Pricing-to-Market in India's exports: The role of market heterogeneity and product differentiation

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Motivation

- The issue of ERPT to import prices has received much attention in the context of developed economies
- If the ERPT is low, this can limit the short-run adjustment role of exchange rate and thus the desirability of flexible exchange rates
- Some of the potential factors include the degree of price stickiness, the choice of price-setting currency by exporting firms, and the sensitivity of elasticity of external demand
- This paper examines the pricing behaviour of exporters in an emerging market economy

ERPT Debate – Macro or Micro?

- Local-currency pricing (LCP) models (Gopinath & Rigobon, 2008) assume that stickiness of local currency price is the reason why consumer prices do not respond much to exchange rates
- So ERPT behaviour can be attributed to sticky prices (macro) or to more structural features of international trade (PTM)
  - Considerable cross-country differences: PTM is higher with volatile macro conditions (Alexius & Vredin 1999), while ERPT increases with inflation (Taylor, 2000) and declines with inflation targeting (Reyes 2007, Choudhri *et al*., 2005)
- ERPT is lower for differentiated goods (Yang 1997, Gopinath & Rigobon 2008, Halpern & Koren 2007)
- Campa & Goldberg (2005) find both macro and micro factors are important, ultimately supporting a micro explanation, with a changing composition of import goods being important in OECD, while import penetration is most important in the Euro area (Campa & Minguez 2006)
- Also ERPT is higher when the exporter's share in the destination market is high (Feenstra et al 1996), but for lower shares the effect is non-linear (Yang 1998)

The concept of pass-through

- Complete pass-through – changes in exchange rate (or tariff rate) leading to one-for-one change in prices in the importing country's currency
  - Mark-up does not change
- Incomplete pass-through – less than one-for-one change in the local currency import prices (departure from LOOP and PPP)
  - Mark-up changes with exchange rate (or tariff rate)
- Extent to which prices change would depend on:
  - Domestic consumers' incentives to alter purchases of foreign goods
  - Willingness of exporters to alter their profit margins

Literature on Pricing to Market (PTM)

- Early micro-based theoretical literature: Firms set price as markup over marginal cost, and set different markup in different countries because of different market conditions
  - Dornbusch (1987), Krugman (1987), Dixit (1989)
  - PTM exists because of international market segmentation (e.g. trade barriers and local currency pricing due to sticky prices in the buyer's currency)
  - If prices are set in the currency of the exporter (PCP), incomplete pass-through indicates ex-ante price discrimination and PTM
- Empirics: a number of studies tested for PTM using industry-level data
  - Knetter (1989,1993,1995), Feenstra (1989), Marston (1990), Kasa (1992), Gagnon & Knetter (1995), Yang (1995)
  - PTM can be heterogeneous across product categories and destination markets (see Balaguer et al 2004 for the automobile industry in the Euro zone)

Literature is primarily empirical

- "Large" countries - US importers, German & Japanese exporters
  - Knetter (1994), Kim (1990), Koch & Rosensweig (1992), Parsley (1993), Athukorala & Menon (1994), Gagnon & Knetter (1995), Goldberg (1995), Bleaney (1997), Tange (1997), Yang (1997,1998)
- "Small" countries - Exporters in South Korea, Australia, Switzerland, Norway, Sweden, Ireland
  - Athukorala (1991), Dwer & Kent (1994), Yang & Hwang (1994), Lee (1997), Menon (1992,1996), Gross & Schmitt (1996), Naug & Nymoen (1996), Gottfries (2002), Doyle (2004)
- Evidence for emerging markets
  - Choudhri et al. (2005), Choudhri & Hakura (2006), Barhoumi (2006), Ca'Zorzi et al (2007) – aggregate import prices in emerging markets
  - Frankel et al (2005) - import prices of 8 commodities in 76 developing countries
  - Mallick & Marques (2006, 2008a) – impact of macroeconomic policy reforms on ERPT in India (1 and 2-digit level)
  - Mallick & Marques (2008b) – ERPT vs. TRPT into import prices of India in the post-reform period (2-digit level)

Contribution of this paper

- In this paper we extend the analysis of India's post reform period to study PTM in India's export prices at the 4-digit level
  - In G3 and BRICS markets
  - In homogeneous and differentiated goods
  - Controlling for barriers to trade on India's exports (importance of asymmetric trade liberalisation)
- Discussion of both TRPT and ERPT scarce in the literature (Feenstra 1989 for US imports, Menon 1996 for Australian imports, Mallick & Marques 2008b for India's imports)

