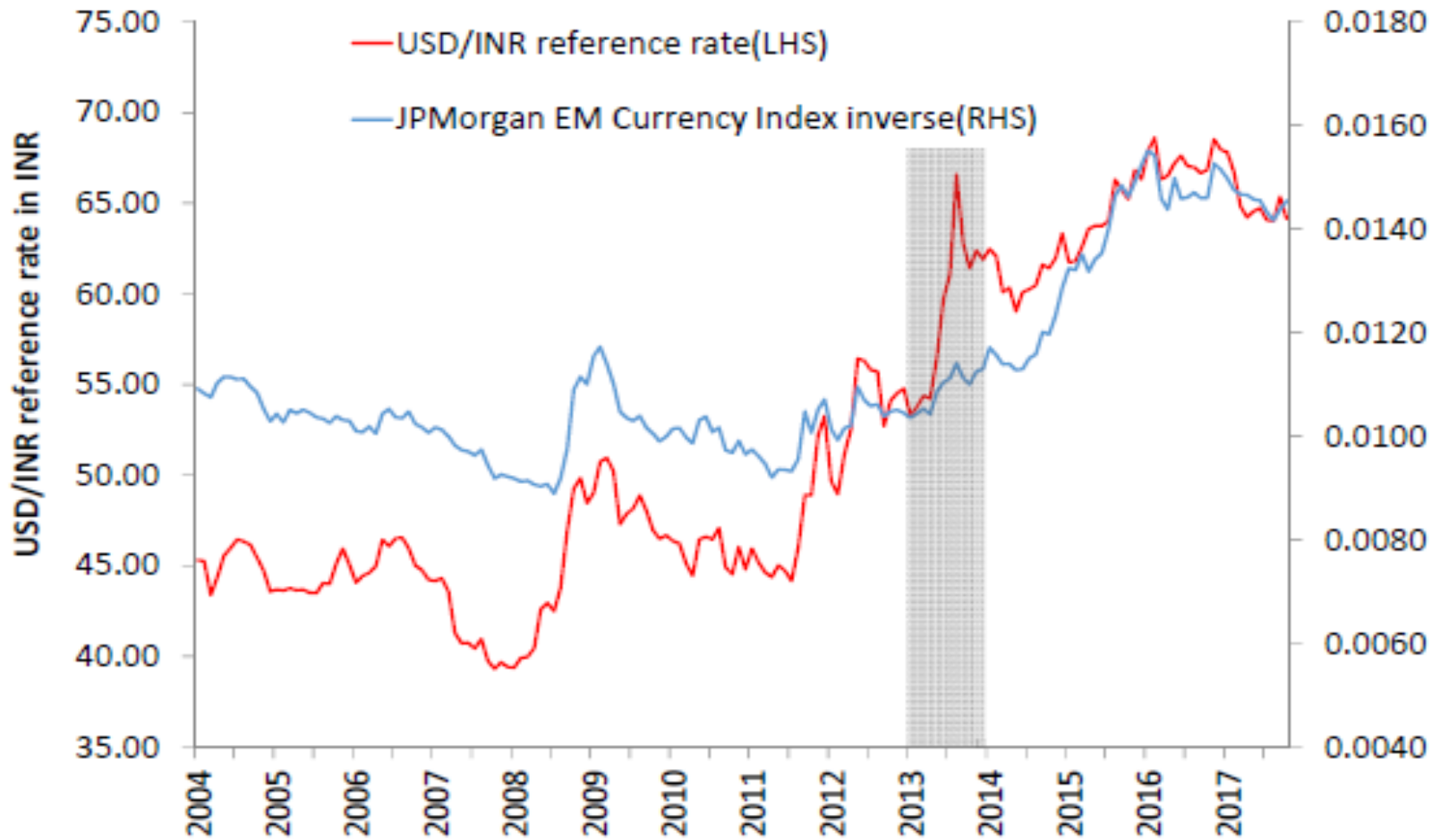
# Volatility of FPI flows- 'Surge' & 'Stop'



