

Does greater currency flexibility reduce firm exposure?

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What explains pegged exchange rates?

- One rationale for “fear of floating”:
Incomplete financial markets → balance sheet currency mismatches → the government socialises currency risk management.
- One consequence of currency pegging could be moral hazard:
the optimal response by firms, when the central bank gives out such guarantees, is to carry unhedged currency exposure.
- Incomplete markets might encourage the central bank to peg; the peg encourages companies to carry unhedged currency risk, and reinforces the political support for pegging.

Empirical evidence

- Macroeconomic evidence did not find strong evidence that pegged exchange rates induce higher short term foreign currency denominated credit.
- Discerning firm-level phenomena is easiest with firm-level data.
- In Latin America (Kamil, 2006) and East Asia (Parsley and Popper, 2006): more currency flexibility yields reduced currency mismatch.
- In Mexico (Martinez and Werner, 2002): shift from fixed to floating gave more hedging.

Either hypothesis could be true for India

- In India currency spot and derivatives markets are weak and capital controls exist.
This suggests high currency risk owing to incomplete markets.
- The Indian rupee has been pegged to the US dollar.
This should induce high currency risk owing to moral hazard.

Harness a unique natural experiment

- India provides a unique natural experiment, where we can study the response of a set of firms placed under alternating high and low volatility phases of a pegged exchange rate regime.
- The rupee has been pegged to the USD in the period 1993-2006, but four distinct periods of significantly different currency volatility can be identified.
- We observe a fixed set of firms through three significant changes in currency flexibility.

Predictions

- If the incomplete market hypothesis were true: **we would find that whether the currency volatility was high or low, unhedged currency exposure of firms remains unchanged.**
- If the moral hazard hypothesis were true, and firms carry currency risk in response to the flexibility of the currency: **we should find that periods of low volatility have high unhedged currency risk, and vice versa.**

Preview our main finding

- Firms modify their risk exposure sharply in response to changes in the exchange rate regime.
- There is also evidence of homogeneous exposures by firms - of firms that appear to think there is a one-way directional bet at certain times.

Structural breaks in the exchange rate regime

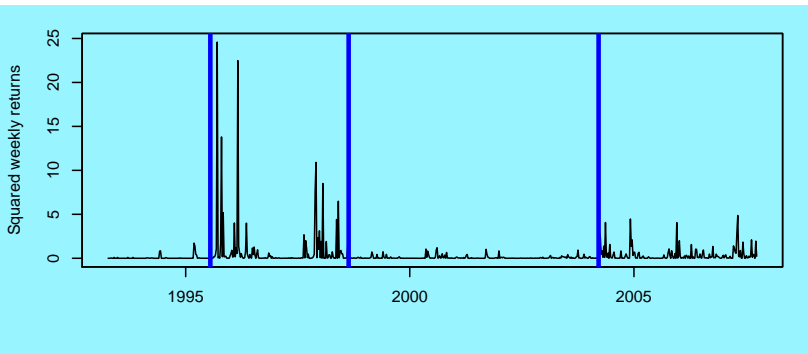
Draws on the work of Achim Zeileis, Ajay Shah, Ila Patnaik.

Structural breaks in currency flexibility

	Dates	INR/USD Weekly vol.	Δ Reserves Bln. USD / yr
1	1993-04-01 - 1995-02-17	0.16	6.93
2	1995-02-17 - 1998-08-21	0.93	1.39
3	1998-08-21 - 2004-03-19	0.29	14.81
4	2004-03-19 - 2007-02-12	0.61	27.50

Currency vol ranging from 0.16 to 0.93 - a good experiment.

Squared weekly returns on INR/USD



Measuring currency exposure

Financial statement data is inadequate for measuring firm exposure.

- A company's direct export and import data may be incomplete if companies operate through local third parties.
- Economic exposure owing to import parity pricing is not measured.
- Balance sheet data from annual accounts is often incomplete in terms of foreign liabilities.
- Disclosures about currency derivatives are often inadequate.

