Motivations for capital controls and their effectiveness

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The views expressed in the paper are those of the authors. No responsibility for them should be attributed to the Bank of Canada.

The role of capital controls: The old consensus

- Pre-2008: Capital account liberalization is an integral part of modernization

  - Capital controls lead to microeconomic distortions, bureaucracy, corruption, lobbying

- From the 1970s onwards, capital account liberalization took place worldwide.

- In 2007, the 61 countries that had a fully open capital account (based on the Chinn-Ito measure) made up 69% of world GDP.

Reopening the debate

- Post-2008: International policy debate on capital controls

- EMEs argue capital controls are "macroprudential"

    - Externalities lead to overborrowing in good times and
      over-reliance on short term debt (Jeanne and Korinek, 2010;
      Bianchi, 2011)

- Others argue capital controls are tools in a "currency war"

- IMF: Capital controls are back in the toolkit.

- By 2013, the number of countries with a fully open capital
  account (based on the Chinn-Ito measure) had dropped to 55.

Back in the toolkit?

Four open questions surrounding the use of capital controls actions (CCAs):

1. Precisely which capital control instruments are bring advocated?

2. Why do policy makers actually wield CCAs - exchange rate or macroprudential motivations?

3. Under what circumstances, and how effective are capital controls?

4. Cost-benefit analysis

This paper makes three contributions to the debate

1. Builds a detailed dataset of capital control actions for one country: India

   - Identifies all the different instruments used in a complex regime

2. Carefully tests exchange rate vs. macroprudential motivations for inflow controls

   - Focus only on capital controls on foreign debt, which might have a macroprudential motivation

3. Tests effectiveness after controlling for selection bias, using Propensity Score Matching (PSM) methodology

Part I

The dataset

The dataset

- India has a comprehensive administrative system of capital controls
- We study every change in controls on foreign borrowing, for the January 2004 to September 2013 period
- Discarded ambiguous actions
- Led to a database with 68 easings and 7 tightenings

- Analysed and classified with the help of lawyers
- More detailed than some recent papers (Forbes, 2013; Pasricha, 2012; Pasricha et al., 2015)

Part II

What motivates the use of capital controls?

Defining "capital controls" and "macroprudential tools"?

- Capital Controls: Regulations on cross-border flows that discriminate based on residency of the transactor.

    - Example: Tax on non-residents' investment in fixed income securities in Brazil

- Macroprudential tools: Those used with the objective of limiting systemic or system-wide financial risk (FSB-BIS-IMF, 2011)

    - Capital controls can be considered macroprudential when they are applied with the objective of limiting systemic risk

   - Use of capital controls to manage exchange rate or overheating pressures is "macroeconomic" not "macroprudential"

Testing Motivations: Variables to test

- **Exchange rate objectives**: Limiting "exchange rate movements"
  1. INR/USD returns
  2. Frankel-Wei residual changes
  3. REER changes

- **Macroprudential objectives**: Limiting "systemic risk" (i.e. to prevent buildup of financial imbalances that can lead to future financial crashes)
  1. Foreign borrowing
  2. Gross capital inflows
  3. Credit to GDP gap
  4. Private bank credit growth
  5. Stock price booms
  6. M3 growth

Testing Motivations: Methodology

1. **Logit Regressions**: Put both sets of variables (exchange rate and others) in a logit explaining easings of controls and see which are significant
   - **Result: Only exchange rate variables are significant in logits**
2. **Event study**: Look for patterns prior to easing and tightening changes: do we see exchange rate appreciation, build-up of financial imbalances?