Source: RBI

Data for 2017-18 updated till July 2017

# Taper Tantrum and Exchange rate



Source: Bloomberg and RBI

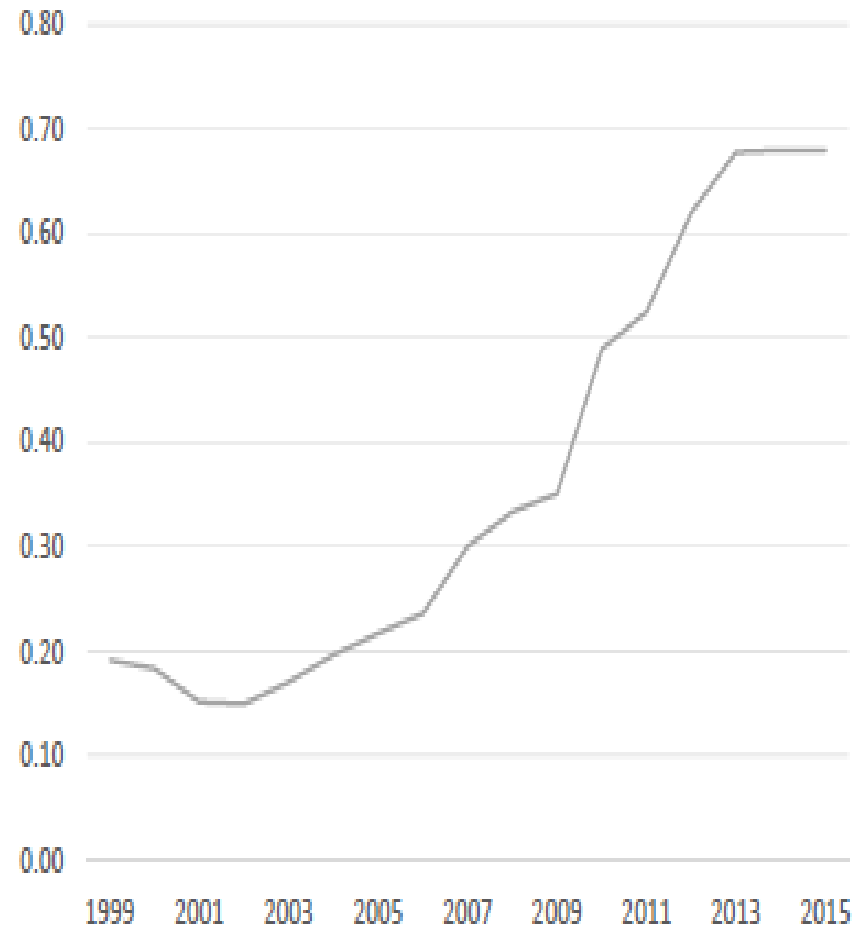
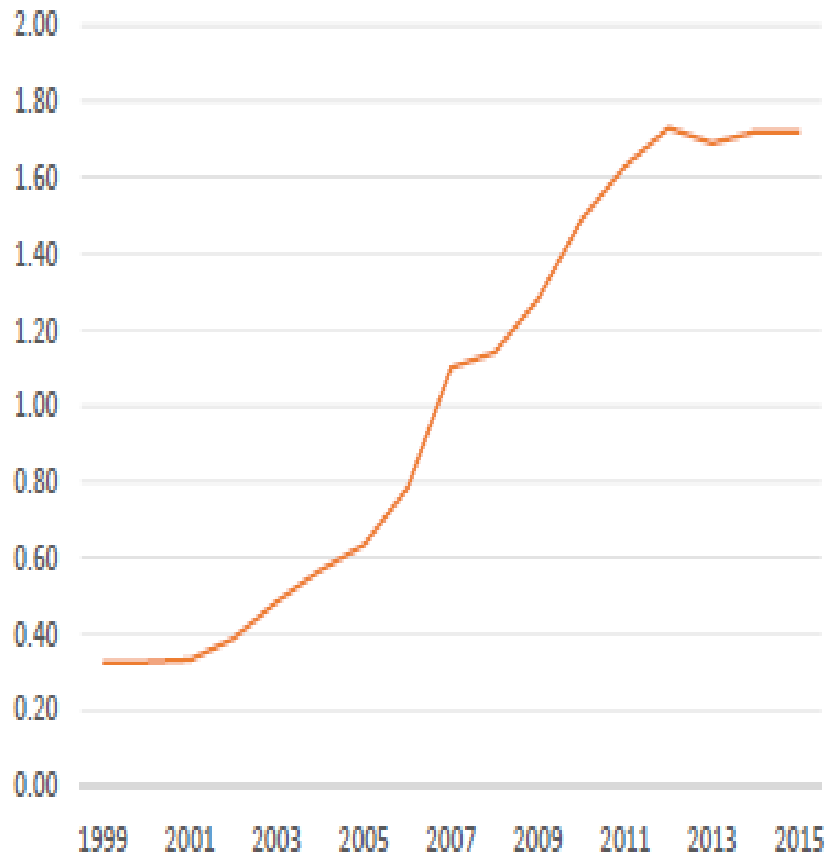


