

**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

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

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<b>Variables (In %)</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
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



<b>Variables (In %)</b>	<b>Mean</b>	<b>S.Dev</b>	<b>Mean</b>	<b>S.Dev</b>	<b>Mean</b>	<b>S.Dev</b>
	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