Facing the Quadrilemma: Reserve Accumulation, Exchange Rates and Monetary Policy in Large Emerging Markets

Fernando Chertman, Michael Hutchison and David Zink

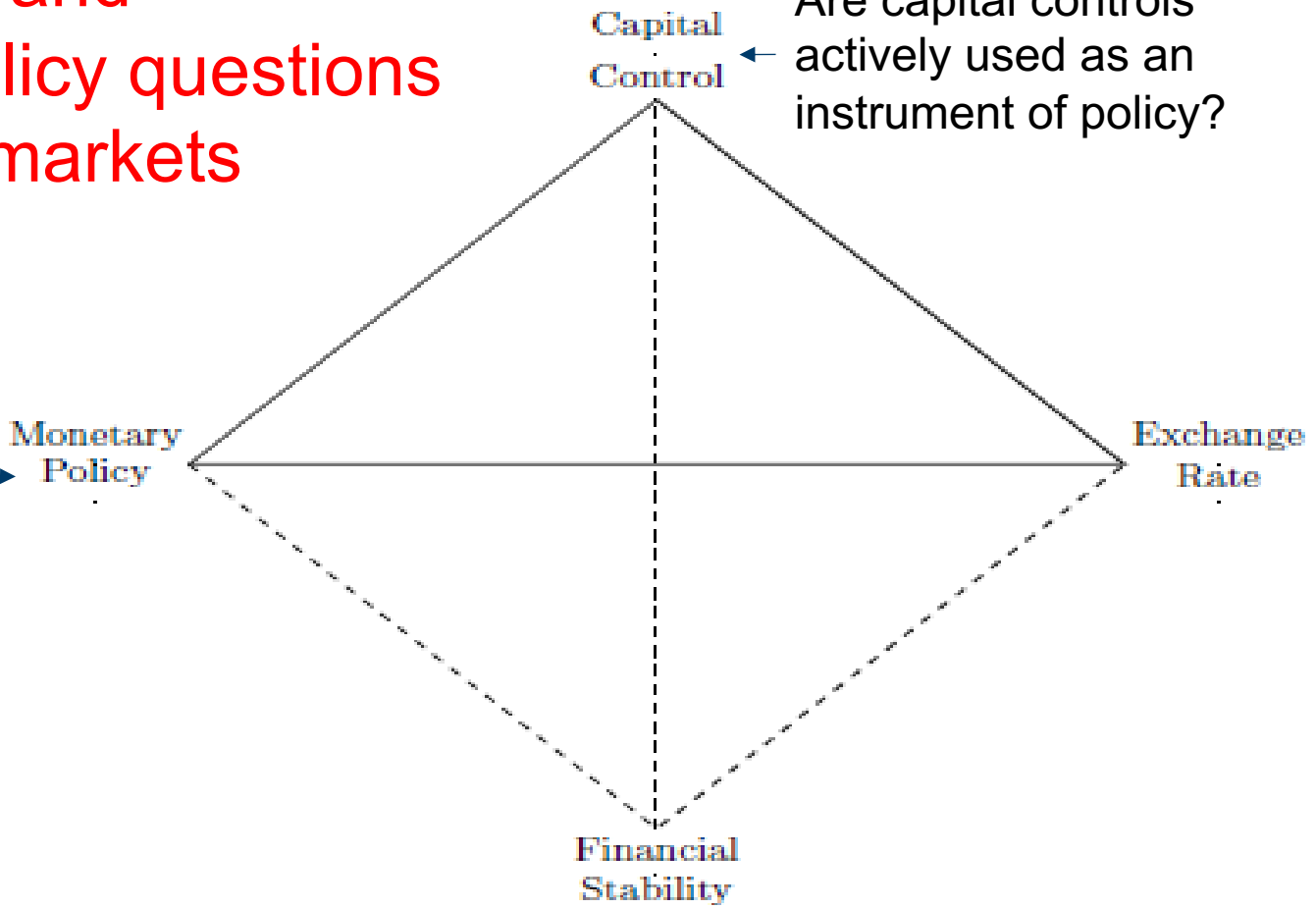
May 2019

UC SANTA CRUZ

Motivation

- How do large emerging markets manage the quadrilemma?

Quadrilemma and associated policy questions for emerging markets



Are capital controls actively used as an instrument of policy?

Is the Taylor rule Targeting inflation, output and exchange rate?

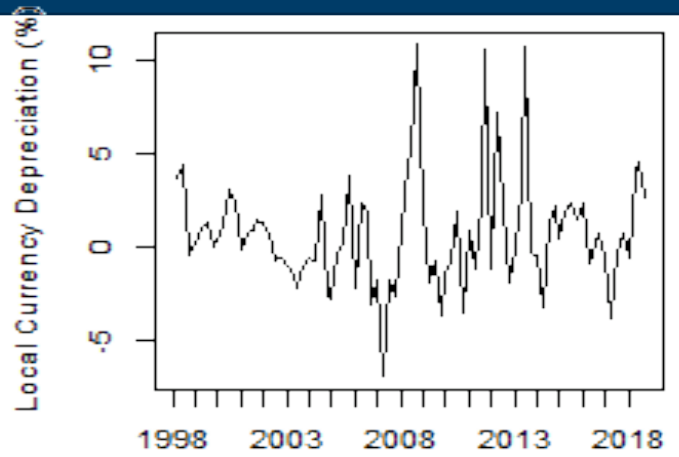
How much flexibility? "Managing" ER by Taylor rule and fx intervention?

International Reserve Accumulation: what is the associated fx intervention policy?

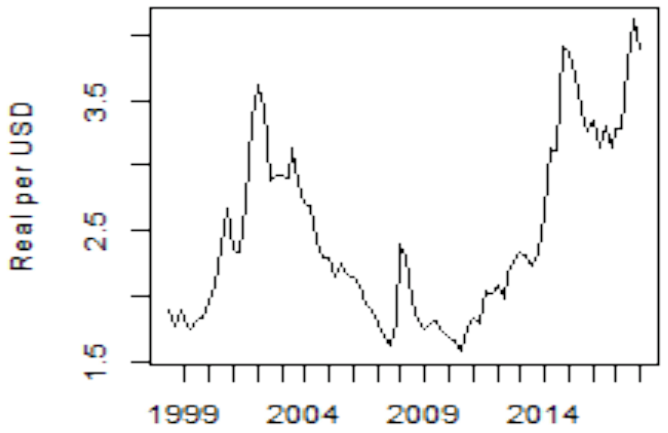
Motivation

- How do large emerging markets manage the quadrilemma?
- Two large EMs– Brazil and India- share characteristics:
  - Flexible but managed exchange rates
  - Active domestic interest rate monetary tool
  - Active fx intervention
  - Large buildup in international reserves
  - Discretionary capital control changes

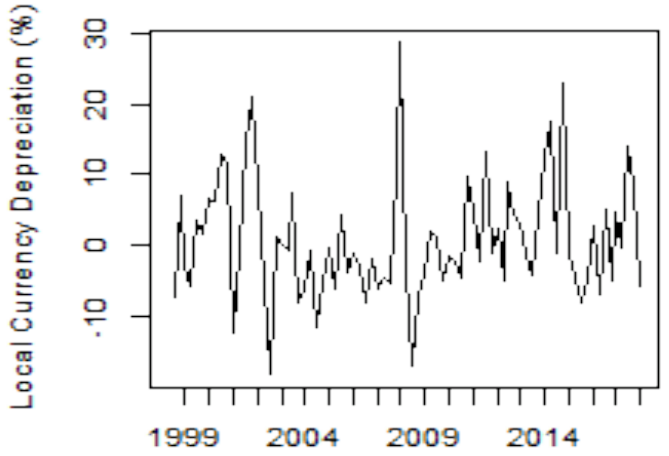
Panel A: India



Panel B: India



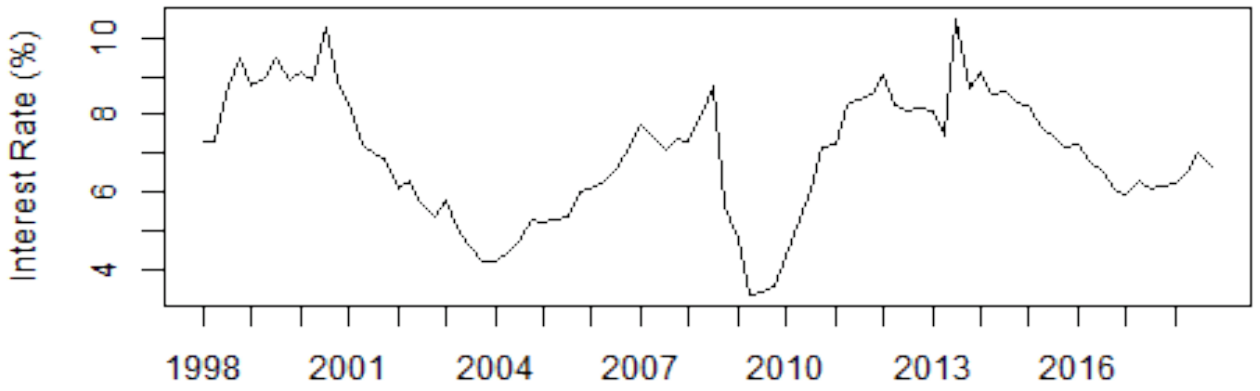
Panel C: Brazil



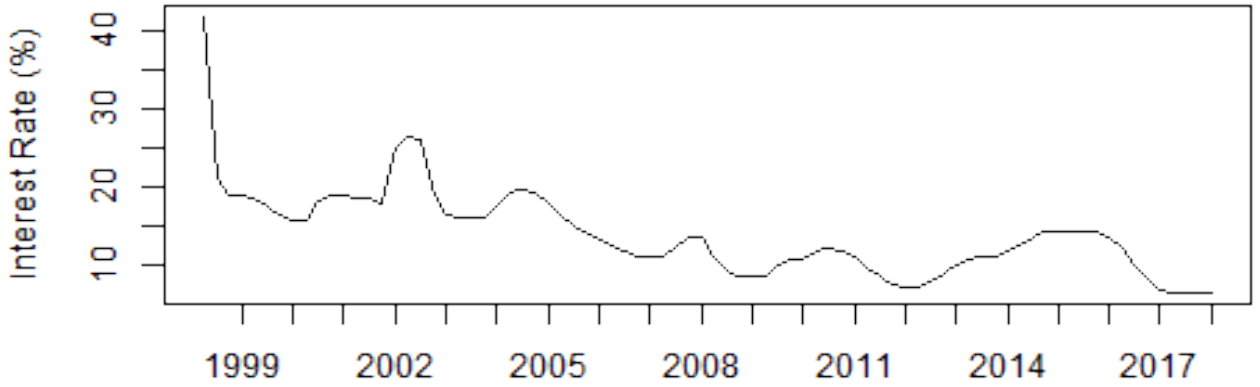
Panel D: Brazil

Motivation

- How do large emerging markets manage the quadrilemma?
- Two large EMs– Brazil and India- share characteristics:
  - Flexible but managed exchange rates
  - Active domestic interest rate monetary tool
  - Active fx intervention
  - Large buildup in international reserves
  - Discretionary capital control changes