# **MEASURING RESILIENCE**

# A measure of external resilience

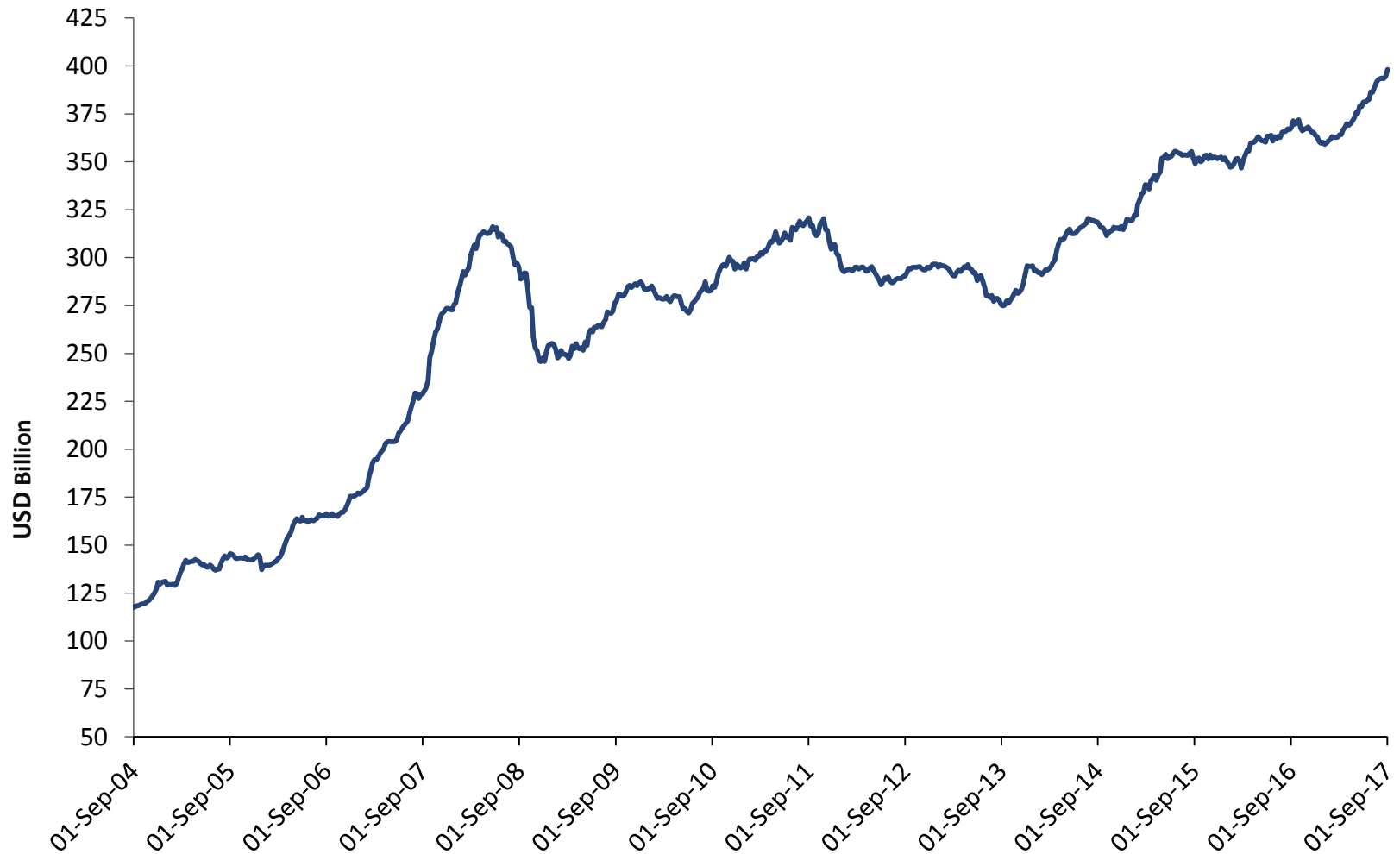
- International or external-sector liquidity
  - Country has issued net short-term (ST) debt claims to foreign investors
    - In the aggregate, should include unhedged foreign exposures and all reversible “hot money” flows
  - If foreigners run, does the country have adequate FX reserves?
  - $Liquidity_i = \frac{FX\ Reserves_i - ST\ Ext\ Debt_i}{GDP_i}$
  - Simply looking at reserves is inadequate and a potentially misleading indicator of vulnerability
  - Akin to Guidotti-Greenspan (1999) “rule”

# Foreign reserves and short-term debt for EMs tend to rise together



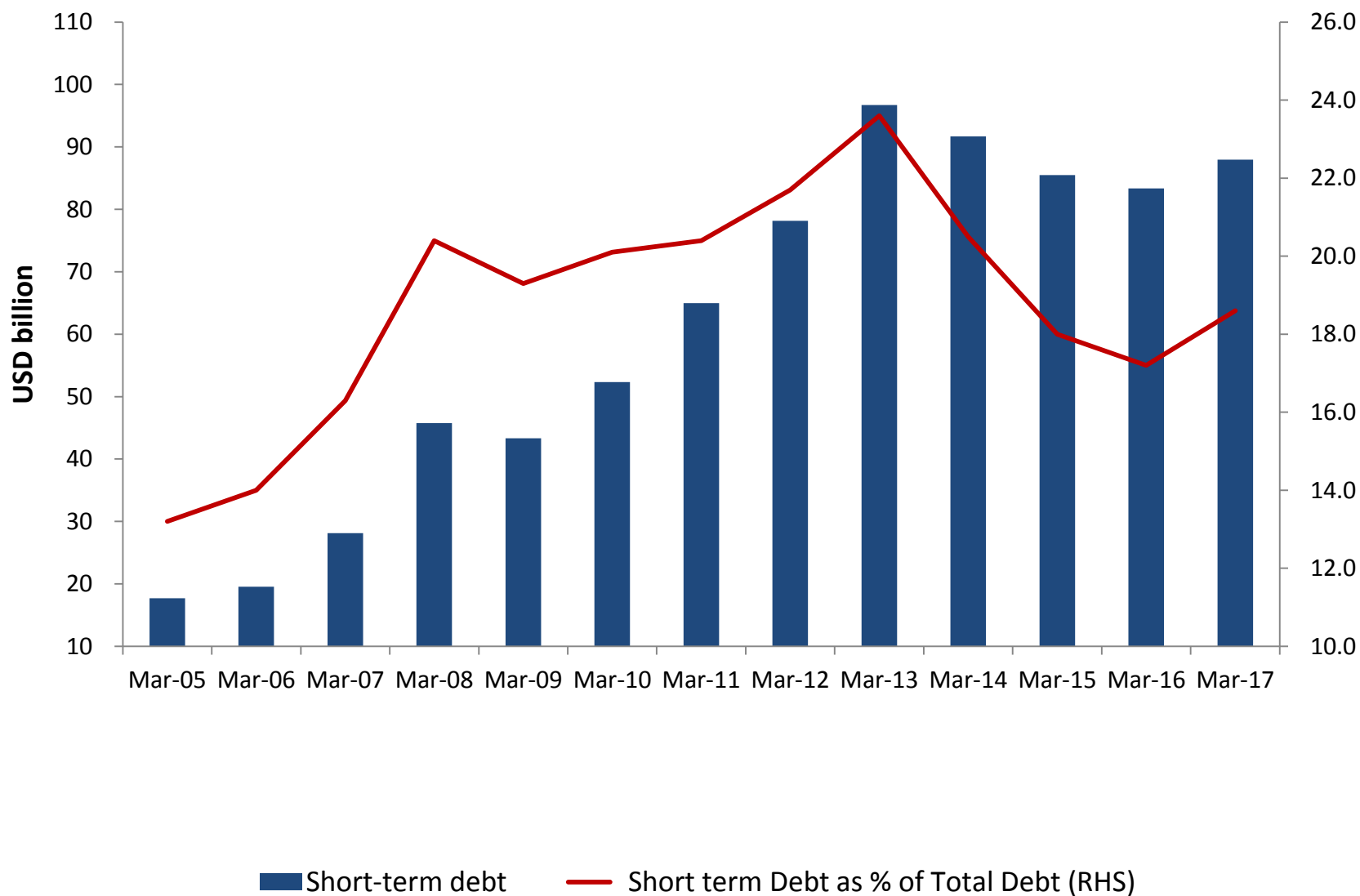
Source: IMF (in trillion USD), see also Carstens (2016)

