Pricing to Market in India's Exports: The Role of Market Heterogeneity and Product Differentiation*

Sushanta Mallick
Queen Mary, University of London, UK
Email: s.k.mallick@qmul.ac.uk

Helena Marques
University of Manchester, UK
Email: helena.marques@mbs.ac.uk

Abstract

This paper studies the pricing to market (PTM) behaviour of Indian exporters during the economic reforms period (1992-2005). A PTM model has been estimated using panel data at the four-digit level of classification for the G3 and three emerging markets (Brazil, China and South Africa), distinguishing also homogeneous from differentiated goods. Overall, we observe that there is clear evidence of incomplete exchange rate pass-through (ERPT) to buyers' currency prices. This degree of ERPT is net of changes in the level of protection faced by India's exporters (import tariffs in destination markets), inflation and openness in the export destination market, a macroeconomic policy index partly reflecting changes in exporter's costs, the share of the exporter in the destination market and the share of the product in the exporter's total exports. The empirical results indicate that Indian firms do practice PTM and absorb exchange rate changes into their mark-up in G3 markets, partly owing to tougher competition, but they fully pass-through the exchange rate changes in emerging markets. On the contrary, Indian exporters seem to be taking advantage of trade liberalisation in destination markets by marginally increasing the exporter currency prices into emerging markets but not into the G3. We also find a similar impact of trade liberalisation in the case of differentiated goods.

Keywords: exchange-rate pass-through, pricing-to-market, product differentiation, India
JEL Classifications: F4, O1

* The authors acknowledge financial support from the British Academy through a Small Research Grant (Project SG-46699). We gratefully acknowledge the comments and suggestions by participants at the European Economic Association (23rd Annual Congress, 27-31 August 2008, Milan), the Canadian Economic Association (42nd Annual Meeting, 6-8 June 2008, University of British Columbia, Vancouver), the European Economics and Finance Society (7th Annual Meeting, University of Economics, Prague, 22-25 May 2008), Allied Social Science Associations (Annual Meeting, 4-6 January 2008, New Orleans) and seminar participants at RWTH Aachen University, Germany (4 November, 2008); Institute of Social Studies, The Hague, Netherlands (16 September, 2008); Newcastle University (14 May, 2008); the Reserve Bank of India [India's Central Bank], Mumbai (25 July, 2008); University of Mumbai (24 July, 2008); Indira Gandhi Institute of Development Research, Mumbai (23 July, 2008); Indian Council for Research on International Economic Relations, Delhi (10 July, 2008); National Institute of Public Finance and Policy, Delhi (14 July, 2008); Research and Information System for Developing Countries, Delhi (17 July, 2008); Indian Institute of Foreign Trade, Delhi (17 July, 2008); Indian Institute of Finance (18 July, 2008); Institute of Management Technology, India (15 July, 2008); Indian School of Business, Hyderabad (29 July, 2008), University of Hyderabad (1 August 2008), Xavier Institute of Management, India (11 August, 2008). Also thanks are due to Matthieu Bussière, Eric Santor, and Cedric Tille for their useful comments. The usual caveat applies.

1. Introduction

The exchange rate pass-through (ERPT) literature has traditionally focused on developed countries (Campa and Minguez 2006, Faruqee 2006, Campa and Goldberg 2005, Gagnon and Ihrig 2004, Sasaki 2002, Kardasz and Stollery 2001, Gross and Schmitt 2000, Betts and Devereux 1996, Gron and Swenson 1996, Athukorala and Menon 1994, Knetter 1993, Marston 1990). Empirical studies on small open economies have also emerged over time motivated by the important price effects of currency movements (for example, Gottfries (2002) on Sweden, Lee (1997) for South Korea, Naug and Nymoen (1996) for Norway, Dwyer and Kent (1994) for Australia). Recently, however, as emerging markets make their presence felt in the global marketplace and become the new engines of global growth, there has been a growing interest in understanding the nature of ERPT in those markets. Most of the studies are conducted at an aggregate level, including cross-country comparisons, as in Barhoumi (2006), Choudhri and Hakura (2006), and Choudhri *et al*. (2005). An important finding of this recent literature is that ERPT can also be incomplete outside the developed world, although generally it is higher in emerging markets than in developed countries. Gaulier et al. (2008) compare for a large number of products the level of pass-through into total imports of advanced countries and emerging markets. This paper provides further novel evidence using bilateral data on India's export prices. India is itself an emerging market which has been undergoing a process of economic liberalisation and currently has experienced almost two decades of policy reforms.