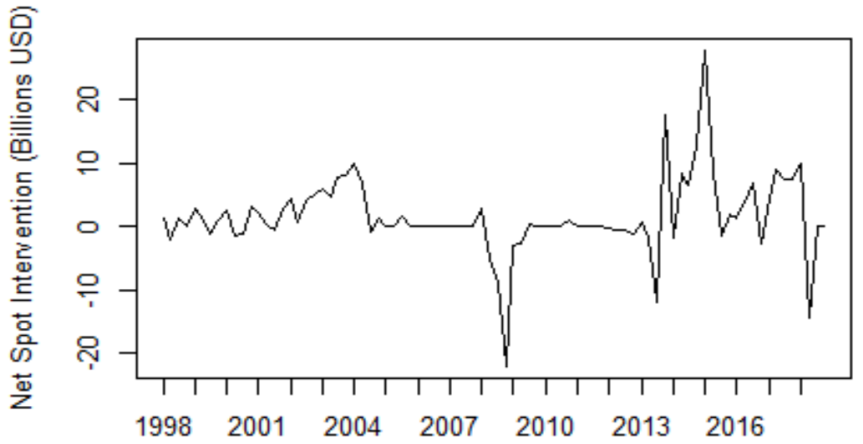
Panel A: India



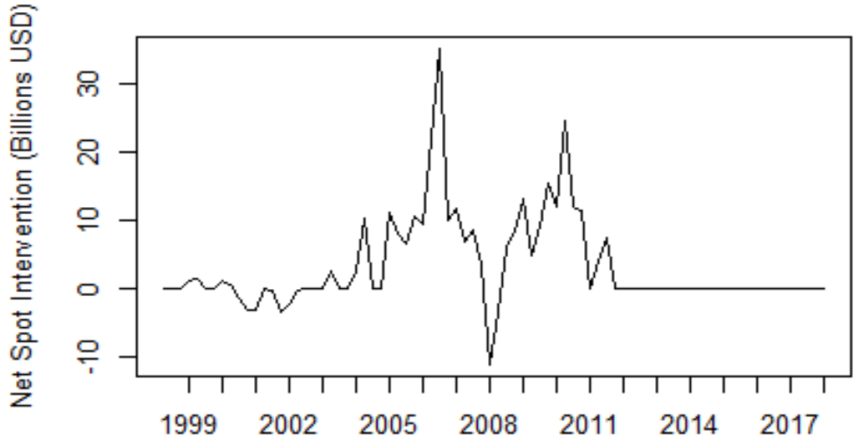
Panel B: Brazil

Motivation

- How do large emerging markets manage the quadrilemma?
- Two large EMs– Brazil and India- share characteristics:
  - Flexible but managed exchange rates
  - Active domestic interest rate monetary tool
  - Active fx intervention
  - Large buildup in international reserves
  - Discretionary capital control changes



Panel B: India



Panel C: Brazil

Form of Taylor rules?
Only domestic or also external objectives?

Motivation

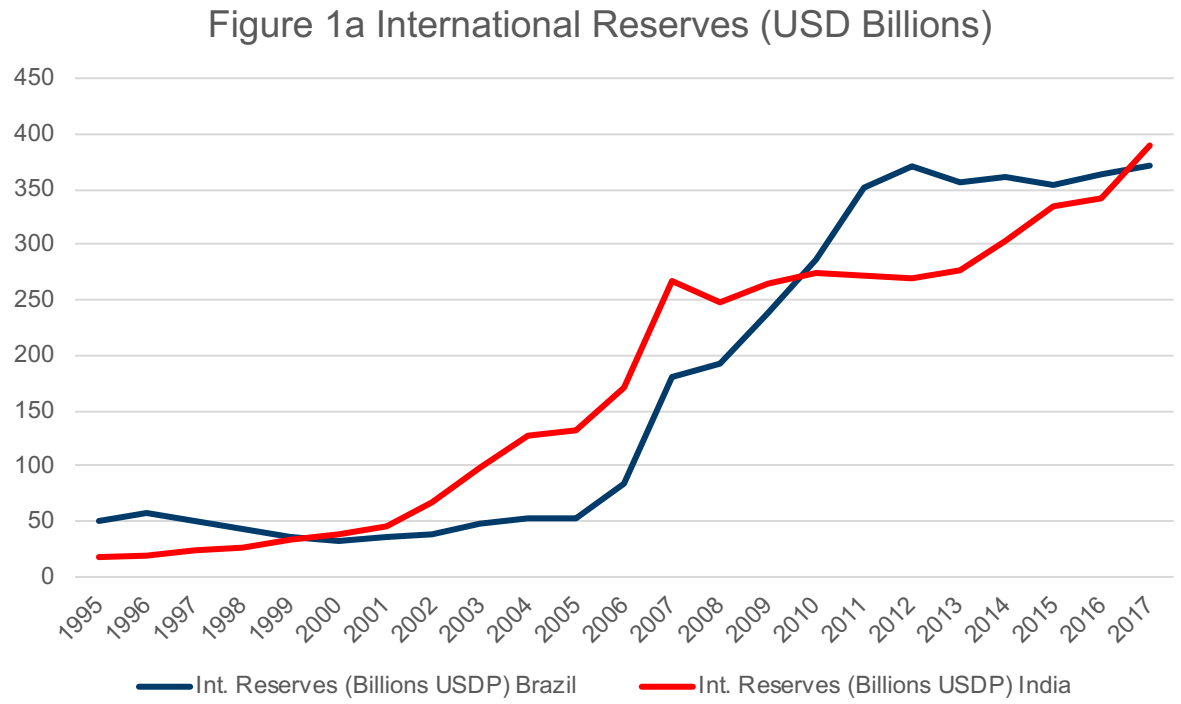
- How do large emerging markets manage the quadrilemma?
- Two large EMs– Brazil and India- share characteristics:
  - Flexible but managed exchange rates
  - Active domestic interest rate monetary tool
  - Active fx intervention
  - Large buildup in international reserves
  - Discretionary capital control changes

Why buildup in so many EMs?

Mercantilist (e.g. BW2…Dooley et al.)

Precautionary (e.g. Aizenman et al.)

Hoarding- Mrs Machlup's Wardrobe and the Joneses (e.g. Cheung et al.0



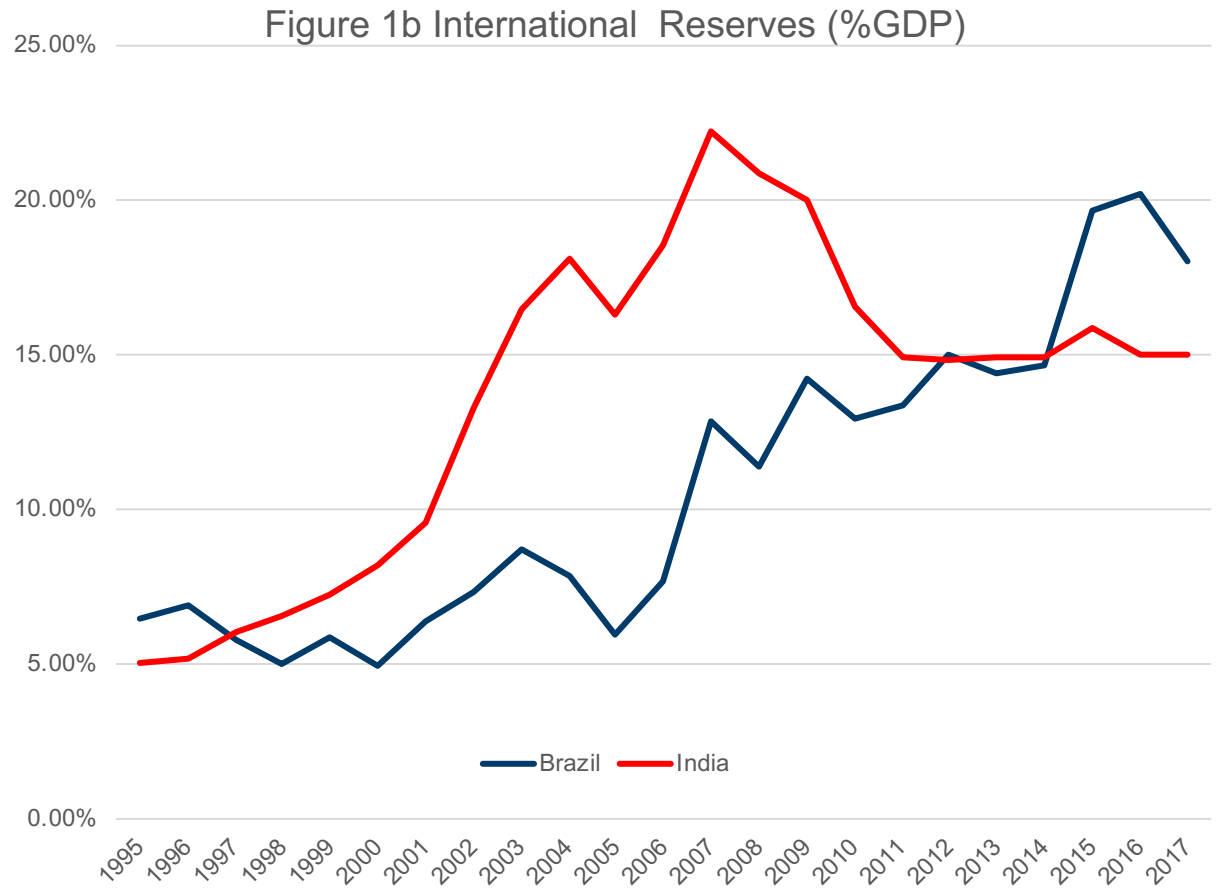
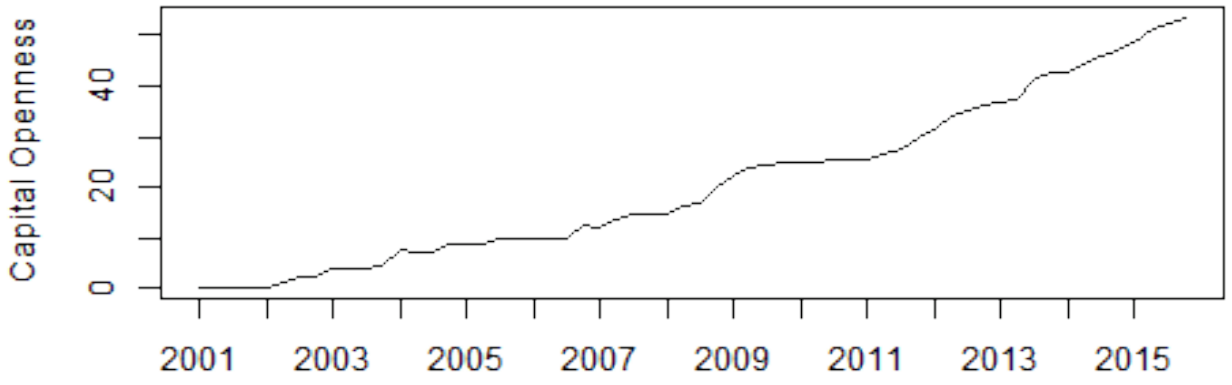