# Trend in Forex Reserves for India



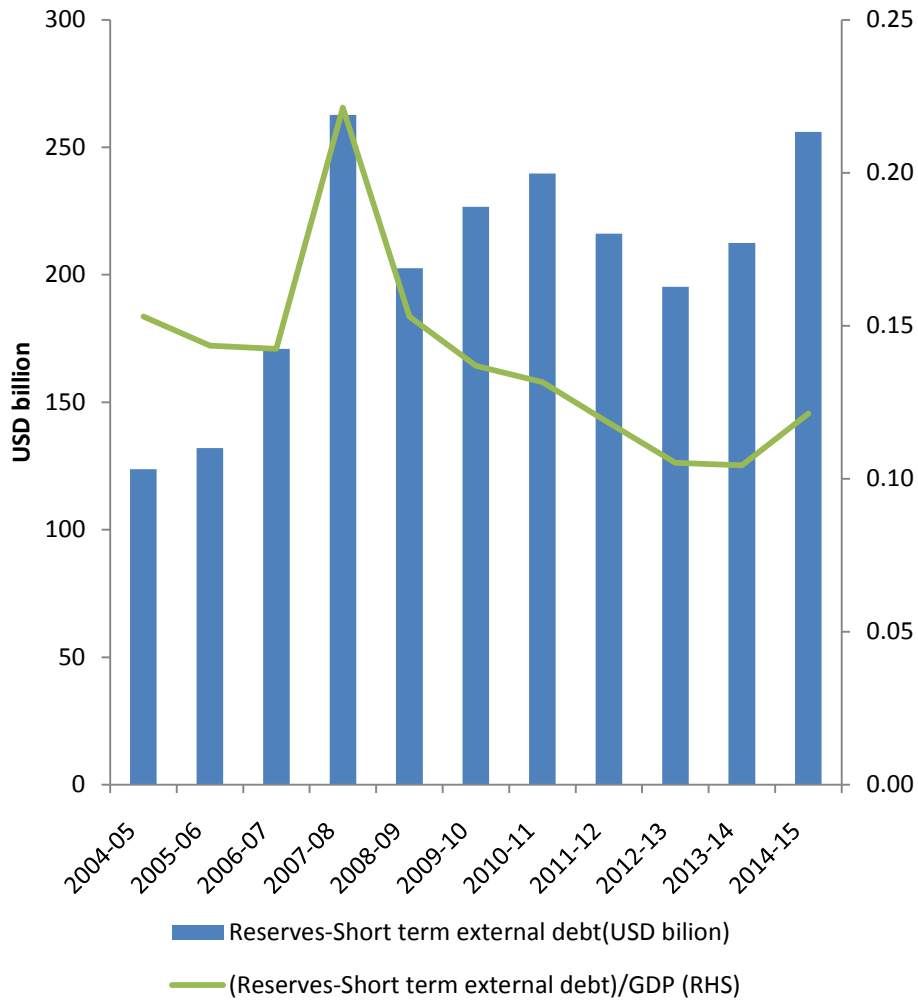
Source: RBI

## Movement in Short term External debt

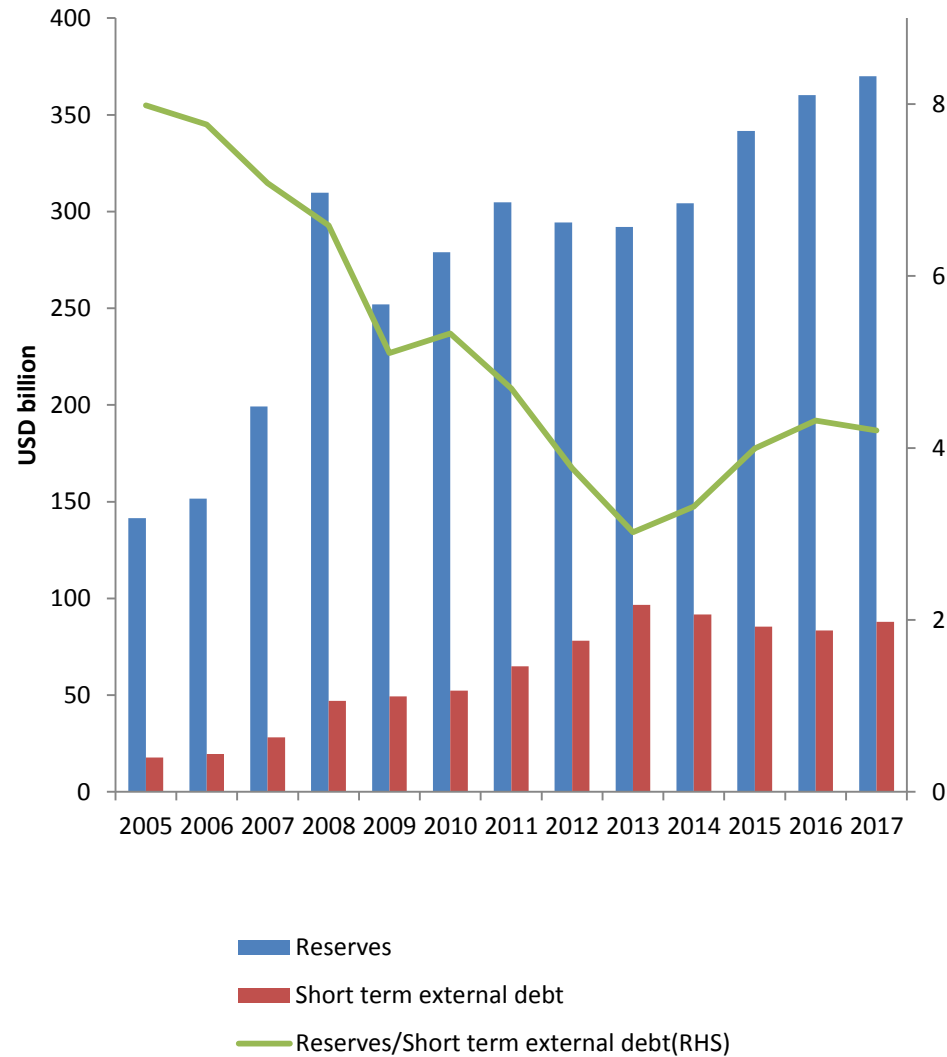


Source: *INDIA'S EXTERNAL DEBT, A Status Report, 2016-17* by Government of India

### (Reserves – Short-term external debt)/GDP



### Reserves/Short-term External Debt



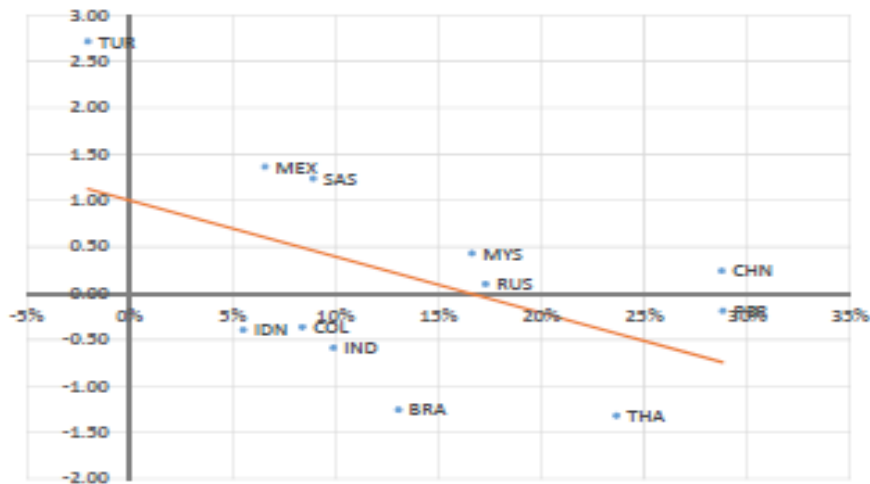