   - Horizons: Up to 3 months prior for exchange rates and stock prices; upto 6 months prior for others
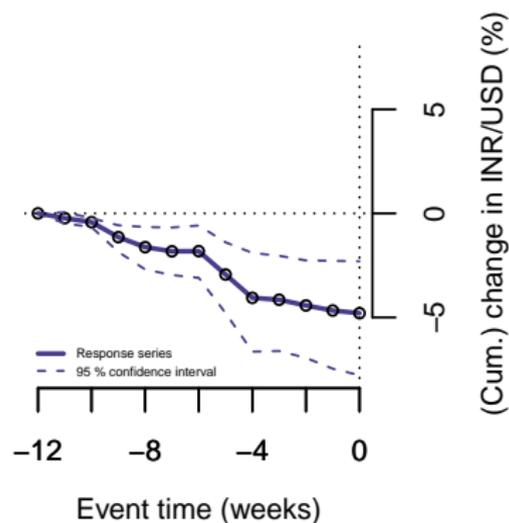   - Robust inference using bootstraps (Kothari and Warner, 2007)

Significant nominal depreciation prior to easing; appreciation prior to tightening of controls

INR/USD returns: Increase = depreciation pressure
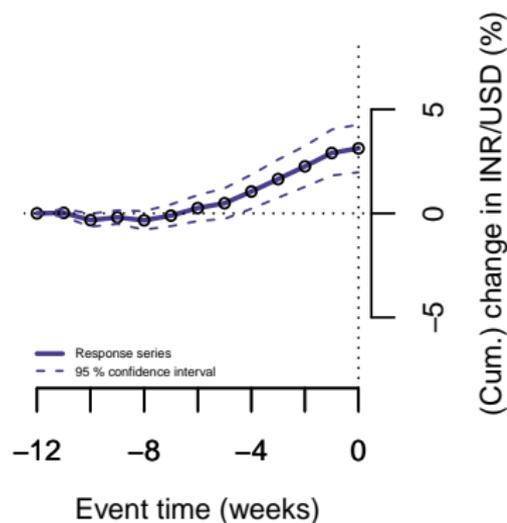
Note: Confidence intervals constructed using bootstraps.

Event study reveals strong evidence for exchange rate motivation

Variable	Estimated trend prior to:	
Exchange Rate Objective	Easing	Tightening
INR/USD Returns	Depreciation	Appreciation
Frankel-Wei Residual	Depreciation	Appreciation
REER	Depreciation	*Appreciation*
Macroprudential Objective	Easing	Tightening
Foreign Borrowing (ECB)	*No Trend*	No Trend
Gross Inflows	No Trend	Increasing
Credit to GDP gap	*Slowing*	No Trend
Bank Credit Growth	No Trend	No Trend
Stock Prices	No Trend	*No Trend*
M3 Growth	No Trend	No Trend

Notes: The table summarizes the statistically significant trends (95%) over 1 month prior to the event for nominal exchange rates and stock prices, and 3 months (1 quarter) prior to the event for the other variables. The significance of trends for variables in italics depends on the horizon considered.

Summary: Motivations for capital controls

- Clear pattern of response to exchange rate depreciations and appreciations

- Evidence less clear for variables that capture macroprudential objectives:

  - These variables not significant in logit
  - Only one-sided evidence for gross inflows
  - Significance of trend for credit-gdp gap and foreign borrowing (prior to easing) and stock prices (prior to tightening) depends on horizon considered

Part III

Consequences of capital controls: Propensity score matching

The puzzle of causal effects

- We observe the outcome after the treatment
- We don't observe the counterfactual
- Key insight: RBI responds to a certain macro-economic situation
- Can we identify moments in time which are similar to those in which the RBI used CCAs?
- Propensity score matching: Estimate a logit that predicts an easing CCA, and identify moments in time which are the control (Angrist and Kuersteiner, 2011)