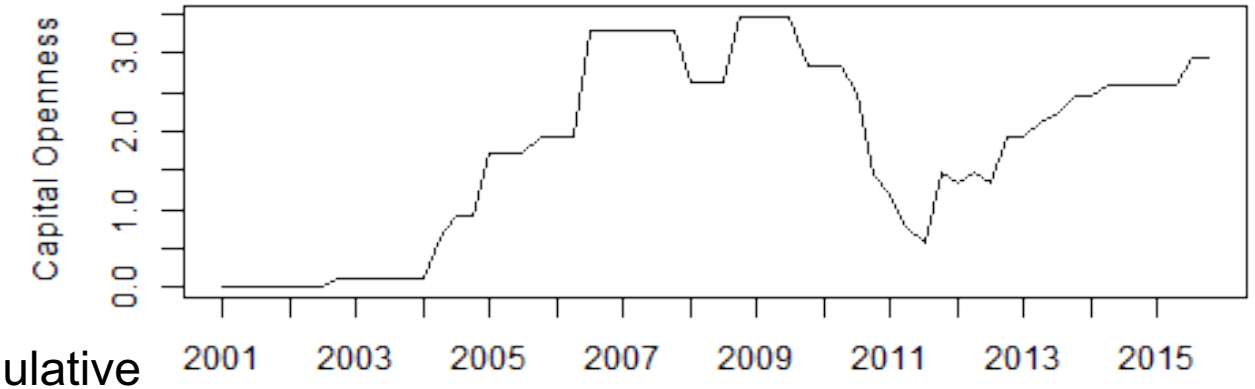
Figure 1b International Reserves (%GDP)
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
Brazil
India
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017

Motivation

- How do large emerging markets manage the quadrilemma?
- Two large EMs– Brazil and India- share characteristics:
  - Flexible but managed exchange rates
  - Active domestic interest rate monetary tool
  - Active fx intervention
  - Large buildup in international reserves
  - Discretionary capital control changes



Panel A: India



Panel B: Brazil

Pasricha et al. 2015
Updated in Pasricha 2017
Net number of changes cumulative given (liberalize less restrictions), not a “level” measure of openness

How do they functionally manage macro policy?

- Facing the quadrilemma

Our approach

- Model
  - Interest rate policy
  - Intervention policy
  - Reserve accumulation identity

- To achieve
  - Internal goals: output and inflation
  - External goals: exchange rates and reserve accumulation (financial stability)

- Complication or complement to policy control? capital controls

Taylor Rule:

$$(1) \qquad \boldsymbol{i_t = \alpha_1 + \alpha_2 (y_t - y*) + \alpha_3 (\pi_t - \pi^*) + \alpha_4 (e_t - e_{t-1}) + \alpha_5 i_{t-1} + \varepsilon_t}$$

i_t is interest rate operating instrument, $(y_t - y*)$ is (log) output less (log) output trend, $(\pi_t - \pi^*)$ is inflation deviation from target, $(e_t - e_{t-1})$ is the (log) nominal exchange rate change. Stabilizing objectives ("leaning against the wind") of output, inflation and the exchange rate suggests that $\alpha_2 > 0, \alpha_3 > 0, and\ \alpha_4 > 0$.

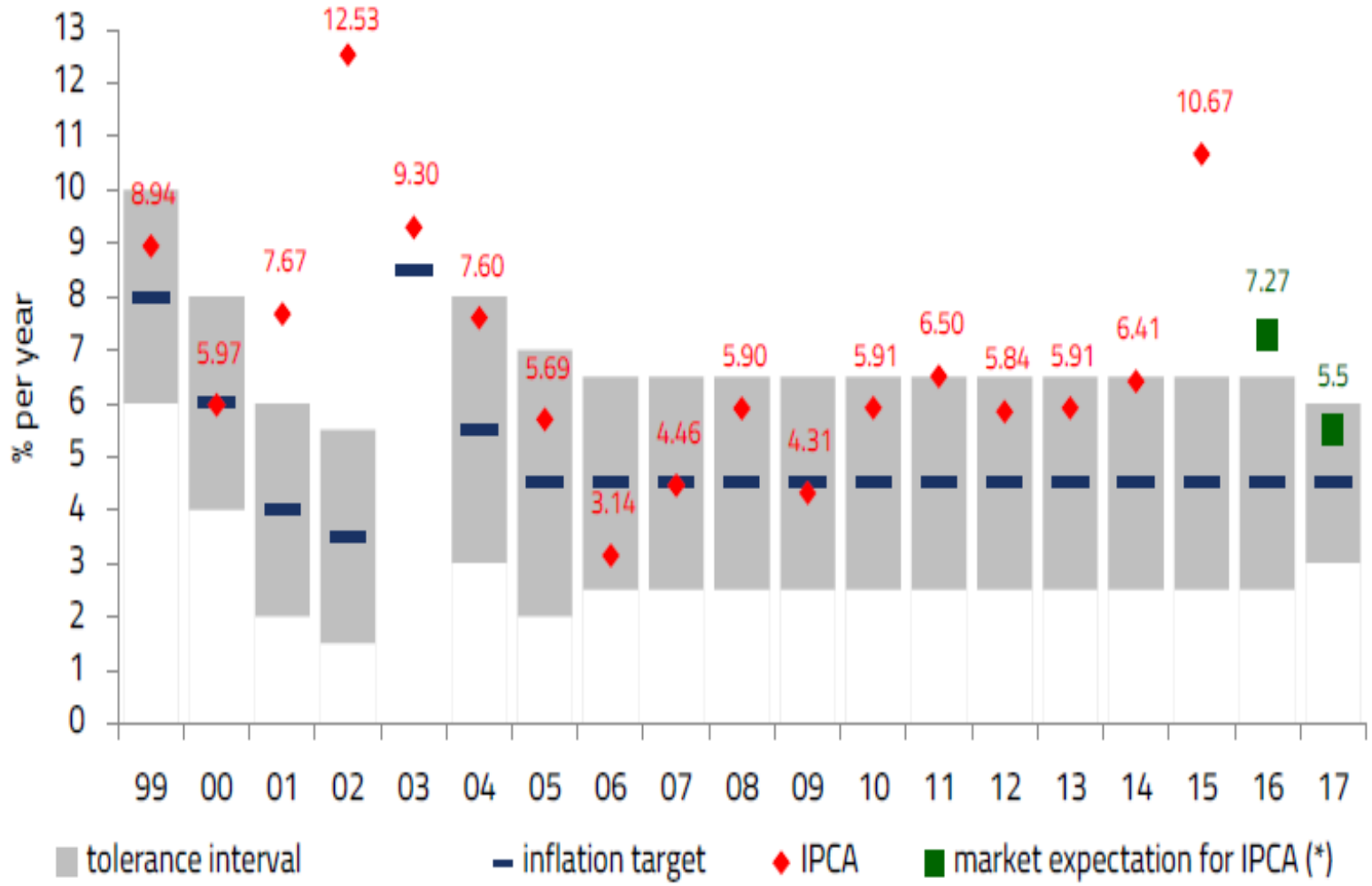
Operational interest rates:

Policy rate: 3-mo. Interbank for India

SELIC rate (overnight) for Brazil

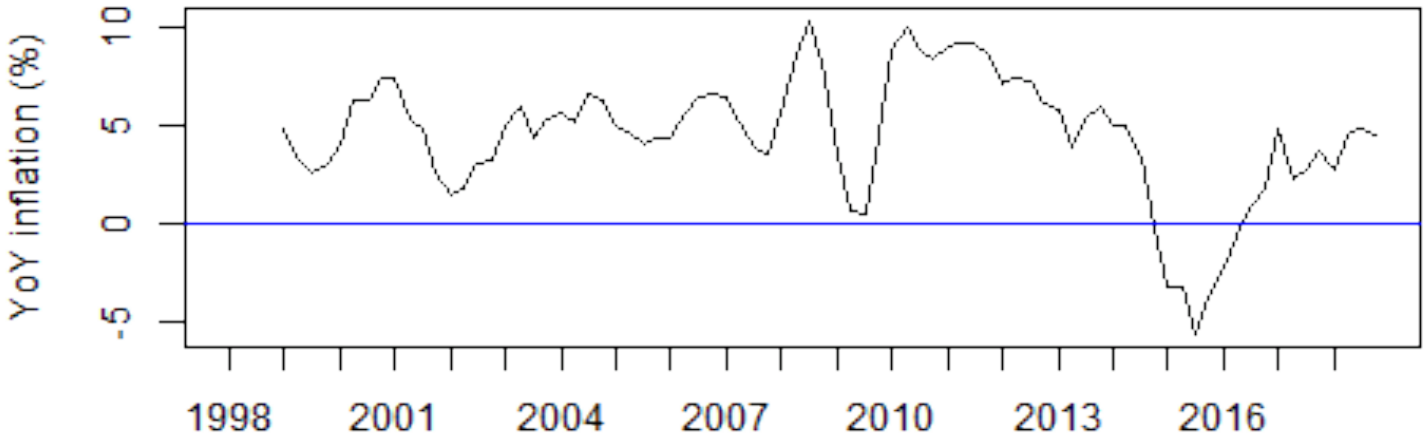
Brazil has an IT regime since 1999, 4.5% target 2005-18

4.25 percent in 2019
4.00 percent in 2020,

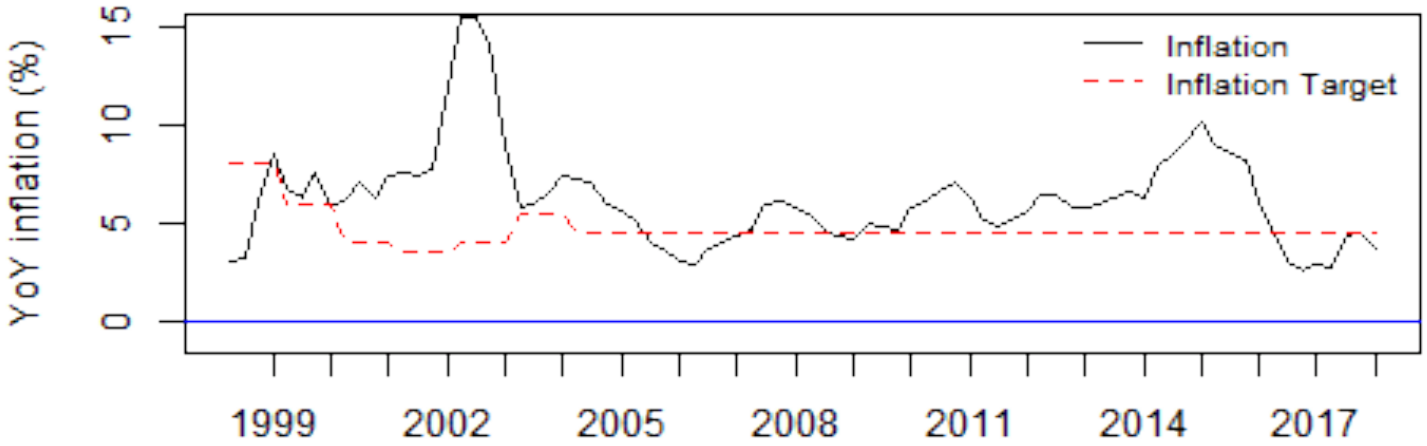


WPI India

IPCA Brazil
(broad CPI
used for IT)