Source: INDIA'S EXTERNAL DEBT, A Status Report, 2016-17 by Government of India

# Does the measure work more broadly?

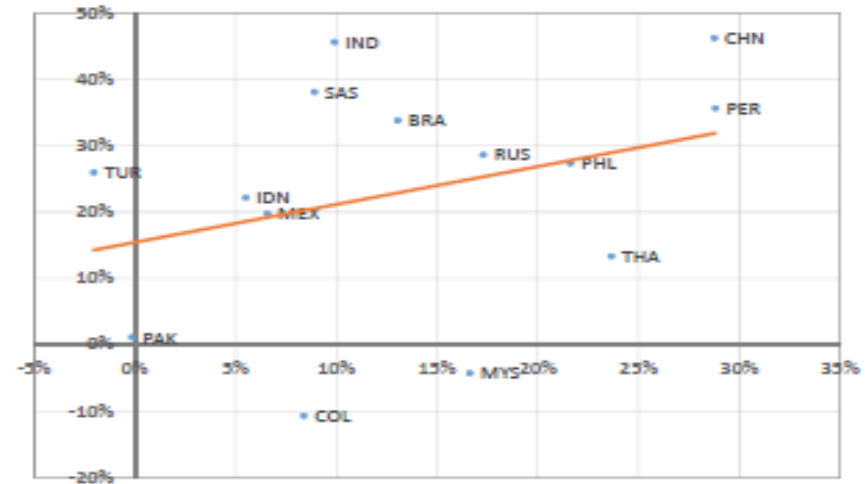
- Cross-country outcomes during the taper tantrum explained by liquidity

$$\text{Liquidity}_{i,2013} = \frac{\text{Reserves}_{i,2013} - \text{ST Debt}_{i,2013}}{\text{GDP}_{i,2013}}.$$