After matching: No impact of easings on the INR/USD exchange rate
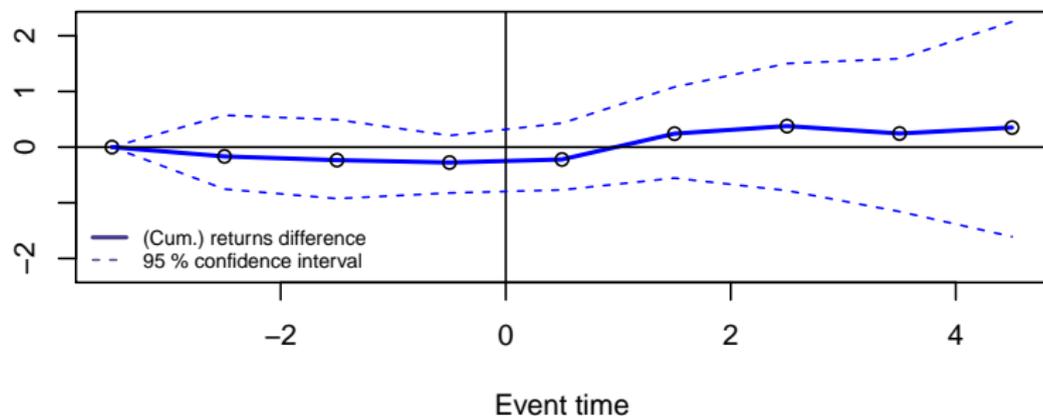
Note: The figure shows the average (cumulative) INR-USD returns difference between the 22 treated and 22 control weeks. Confidence intervals constructed using bootstraps.

No other causal impacts either

Table: Tests of equality of means between treated and control weeks

	Credit growth				FW residuals	
	OLS	Robust			OLS	Robust
1	-0.17 (0.42)	-0.44 (1.7)		1	-0.09 (0.48)	0.28 (0.5)
2	-0.36 (0.45)	-0.36 (0.45)		2	-0.07 (0.57)	0.27 (0.58)
3	-0.41 (0.66)	-0.88 (0.73)		3	-0.04 (0.71)	0.16 (0.94)
4	-0.36 (0.59)	-0.75 (0.48)		4	-0.25 (0.83)	-0.23 (0.92)

	Stock prices				Net foreign investment inflows	
	OLS	Robust			OLS	Robust
1	0.44 (2.01)	0.44 (2.01)		1	0.03 (0.04)	0 (0.02)
2	0.24 (2.4)	0.13 (3.01)		2	0.03 (0.04)	-0.01 (0.03)
3	-0.06 (2.29)	1.38 (12.8)		3	0.03 (0.04)	0 (0.03)
4	-0.08 (2.76)	1.17 (3.55)		4	0.03 (0.04)	-0.04 (0.03)

For 22 matched pairs, the table shows test of equality of means between the treated and control weeks at a horizon of 1, 2, 3 and 4 weeks after the event. Standard errors in brackets

Robustness checks in the paper

Motivations

- Logit Regressions
- Pre- and post-crisis periods
- Different sub-categories of capital controls

Effectiveness

- Adding VIX and reserves to logits
- Pre- and post-crisis periods
- Different sub-categories of capital controls
- Genetic Matching (instead of PSM)

Conclusions

- Evidence of use of capital controls to pursue exchange rate objectives

- Macroprudential motivations less evident in the data

- Capital control actions have no causal impact, even in a country with comprehensive "walls" of capital controls

Part IV

Appendix

Poor measurement of openness has plagued the literature on capital controls

- Low frequency (annual) and rough databases - e.g. Chinn-Ito.
- E.g. is China more open than India?

Chinn-Ito Index of De-Jure Capital Account Openness

Legend: Brazil, China, India, Russia
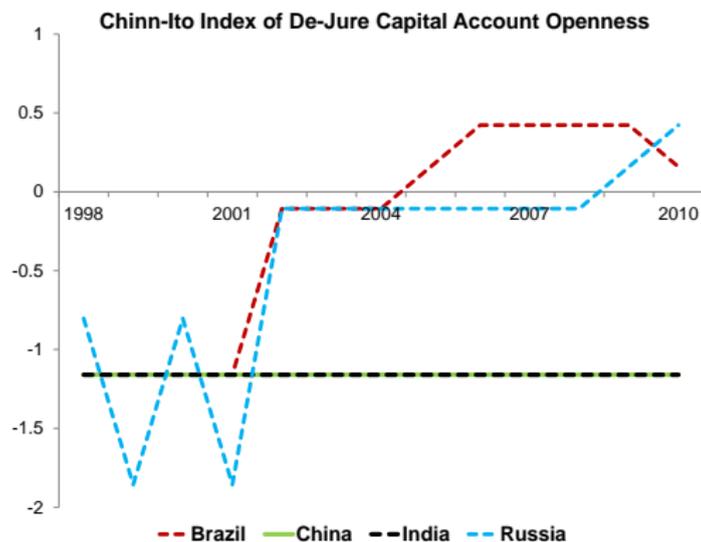
All aspects of foreign borrowing (ECB) are tightly controlled