By examining the pricing behaviour of Indian exporters, this paper throws light on the issue of incomplete ERPT in bilateral trade between emerging markets, also allowing an analysis of the impact of bilateral trade liberalization. This is done at a product level for India's exports to six different markets: the G3 group of three large and developed economies (USA, EU-15 and Japan) and three countries in the BRICS group of dynamic emerging market economies (Brazil, China and South Africa).[1] This grouping allows us to compare three large emerging market economies from different parts of the World. The BRICS group is the largest economic group after G3, with potential to lead the future world economy and has been put through internationalisation strategies in the aftermath of policy liberalisation.[2] Thus the study of the pricing behaviour of Indian exporters in these international export markets enables us to reflect on the benefit of reforms in reducing the anti-export bias that existed prior to the 1990s in most emerging markets.

Another contribution of this paper is the study of PTM behaviour at the product level. Although Mallick and Marques (2006) find incomplete ERPT at an aggregate level for India, it is well known that there is significant variation in the ERPT effect across manufacturing industries (Goldberg and Knetter 1997). Thus also for emerging markets the ERPT effect should be examined at the product level. Recently, Frankel *et al.* (2005) have examined the pass-through into import prices of eight selected narrowly defined brand commodities exported by 76 developing countries, reporting a downward trend in ERPT. There is however limited evidence in the case of developing countries for a broad spectrum of products. In this paper we use annual data for around 1000 4-digit products

[1] Although we use the word BRICS through out the paper, it refers to India's exports to Brazil, China and South Africa. We make use of the vowel 'I' in the middle, which commonly identifies India, to form the acronym BRICS. Russia was excluded due to the behavior of the ruble following the 1998 crisis which could bias the results.

[2] Besides the cases of Brazil and China, the implementation of trade reforms in South Africa during the 1990s has also increased the exposure of the South African economy to international trade.

exported by India,[3] distinguishing the 4-digit categories according to the Rauch (1999) classification of product differentiation.[4]

We then estimate the variations in PTM behaviour across markets (G3 and BRICS) and products (homogeneous, references and differentiated). Our approach allows us to distinguish the markets and product types where we find PTM behaviour, or incomplete ERPT, from those where ERPT is possibly complete. The degree of PTM will reflect the extent to which the markets are integrated or segmented. Under imperfect competition, firms are able to price differently in separate markets by varying their mark-ups, effectively imposing market segmentation. The level of market segmentation can be expected to vary across the six trading partners of India considered in this paper. The products and markets in which the exchange rate changes are transmitted to a greater extent into prices could be interpreted as those in which the exporting country (India) has a better pricing or market power. To the best of our knowledge, there is no study that distinguishes the price response by the type of exported goods and by the type of destination markets.

The estimated ERPT is net of changes in the level of protection faced by India's exporters (import tariffs in destination markets), inflation and openness in the export destination market, a macroeconomic policy index partly reflecting changes in the exporter's costs, India's market share in the destination market and the share of the product in the exporter's total exports (export composition effect). All these controls are justified by the literature and India's recent economic developments (Mallick and Marques 2008a).

---

[3] This is the highest level of disaggregation possible for emerging markets.
[4] The same regressions were run for the liberal and the conservative classifications. As the results were robust to the classification used, only those for the liberal classification are shown in this paper.

Campa and Goldberg (2005) find that the industry composition of imports is the most important factor influencing ERPT into import prices of 25 OECD countries, whilst Campa and Minguez (2006) find that openness to imports is more important than import composition in determining the ERPT into import prices of all Euro area countries.

Moreover, following the process of trade liberalisation among emerging markets, we consider the product-specific tariff rates faced by India in the export destination market. There are only two studies in the literature that discuss both tariff-rate pass through (TRPT) and ERPT (Feenstra 1989 and Menon 1996), and they do it for developed countries. However, given the extent of trade liberalisation and the importance of imported inputs in emerging markets, it is important to gauge the exchange rate impact on India's export prices after having isolated the effect of tariffs faced in those export markets. On the other hand, Bergin and Feenstra (2007) show that an increased openness of destination markets to low-cost countries fosters price competition and induces lower ERPT by other exporters to those markets. This aspect is controlled for in our paper by considering a measure of trade openness in each destination market.