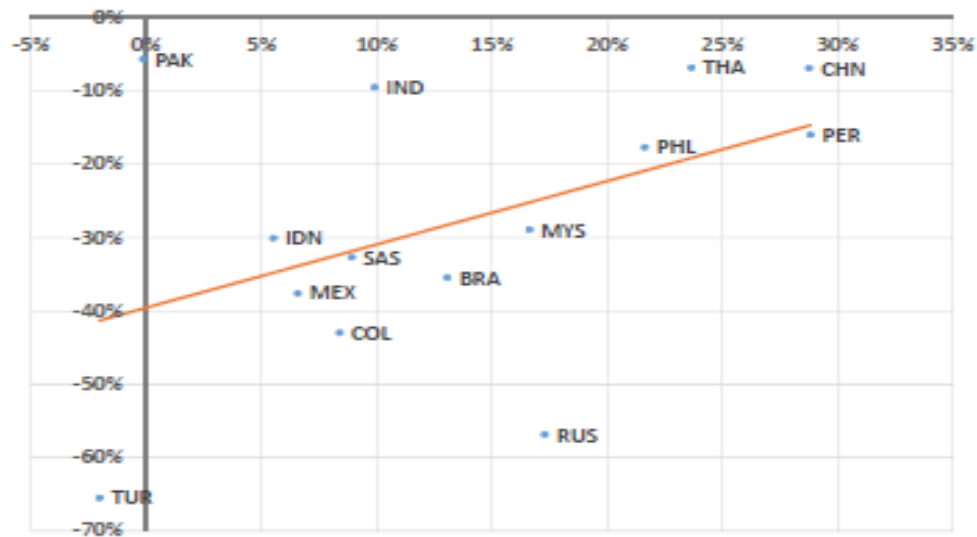
- Asset price changes from June '13 to Oct '17



(a) Change in Sovereign Bond Spread



(b) Stock Market Return



(c) Currency Appreciation



# Does the measure work more broadly?

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

$$\text{Liquidity}_{i,2013} = \frac{\text{Reserves}_{i,2013} - \text{ST Debt}_{i,2013}}{\text{GDP}_{i,2013}}.$$

- Global factor: 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 (3.94) <sup>***</sup>	-0.0627 (3.32) <sup>***</sup>	-0.1228 (7.35) <sup>***</sup>	-0.1162 (6.72) <sup>***</sup>
Global Factor $\times$ Liquidity			0.0748 (4.13) <sup>***</sup>	0.0784 (3.21) <sup>***</sup>
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 (4.84) <sup>***</sup>	0.1297 (4.97) <sup>***</sup>	0.217 (3.68) <sup>***</sup>	0.1828 (3.71) <sup>***</sup>
Global Factor $\times$ Liquidity			-0.0986 (2.23) <sup>**</sup>	-0.0843 (2.28) <sup>**</sup>
Liquidity			0.0035 -0.18	0.1021 (1.94) <sup>*</sup>
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

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

# **A MODEL OF RESERVES AND CAPITAL CONTROLS**

# Sketch of the model

- Caballero-Krishnamurthy (2001), 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 in foreign currency
- Invests domestically at normal-time exchange rate ( $=1$ )
- Liability is short-term, due at  $t=1$ ; cash flows at  $t=2$
- Retrenchment risk (sudden stop/reversal) w.p.  $p$
- In case of retrenchment, the firm liquidates collateral  $L$  domestically, converts to foreign currency at rate  $e < 1$
- Incurs liquidation costs to meet the shortfall of  $L(1 - e)$
- Central bank has reserves  $X$  that are used to act as buyer of last resort of domestic currency in the retrenchment state
- $e = X / L$  ; Bankruptcy cost suffered =  $f(L - X)$

# Fire-sale externality

- Each firm is competitive; so does not internalize the impact of its short-term external liability on the price  $e$
- Price  $e$  increases in reserves  $X$  and decreases in aggregate short-term external debt  $L$
- Privately optimal  $L$ 
  - Declines in  $p$ , 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
  - Beyond a point, less reserves can be more!

