

One way bets on pegged exchange rates

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Importance of the currency exposure of firms

- 1 Pegged exchange rates often involve forecastable exchange rates. With incomplete markets or capital controls, exposure is determined by industry characteristics. But if there is enough *de facto* convertibility, the exposure of firms reflects the currency expectations of firms.
- 2 If not, some industries, such as exporters will stand to lose when the currency appreciates.
- 3 This analysis can give us a mapping of who gains and who loses from currency movements.

The firms that we analyse here

- In this paper, we study the firms which are members of the CMIE Cospi index.
- All firms where stock market trading took place on atleast 66% of the days in the last six months.
- Roughly 2500 firms today.
- These firms account for 37% of India's exports of goods and services in 2006-07.

Part I

Measurement of currency exposure

Accounting data?

Accounting data is a poor guide to the exposure of a firm:

- 1 A firm might not import – it might buy imported goods from a trading company.
- 2 Exposure might arise from import competition (against either raw materials or products) even if physical transactions are domestic.
- 3 Debt and derivatives can alter currency exposure.

Learning from the stock market

- When INR/USD appreciates by 1%, what happens to the stock price?
- The stock market consumes all kinds of information, including facts about exposures, import competition, debt, derivatives positions, etc.
- Well accepted in the economics literature as the best strategy for measurement of currency exposure.
- ‘Augmented market model’ (AMM):

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

- By and large, in the literature, little exposure is found in most papers.

Interpretation of β_2

- Suppose INR/USD goes from 40 to 44 – i.e. r_{M2} of +10%
- Suppose $\beta_2 = 2$
- This predicts a stock return of +20%
- Positive values : Gain from depreciation
- Negative values : Gain from appreciation.

Part II

Estimation strategy

Choice of exchange rates

- Trade weighted
- Bilateral
- Industry specific

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Solution: Shift from raw r_{M2} series to innovations off an AIC-minimising AR model.

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Solution: Identify the lag structure through which currency innovations impact on r_j by minimising the Schwartz Bayesian Criterion. So the lag structure varies from one stock to the next.

In this case, the total impact is the sum of β_2 coefficients across all lags.

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Solution: Identify break dates in the exchange rate regime using the strategy of Zeileis et. al. 2007, and do separate analysis for each period.

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Solution: A regression of r_{M1} on currency innovations with five days of lags, and calculate residuals. These residuals represent pure equity index returns, uncontaminated by exchange rate effects (if any).

Problem: Developing countries are a hostile terrain for augmented market models

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efficiency of estimation of β_2 requires: high $\text{Var}(r_{M2})$ and low $\text{Var}(\epsilon)$.
But with pegged exchange rates, $\text{Var}(r_{M2})$ is low and in emerging markets, $\text{Var}(\epsilon)$ is high.

Obtain efficiency by averaging β_2 across many firms

Even though each β_2 estimate has low efficiency, β_2 is still unbiased, and efficiency can be obtained by averaging across firms. Regressions with industry indexes address this issue.

CMIE industry indexes

- CMIE has an industry classification with a total of 164 industries organised as a tree.
- At every node of the tree, there is a stock market index
- Daily data from mid-1990 onwards.

Summary of estimation strategy

- 1 Work within dates of structural breaks of exchange rate regime as identified in previous work. In the case of India, this induces four periods.
- 2 Shift from r_{M2} series to innovations for each period separately, using an AR model.
- 3 Purge r_{M1} of currency effects and shift to residuals, using a lag structure chosen based on the SBC. This is also done separately in each of the four periods of the exchange rate regime, in order to reflect changing currency market conditions and views of firms.
- 4 Apply this strategy to 164 tree-structured industry indexes. Compute the augmented market model using orthogonalised equity index returns and currency innovations for each industry index, using the SBC to choose the lag structure.
- 5 The overall currency exposure of an industry is the sum of currency coefficients. Statistical significance is assessed using heteroscedasticity-consistent inference.

Part III

Questions about exchange rate exposure of firms in India

Backdrop - the exchange rate regime

Four periods:

- 1 4/1993 – 2/1995: Low flexibility, appreciation prevented by reserves accumulation
- 2 2/1995 – 8/1998: High flexibility, Asian crisis, fears of depreciation
- 3 9/1998 – 3/2004: Low flexibility, appreciation prevented by reserves accumulation
- 4 3/2004 – 2/2008: Higher flexibility, massive reserves accumulation.

Backdrop: Incomplete markets

- Fledgling currency market
- Gradual improvements in liquidity of currency forwards
- Capital controls limit companies in their use of the forward market.

Backdrop: Capital controls

- Steady movement towards *de facto* convertibility.
- In period 1 and period 3: a continuous pace of decontrol of the capital account.
- In recent years, many firms turning themselves into multi-nationals
- Current account : 60% of GDP; misinvoicing can be used.

Questions

- 1 What industries have what kinds of exchange rate exposure? I.e., what is the map of interests in the political economy of exchange rate appreciation?
- 2 How much do highly export-oriented industries suffer from rupee appreciation?
- 3 Have the exposure of firms been stable across time? (This would be consistent with capital controls and incomplete markets).

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- 1 What industries have what kinds of exchange rate exposure? I.e., what is the map of interests in the political economy of exchange rate appreciation?
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- 3 Have the exposure of firms been stable across time? (This would be consistent with capital controls and incomplete markets). Or, has the exposure of some industry indexes changed sharply?

