

**Impact of Exchange Rate Movements on Exports:
An Analysis of Indian Non-Financial Sector Firms**

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1. Introduction

Growth of Global Trade

Trade/output; tripled since WWII

The increasing role of developing economies

Recurrent Concerns

Exchange rate effects on export growth

The Case of India

Before the 1990s

Relatively closed

Post 1991

Sequence of liberalization reforms

Flexible (managed) FX policy

India's Exports

Annual growth rate: 16% (1999-2000); 33% (2010-2011)

Exports of services, 23%; Exports of goods, 18% (2000 to 2010)

Share in GDP: 6% (1990); 12% (2000); 23% (2010)

Share in world trade: 0.5% (1990); 1.4% (2010)

REER appreciating...

Current Study

Indian firms' exporting activity – Exchange rate behavior; 2000s

Non-financial sector firms

Appreciation/Depreciation + Volatility

Intensive margin

Control variables

Firm Level Data

Ingredients of aggregate trade statistics

Alleviate aggregation bias, simultaneity, measurement errors

Limited evidence from developing economies

Some Research Questions:

A. Exchange rate effects

Depreciation/appreciation

Volatility

Textbook answers(?)

Asymmetry

B. Additional Analyses – Firm-specific features

Accounting information

Macro variables

Export intensity

Types of exports

Summary

Canonical exports equations

REER effect – negative, 6.3% to over 10%

Volatility effect – negative, up to 13%

Alternative Specifications

Firm-specific accounting information – nil

Wages – negative, 0.6%

Asymmetric

Appreciation > depreciation

Small export share > large export share

Exports of services (esp. IT) > exports of goods

2. Data

Prowess database; Center for Monitoring Indian Economy

Annual data; 2000 to 2010

Some descriptive statistics

Year	2000	2001	2002	2003	2004	2005
Total Exporting Firms	3214	3251	3698	3348	4105	4154
Year	2006	2007	2008	2009	2010	
Total Exporting Firms	4167	4225	4289	4068	3702	

Variables (In %)	Mean	Std. Dev.	Min	Max
Exports/Sales	28.03	31.91	0	100.99
Exports/Sales (Goods)	25.07	29.60	0	100.99
Exports/Sales (Services)	26.19	35.51	0	100.98
Firm Size (log of Total assets)	6.64	1.83	0	14.86
Capacity Utilization	110.27	75.74	0	599.37
Collateral (Net fixed assets/Total assets)	32.30	20.84	0	100
Foreign Liability/Total Liability	1.66	6.08	0	99.46
REER	93.35	3.44	89.52	100
REER Change	1.35	4.88	-5.45	11.71
REER Volatility	1.90	0.69	1.22	3.54
Nominal Wage Index	219.04	127.46	87.40	418.1
GDP Change	9.96	3.33	4.33	14.33

Variables (In %)	Mean	S.Dev	Mean	S.Dev	Mean	S.Dev
	2000		2005		2010	
Exports/Sales	26.18	31.27	28.89	32.31	27.04	31.22
Exports/Sales (Goods)	25.92	50.13	26.15	35.72	23.99	28.77
Exports/Sales (Services)	25.59	53.83	31.29	55.66	30.54	73.35
Firm Size (log of Total assets)	6.32	1.63	6.45	1.81	7.29	1.93
Capacity Utilization (Sales/Total assets)	103.81	72.56	114.38	75.43	106.88	72.44
Collateral (Net fixed assets/Total assets)	36.28	21.41	31.52	20.41	29.60	20.16
Foreign Liability/Total Liability	0.73	4.35	2.15	6.80	1.75	5.64
REER	91.34	0	94.10	0	100.001	0
REER Change	4.53	0	3.40	0	11.71	0
REER Volatility	1.91	0	1.74	0	2.19	0
Nominal Wage Index	103.76	0	100	0	418.1	0
GDP Change	4.33	0	13.53	0	11.39	0

3. Baseline Regression

$$\Delta X_{it} = \beta_0 + \beta_1 \Delta REER_t + \beta_2 (REER_vol)_t + \beta_3 \Delta I_t^* + \chi \mu_i + \phi \eta_t + \varepsilon_{it}$$

Variables	I	II	III	IV	V
REER Change	-0.063*** (0.017)		-0.062*** (0.017)	-0.063*** (0.017)	-0.071*** (0.019)
REER Volatility		-0.379*** (0.119)	-0.375*** (0.119)	-0.455*** (0.120)	-0.303* (0.174)
I* Change				0.027*** (0.009)	0.033*** (0.010)
Year Dummies	No	No	No	No	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	33132	33132	33132	33132	33132

4. Firm-Specific Effects

$$\Delta X_{it} = \beta_0 + \beta_1 \Delta REER_t + \beta_2 (REER_vol)_t + \beta_3 \Delta I_t^* + \beta_4 Y_{it-1} + \chi \mu_i + \phi \eta_t + \varepsilon_{it}$$