Panel A: India

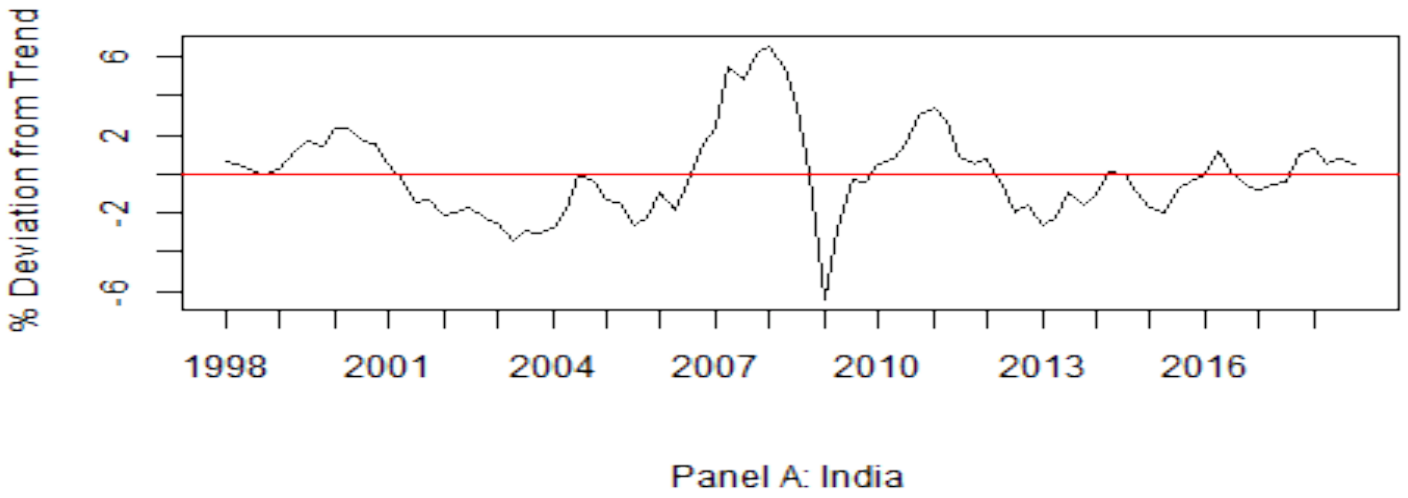


Panel B: Brazil

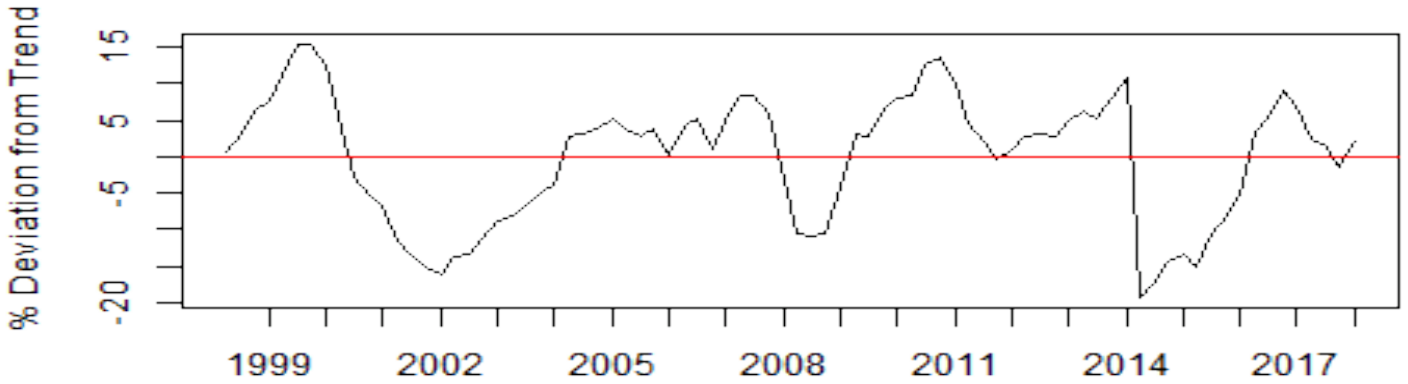
Output Gap

Industrial Production

HP filter, cyclical component



Panel A: India



Panel B: Brazil

Intervention Policy Function:

$$(2) \qquad I_t = \beta_1 + \beta_2 \ (e_t - e_{t-1}) + \beta_3 \ (R_t - R_t^*) + \mu_t$$

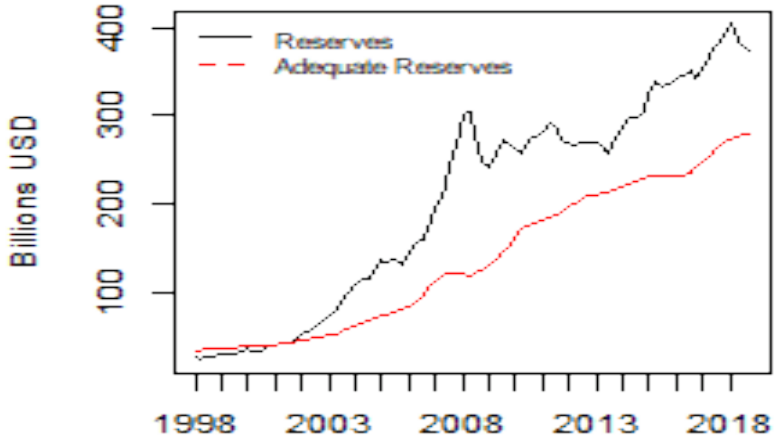
Where I_t is foreign exchange market intervention (USD purchases (purchases of FX positive, sales negative; %last quarter's stock of reserves), $(R - R*)$ is the (log) stock of international reserves less the (log) of reserve adequacy. Foreign exchange sales intervention to slow or reserve exchange rate depreciation $(e_t - e_{t-1} > 0)$ suggests $\beta_2 < 0$. Reserves above the target value suggests foreign exchange sales $\beta_3 < 0$.

What is “adequate” or target reserves?

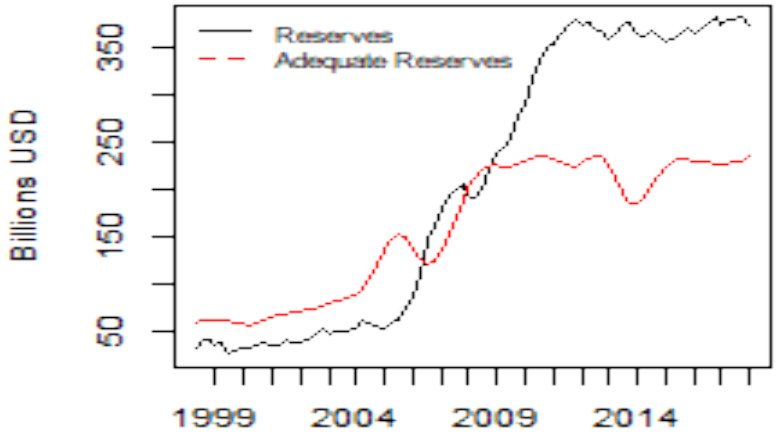
What is operational target of “mercantilist” or “hoarding”?

Easier to proxy “precautionary”…

Using IMF measure of reserve adequacy



Panel A: India



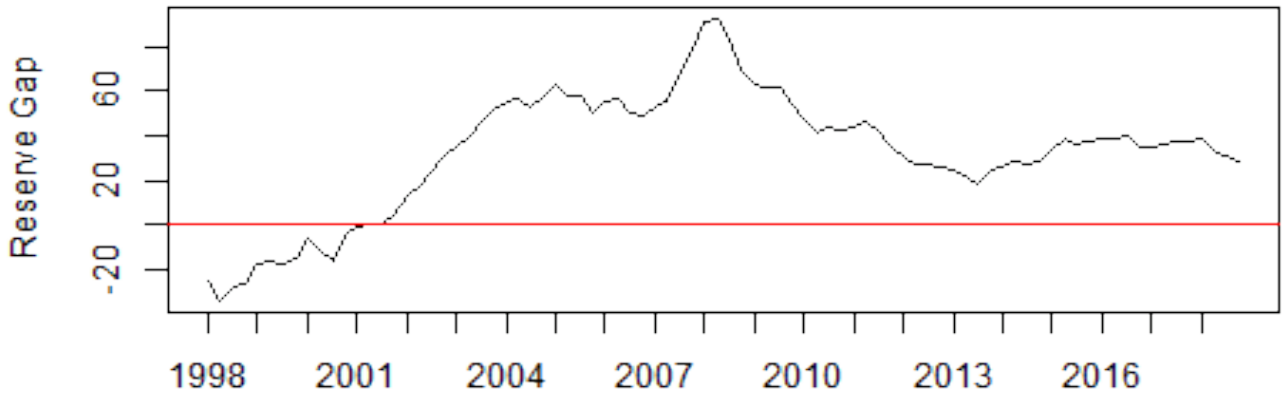
Panel C: Brazil

Reserve Target? If so, what target?

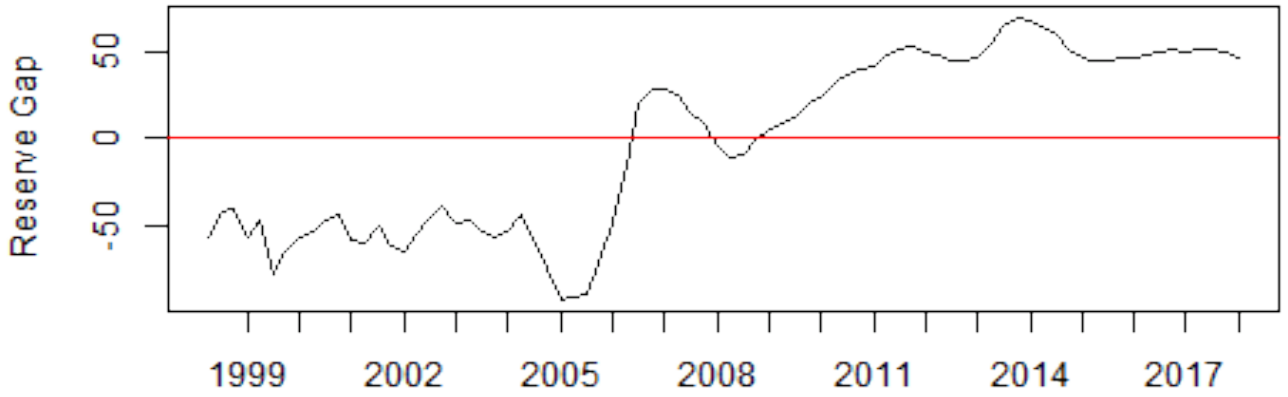
Reserve Target values are from IMF report “Assessing Reserve Adequacy". The institution's work compares the reserve holdings and alternative metrics of reserve adequacy.