India's policy reforms

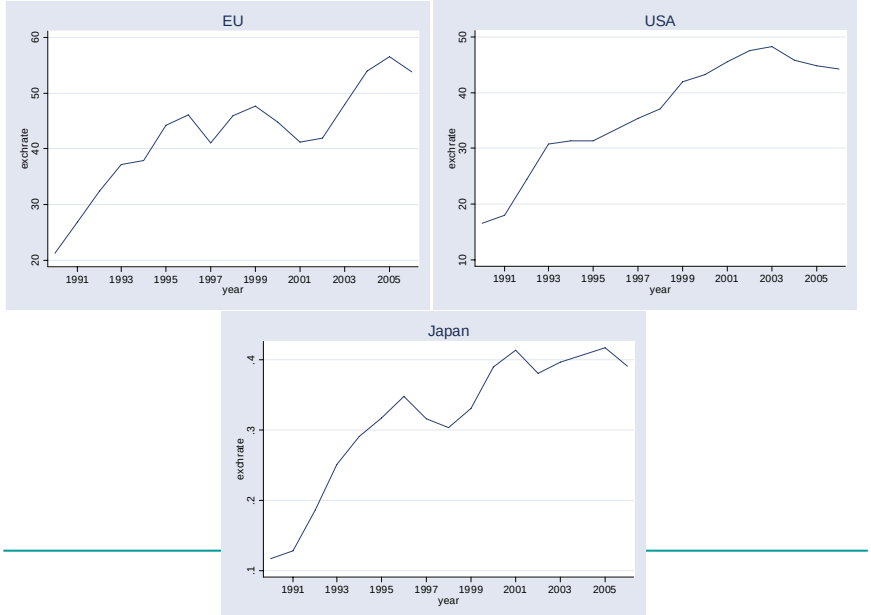
- The 1991 balance of payments crisis
  - Exogenous factors – 1990 Gulf War and oil shock; Political instability and weak government credibility
  - Endogenous factors – Import substitution policy, making exports uncompetitive and contributing to external and fiscal imbalances
- Macroeconomic reforms (exchange rate regime change, Trade reforms - tariff reduction, quota elimination)
  - In 1991 adjusted peg replaced with a managed float, and rupee was devalued by more than 40% in two years
  - Trade (as % of GDP) is up from 16% in 1985-86 to 46% in 2007
  - Share of primary (manufactured) products in exports from 26% (68%) in 1987-88 to 16% (70%) in 2005-06

India's trade prices and exchange rate (%)

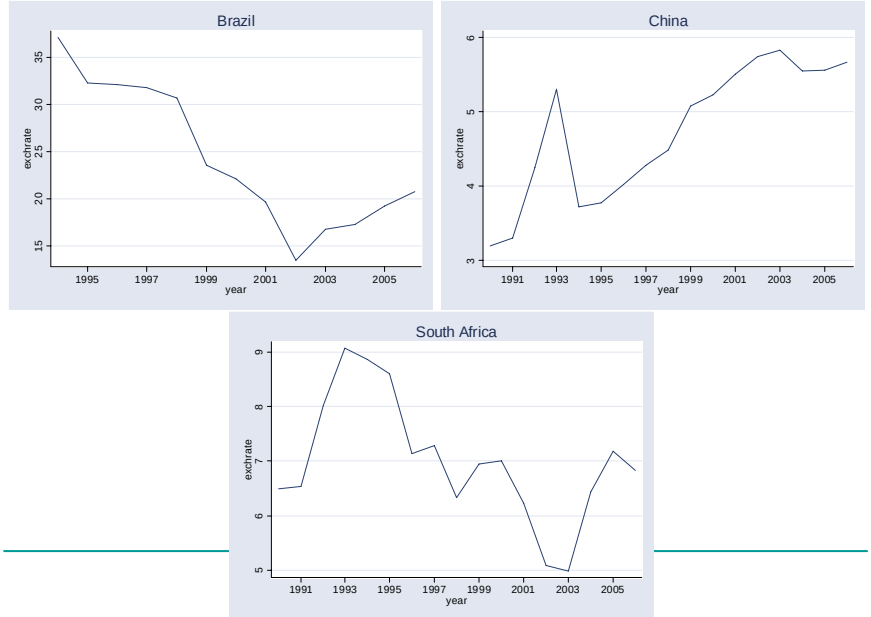
	1974-1980	1981-1990	1991-1995	1996-2000	2001-2007
Trade (% of GDP)	13.3	14.0	19.8	24.3	37.3
Exchange rate Changes	-0.1%	-7.8%	-11.1%	-6.0%	0.2%
Import prices (% change)		8.0	5.7	6.9	4.2
Import volume (% change)		6.1	17.3	6.5	20.4
Export prices (% change)		10.6	11.0	5.4	5.6
Export Volume (% change)		6.3	14.9	8.7	12.8