Measuring currency exposure through stock market returns

- We focus on the 100 most liquid firms of India.
- For these firms, there is an active speculative market where all kinds of information is impounded into the price.
- If a firm has currency exposure, the stock price will go up (or down) when the exchange rate changes.
- Example: In the last few weeks, all major IT firms have complained about INR appreciation affecting profit.

Estimation strategy

- Augmented market model:

$$r_j = \alpha + \beta_1 r_{M1} + \beta_2 r_{M2} + \epsilon$$

r_j measures firm returns

r_{M1} measures market index movements

r_{M2} measures currency fluctuations

If an exporting firm is unhedged and gains when there is a currency depreciation, it would have $\beta_2 > 0$.

- Re-express r_{M2} as ARMA innovations i_{M2} , with separate models in each sub-period. The overall exposure is the $\bar{\beta}_2$, the sum of coefficients on $i_{M2,t}, i_{M2,t-1}, \dots, i_{M2,t-4}$.
- Inference procedures based on a HAC covariance matrix.

An example: Satyam Computers gains when INR/USD depreciates

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.2471	0.2750	0.90	0.3708
r_{M1}	0.9194	0.0960	9.57	0.0000
e_0	1.0339	0.5026	2.06	0.0420
e_1	0.2789	0.4568	0.61	0.5428
e_2	0.1933	0.4688	0.41	0.6809
e_3	0.6478	0.4494	1.44	0.1523
e_4	0.2851	0.4390	0.65	0.5173
R^2	0.4697			
$\bar{\beta}_{2j}$	2.4389	0.8837	2.76	

A 1% innovation to INR/USD gives a 2.4389% change in the price of Satyam, spread over five weeks.

How important are these 100 firms?

CMIE Cospi is a set of roughly 2,500 listed firms in India which trade on at least 66% of trading days.

Set	(Trillion Rupees)	
	Market value	Value added
CMIE Cospi (2500 firms)	35.3	4.74
Nifty (50 firms)	19.6	2.33
Nifty Junior (50 firms)	3.3	0.71
Fraction accounted for by 100 firms	0.65	0.64

Summary statistics about $|\bar{\beta}_{2j}|$

Period	Q1	Median	Mean	Q3
1	3.04	5.83	9.03	10.82

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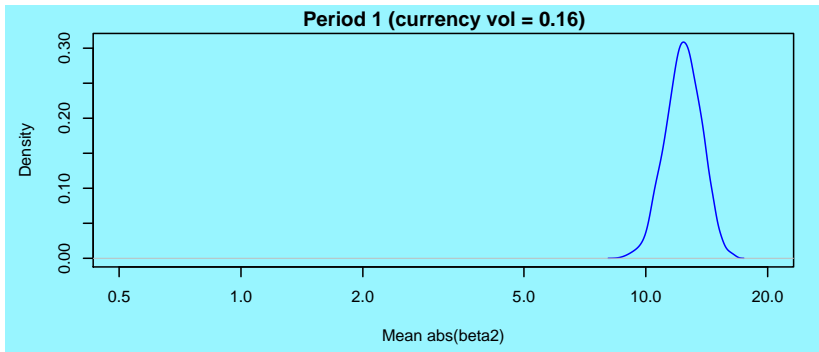
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Period	Q1	Median	Mean	Q3
1	3.04	5.83	9.03	10.82
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3	0.89	1.80	2.29	3.24

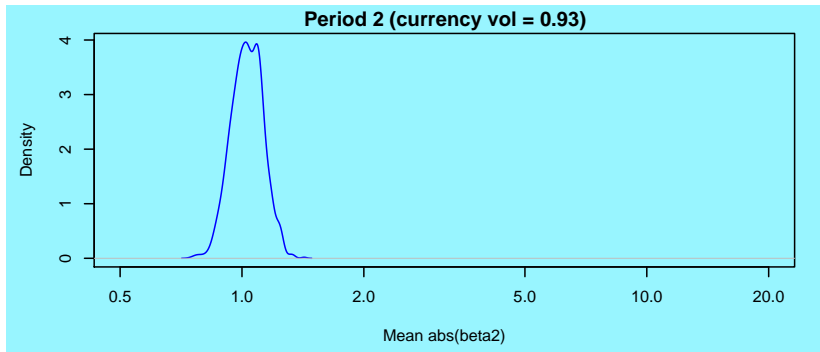
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2	0.34	0.58	0.76	0.93
3	0.89	1.80	2.29	3.24
4	0.34	0.86	1.14	1.60