The importance of macroeconomic management for ERPT, reflected via aggregate inflation, has been stressed in recent literature (see for example Campa and Goldberg 2005). In particular, it is thought that lower inflation levels can help explain both the observed decline in ERPT since the 1990s and the lower ERPT in developed countries compared to developing countries. Studying prices of Swedish exports to five countries, Alexius and Vredin (1999) find that PTM is quite common and persistent, and is affected by macroeconomic conditions or aggregate demand in export destination markets. Hence it is important to control for the influence of macroeconomic features on pass-through decisions, as PTM behaviours could be more pronounced in environments with macroeconomic instability, because of higher price volatility leading to fluctuations in demand. Also Taylor (2000) finds a positive relationship between ERPT and inflation. Reyes (2007) shows analytically that this positive relationship can be the direct result of implementing an inflation targeting regime, thus supporting the empirical evidence on declining ERPT in developing countries that have been adopting inflation targeting regimes.

On the other hand, Halpern and Koren (2007), using a dataset for Hungarian imports of differentiated and homogeneous goods, find that import prices are higher for firms with greater market power and for intermediate inputs with a high cost share. Gaulier *et al*. (2008) study ERPT at the product level for a large number of countries, reporting a dichotomous pricing behaviour, with complete ERPT in around 25% of sectors and significant PTM in the remaining ones. They show that pass-through tends to be higher in volatile environments, in less developed countries, and in weakly integrated markets.

Having taken account of the described control variables, our empirical results demonstrate that in 1992-2005, on average, Indian exporters do not fully pass through exchange rate changes and adjust their mark-up in order to smooth their effects onto local (buyer) prices in the destination market. Our empirical analysis further suggests that there is heterogeneity across product groups and across export markets (PTM). More price discrimination is observed among the G3 group of developed markets as opposed to the BRICS group of emerging markets. This seems to be in line with the intuitive reasoning that the G3 markets are more competitive than the BRICS markets for the Indian exporters. In terms of country-specific results, particularly in the case of the US, Indian exporters absorb around 60% of the variation in exchange rate and pass on only 40% of the change in exchange rate, supporting the idea that prices in terms of buyer currency have become less responsive to exchange rate movements in the recent years. However, only in the BRICS, tariff reduction has had a significant impact on India's export prices, hinting that trade liberalisation among large emerging markets may have important impacts on the pricing behaviour and profitability of exporting firms. We find a similar impact of trade liberalisation on export prices of differentiated goods.

The remainder of the paper is organized as follows. Section 2 describes a simple PTM model with both exchange rate and tariff rate pass-through into export prices, from which the empirical specification is derived. Section 3 discusses the data and estimation results. A summary and discussion of implications of the findings are provided in Section 4.

2. A model of exchange rate and tariff pass-through

The study of ERPT, defined as the elasticity of destination-currency prices of traded goods to exchange rate changes, goes back to the 1970s (see, for example, the survey in Goldberg and Knetter (1997)). Empirical studies have provided substantial evidence of incomplete ERPT (see Menon (1995), for an earlier survey), which reflects departures from the law of one price (LOP) in traded goods.[5] If exporters have some market power and markets are segmented, an exchange rate change may induce price discrimination

[5] See Rogoff (1996) for the PPP puzzle, discussing the factors driving the arbitrage between prices in different countries, with tariffs, transportation costs, non-tariff barriers, and pricing to market as possible factors.

across destination markets, or pricing-to-market (Krugman, 1987), such that exporters set different prices, in the exporters' currency, in different destinations (Adolfson, 2001). This phenomenon is made possible by imperfect competition and the associated mark-up pricing: when the exchange rate changes, exporters change the price in their own currency to stabilise their export prices in the importer's currency, implying incomplete ERPT to import prices. This exporter pricing behaviour framework is our starting point in order to examine PTM in export prices. In a partial equilibrium framework, the phenomenon can be explained through a mark-up model (Campa and Goldberg (2005), Gagnon and Knetter (1995)).

PTM arises when firms endowed with market power alter their pricing decisions in response to exchange rate changes. While the PTM behaviour of exporters is often empirically investigated using aggregate data, a product-level analysis is more relevant and meaningful to extract the extent of such behaviour. Even when PTM behaviour is found on the aggregate, there may be differences between homogeneous and differentiated goods. It is possible that homogenous goods sell for the same price after converted to a common currency, regardless of where those goods are sold (full ERPT, no PTM). However, differentiated goods may behave differently and are more likely to reflect a PTM phenomenon, where firms price-discriminate setting different prices for different destination markets (incomplete ERPT with PTM).