Source: Calculated with Data from WDI, World Bank; and RBI

Annual Bilateral Exchange Rates – G3



Annual Bilateral Exchange Rates – BRICS



Composition of India's exports

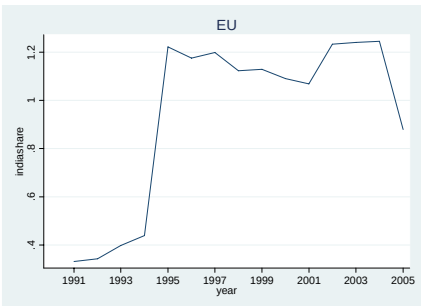
Exports (%)	1990-91	1999-00	2005-06
Agriculture and allied products	18.5	15.2	10.0
Ores and minerals	5.3	2.5	6.0
Leather and manufactures	8.0	4.3	2.6
Chemicals and allied products	9.5	12.8	14.3
Engineering goods	12.4	14.0	21.0
Textile and textile products	23.9	26.7	16.0
Gems and jewellery	16.1	20.4	15.1
Petroleum products	2.9	0.1	11.3

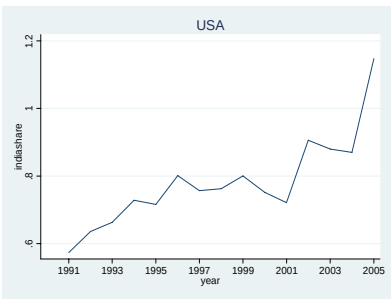
Direction of India's exports (%)

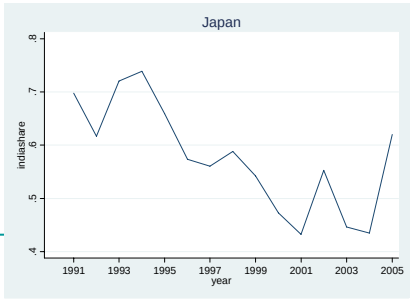
Exports (%)	1990-91	1999-00	2005-06
European Union (EU-15)	27.5	25.5	21.7
USA	14.7	22.8	16.8
Japan	9.3	4.6	2.4
China	0.1	1.5	6.6
Russia	16.1	2.6	0.7
Africa	2.2	4.2	5.5
Latin American Countries	0.5	1.9	3.0

Source: Calculated with data from RBI

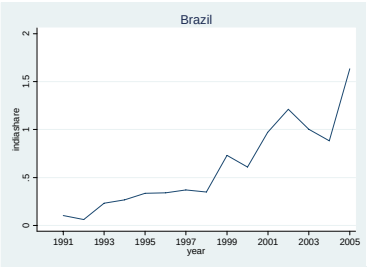
India's share in export markets – G3

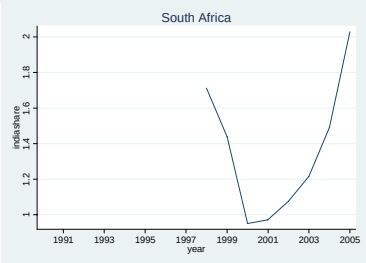






India's share in export markets – BRICS





The Model

- Mark-up model – Profit-maximising exporting firm producing n goods for sale in m foreign markets with input price index w and e given in rupee/USD:

$$\Pi = \sum_{i=1}^{m}\sum_{j=1}^{n} P_{ij}^{x} q_{ij}\left(\frac{P_{ij}^{x}}{e_i\left(1+T_{ij}\right)p_i^{*}}\right) - C\left(\sum_{i=1}^{m}\sum_{j=1}^{n} q_i\left(\frac{P_{ij}^{x}}{e_i\left(1+T_{ij}\right)p_i^{*}}\right), w\right)$$

- Profit-maximising price with η the absolute value of the price elasticity of demand in the foreign market:

$$P_{ij}^{x} = MC\left[\frac{\eta_{ij}\left(\frac{P_{ij}^{x}}{e_i\left(1+T_{ij}\right)p_i *}\right)}{\eta_{ij}\left(\frac{P_{ij}^{x}}{e_i\left(1+T_{ij}\right)p_i *}\right)-1}\right], i = 1,\ldots,m,\ j = 1,\ldots,n$$

Derivation of the testable equation

- In log-linear terms:

$$d\ln P_{ij}^{x} = d\ln MC - \frac{\partial \ln \eta_{ij}}{\left(\eta_{ij}-1\right)\partial \ln\left(\frac{P_{ij}^{x}}{e_i\left(1+T_{ij}\right)p_i^{*}}\right)}\left(\frac{P_{ij}^{x}}{\left(e_i\left(1+T_{ij}\right)p_i^{*}\right)^2}\left[d\ln P_{ij}^{x} - d\ln e_i - \frac{T_{ij}}{1+T_{ij}}d\ln T_{ij} - d\ln p_i^{*}\right]\right)$$