This reserves adequacy measure was initially developed in the IMF Board Paper "Assessing Reserve Adequacy" - RAM1 (February 15, 2011), and adjusted in the latest IMF Board Paper "Assessing Reserve Adequacy- Specific Proposals" (December 19, 2014), in order to reflect the outflows during the Global Financial Crisis which were not addressed in RAM1.

Operationally, IMF defines international reserve adequacy (RA) for emerging market economies with floating exchange rates as RA=5%×Exports+5%×Broad Money+30%×Short Term Debt+15%×Other Liabilities.



Panel A: India



Panel B: Brazil

Reserve Accumulation:

Intervention is linked to international reserves through an accounting identify, i.e. the rise (fall) in international reserves equals foreign exchange intervention purchases (sales) plus interest earnings on foreign reserves and valuation changes:

(3) $R_t - R_{t-1} = I_{t-1} + i^*_{t-1} R_{t-1} + VAL_{t-1}$

Estimation of Taylor Rule and Intervention Policy Equations

- Individual time series
- Quarterly time series 1998q1-2018q4
- IV estimation for reserve gap, HAC Newey-West Ses reported
- Allow for policy shift post-GFC

Full Sample Results

Panel A: Interest Rate Policy	Dependent Variable: i_t	
	India	Brazil
c	1.1277***	1.30*
	(0.3943)	(0.7100)
$\hat{Y}$	0.1150***	−0.0000
	(0.0342)	(0.0203)
$\pi - \pi^*$	0.0194	0.7307***
	(0.0194)	(0.2300)
Δe	0.0348	0.0377
	(0.0646)	(0.0345)
i_{t-1}	0.8170***	0.9740***
	(0.0498)	(0.0498)
R^2	0.8321	0.9215
Num. obs.	80	76

Panel B: Spot Intervention	Dependent Variable: I_t	
	India	Brazil
c	3.2275***	2.93**
	(0.7114)	(1.2802)
Δe	−0.4766***	−0.2662***
	(0.1496)	(0.0801)
$R - R^*$	−0.0402***	−0.0311
	(0.0120)	(0.0291)
R^2	0.1319	0.1368
Num. obs.	83	76

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

- India targets output
- Brazil targets inflation
- Little systematic exchange rate targeting using interest rate
- Highly persistent policies

- Both “lean against wind” intervention, India more strongly
- India systematically intervenes to achieve identifiable reserves target

Pre- and Post GFC

Panel A: Interest Rate Policy	Dependent Variable: i_t			
	India		Brazil	
	Pre-Crisis	Post-Crisis	Pre-Crisis	Post-Crisis
c	1.4799***	0.8609	2.51**	1.07
	(0.4983)	(0.5315)	(1.20)	(0.76)
$\hat{Y}$	0.1207*	0.1611***	−0.0000	0.0120
	(0.0651)	(0.0225)	(0.0203)	(0.0112)
$\pi - \pi^*$	−0.0236	0.0353**	0.70**	0.48**
	(0.0537)	(0.0145)	(0.34)	(0.22)
Δe	−0.0242	0.0818	0.10**	−0.01
	(0.0334)	(0.0820)	(0.04)	(0.01)
i_{t-1}	0.7863***	0.8555***	0.91***	0.95***
	(0.0528)	(0.0756)	(0.05)	(0.07)
R^2	0.8486	0.858	0.8515	0.8732
Num. obs.	40	40	36	40

Panel B: Spot Intervention	Dependent Variable: I_t			
	India		Brazil	
	Pre-Crisis	Post-Crisis	Pre-Crisis	Post-Crisis
c	3.5684***	4.6347**	2.36	3.87***
	(1.1493)	(1.8151)	(2.58)	(0.90)
Δe	−0.6624**	−0.3476**	−0.48***	−0.09***
	(0.2975)	(0.1517)	(0.13)	(0.03)
$R - R^*$	−0.0315*	−0.0969**	−0.04	−0.06***
	(0.0170)	(0.0378)	(0.04)	(0.01)
R^2	0.1503	0.1437	0.1016	0.4107
Num. obs.	43	40	36	40

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Confirmation:
- India: output
- Brazil: inflation

New
- inflation targets in India post-GFC

Confirmation:
- “leaning” both periods
- India targeting reserves

New
- Less leaning post-GFC
- Both reserves target post-GFC

How do you pull off target reserves, especially period of buildup of reserves?

- Asymmetric intervention test

Asymmetric intervention during period of large reserve buildup pre-GFC
….but symmetric fx intervention post-GFC

Panel A: Spot Intervention	Dependent Variable: I_t					
	India			Brazil		
	Full Sample	Pre-Crisis	Post-Crisis	Full Sample	Pre-Crisis	Post-Crisis
c	2.57***	3.56***	1.70	1.85**	2.33	0.89
	(0.67)	(0.62)	(1.05)	(0.76)	(1.47)	(0.87)
Δe	−0.70***	−1.11***	−0.42**	−0.23***	−0.36***	−0.03
	(0.19)	(0.07)	(0.20)	(0.08)	(0.12)	(0.06)
Appreciated	1.17	2.31	−0.38	4.60**	9.83***	0.35
	(1.48)	(2.20)	(1.21)	(1.91)	(2.76)	(1.13)
$\Delta e \times$ *Appreciated*	1.44***	2.27***	0.61 ?	0.62**	1.24***	−0.05 ?
	(0.37)	(0.45)	(0.41)	(0.28)	(0.39)	(0.14)
R^2	0.21	0.31	0.17	0.18	0.35	0.06
Num. obs.	83	43	40	79	39	40

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 1: Asymmetric Exchange Rate Intervention

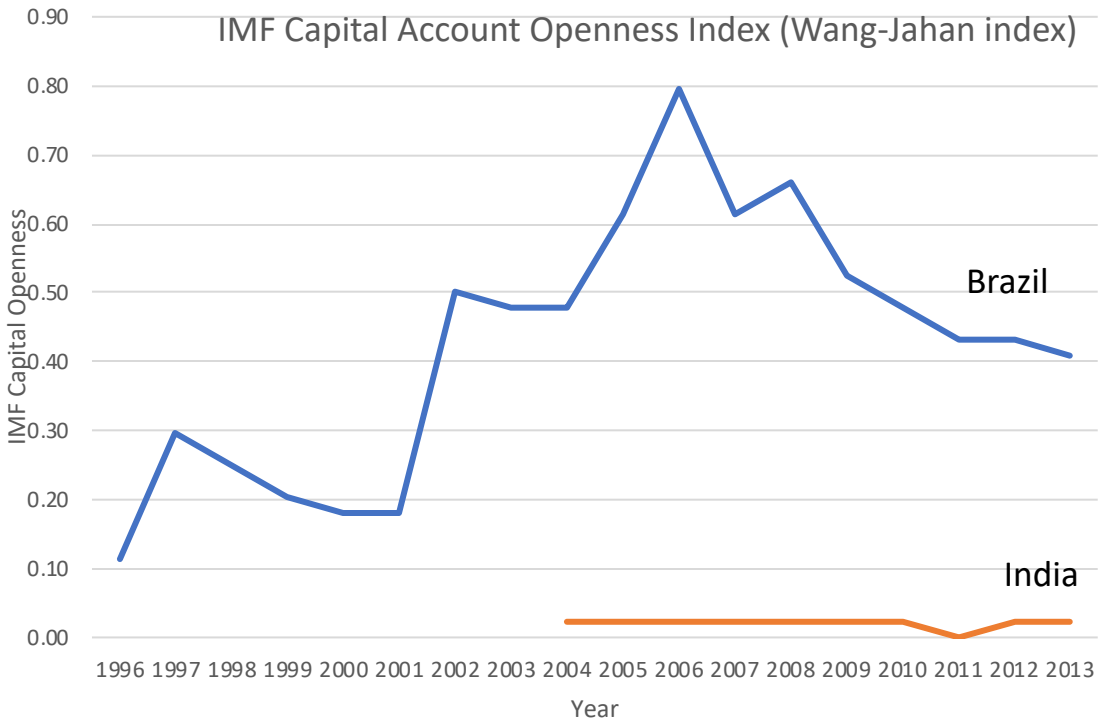
Next Up: capital controls and macro policy

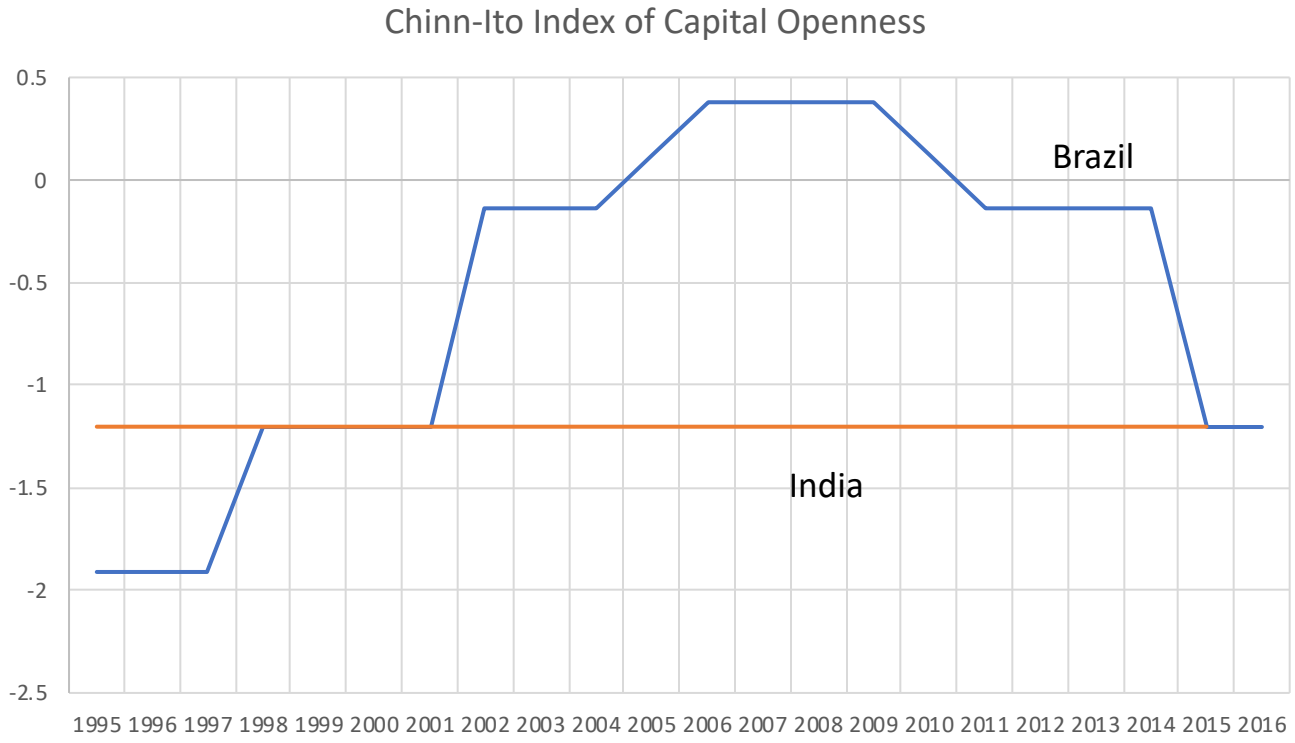
- Our angle: how do fluctuations in capital controls influence monetary management?