# Can the central bank do better?

- Central bank can “tax” short-term external debt to get firms to internalize the cost of reserves and the fire-sale externality (capital controls, macro-pru limits)
- In the extremis, an omniscient central bank can just limit  $L$  to the “right” level
- More realistically, it has to charge a Pigouvian tax that increases in the likelihood of the retrenchment state and liquidation / bankruptcy costs
- Macro-prudential comes first; makes the reserves work!
  - Macro-pru limits the moral hazard channel of reserves
  - Make larger reserves effective as a defense against stops
  - Jeanne and Korinek (2010), Jeanne (2016)

# Heterogeneity among firms

- Sets of firms; set  $i$  faces liquidation in the retrenchment state w.p.  $p_i$
- Lower  $p_i$  captures the relative safety of a firm: larger, more stable, export-oriented firms
- Now,  $e = X / \int_i p_i L_i di$
- Riskier (safer) firms contribute more to the fire-sale externality and over (under) borrow
- Pigouvian taxation:  $\frac{\tau^{F,i}}{\tau^{F,i'}} = \frac{p^i}{p^{i'}}$

# Foreign currency vs local currency debt

- Suppose now that foreigners can also invest in domestic currency debt (locally or abroad)
  - Assume foreign currency debt is cheaper (by  $s$ ) due to accommodative policies abroad or lack of ease for foreigners in bankruptcy
- Foreigners leave domestic markets too in retrenchment state, not rolling over domestic debt (e.g., FPI outflow)
- “Twin crisis”:
  - Kaminsky-Reinhart (1996), Chang-Velasco (2001)
- FPI’s charge ex ante for the fx risk they bear:  $p(1 - e)$   
$$r^D - r \approx s + \phi(1 - e)$$
- In retrenchment state:  $e = X / (L_{foreign} + L_{domestic})$
- Incentive to issue abroad due to cheaper costs (“carry”)
  - Carry trade ignores the fire-sale externality, as before



# 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 markets 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
  - Hence, central bank has to tax both margins of arbitrage
- This way, overall short-term external debt can be kept limited and reserves made to work in sudden stops
- To manage global spillovers, macro-pru on foreign flows into both foreign-currency and domestic-currency debt complement the central bank’s reserves

# **MANAGING CAPITAL FLOWS: THE RBI APPROACH**

# I. Caps on external debt

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

## II. 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

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

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

Source: RBI, DBIE.

## II. 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
- FPI restrictions in the past also included
  - 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

### III. 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.

### III. 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.

# IV. Rationing high-liquidity demanders

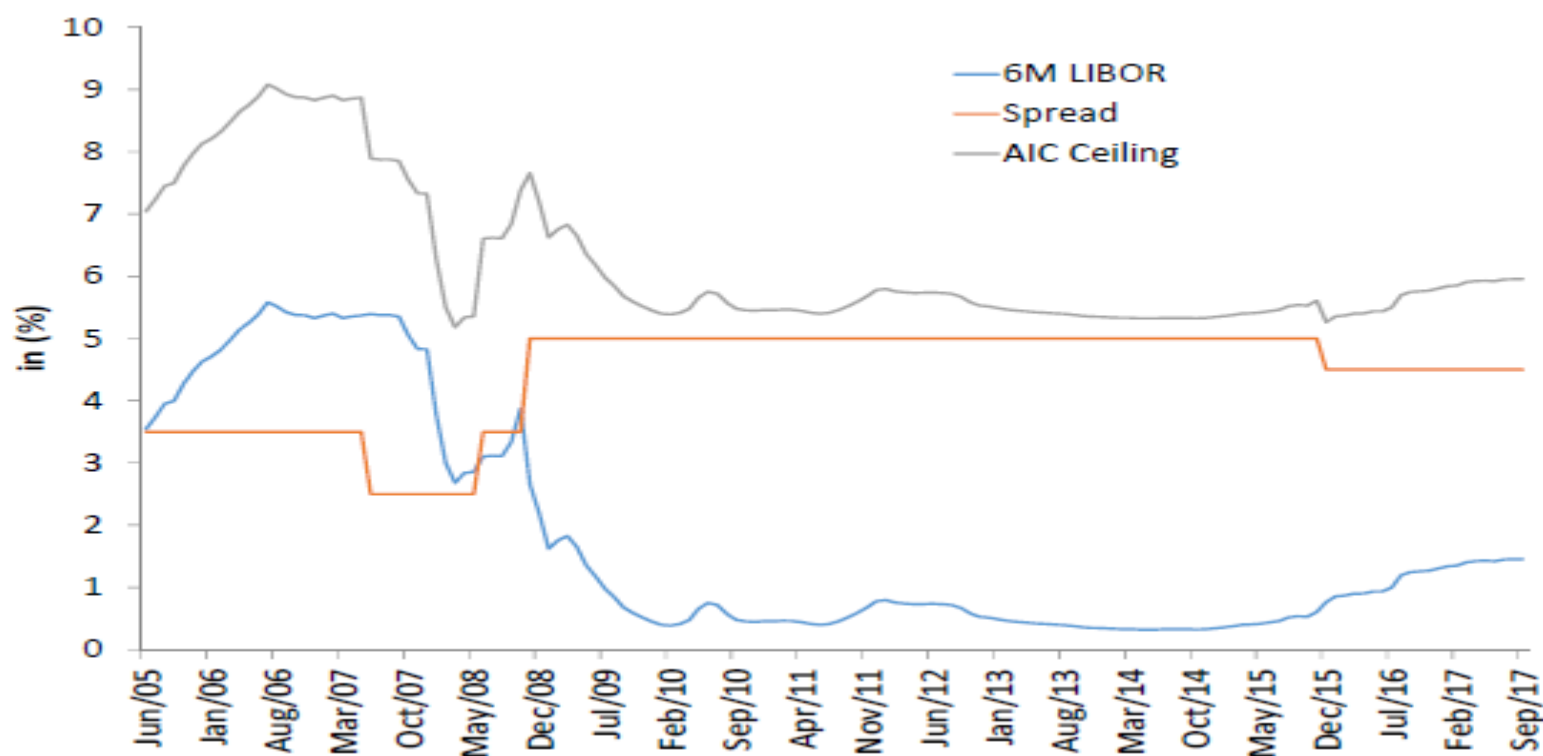
- Only relatively high credit quality borrowers can tap into ECBs:
  - Coupon or “all-in-cost” ceilings by debt issue
  - Imposing sub-limits on investments in risky instruments such as unlisted corporate bonds and security receipts (a form of distressed asset resolution instrument)
  - Ruling out excessive 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.