- Rearranging:

$$d\ln P_{ij}^{x} = \tau_{ij} + (1-\delta_{ij})d\ln MC + \delta_{ij}\left(d\ln e_i + \frac{T_{ij}}{1+T_{ij}}d\ln T_{ij} + d\ln p_i^{*}\right)$$

- τ_{ij} is a sector-specific intercept and δ_{ij} is a PTM coefficient, which is a function of both the level and the elasticity of η_i

$$\delta_{ij} = -\frac{\partial \ln \eta_{ij}}{\partial \ln\left(\frac{P_{ij}^{x}}{e_i\left(1+T_{ij}\right)p_i^{*}}\right)}\frac{P_{ij}^{x}}{\left(e_i\left(1+T_{ij}\right)p_i^{*}\right)^2}\left[1-\eta_{ij}-\frac{\partial \ln \eta_{ij}}{\partial \ln\left(\frac{P_{ij}^{x}}{e_i\left(1+T_{ij}\right)p_i^{*}}\right)}\frac{P_{ij}^{x}}{\left(e_i\left(1+T_{ij}\right)p_i^{*}\right)^2}\right]^{-1}$$

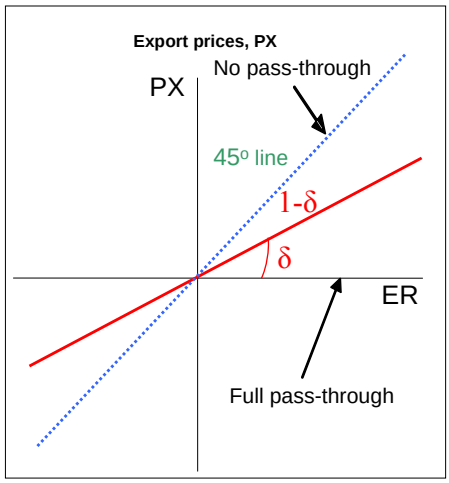
Testable equation for export prices

- The empirical specification can be written as:

$$d\ln P_{ijt}^{x} = \alpha_{ij} + \delta_{ij}d\ln e_{it} + \beta_{ij}d\ln T_{ijt} + \lambda_i Inf_{it} + \phi_{ij}Open_{it} + \theta_{ij}Policy_t + \mu_{ij}\,ProductShare_{ijt} + \gamma_{ij}IndiaShare_{ijt} + \varepsilon_{ijt}$$

  - $\alpha_{ij} = \tau_{ij} + (1-\delta_{ij})d\ln MC$ is a sector-specific intercept
  - $1-\delta_{ij}$ is the ERPT coefficient
  - 1-($\beta_{ij} = \delta_{ij}\frac{T_{ij}}{1+T_{ij}}$) is the TRPT coefficient
  - $\delta = 1 \Rightarrow$ No ERPT; $\delta = 0 \Rightarrow$ Full ERPT and TRPT
  - PTM requires $\delta \neq 0$

A Summary Graphical Framework



PTM is inversely related to the pass-through (PT)

PTM coefficient is specific to the exporter, the country of destination, and the product

PTM is null when PT is complete

PTM is positive as long as exporters absorb currency changes in their mark-ups in order to keep their local currency price stable

Data

- Sources: India Trades database from CMIE, SITC 4-digit products; TRAINS Database from World Bank (4-digit import tariffs data)
- Unbalanced panel for around 1000 4-digit products in the post-reform period (1992-2005)

Country	*Years*	*Number of unit value observations*
Brazil	1994-2005	2551
China	1992-2004	3475
South Africa	1994-2005	5644
Total BRICS		***11,670***
EU	1992-2004	11779
USA	1992-2003	10421
Japan	1992-2003	6752
Total G3		***28,952***

Definition of product differentiation

- Rauch (1999) classifies goods by the availability of information on their price
- A reference price distinguishes homogeneous from differentiated (branded) products
- Reference prices for homogeneous commodities can be
  - Quoted on organised exchanges
  - Quoted only in trade publications
- PTM (incomplete ERPT) expected in differentiated goods