Following this line of literature, we develop a simple analytical model of ERPT with tariffs. To examine PTM behaviour, we model a firm with sales to a foreign export market. The exporting firm's profits will equal the difference between its revenue and its cost across *i* different markets and *j* goods:

$$(1) \qquad \Pi = \sum_i \sum_j P_{ij}^x q_{ij}\left(\frac{P_{ij}^x}{e_i\left(1+T_{ij}\right)p_{ij}^*}\right) - C\left(\sum_i \sum_j q_i\left(\frac{P_{ij}^x}{e_i\left(1+T_{ij}\right)p_{ij}^*}\right), w\right)$$

where w is an index of input prices, including the imported raw materials, q is the quantity demanded of exports, which can be assumed as a function of the export price (p^x – price in exporter's currency) relative to the price level in the destination market (p^*), e is the exchange rate defined as the domestic currency (e.g., rupee) price of foreign currency (e.g., USD). T is the unit tariff rate which refers to the tariff imposed in the export destination market. The exchange rate e should be multiplied by the foreign price level because it is the price of exports relative to prices in the destination market that enters the demand curve. Also in the demand function, we consider the tariff rate at product level in the destination market that can influence the level of external demand.[6]

Assuming that the firm's external demand changes as the exchange rate changes, the representative exporter may be constrained to keep the price of its products in its own currency stable despite exchange rate fluctuations. This means that the exporter would maximise its profit function by setting its export price as a mark-up over the production cost, where the exchange rate is assumed to determine the profit mark-up at a given price elasticity of external demand (η_{ij}). Taking the first order derivative of equation (1) with respect to P^x, the following expression is obtained:

[6] Although the profit function here is assumed to be only for exporting firms, there could be firms doing both exporting and selling in the domestic market, in which case one could derive their profit function by making $e=1$ and $T=0$.

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

The term in parenthesis in the right-hand side of this equation can now be interpreted as mark-up ($\frac{\eta_{ij}}{\eta_{ij}-1}$) over marginal cost (MC).

Using log-linear approximation via total differentiation, equation (2) can be written as:

$$(3)\ d\ln P_{ij}^{x} = d\ln MC_j - \frac{\partial \ln \eta_{ij}}{\left(\eta_{ij}-1\right)\partial \ln\left(\dfrac{P_{ij}^{x}}{e_i\left(1+T_{ij}\right)p_i^{*}}\right)} \left(\frac{P_{ij}^{x}}{\left(e_i\left(1+T_{ij}\right)p_i^{*}\right)^2} \left[d\ln P_{ij}^{x} - d\ln e_i - \frac{T_{ij}}{1+T_{ij}} d\ln T_{ij} - d\ln p_i^{*} \right] \right)$$

Collecting terms for $d\ln P_i^{x}$ on the left hand side yields the following testable equation:

$$(4)\qquad d\ln P_{ij}^{x} = \tau_{ij} + (1-\delta_{ij})d\ln MC_j + \delta_{ij}\left(d\ln e_i + \frac{T_{ij}}{1+T_{ij}} d\ln T_{ij} + d\ln p_i^{*} \right)$$

where

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

is a function of both the level and the elasticity of η_{ij}, and τ_{ij} is a sector-specific intercept across *i* different markets that captures the constant terms. The coefficient δ is a PTM coefficient, which can be analysed as an ERPT coefficient in terms of buyer's currency price. The ERPT depends on how price affects external demand elasticity and thus it is expressed in terms of the exporter's price in foreign currency. When the demand elasticity is zero, the partial derivative in the δ function will be zero, which means δ=0 and there will be full ERPT in foreign currency terms, thus no PTM is possible. If the demand elasticity is unitary, the partial derivative in the δ function equals one, and hence δ=1, which means exporters fully absorb exchange rate changes, that is, there is no ERPT to foreign currency prices. In this case the extent of PTM corresponds to exchange rate fluctuations.

3. Empirical testing of the PTM hypothesis

The variables in equation (4) are directly included in the empirical specification, apart from marginal cost, which is unobservable directly and so is included in the sector-specific term. Following equation (4), the empirical specification for India's export price of product *j* in *i* different markets over period *t* can be written as follows:

$$\begin{aligned} d\ln P^{x}_{ijt} &= \alpha_{ij} + \delta_{ij} d\ln e_{it} + \beta_{ij} d\ln T_{ijt} + \lambda_i Inf_{it} + \phi_{ij} Open_{it} \\ &\quad + \theta_{ij} Policy_t + \mu_{ij}\, ProductShare_{ijt} + \gamma_{ij} IndiaShare_{ijt} + \varepsilon_{ijt} \end{aligned} \tag{5}$$

where $\alpha_{ij} = \tau_{ij} + (1-\delta_{ij}) d\ln MC_j$ is a constant term, $d\ln P^{x}_{ijt}$ is the change in the log of export prices in domestic currency (rupees),[7] $d\ln e_{it}$ is the variation in the log of the bilateral exchange rate (an increase indicates depreciation), $d\ln T_{ijt}$ is the change in the