Variables	I	II	III	IV
REER Change	-0.070*** (0.020)	-0.069*** (0.020)	-0.072*** (0.020)	-0.073*** (0.020)
REER Volatility	-0.293 (0.183)	-0.285 (0.183)	-0.312* (0.185)	-0.322* (0.184)
I* Change	0.033*** (0.011)	0.034*** (0.011)	0.037*** (0.011)	0.036*** (0.011)
Lagged Firm Size	-0.038 (0.209)	-0.042 (0.213)	0.090 (0.236)	0.127 (0.234)
Lagged Collateral		0.008 (0.010)	0.009 (0.010)	0.010 (0.010)
Lagged Capacity Utilization			0.002 (0.003)	0.002 (0.003)
Lagged Foreign Liability Share				-0.026 (0.017)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
Observations	33132	33021	32930	32922

5. Macro Effects

$$\Delta X_{it} = \beta_0 + \beta_1 \Delta REER_t + \beta_2 (REER_vol)_t + \beta_3 \Delta I_t^* + \beta_4 Y_{it-1} + Z_t + \chi \mu_i + \gamma \eta_t + \varepsilon_{it}$$

Variables	I	II	III
REER Change	-0.100*** (0.023)	-0.097*** (0.023)	-0.100*** (0.023)
REER Volatility	-0.938*** (0.335)	-0.912*** (0.264)	-0.936*** (0.269)
I* Change	0.066*** (0.019)	0.062*** (0.015)	0.064*** (0.015)
Change in Nominal Wages	-0.006* (0.003)	-0.006*** (0.002)	
GDP Change		-0.016 (0.066)	-0.013 (0.066)
Change in Real Wages			-0.006*** (0.002)
Firm Fixed Effects	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes
Observations	33132	33132	33132

6. Additional Analyses

A. *Asymmetric exchange rate effects*

Variables	I	II
I* Change	0.013 (0.012)	0.018* (0.011)
REER Change*Appreciation Dummy	-0.163*** (0.053)	
REER Change* Depreciation Dummy	0.192 (0.126)	
REER Volatility*Appreciation Dummy		-0.644*** (0.214)
REER Volatility*Depreciation Dummy		-0.154 (0.171)
Firm Fixed Effects	Yes	Yes
Year Dummies	Yes	Yes
Observations	33132	33132

B. Export Level

Variables	III	IV
I* Change	0.025*** (0.010)	-0.042** (0.021)
REER Change*Small Exports Dummy	-0.111*** (0.046)	
REER Change*Large Exports Dummy	-0.053*** (0.019)	
REER Volatility *Small Exports Dummy		-0.930** (0.412)
REER Volatility *Large Exports Dummy		1.263*** (0.413)
Firm Fixed Effects	Yes	Yes
Year Dummies	Yes	Yes
Observations	33132	33132

C. *Types of Exports*

Variables	Exports of Goods (I)	Exports of Services (II)	Exports of IT Services (IV)	Exports of Non-IT Services (V)
REER Change	-0.061*** (0.017)	-0.096** (0.050)	-0.195 (0.177)	-0.094*** (0.039)
REER Volatility	-0.207 (0.211)	-0.461 (0.326)	-0.539* (0.315)	0.194 (0.290)
I* Change	0.042*** (0.012)	0.028 (0.018)	-.031 (0.040)	.014 (0.022)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
Observations	26952	9025	2456	5475

D. Real Exports

Variables	Real Exports (WPI) I	Real Exports (CPI) II
REER Change	-0.085*** (0.020)	-0.082*** (0.019)
REER Volatility	-0.494*** (0.192)	-0.472*** (0.189)
I* Change	0.042*** (0.011)	0.045*** (0.011)
Year Dummies	Yes	Yes
Firm Fixed Effects	Yes	Yes
Observations	38175	38175

E. Nominal Effective Exchange Rate

Variables	I	II	III	IV	V
NEER Change	-0.063*** (0.019)		-0.067*** (0.019)	-0.071*** (0.019)	-0.030* (0.019)
NEER Volatility		0.063 (0.073)	-0.034 (0.076)	-0.147 (0.097)	0.216*** (0.075)
I* Change				0.025** (0.012)	-0.011 (0.012)
Year Dummies	No	No	No	No	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	33132	33132	33132	33132	33132

7. Concluding Remarks

Exporting Behavior

Indian non-financial sector firms

Exchange rate effects

Adverse FX effect

Strong appreciation effect

Adverse volatility effect

Possible exceptions – large exports firms

Harder hit for services than goods exports

Policy Implications

Slow down appreciation

Reduce volatility

Note the differences across different types of firms.

Future Research

Sources of asymmetry

Destination specific

More detailed sectoral analysis

Extensive margin