Sector distribution of product types

Top-5 in number of 4-digit products (liberal classification)		
Differentiated	***Reference-priced***	***Homogeneous***
Code 84 - Nuclear reactors, boilers, machinery and mechanical appliances (85)	Code 28 – Inorganic chemicals (39)	Code 26 – Ores, slag and ash (17)
Code 85 – Electrical machinery and equipment (39)	Code 29 – Organic chemicals (39)	Code 15 – Animal or vegetable fats (14)
Code 90 - Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments/apparatus (33)	Code 25 - Salt; sulfur; earth & stone; lime & cement plaster (25)	Code 81 – Base metals (13)
Code 73 – Articles of iron and steel (20)	Code 72 – Iron and steel (24)	Code 28 – Inorganic chemicals (11)
Code 70 – Glass and glassware (20)	Code 55 - Manmade staple fibres, including yarns & woven fabrics (14)	Code 71 - Natural or cultured pearls, precious or semiprecious stones, precious metals (11)

Country distribution of product types

Number of 4-digit products (liberal classification)				
Country	***Differentiated***	***Reference-priced***	***Homogeneous***	***Total***
Brazil	146	91	14	251
China	182	127	26	335
South Africa	230	97	18	345
Total BRICS	***558 (60%)***	***315 (33%)***	***58 (7%)***	***931***
EU	354	197	41	592
USA	318	165	28	511
Japan	129	98	17	244
Total G3	***801 (59%)***	***460 (34%)***	***86 (6%)***	***1347***

Results with common coefficients

	(2)		(7)	
dexchrate	0.058***†††	(0.014)	0.174***†††	(0.023)
dtariff	-0.016**†††	(0.009)	-0.014*†††	(0.008)
prodshare			0.001***	(0.000)
indiashare			0.002	(0.010)
policy			-0.142***	(0.014)
inflation			0.024***	(0.004)
openness			-0.004	(0.018)
Constant	0.043***	(0.003)	0.229***	(0.016)
Wald Chi-sq	19.98***		255.60***	
Log-likelihood	-21821.49		-17858.99	
Symmetry test	19.39***		59.08***	
Homogeneity test	3304.39***		1182.21***	
Observations	24302		19726	
No. of 4-digit products	877		835	

*NOTE: All regressions carried out by FGLS controlling for heteroskedasticity and autocorrelation. Robust standard errors in parentheses. Significantly different from zero: * at 10%; ** at 5%; *** at 1%. Significantly different from one: † at 10%; †† at 5%; ††† at 1%. The symmetry test is a Chi-Sq test where H0: dexchrate = dtariff . The homogeneity test is a Chi-Sq test where H0: dexchrate + dtariff = 1.*

Common coefficients with time dummies

Model 10			Time Dummies		
Dexchrate	0.060**††††	(0.030)	year_1993	-0.084***	(0.020)
Dtariff	0.004	(0.007)	year_1994	-0.166***	(0.020)
Prodshare	0.001	(0.000)	year_1995	-0.148***	(0.020)
Indiashare	-0.023*	(0.014)	year_1996	-0.089***	(0.020)
Inflation	0.008*	(0.005)	year_1997	-0.017	(0.017)
Openness	0.006	(0.021)	year_1998	-0.170***	(0.020)
Brics	-0.020**	(0.008)	year_1999	-0.146***	(0.019)
Condif	0.025**	(0.011)	year_2000	-0.191***	(0.019)
Constant	0.204***	(0.020)	year_2001	-0.197***	(0.020)
Symmetry test	3.26*		year_2002	-0.198***	(0.020)
Homogeneity test	949.40***		year_2003	-0.185***	(0.019)
Observations	19726		year_2004	-0.192***	(0.020)
No. of 4-digit products	835		year_2005	-0.070**	(0.032)

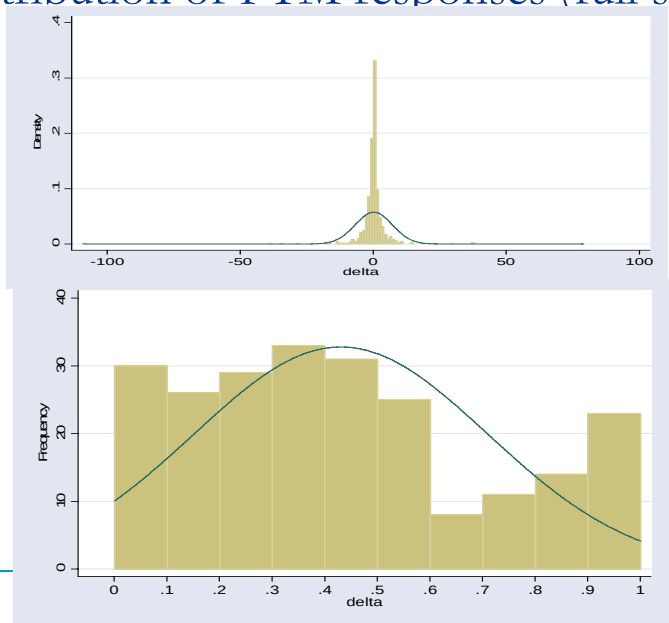
*NOTE: All regressions carried out by FGLS controlling for heteroskedasticity and autocorrelation. Robust standard errors in parentheses. Significantly different from zero: * at 10%; ** at 5%; *** at 1%. Significantly different from one: † at 10%; †† at 5%; ††† at 1%. The symmetry test is a Chi-Sq test where H0: dexchrate = dtariff . The homogeneity test is a Chi-Sq test where H0: dexchrate + dtariff = 1.*