Eligible Borrowers
Controls on eligible lenders
Amount and maturity restrictions
Price ceiling (All-in-cost ceilings)
Permitted activities with foreign exchange (End-use)
Un-permitted activities with foreign exchange (End-uses not permitted)
Guarantees by financial institutions
Nature of security that can be used by borrowers
Remittance of borrowed funds into India
Early repayment of ECB's
Additional ECB for repayment of ECB's
Interest payment of ECB's
Legal process
Route for distressed corporate entities

A change in our dataset is an easing/tightening of any of these.

Tightening and easing events by type

Variables	Easing	Tightening
Automatic eligible borrowers	12	1
Automatic amount and maturity	8	0
Automatic all-in-cost ceilings	1	1
Automatic end use	6	1
Automatic end use not allowed	0	1
Automatic parking	0	1
Automatic prepayment	3	0
Approval eligible borrowers	17	0
Approval amount maturity	4	0
Approval all-in-cost ceilings	2	2
Approval end use	9	0
Approval parking	0	1
Approval prepayment	1	0
Trade-credit amount maturity	2	0
Trade-credit all-in-cost ceilings	3	0
Total	68	8

Year-wise CCAs

Year	Easing events	Tightening events
2003	0	1
2004	2	0
2005	6	0
2006	2	0
2007	1	6
2008	8	0
2009	0	0
2010	8	1
2011	6	0
2012	20	0
2013	15	0

Example: Comparison with literature

From a 21st May 2007, RBI circular we get three tightening events:

1. The all in cost ceilings were reduced for the eligible borrowers under the automatic route.
2. The all in cost ceilings were reduced for the eligible borrowers under the approval route.
3. The end use restrictions were tightened.

Forbes et. al. (2013) classify these three changes introduced on a single day as one tightening event; Pasricha (2012) and Hutchison, Pasricha, Singh (2013) classify them as *two* tightening events.

Bottomline: A very precise dataset on capital controls.

Logit results: Easings follow exchange rate depreciation.

Dependent Variable: Dummy, Easing of capital controls

	Model 1	Model 2	Model 3 (Monthly)
INR/USD returns$_{t-1}$	0.60*		0.29*
Foreign borrowing (ECB)$_{t-1}$			-0.003
Bank credit growth$_{t-1}$	-0.38	-0.37	-0.37
M3 growth$_{t-1}$	-0.31	0.13	-0.33
Nifty returns$_{t-1}$	-0.05	-0.05	0.00
INR/USD returns$_{t-2}$	0.30		
Bank credit growth$_{t-2}$	-0.02	-0.03	
M3 growth$_{t-2}$	-0.09	0.15	
Nifty returns$_{t-2}$	0.02	-0.03	
INR/USD returns$_{t-3}$	1.21*		
Bank credit growth$_{t-3}$	0.05	0.09	
M3 growth$_{t-3}$	-0.02	-0.23	
Nifty returns$_{t-3}$	0.11	0.06	
FW predicted$_{t-1}$		0.13	
FW residuals$_{t-1}$		0.65*	
FW predicted$_{t-2}$		-0.08	
FW residuals$_{t-2}$		0.29	
FW predicted$_{t-3}$		0.01	
FW residuals$_{t-3}$		0.63*	
N	535	508	85

* indicates significance at $p < 0.05$

Same result with Frankel-Wei residual: Controls respond to exchange rate changes

Increase = depreciation pressure

68 easing

8 tightening

(Cum.) change in FW resid. (%)

Event time (weeks)