[7] As it is well known that unit values are an imperfect proxy for the true prices of goods and are subject to aggregation bias, the results must be interpreted with caution. However, in the absence of micro data for emerging markets, unit values can be regarded as a first approximation to allow the analysis of an important issue.

log of the tariff rate, *ProductShare* refers to the share of each product in India's exports, *Indiashare* refers to India's market share of each product in the destination market, meant to proxy the market power of Indian exporters in the destination market, *Inf* and *Open* denote foreign inflation and openness to trade, *Policy* denotes a macroeconomic policy index[8] for India, and the error term, ε, is assumed to be independently and identically distributed. India's policy index can reflect the degree of domestic macroeconomic stability, whether foreign exporters set their prices in relation to prices in the destination market as in Marazzi and Sheets (2007). Besides, as the policy index incorporates inflation, fiscal and trade variables, it reflects the exporter's cost variations by capturing the extent of changes in the price of imported inputs in the exporter's cost of production. A similar interpretation is possible for the α coefficient.

The empirical specification in first differences comes out directly from the theoretical formulation, but it also presents advantages. Prices can adjust fully after one year (taken here as the long run), but in the short run export prices may be fixed in home currency, making pass-through differ in the short-run and in the long-run (Gottfries, 2002). The formulation in first differences can eliminate the effect of those short-run nominal rigidities,[9] thus enabling us to attribute the degree of pass-through to a more long-term phenomenon namely PTM. Besides, given the annual frequency of the dataset, the estimated coefficients are more likely to capture long-run pass-through. Statistically, the specification in first differences is also justified, as the series in levels are non-stationary (see Mallick and Marques, 2008).

[8] The policy index includes inflation, trade openness and budget surplus, following Burnside and Dollar (2000). We have updated this for India until 2006. For more details, see Mallick and Marques (2008a).
[9] The underlying rationale for such price rigidity is that firms incur some type of costs associated with price changes, either of the 'menu-cost' or 'contracting-cost' type (see Devereux and Yetman, 2003).

The degree of ERPT or TRPT to export prices will be analysed from India's point of view. In equation (5), if δ=0 or β=0 (δ=1 or β=1), there is complete ERPT or TRPT (no ERPT or TRPT), as the rupee price of *exports* does not change (changes one-to-one) with the exchange rate or tariff rate. If both δ and β are strictly between 0 and 1, then there is incomplete pass-through to export prices in the buyer's currency and in this case we can talk of PTM. Generally, the greater the degree of PTM, the lower the extent of pass-through.

3.1 Data Description

The unit value data for India's exports to G3, Brazil, China and South Africa in 1992-2005 is taken from the "India Trades"[10] database at the 4-digit product level.[11] The data on import tariffs was collected from the World Bank TRAINS database. The control variables are taken from individual country sources in IMF's IFS database. We further include two dummies, one for the BRICS and another for product-specific effects by using the Rauch (1999) classifications (liberal and conservative) to distinguish among differenced (LIBDIF and CONDIF dummies), referenced-priced (LIBREF and CONREF dummies) and homogeneous goods (LIBHOM and CONHOM dummies).

The distinction between differenced and homogeneous goods is important in the case of India as during the sample period the composition of India's exports has shifted from primary goods and traditional manufacturing into capital-intensive and engineering-

[10] The "India Trades" database is compiled by the Centre for Monitoring the Indian Economy (CMIE) from the original source Directorate General of Commercial Intelligence and Statistics (DGCIS), Government of India.
[11] The complete list of product codes (over 10 pages) used in the regressions is available upon request from the authors.

based products. At the same time, India's share in export markets has increased in most cases (Figure 1).[12]

[Figure 1 here]

Following Rauch (1999), availability of information on a reference price distinguishes homogeneous from differentiated products. Thus the differentiated products are defined as those without an organised exchange price or centralised reference-price. In other words, differentiated products are branded goods with a manufacturer label, making them distinct from the homogenous goods.

For our dataset, Table 1 shows the number of 4-digit products in each classification and category, Table 2 shows the distribution of 4-digit products by classification types across the sample markets, and Table 3 presents some examples of the most common product groups falling under each classification type. The most interesting point to note is the similarity of distribution across product categories exported to the G3 and to the BRICS. This characteristic allows us to attribute ERPT differences across markets solely to market heterogeneity. Hence, product heterogeneity is treated separately.