Common coefficients with interaction terms

	(2)		(8)	
Dexchrate	0.058***†††	(0.014)	0.153***†††	(0.056)
Dtariff	-0.016**†††	(0.009)	-0.014*†††	(0.008)
Prodshare*exchrate			0.006***	(0.001)
Indiashare*exchrate			0.142**	(0.059)
Policy			-0.137***	(0.015)
Inflation*exchrate			-0.007***	(0.002)
Openness*exchrate			-0.382**	(0.149)
Constant	0.043***	(0.003)	0.227***	(0.021)
Wald Chi-sq	19.98***		200.04***	
Log-likelihood	-21821.49		-17853.46	
Symmetry test	19.39***		8.63***	
Homogeneity test	3304.39***		230.27***	
Observations	24302		19726	
No. of 4-digit products	877		835	

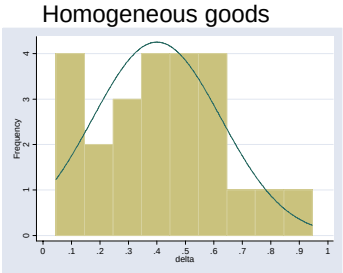
*NOTE: All regressions carried out by FGLS controlling for heteroskedasticity and autocorrelation. Robust standard errors in parentheses. Significantly different from zero: * at 10%; ** at 5%; *** at 1%. Significantly different from one: † at 10%; †† at 5%; ††† at 1%. The symmetry test is a Chi-Sq test where H0: dexchrate = dtariff . The homogeneity test is a Chi-Sq test where H0: dexchrate + dtariff = 1.*

Distribution of PTM responses (full sample)

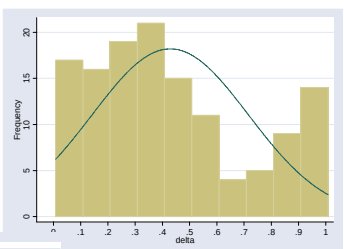


Distribution of PTM responses according to the Rauch (1999) classification

Homogeneous goods



Differentiated goods



Reference-priced goods

product group	product name	product code	exrate coefficient	p-value
Code 03 - Fish, crustaceans & aquatic invertebrates	Fish, frozen (excluding fillets or other fish meat)	303	0.79	0.002
	Molluscs & other aquatic invertebrates, live, fresh, chilled, frozen, dried, salted, in brine	307	0.70	0.007
Code 09 - Coffee, tea, spices	Ginger, saffron, turmeric, thyme, bay leaves, curry, origanum, dill & other spices	910	0.59	0.025
Code 12 - Oil seeds & oleaginous fruits; miscellaneous grains, seeds & fruit; industrial or medicinal plants; straw & fodder	Other oil seeds & oleaginous fruits, whether or not broken	1207	0.42	0.091
Code 19 - Preparations of cereals, flour, starch or milk; bakers wares	Malt extract; food preparations of flour, meal, starch or malt extract, limited cocoa	1901	0.94	0.008
Code 20 - Preparations of vegetables, fruit, nuts or other plant parts	Vegetables, fruit, nuts & other edible parts of plants, prepared or preserved by vinegar or acetic acid cucumbers, gherkins, onions, capers, artichokes	2001	0.59	0.003
Code 29 - Organic chemicals	Hydrocarbon derivatives, sulfonated, nitrated whether or not halogenated	2904	0.36	0.038
Code 38 - Miscellaneous chemical products	Industrial monocarboxylic fatty acids; acid oils from refining; industrial fatty alcohols	3823	0.32	0.057
Code 39 - Plastics and articles thereof	Polymers of ethylene, in primary forms	3901	0.97	0.104
	Natural & modified natural polymers nesoi (not elsewhere specified or included) in primary forms alginic acid, hardened proteins	3913	1.00	0.042
Code 51 - Wool & animal hair, including yarn & woven fabric	Yarn of combed wool, not packed for retail sale	5107	0.57	0.071
Code 55 - Manmade staple fibres, including yarns & woven fabrics	Yarn (not sewing thread) of synthetic staple fibers, no retail	5509	0.61	0.069
Code 56 - Wadding, felt and nonwovens; special yarns; twine, cordage, ropes and cables and articles thereof	Twine, cordage, rope & cables, whether or not plaited, braided, (impregnated, coated, covered or sheathed with rubber or plastic)	5607	0.98	0.106
Code 62 - Articles of apparel, accessories, not knit or crochet	Womens or girls' blouses, shirts and shirt-blouses	6206	0.28	0.077
Code 64 - Footwear, gaiters and the like and parts thereof	Footwear, uppers of leather, outer soles of rubber, plastic, leather or composition leather	6403	0.90	0.069
Code 73 - Articles of iron or steel	Chain & parts thereof, of iron or steel	7315	0.54	0.064
Code 79 - Zinc and articles thereof	Zinc tubes, pipes and tube or pipe fittings	7906	0.91	0.022
Code 84 - Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof	Parts for spark-ignition or compression-ignition engines of 8407 or 8408	8409	0.83	0.06
Code 85 - Electrical, electronic equipment	Prepared unrecorded sound recording media (non-photo)	8523	0.81	0.069
Code 87 - Vehicles, (not railway, tramway, rolling stock); parts and accessories	Bicycles & other cycles (not motorized) delivery tricycles	8712	0.42	0.052
Code 96 - Miscellaneous manufactured articles	Vacuum flasks & vessels with cases; parts thereof(not glass inners)	9617	0.95	0.097