Response series
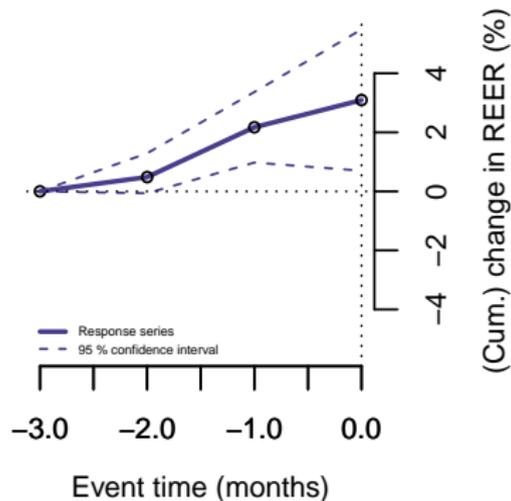95 % confidence interval
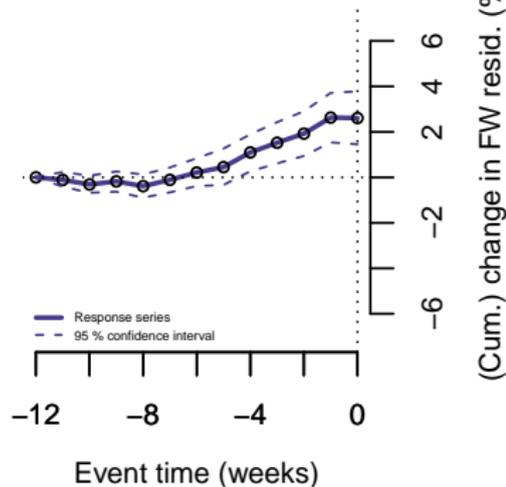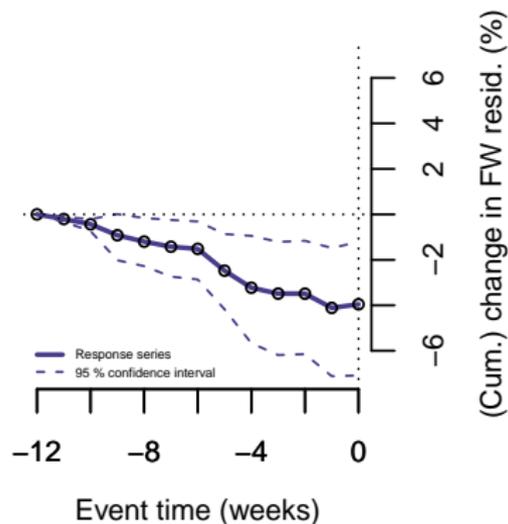
Same result with REER: Controls respond to exchange rate changes
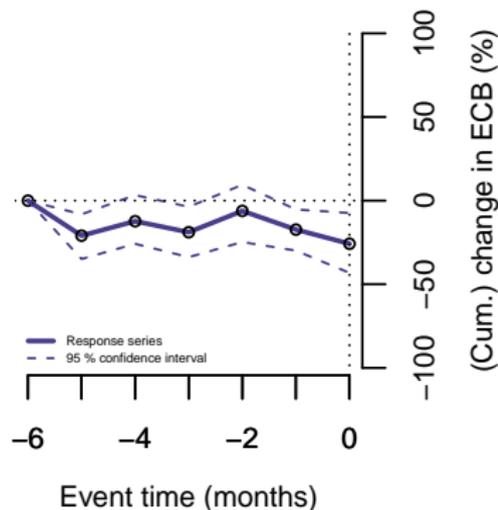
Increase = Appreciation pressure
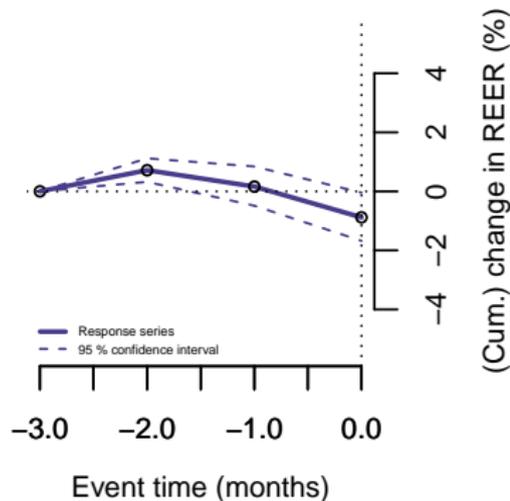
68 easing