[Table 1-3 here]

3.2 Results and Discussion

Equation (5) is estimated using FGLS and controlling for heteroskedasticity and autocorrelation. The estimation results are presented in Table 4 (common coefficients),

[12] In the EU, India's market share went up since 1995, when India became a member of the WTO on 1 January 1995.

Table 5 (separate coefficients for G3 and BRICS), Tables 6-11 (country-specific regressions) and Table 12 (separate coefficients for homogeneous and differentiated goods). The variables included are all relevant as they increase the Wald Chi-Squared test of overall fit and improve the log-likelihood statistic, apart from the product type dummies, which are always insignificant in Tables 4 and 5 and do not visibly improve the model's fit. They are however relevant at country-level (US, Japan, Brazil and South Africa). On the other hand, the BRICS dummy in Tables 4 and 12, whilst improving the model's fit, is not significant, indicating that our control variables account for the main sources of significant differences across G3 and emerging export markets, as shown in Table 5.

[Tables 4-12 here]

In Table 4 we find overall incomplete pass-through of exchange rates and tariff rates (coefficients statistically between zero and one), so on average there is PTM in India's exports. The extent of response of rupee export prices to exchange rate changes is about 18%, implying an average ERPT of 82%. When distinguishing between export markets (Table 5), we see that the average result of PTM (incomplete ERPT) only holds for exports to the G3 markets, with Indian exporters increasing their rupee prices by around 30% of the exchange rate changes. Hence as the Indian rupee depreciated, Indian exporters were reducing their prices in the buyers' currency by 70% of the depreciation. This finding is in line with Gopinath *et al*. (2007) who emphasise that the currency in which goods are priced (producer currency pricing or local currency pricing) has important implications for ERPT and optimal exchange rate policy. In the context of US imports, they find that there is a large difference in the pass-through of the average good priced in dollars (25%) compared to non-dollar pricing (95%). Our result of 70% average ERPT suggests that a large proportion of the goods exported is priced in producer currency prices (i.e., Indian rupee), as pointed out in Mallick and Marques (2008b). If the rupee price goes up following depreciation in the exporter's currency, external demand could be more elastic and this is when exporters are likely to absorb the exchange rate shock, indicating incomplete pass-through thus providing evidence for price discrimination across markets rather than price stickiness. On the other hand, the exporting firms refrain from such PTM when they export to BRICS markets, implying that ERPT is complete for the BRICS, which means Indian exporters fully pass through the changes in exchange rates to these markets. This high degree of ERPT means a low degree of price competition in the BRICS markets, whereas a relatively lower degree of ERPT in G3 markets implies a higher degree of price competition.[13]

The bilateral exchange rates of the rupee against the currencies of the six export markets considered in the paper follow a different path (Figure 2). In 1991-2005, the rupee depreciated against the G3 currencies and against the Chinese yen, but appreciated against the Brazilian real and the South African rand (1992-2003). Hence it is important to compare country-specific results in order to be sure that our main conclusions are not hiding an asymmetry in the exporters' responses to appreciation or depreciation. If this was the case, we would expect rupee prices of exports to increase to some extent when the rupee depreciates (G3 and China) and not to react when the rupee appreciates (Brazil and South Africa). Instead, we find that rupee prices do not consistently react against the

[13] This is in line with the result in the context of US automobile market in Banik and Biswas (2007) that a low degree of price competition corresponds to a high degree of ERPT.

currencies of any emerging market (Tables 9-11) and similarly for the EU (Table 7) after accounting for openness of the export market. However, rupee prices consistently react against the currencies of the US (Table 6) and Japan (Table 8), with exporters absorbing up to 60% (20%) of the exchange rate changes in the case of the US (Japan).[14]

The EU's openness is keeping the prices of India's exports at lower levels (see Table 7), which is in line with the result of Bergin and Feenstra (2007) that an increased openness of destination markets to low-cost countries fosters price competition and induces lower prices by other exporters to those markets. Whilst openness of the destination market plays a similar role in the case of Brazil (Table 10) and South Africa (Table 11), the reverse is found for the US (Table 6). The general result is pointing towards some evidence on price discrimination being exercised by Indian exporters.