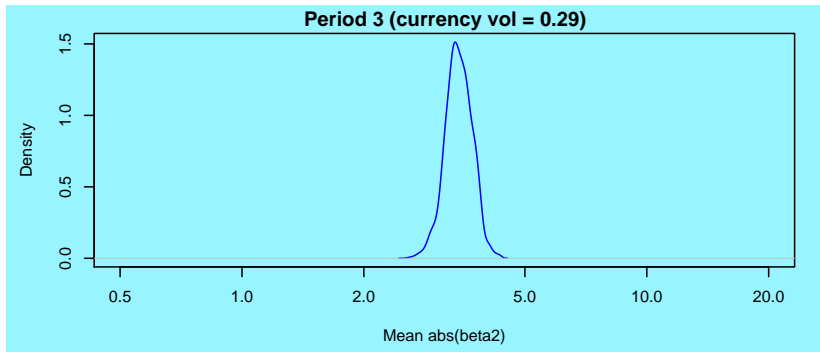
Distribution of $E(|\bar{\beta}_{2j}|)$ in Period 1



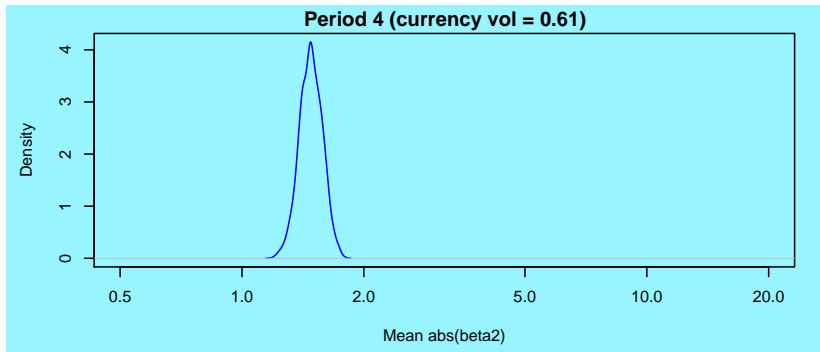
Distribution of $E(|\bar{\beta}_{2j}|)$ in Period 2



Distribution of $E(|\bar{\beta}_{2j}|)$ in Period 3



Distribution of $E(|\bar{\beta}_{2j}|)$ in Period 4



$E(|\bar{\beta}_{2j}|)$ in four periods

Period	$E(\bar{\beta}_{2j})$	Std. Devn.
1	12.596	1.198

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$E(|\bar{\beta}_{2j}|)$ in four periods

Period	$E(\bar{\beta}_{2j})$	Std. Devn.
1	12.596	1.198
2	1.041	0.095
3	3.447	0.258
4	1.492	0.099

One way bets on pegged exchange rates

- So far we have focused on $E(|\beta_2|)$
- What about $E(\beta_2)$?
- If some firms are long and some are short, these β_2 values will cancel out.
- But what if firms see the exchange rate as a one-way bet, and are often lined up with one direction of exposure?

$$\bar{\beta}_2$$

Period	$\bar{\beta}_2$	Std. Devn.
1	2.6325	1.609

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1	2.6325	1.609	
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3	-0.8346	0.367	*

$$\bar{\beta}_2$$

Period	$\bar{\beta}_2$	Std. Devn.	
1	2.6325	1.609	
2	-0.2002	0.125	
3	-0.8346	0.367	*
4	-0.6733	0.122	***

Conclusions

- The currency exposure of Indian firms responds strongly to currency flexibility - less flexibility induces more risk-taking.
- There is also evidence of firms exploiting one-way bets on pegged exchange rates.
- Our results support the moral hazard hypothesis.

Thank you.