8 tightening

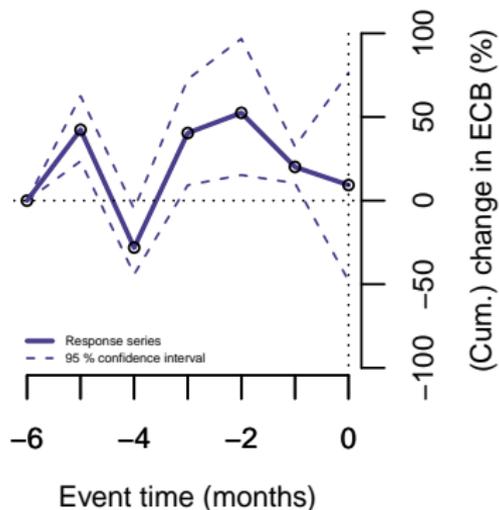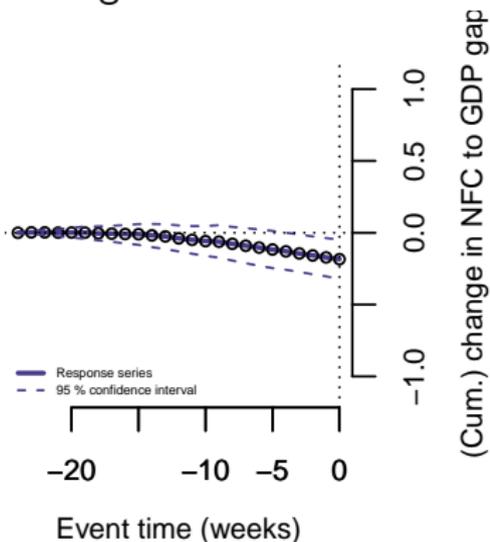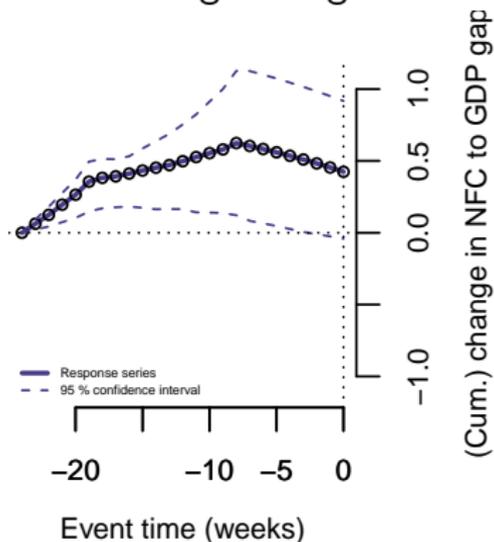# No trend in foreign borrowings prior to tightenings

68 easing

8 tightening

Back

No significant trend in credit-to-GDP gap prior to tightening

68 easings

7 tightenings

(Cum.) change in NFC to GDP gap

Event time (weeks)

Response series
95 % confidence interval

Note: Confidence intervals constructed using bootstraps.