Summing up the evidence

- Incomplete ER pass-through is found even after having controlled for destination market tariffs
- Import tariffs have a negative significant effect on exporter's prices, as export prices adjust to keep their market share constant
- With big countries (G3), Indian exporters appear to experience more pass-through of tariffs relative to BRICS, where tariffs pass-through is incomplete.

The role of market-group heterogeneity

(7)	G3		BRICS		G3 vs. BRICS test
dexchrate	0.283***†††	(0.038)	0.048†††	(0.034)	21.18***
dtariff	0.005†††	(0.009)	-0.088***†††	(0.019)	19.23***
prodshare	0.001***	(0.000)	0.000	(0.001)	0.05
indiashare	-0.051***	(0.018)	0.027***	(0.010)	13.92***
policy	-0.108***	(0.020)	-0.104***	(0.023)	0.05
inflation	1.027***	(0.326)	0.007	(0.005)	9.76***
openness	0.039	(0.025)	-0.080*	(0.046)	5.10*
Symmetry test	52.04***		11.90***		
Homogeneity test	337.32***		700.43***		
Constant	0.181***	(0.025)			
Wald Chi-sq	268.49***				
Log-likelihood	-17825.88				
Observations	19726				
No. of 4-digit products	835				

*NOTE: All regressions carried out by FGLS controlling for heteroskedasticity and autocorrelation. Robust standard errors in parentheses. Significantly different from zero: * at 10%; ** at 5%; *** at 1%. Significantly different from one: † at 10%; †† at 5%; ††† at 1%. The symmetry test is a Chi-Sq test where H0: dexchrate = dtariff . The homogeneity test is a Chi-Sq test where H0: dexchrate + dtariff = 1. The G3 vs. BRICS test is a Chi-Sq test where H0: G3 coeffs = BRICS coeffs. The omitted dummy variable stands for homogeneous goods in the Rauch classification.*

The G3 – country heterogeneity

(7)	EU		US		Japan	
dexchrate	-0.006†††	(0.037)	0.615***†††	(0.066)	0.195**†††	(0.071)
dtariff	0.013†††	(0.008)	-0.028***†††	(0.009)	-0.020†††	(0.031)
prodshare	0.001	(0.000)	0.001*	(0.000)	0.001	(0.000)
indiashare	0.008	(0.017)	0.335**	(0. 139)	-0.122	(0.157)
policy	0.038	(0.024)	-0.364***	(0.060)	-0.178*	(0.099)
inflation	2.913***	(0.574)	2.108*	(1.162)	4.969***	(0.999)
openness	-0.516***	(0.082)	1.113***	(0.362)	0.434	(1.055)
Referenced goods	-0.013	(0.010)	-0.034**	(0.014)	0.017	(0.018)
Differentiated goods	-0.010	(0.010)	-0.009	(0.014)	0.030	(0.018)
Constant	0.251***	(0.044)	-0.031	(0.114)	0.262	(0.255)
Wald Chi-sq	356.39***		271.31***		141.52***	
Log-likelihood	-4605.451		-3389.09		-1473.379	
Observations	7409		4964		2196	
No. of 4-digit products	752		611		308	

*NOTE: All regressions carried out by FGLS controlling for heteroskedasticity and autocorrelation. Robust standard errors in parentheses. Significantly different from zero: * at 10%; ** at 5%; *** at 1%. Significantly different from one: † at 10%; †† at 5%; ††† at 1%. The omitted dummy variable stands for homogeneous goods in the Rauch classification.*