International evidence

- Empirical studies for other countries do not find large exposures. This has been attributed to hedging.
- Industry level studies find even lower or insignificant levels of exposure. This has been attributed to hedging and to positions cancelling out.
- In Japan, US, Canada, France, Germany and UK currency movements have little effect on industry indexes.

Positions of present Indian policy framework

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Have exposures been stable?

India does not have convertibility; capital controls are effective; so exposures largely reflect industry characteristics in the real economy.

Net exports to sales by industry

	Net exports in 2007
Chemicals	-0.22
Construction	0.05
Diversified	-0.04
Electricity	-0.07
Food & beverages	0.03
Machinery	-0.07
Mining	-0.04
Misc. manufacturing	-0.03
Non-metal mineral products	-0.03
Textiles	0.14
Transport equipment	0.01

Part IV

Exchange rate exposure in Nifty

Average exposure of Nifty firms in the four periods

	Period 1	Period 2	Period 3	Period 4
Same day	0.538 (0.8)	-0.283 (-2.4)	-1.204 (-4.0)	-1.249 (-8.1)
Lag 1	1.060 (1.6)	-0.055 (-0.5)	-0.603 (-2.0)	-0.398 (-2.6)
Lag 2	0.877 (1.3)	0.092 (0.8)	0.002 (0.0)	-0.267 (-1.7)
Lag 3	-0.287 (-0.4)	0.180 (1.5)	-0.342 (-1.1)	0.173 (1.1)
Lag 4	0.656 (0.9)	0.124 (1.0)	0.431 (1.4)	-0.251 (-1.6)
Lag 5	1.008 (1.6)	-0.029 (-0.2)	0.455 (1.5)	-0.119 (-0.8)
\bar{R}^2	0.005	0.005	0.015	0.073

Part V

Results for industry indexes

Broad industry groups (1 of 2)

	P.1	P.2	P.3	P.4
Food and beverages	1.1613 (2.29)	-0.022 (-0.21)	-0.8499 (-3.35)	-1.3462 (-7.89)
Textiles	0.702 (1.06)	-0.1006 (-2.15)	-0.8832 (-2.87)	-0.4695 (-1.45)
Chemicals	1.6803 (3.3)	0.0519 (0.3)	-0.6813 (-2.23)	-1.6609 (-12.95)
Non-metallic minerals	2.3461 (4.57)	-0.0146 (-0.07)	-1.0844 (-3.96)	-1.4509 (-7.46)
Metals and metal products	3.8096 (3.28)	-0.4037 (-3.22)	-2.6453 (-5)	-2.308 (-9.76)
Machinery	1.8535 (2.49)	-0.2224 (-3.83)	-2.138 (-5.3)	-3.2046 (-3.42)

Broad industry groups (2 of 2)

	P.1	P.2	P.3	P.4
Transport equipment	4.2014 (3.55)	-0.2024 (-3.88)	-1.7437 (-5.73)	-1.7125 (-13.15)
Electricity	4.5418 (4.96)	-0.1062 (-0.74)	-0.7007 (-1.8)	-1.7608 (-8.57)
Non-fin services	-1.024 (-1.07)	-0.1895 (-3.03)	-1.9138 (-4.37)	-1.1068 (-2.25)
Construction	0.8585 (1.36)	0.0357 (0.18)	-1.9572 (-2.66)	-2.3282 (-2.59)
Finance	2.7802 (2.54)	-0.3202 (-5.99)	-3.8574 (-2.64)	-1.1467 (-2.95)

Closely examine textiles

	P.1	P.2	P.3	P.4
Cotton	0.6135 (0.79)	-0.098 (-1.56)	-0.7757 (-2.35)	-0.4239 (-1.16)
Yarn	0.8841 (0.76)	-0.1045 (-1.54)	-0.7159 (-2.45)	-0.2588 (-0.78)
Cloth	0.3798 (0.57)	-0.0903 (-1.06)	-0.9554 (-2.16)	-1.354 (-3.31)
Synthetics	2.3176 (3)	-0.0563 (-0.81)	-2.1602 (-3.13)	-1.3412 (-5.63)
Processing	1.4462 (1.2)	-0.162 (-1.22)	-1.4804 (-1.08)	-1.4616 (-3.33)
Readymade garments	1.2525 (0.45)	0.4035 (1.4)	-2.8493 (-2.38)	-0.4856 (-0.61)
Overall	0.702 (1.06)	-0.1006 (-2.15)	-0.8832 (-2.87)	-0.4695 (-1.45)

Some other export-oriented sectors

	P.1	P.2	P.3	P.4
Automobile components	1.4031 (1.08)	0.1301 (0.45)	-1.9393 (-1.81)	-1.3239 (-5.76)
Software + BPO	-0.8566 (-0.41)	-0.4183 (-1.09)	-3.7425 (-3.46)	-0.3094 (-1.45)

Part VI

Summary of results

What industries have what kinds of exchange rate exposure?

By and large, in Period 3 and particularly in Period 4, a lot of industries were able to setup a position which profited from INR appreciation.

How much do highly export-oriented industries suffer from rupee appreciation?

Some highly exported oriented industries *benefit* from INR appreciation.

In Period 4, the most that can be said about some highly export-oriented industries is that the null of no impact of INR/USD cannot be rejected.

Has the exposure of some industry indexes changed sharply over time?

Yes. This may reflect increasing *de facto* convertibility.

Thank you.