# V. Harmonizing ECB and Masala Bonds

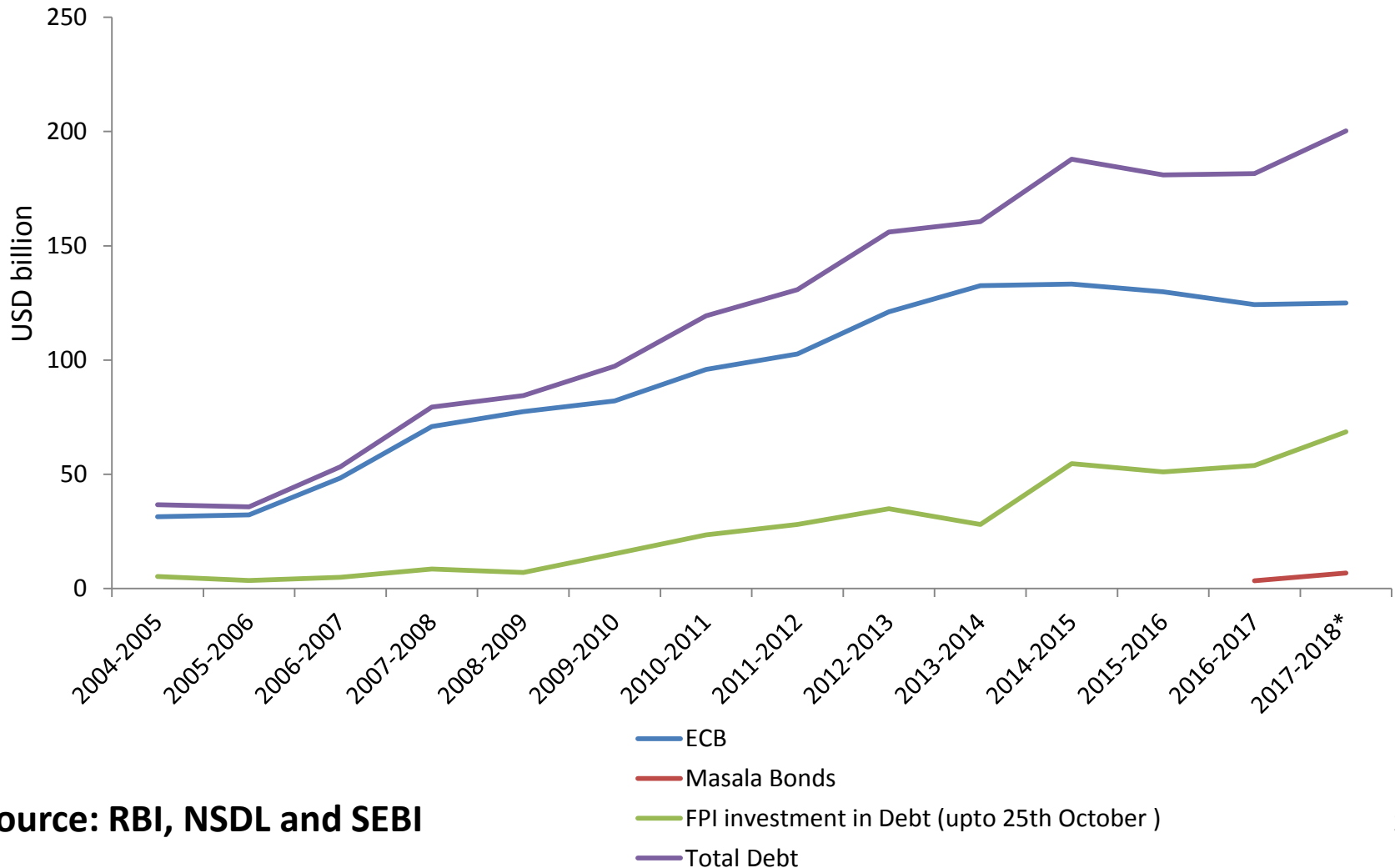
- Masala Bonds envisioned to provide wider access for Indian entities to international debt markets without currency risk
- Guidelines were more relaxed than ECB norms: No restrictions on investors; any corporate eligible to issue; no cost ceiling
- Masala Bonds route gained popularity in the past year as “arbitrage” over ECB and FPI in domestic corporate bonds
  - 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

# Some food for thought...

- Potential arbitrage of capital controls between ECB and FPI in debt markets
  - Should there be all-in-cost ceilings on domestic debt FPI's can invest in?
- Greater linking of FPI and ECB + Masala bond caps to the extent of reserves
  - Conversely, reserves accumulation policy contingent on the external short-term debt
  - Unclear that caps should be linked to the underlying market-size, as in GSEC and SDL case
  - Also caps should be on stocks, rather than flows
- Shouldn't the limits on Long-term investors be larger than for General investors?

# Is there arbitrage across FPI vs ECB?

## Movement in O/S debt stock



Source: RBI, NSDL and SEBI