In Figure 3, we show the distribution of PTM coefficients using the entire sample of products. About 35% of the products cluster between zero and one, indicating incomplete ERPT in the buyer's currency. This value is also close to the 25% indicated by Gaulier et al (2008). Those products for which the coefficient is negative could partly reflect the effect of transfer pricing between multinational firms and their affiliates in India or intra-firm trade on the destination-currency prices of exports from India. Given the current trend of outsourcing of foreign production, it is likely that there could be some intra-firm trade, which can suggest that there can be some foreign firms practicing price discrimination across markets as Halpern and Koren (2007) have found for the case of Hungary. There can of course be measurement errors that cause coefficients to be out of the theoretical boundaries.

[14] Note that these bilateral exchange rates show little fluctuation around an upward trend and this upward trend could reflect quality-upgrading by Indian exporters.

[Figure 3 here]

Figure 4 shows the distribution of the PTM coefficients for the three product types considered according to the Rauch (1999) classification: homogeneous, reference-priced and differentiated. The percentage of PTM coefficients respecting the theoretical boundaries of zero and one is respectively around 30%, 50% and 20%. Moreover, the density decreases with the degree of product differentiation. Almost 1/3 of the homogeneous goods have a negative PTM coefficient, implying that it is in this category that multinationals are more present and intra-firm trade may be more important. Employing a Dixit-Stiglitz product differentiation model, Yang (1997) shows that ERPT is greater for differentiated products as they face less elastic demand. Gopinath and Rigobon (2006) show that, in the case of US import and export prices, local currency prices of differentiated goods are relatively sticky compared to those of homogenous goods, which means exporters are more likely to absorb the exchange rate shock for differentiated goods rather than for homogenous goods.

Our results in Table 12 do not return significant differences in ERPT between the three product types, although at the country-level we see that, compared to homogeneous goods, reference-priced goods have lower export prices for the US and Brazil (higher for South Africa) and differentiated goods have higher export prices for Japan and South Africa, Hence we believe that whether export prices vary with the degree of differentiation depends on the particular product lines being exported and so it is difficult to keep this result on the aggregate, unless a country's exports were highly specialised, which obviously is not the case of India.

[Figure 4 here]

Table 4 shows that on average trade liberalisation in the destination markets significantly increases rupee export prices, although by a small extent (1.5% of the tariff rate change). Table 5 shows that this average result is due to incomplete TRPT being found only for the BRICS (rupee export prices increase by up to 9% of the tariff rate change). The tariff rate coefficient is insignificant for G3, which could reflect the fact that this group of countries embraced trade liberalisation much earlier than the period under study here, and hence there is low variability in tariff rates in the sample period. Besides, trade liberalisation is the only source of significant differences in pass-through into export prices across homogeneous or differentiated products (Table 12), where TRPT is incomplete only for differentiated goods.

Hence the results imply that G3 and BRICS have underlying characteristics that distinguish them as export markets and that go beyond differences in India's bilateral export basket composition operating via trade liberalisation.[15] In this way, our results support the view of Campa and Minguez (2006), who find that openness to imports is more important than import composition in determining the ERPT into import prices of all Euro area countries, over that of Campa and Goldberg (2005), who find that the industry composition of imports is the most important factor influencing ERPT into import prices of 25 OECD countries.

With respect to the relationship between ERPT and TRPT, we reject symmetry and homogeneity in most tables for our preferred models (7 onwards). Symmetry of ERPT and TRPT is accepted only for the EU and South Africa. The variations in implied ERPT and TRPT across the export markets are summarised in Table 13. Whilst ERPT is

[15] This could not in any case be the explanation as in our dataset the distribution across product types is remarkably similar between G3 and BRICS (see Table 2).

complete for the EU, China and South Africa, and almost complete for Brazil, it is around 40% for the US and 80% for Japan. TRPT, on the other hand, ranges from a high of 100% for Japan and the EU to a low of around 80% for China. This is further evidence that Indian exporters price-to-market.

With respect to other control variables, on average we find a positive relationship between rupee export prices and both product share and inflation in the export market (Table 4), which confirms the importance of market power and of macroeconomic conditions in export markets. Disaggregating these effects by country type (Table 5), product share and inflation are important only for G3 markets. However, the impact of product share seems to be second-order in magnitude, whilst the lack of inflation significance for the BRICS originates in China (Table 9). For all other countries the positive relationship between market inflation and export prices holds. This result is in line with what has been found in the literature (see for example Gaulier *et al*. 2008, Reyes 2007, Campa and Goldberg 2005, Taylor 2000).