The BRICS – country heterogeneity

(7)	Brazil		China		South Africa	
dexchrate	0.050†††	(0.037)	0.141†††	(0.115)	0.058†††	(0.144)
dtariff	-0.093**†††	(0.038)	-0.168***†††	(0.034)	-0.027**†††	(0.013)
prodshare	0.001	(0.001)	-0.001	(0.000)	-0.003*	(0.002)
indiashare	0.169	(0.046)	-0.028	(0.084)	-0.077***	(0.015)
policy	0.312***	(0.109)	-0.219	(0.134)	0.269***	(0.032)
inflation	0.014***	(0.005)	0.257	(0.200)	3.874***	(0.827)
openness	-1.617***	(0.576)	0.088	(0.307)	-1.766***	(0.219)
Referenced goods	-0.040*	(0.021)	0.009	(0.022)	0.034***	(0.013)
Differentiated goods	-0.015	(0.019)	0.008	(0.024)	0.009	(0.011)
Constant	0.159***	(0.066)	0.279***	(0.079)	0.436***	(0.120)
Wald Chi-sq	65.45***		175.85***		169.06***	
Log-likelihood	-1296.429		-1364.715		-978.8251	
Observations	1669		1626		1862	
No. of 4-digit products	302		372		378	

*NOTE: All regressions carried out by FGLS controlling for heteroskedasticity and autocorrelation. Robust standard errors in parentheses. Significantly different from zero: * at 10%; ** at 5%; *** at 1%. Significantly different from one: † at 10%; †† at 5%; ††† at 1%. The omitted dummy variable stands for homogeneous goods in the Rauch classification.*

The role of product differentiation

(7)	Differentiated		Homogeneous		Dif vs. Hom test
dexchrate	0.194***†††	(0.034)	0.205**†††	(0.080)	0.21
dtariff	-0.044***†††	(0.016)	0.025†††	(0.027)	5.54*
prodshare	0.001**	(0.000)	0.001	(0.000)	3.99
indiashare	-0.007	(0.014)	0.002	(0.031)	0.09
policy	-0.111***	(0.019)	-0.124***	(0.025)	2.35
inflation	0.025***	(0.005)	0.055***	(0.020)	2.50
openness	-0.029	(0.027)	0.008	(0.058)	3.46
Symmetry test	40.41***		4.59***		
Homogeneity test	521.26***		82.24***		
BRICS	0.002	(0.008)			
Constant	0.201***	(0.021)			
Wald Chi-sq	171.20***				
Log-likelihood	-17860.76				
Observations	19726				
No. of 4-digit products	835				

*NOTE: All regressions carried out by FGLS controlling for heteroskedasticity and autocorrelation. Robust standard errors in parentheses. Significantly different from zero: * at 10%; ** at 5%; *** at 1%. Significantly different from one: † at 10%; †† at 5%; ††† at 1%. The symmetry test is a Chi-Sq test where H0: dexchrate = dtariff . The homogeneity test is a Chi-Sq test where H0: dexchrate + dtariff = 1. The Dif vs. Hom test is a Chi-Sq test where H0: Dif coeffs = Hom coeffs. The omitted dummy variable stands for G3.*

Summary results

Table 10: Implied ERPT and TRPT coefficients from Tables 3-8 (average of models 7-9)

	ERPT	TRPT
USA	38.7%	97.2%
EU	100%	100%
Japan	80.5%	100%
China	100%	83.2%
Brazil	96.8%	90.7%
South Africa	100%	97.4%

NOTE: The implied ERPT and TRPT coefficients, which give the change in local currency price, result from subtracting the coefficients in Tables 3-8, which indicate the change in producer currency price, to the full (100%) exchange rate change. Statistically insignificant coefficients are taken as zero.

Conclusions

- Indian exporters do price-to-market across different destinations and products – Market type matters for both ERPT and TRPT, but product differentiation only impacts on TRPT
  - In G3 markets: incomplete ERPT (70%) and complete TRPT
  - In BRICS markets: complete ERPT and incomplete TRPT (90%)
- PTM elasticity is highest to the US market, reflecting the intuition that the US market is more competitive for Indian exporters.
- PTM is more prevalent in exports of processed foods, leather, machinery parts, and other manufactured products than agricultural (fruits, coffee, tea, spices), textile products, and iron or steel.
- Product share and inflation (in G3) increase export price fluctuations but India's market share (especially in G3) dampens it
- Also macroeconomic policy index indicating stability contributes to lowering export prices
- Finally, exchange rate flexibility can facilitate relative price adjustment – but when PT is low, ER will not pose much of a problem for monetary policy