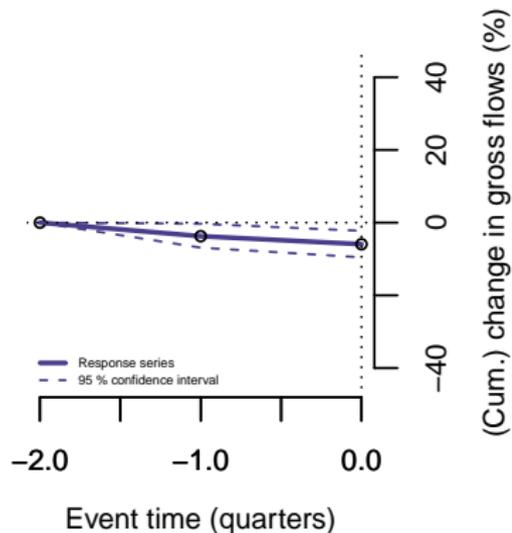# No clear pattern in private bank credit growth prior to control changes
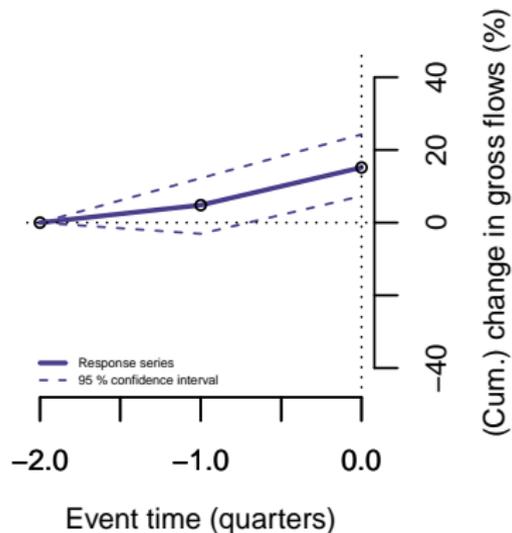

68 easing
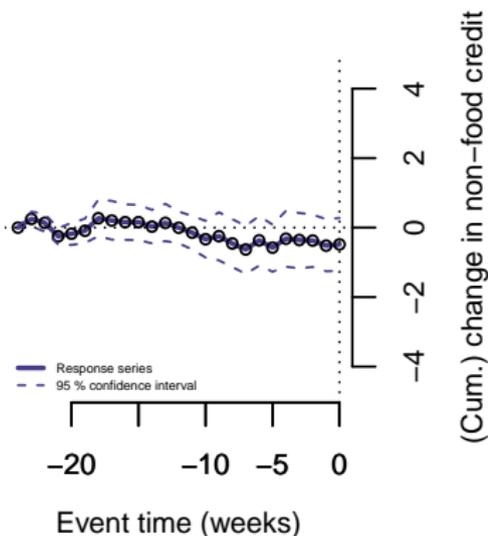
8 tightening

(Cum.) change in non-food credit

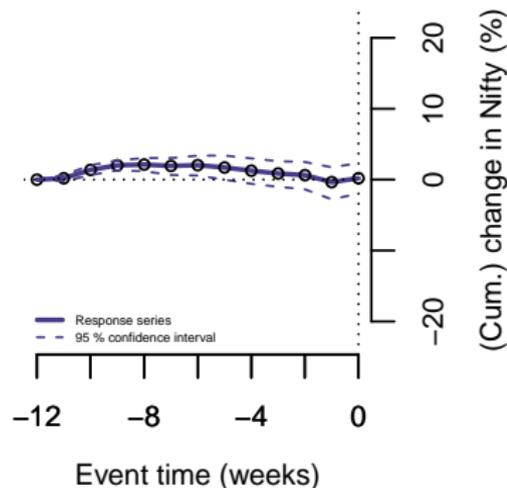Response series
95 % confidence interval

Event time (weeks)

Back
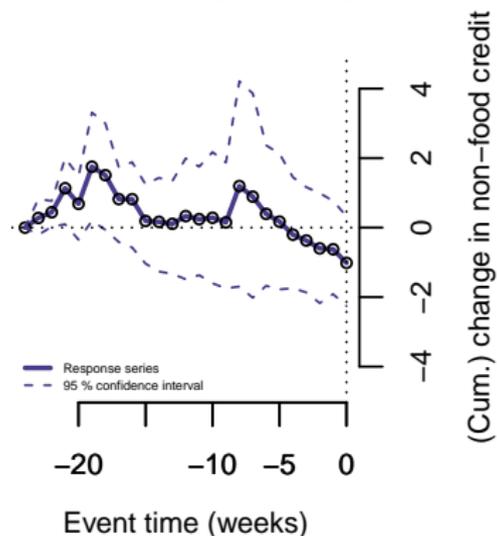
No clear pattern in stock prices in the month prior to capital control changes

68 easing

8 tightening