- Empirically: has net liberalization been accompanied by closer interest rate linkage with U.S. rates, comprising monetary independence?

Side topic (very important!): How to measure capital controls?

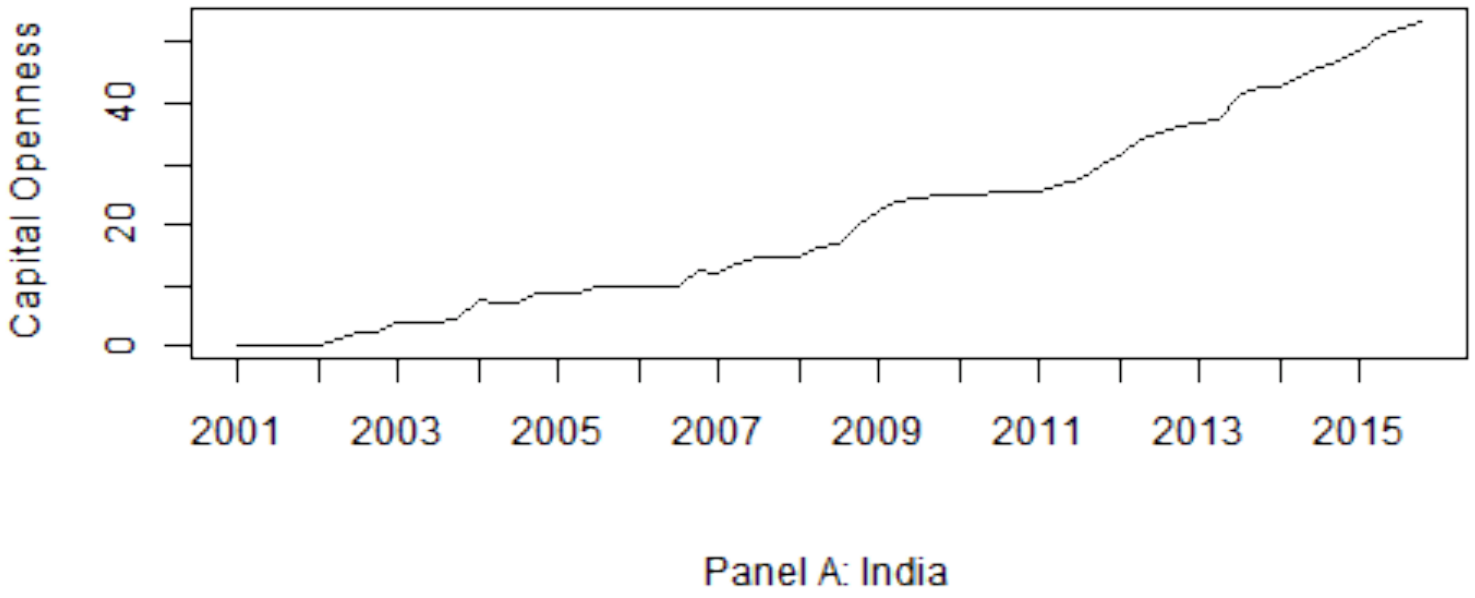
• Chinn-Ito	AREAER-based, level comparison
• IMF (Wang-Jahan)	AREAER-based, level comparison
• Pasricha et al.	Number of net changes (easing measures less restricting measures for aggregate)


IMF Capital Account Openness Index (Wang-Jahan index)
IMF Capital Openness
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Year
Brazil
India

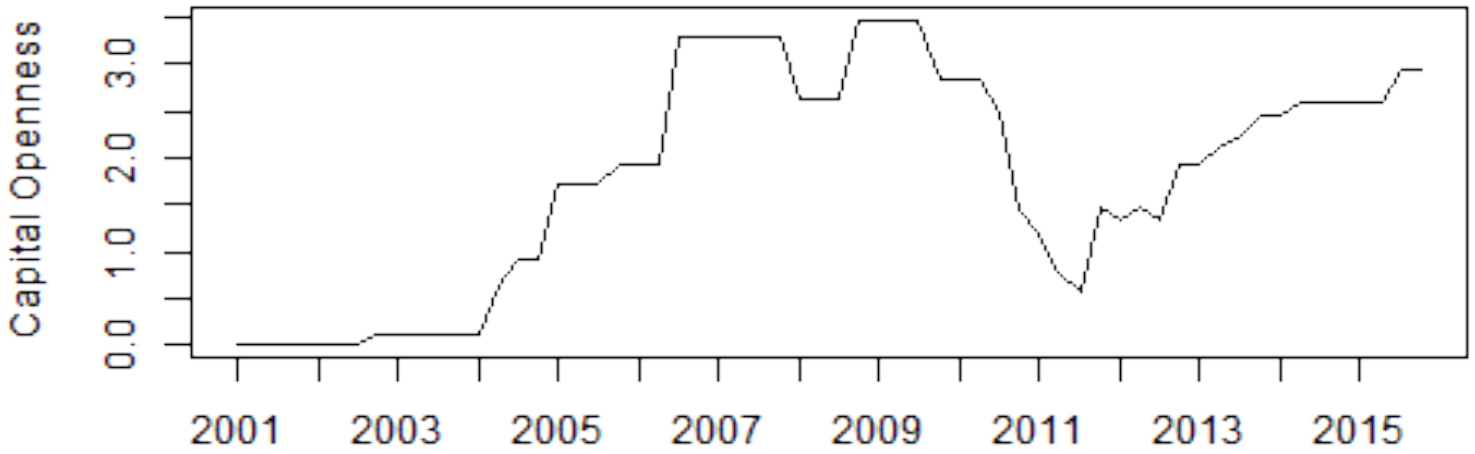

Chinn-Ito Index of Capital Openness
0.5
0
-0.5
-1
-1.5
-2
-2.5
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Brazil
India

Pasricha et al.
Capital Liberalization
Data Set

Number of Net
Easing Measures



Panel A: India



Panel B: Brazil

Panel A: Interest Rate Policy - Pre GFC	Dependent Variable: i_t			
	India		Brazil	
	(1)	(2)	(1)	(2)
c	1.987***	3.2289***	6.4176*	8.8692**
	(0.3249)	(0.8176)	(3.4913)	(4.1772)
$\hat{Y}$	0.1277**	0.2475***	−0.0176	0.0041
	(0.0691)	(0.0578)	(0.0390)	(0.0416)
$(\pi - \pi^*)$	−0.0276	.0909	0.5248	0.5183
	(0.0489)	(.0849)	(0.3105)	(0.3798)
Δe	0.0323	0.0590	0.0089	0.0006
	(0.0336)	(0.0373)	(0.0294)	(0.0279)
i_{t-1}	0.5994***	0.4054***	0.5103*	0.4080
	(0.0455)	(0.1175)	(0.2598)	(0.3249)
i_{US}	0.2474***	0.236***	0.1872	0.2717
	(0.0511)	(0.0473)	(0.2306)	(0.3268)
openness		−0.0809***		−0.6089*
		(0.0284)		(0.3550)
R^2	0.8908	0.8766	0.8198	0.8369
Num. obs.	40	32	32	32

- Pasricha et al. measure
- Only pre-GFC as U.S. rates didn't move in post-GFC
- Greater openness led to lower rates in both India and Brazil….
  - Much more in Brazil

These tables refer to Brazil

Panel A: Interest Rate Policy	Dependent Variable: i_t	
	Pre-Crisis	
	(1)	(2)
c	2.9856**	−1.2779
	(1.3659)	(5.3497)
$\hat{Y}$	−0.0739	−0.1179
	(0.1374)	(0.1439)
$(\pi - \pi^*)$	0.7912	0.7491
	(0.4855)	(0.4430)
Δe	0.0054	−0.0018
	(0.0296)	(0.0410)
i_{t-1}	0.8431***	0.8094***
	(0.1088)	(0.1274)
i_{US}	0.1208	1.1248
	(0.5868)	(1.3762)
IMF openness	−1.5933	7.6095
	(1.6149)	(12.1351)
$i_{US}\times$ IMF openness		−1.9265
		(2.4213)
R^2	0.7933	0.8001
Num. obs.	32	32

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

No systemically link using IMF measure

Ongoing research…

Takeaways

- Complex policies but facing similar constraints
- Taylor Rules: Brazil committed to IT, and India output stabilization
- Intervention policies focused on external stabilization– exchange rates (both) and reserve management (India)
- Identifiable Policy Shifts:
  - India—
    - inflation more important post-GFC
    - Less weight on exchange rate and more on reserves target post-GFC
  - Brazil
    - IT more important pre-GFC, more discretion post-GFC
    - Reserve accumulation objective pre-GFC, targeting adequate reserves post-GFC
- Capital controls complex to measure and difficult to find stable, identifiable linkages with domestic policy constraints

Capital Account Openness Index (April 2016)

The Wang-Jahan capital account openness index is a de jure index that provides information on the state of openness of the capital account based on 12 types of asset categories for 168 countries, of which 60 are low-income developing countries, over the period 1996 -2013. **This index is constructed based on the information contained in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER).** It not only captures the overall openness of the capital account but also provides a breakdown of openness across various types of subcategories: direction of flows (inflow verses outflow), residency (resident verses non-resident), and asset types (for example, equity, bonds, direct investment etc.). The granularity of this index provides researchers and policy-makers new avenues to pinpoint changes in de jure policies with associated changes in de facto capital flows. The large country coverage, particularly of low-income developing countries, allows for an in-depth analysis of each individual country or cross-country comparisons.

Panel B: Spot Intervention	Dependent Variable: I_t		
	Full Sample	Pre-Crisis	Post-Crisis
c	−6.5341	−7.0780	7.6730
	(4.1443)	(5.5368)	(5.3679)
Δe	−0.2275***	−0.2302	−0.1700***
	(0.0833)	(0.1512)	(0.0397)
$(R - R^*)$	−0.0210	−0.0080	−0.0410
	(0.0228)	(0.0409)	(0.0371)
IMF openness	19.9903**	23.0595**	−8.6912
	(8.8857)	(10.5498)	(9.9483)
R^2	0.2687	0.3039	0.2967
Num. obs.	56	32	24

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Panel A: Entire Sample, 1999Q1 - 2018Q4

	India					Brazil			
Statistic	N	Mean	St. Dev.	Min	Max	N	Mean	St. Dev.	Min	Max
i	84	6.98	1.62	3.35	10.52	76	13.447	4.579	6.5	26.500
$\hat{Y}$	84	0.00	2.24	−6.46	6.61	76	−0.207	9.554	−18.712	16.250
π	80	4.56	3.19	−5.68	10.47	76	5.242	3.385	3.025	11.153
$\pi - \pi^*$	80	4.56	3.19	−5.68	10.47	76	0.419	1.023	−1.025	5.685
Δe	83	0.73	3.04	−6.91	10.86	76	1.019	8.498	−17.857	28.557
$R - R^*$	84	33.12	27.68	−34.01	93.13	76	1.244	49.978	−92.475	69.608
I_{spot}	84	1.56	3.89	−8.30	10.14	76	2.63	6.769	−8.816	32.000
I_{total}	84	0.01	11.64	−34.76	26.66	76	2.581	7.12	−11.292	32.000
openness	60	20.76	15.84	0.15	53.73	60	1.802	1.193	0.000	3.490

Panel B: Pre Crisis, 1999Q1 - 2008Q4

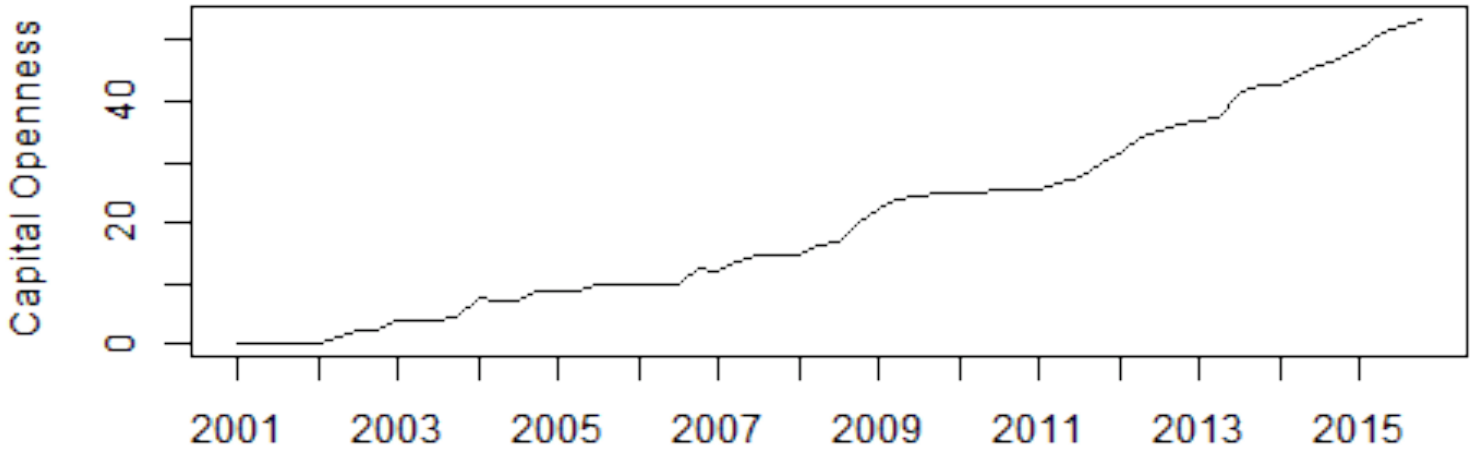
	India					Brazil			
Statistic	N	Mean	St. Dev.	Min	Max	N	Mean	St. Dev.	Min	Max
i	44	6.93	1.63	4.19	10.23	36	16.931	3.775	11.25	26.500
$\hat{Y}$	44	0.25	2.61	−3.43	6.61	36	−0.624	10.049	−17.035	16.250
π	40	4.56	3.19	−5.68	10.47	36	6.268	3.870	3.025	11.153
$\pi - \pi^*$	40	5.15	1.87	1.51	10.47	36	0.546	1.254	−1.025	5.685
Δe	43	0.50	2.87	−6.91	10.86	36	−0.148	8.109	−17.857	20.815
$R - R^*$	44	29.68	36.78	−34.01	93.13	36	−42.709	33.72	−92.475	28.552
I_{spot}	44	2.32	4.79	−8.30	10.14	36	4.263	9.358	−8.816	32.000
I_{total}	44	0.14	11.37	−25.35	23.40	36	3.988	9.801	−11.292	32.000
openness	32	8.07	5.67	0.15	20.36	32	1.409	1.346	0.000	3.490

Panel C: Post Crisis, 2009Q1 - 2018Q4

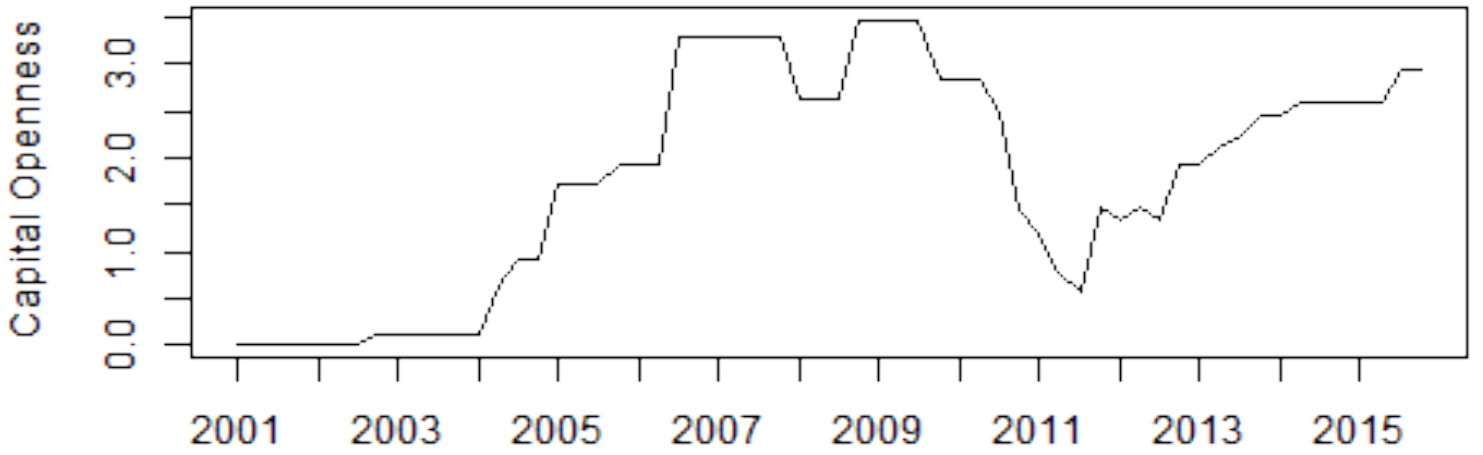
	India					Brazil			
Statistic	N	Mean	St. Dev.	Min	Max	N	Mean	St. Dev.	Min	Max
i	40	7.04	1.63	3.35	10.52	40	10.312	2.5	6.5	14.250
$\hat{Y}$	40	−0.27	1.74	−6.46	3.41	40	0.168	9.198	−18.712	14.710
π	40	3.97	4.05	−5.68	10.12	40	5.057	2.908	3.625	8.741
$\pi - \pi^*$	40	3.97	4.05	−5.68	10.12	40	0.305	0.755	−0.905	2.705
Δe	40	0.98	3.24	−3.86	10.72	40	2.069	8.801	−16.717	28.557
$R - R^*$	40	36.91	10.51	19.07	62.61	40	40.802	19.869	−11.280	69.608
I_{spot}	40	0.72	2.34	−4.56	9.12	40	1.161	2.199	−1.775	8.490
I_{total}	40	−0.16	12.08	−34.76	26.66	40	1.315	2.794	−2.743	8.959
openness	28	35.27	10.11	22.32	53.73	28	2.252	0.798	0.578	3.490

Pasricha et al.
Capital Liberalization
Data Set

Number of Net
Easing Measures



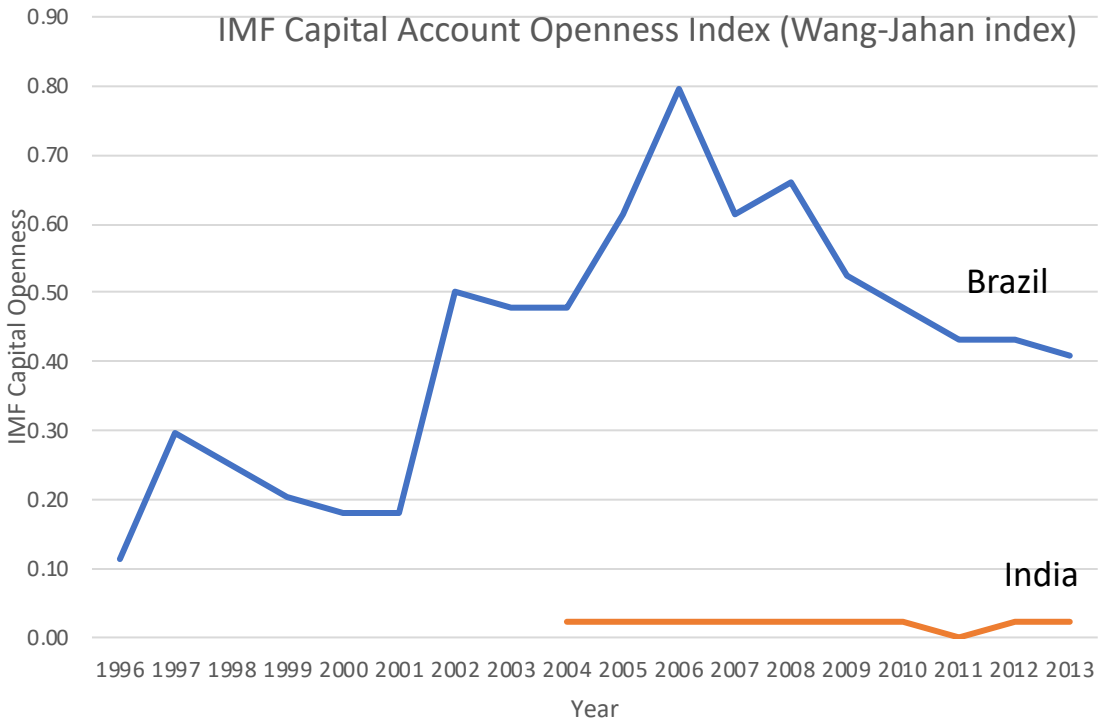
Panel A: India

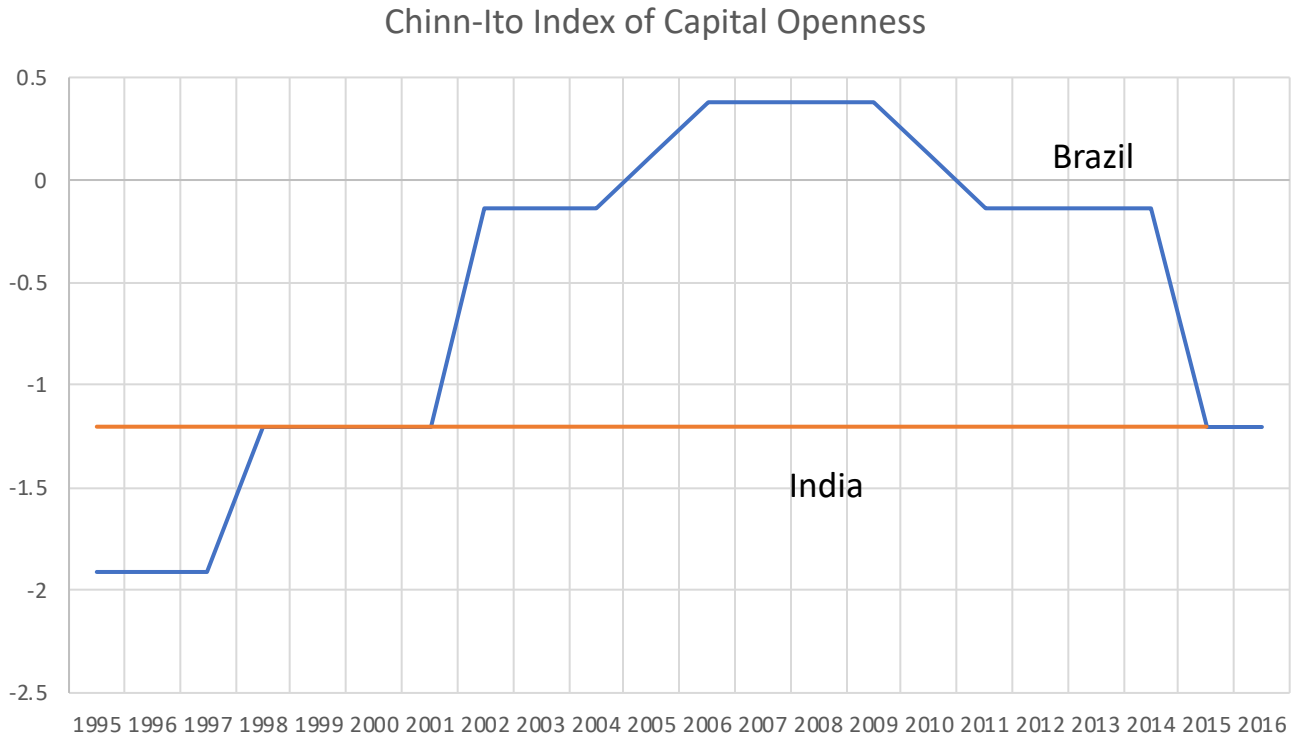


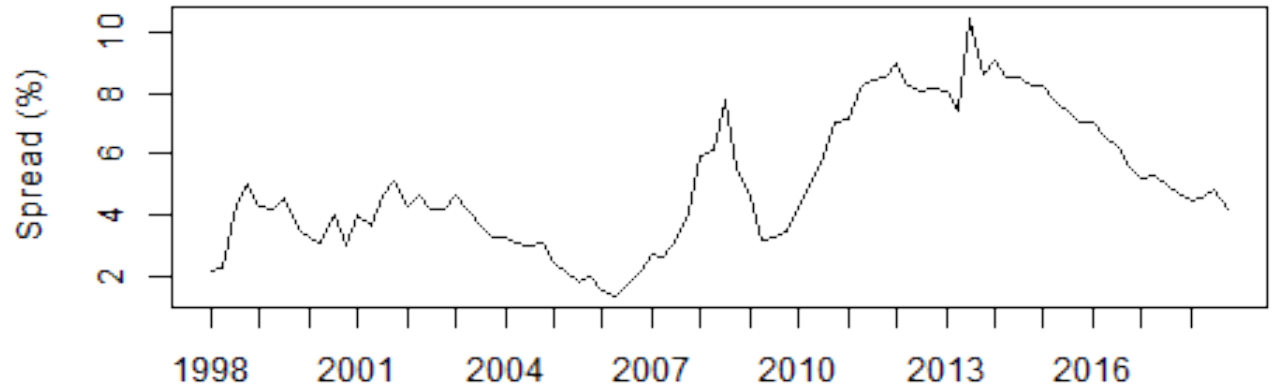
Panel B: Brazil

Capital Account Openness Index (April 2016)

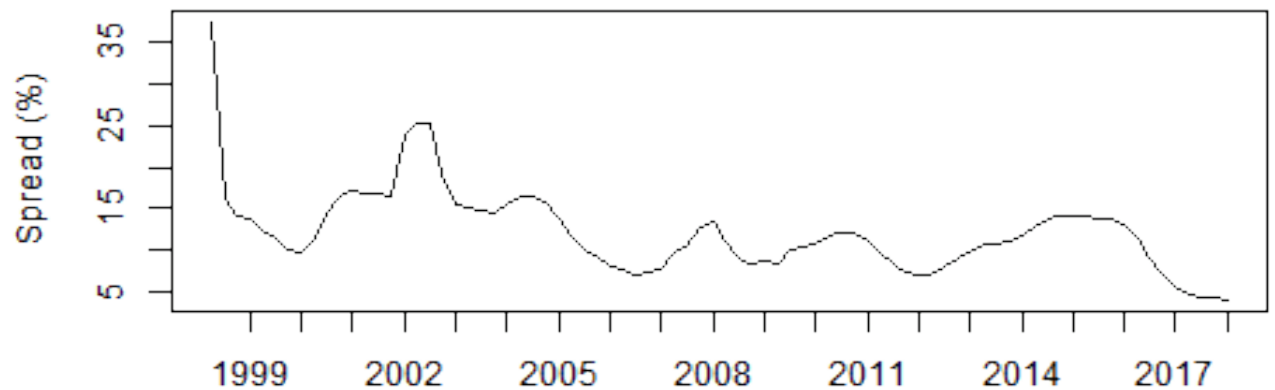
The Wang-Jahan capital account openness index is a de jure index that provides information on the state of openness of the capital account based on 12 types of asset categories for 168 countries, of which 60 are low-income developing countries, over the period 1996 -2013. This index is constructed based on the information contained in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). It not only captures the overall openness of the capital account but also provides a breakdown of openness across various types of subcategories: direction of flows (inflow verses outflow), residency (resident verses non-resident), and asset types (for example, equity, bonds, direct investment etc.). The granularity of this index provides researchers and policy-makers new avenues to pinpoint changes in de jure policies with associated changes in de facto capital flows. The large country coverage, particularly of low-income developing countries, allows for an in-depth analysis of each individual country or cross-country comparisons.


IMF Capital Account Openness Index (Wang-Jahan index)
IMF Capital Openness
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Year
Brazil
India


Chinn-Ito Index of Capital Openness
0.5
0
-0.5
-1
-1.5
-2
-2.5
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Brazil
India



Panel A: India



Panel B: Brazil

Panel A: Interest Rate Policy - Pre GFC	Dependent Variable: i_t			
	India		Brazil	
	(1)	(2)	(1)	(2)
c	1.987***	3.2289***	6.4176*	8.8692**
	(0.3249)	(0.8176)	(3.4913)	(4.1772)
$\hat{Y}$	0.1277**	0.2475***	−0.0176	0.0041
	(0.0691)	(0.0578)	(0.0390)	(0.0416)
$(\pi - \pi^*)$	−0.0276	.0909	0.5248	0.5183
	(0.0489)	(.0849)	(0.3105)	(0.3798)
Δe	0.0323	0.0590	0.0089	0.0006
	(0.0336)	(0.0373)	(0.0294)	(0.0279)
i_{t-1}	0.5994***	0.4054***	0.5103*	0.4080
	(0.0455)	(0.1175)	(0.2598)	(0.3249)
i_{US}	0.2474***	0.236***	0.1872	0.2717
	(0.0511)	(0.0473)	(0.2306)	(0.3268)
openness		−0.0809***		−0.6089*
		(0.0284)		(0.3550)
R^2	0.8908	0.8766	0.8198	0.8369
Num. obs.	40	32	32	32

Panel B: Spot Intervention	Dependent Variable: I_t			
	India		Brazil	
	Pre-Crisis	Post-Crisis	Pre-Crisis	Post-Crisis
c	4.78***	−2.09	−9.39***	8.06***
	(1.35)	(4.51)	(2.14)	(1.77)
Δe	−0.26**	−0.27*	−0.27	−0.00
	(0.11)	(0.16)	(0.20)	(0.02)
$R - R^*$	0.12	−0.02	−0.14***	−0.08***
	(0.10)	(0.05)	(0.03)	(0.02)
openness	−0.97**	0.11	6.17***	−1.50***
	(0.42)	(0.09)	(0.81)	(0.51)
R^2	0.66	0.30	0.49	0.41
Num. obs.	32	28	32	28

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

These tables refer to Brazil

Panel A: Interest Rate Policy	Dependent Variable: i_t					
	Full Sample		Pre-Crisis		Post-Crisis	
	(1)	(2)	(1)	(2)	(1)	(2)
c	0.9760	0.6320	2.9856**	−1.2779	−3.4245	−3.0400
	(1.0712)	(1.9516)	(1.3659)	(5.3497)	(3.7338)	(2.3490)
$\hat{Y}$	−0.0142	−0.0148	−0.0739	−0.1179	0.1863***	0.1907***
	(0.0322)	(0.0346)	(0.1374)	(0.1439)	(0.0544)	(0.0357)
$(\pi - \pi^*)$	0.9332**	0.9336**	0.7912	0.7491	−0.4857	−0.5218
	(0.4139)	(0.4122)	(0.4855)	(0.4430)	(0.3123)	(0.3600)
Δe	0.0302**	0.0298*	0.0054	−0.0018	0.0046	−0.0042
	(0.0144)	(0.0174)	(0.0296)	(0.0410)	(0.0204)	(0.0087)
i_{t-1}	0.9393***	0.9379***	0.8431***	0.8094***	0.4129***	0.3784***
	(0.0802)	(0.0816)	(0.1088)	(0.1274)	(0.0995)	(0.0877)
i_{US}	0.0597	0.1371	0.1208	1.1248	−1.5339	−14.1732*
	(0.1536)	(0.4569)	(0.5868)	(1.3762)	(1.2734)	(6.9147)
IMF openness	−0.4900	0.2694	−1.5933	7.6095	18.5596*	19.0827***
	(0.7449)	(4.0581)	(1.6149)	(12.1351)	(8.9950)	(5.0659)
$i_{US}\times$ IMF openness		−0.1697		−1.9265		19.1731
		(0.8623)		(2.4213)		(11.2279)
R^2	0.9092	0.9093	0.7933	0.8001	0.9204	0.9276
Num. obs.	56	56	32	32	24	24

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$