India is characterised internally by a policy index and externally by its share in each export market. On the aggregate (Tables 4 and 5) there is a negative relationship between the macroeconomic policy index for India and export prices, very much linked to the stabilising effect of the reforms (Mallick and Marques 2008a). Only for the EU, Brazil and South Africa that relationship becomes positive after accounting for openness of the export markets, so that third-country relative price effects could be operating here. Theoretically, the relationship between export prices and India's share in the destination market could be either positive or negative. Feenstra *et al*. (1996) show that ERPT should be high for exporters with a very large share of total destination market sales. When market share is very high, the firms face little competition, and thus will more fully pass through an exchange rate change for a given market demand schedule. At small to intermediate market shares, the theoretical relationship is potentially nonlinear and sensitive to assumptions about the nature of consumer demand and firm interactions (Yang 1998). In our results, where India has a small market share in all export markets (see Figure 1), we find a positive (negative) relationship to export prices for the US and Brazil (South Africa).

To sum up, in the case of India we find that differences between export markets are more important than differences across product types. Only for the case of tariffs both country and product differences are important. The analysis by destination markets is a major contribution of this paper to this line of literature, as we examine country heterogeneity in addition to country-group heterogeneity. On the other hand, macroeconomic policy variables, such as a policy index to reflect production cost, macroeconomic stability and policy reforms in India, and inflation in export markets are important control variables, in accordance with the recent literature.

3.3 Implications of the results

Despite currency depreciation, low or declining ERPT has been evidenced in individual low-income developing countries at the aggregate level (see for example Ca' Zorzi et al. (2007) for 12 emerging markets and Mallick and Marques (2006) for India). A plausible explanation for the decline in ERPT is that the degree of market segmentation has increased with more firms being engaged in PTM behaviour. As we find that the PTM coefficient is significant, meaning the price of identical goods differs across countries, we can conclude that, for the case of India, the international product markets are segmented and exporting firms have market power.[16]

One could think of many possible factors that might have caused an increase in PTM and therefore a decline in the degree of ERPT. In the case of automobile industry in the euro-zone, Balaguer et al. (2004) find that the degree of PTM is quite heterogeneous and differs highly across both product categories and destination markets. When a foreign currency appreciates, exporting firms may raise their foreign currency export prices while maintaining their market shares (see Froot and Klemperer 1989). Aksoy and Riyanto (2000) show that the institutional aspects of vertically related markets play a role in explaining incomplete price adjustments in both intermediate and final goods markets and the failure of PPP in the short run. Parsley (2004) finds that PTM behaviour is a function of home market conditions and the ability to price discriminate across markets. Also with menu costs, it is costly for firms to change prices, and only large enough exchange rate changes can trigger systematic changes in export prices, which partly suggest exporters probably taking advantage of currency depreciation to increase the local (buyer) currency prices marginally, thus exhibiting incomplete price adjustment in foreign currency terms. Besides, as found in this paper, the structural shift to manufactures seems to have established a pattern of imperfect competition and increased the potential for the existence of mark-ups.

In general, an important lesson to take from our analysis is the possibility of incomplete ERPT, even for emerging markets, and the role played by market-specific

[16] Although ERPT could depend on the invoicing currency as much as the market structure, Gil-Pareja (2003) find that local currency price stability is a strong and pervasive phenomenon across products independent of the invoicing currency.

characteristics, such as openness and macroeconomic management, in fostering PTM behaviour and market segmentation.

4. Conclusions

This paper investigated the degree of PTM or the pricing behaviour of Indian firms exporting their products to the G3 or the BRICS group of destination markets following exchange rate changes, after having controlled for bilateral trade liberalisation and overall openness of the destination markets, market structure, product differentiation, and macroeconomic conditions in both the domestic and in the destination market as reflected in India's macroeconomic policy and foreign inflation. The analysis here is contrary to the conventional thinking that ERPT is always complete in developing economies, as they are price takers and hence cannot exercise PTM. In this paper, we demonstrate the existence of incomplete pass-through at a 4-digit product level for India.

For most of the sample period, while the exchange rate usually does not enter as an instrument for G3 policy makers, it did act as an important policy instrument in BRICS economies not only in maintaining price stability but also in promoting export competitiveness and protecting domestic industries. However, as exchange rate changes can influence expected inflation in G3 markets, Indian exporters in those markets seem to be more sensitive in reacting to exchange rate changes (incomplete ERPT) than to tariff changes (complete TRPT), whereas in BRICS markets they respond more to tariff changes (incomplete TRPT) than to exchange rate changes (complete ERPT). In other words, Indian exporters seem to be able to vary mark-ups in G3 markets (but not in

BRICS markets) with respect to changes in exchange rate. As the evolution of bilateral exchange rates in the BRICS countries is more volatile and markets are more segmented, any price changes by the exporters would have to be more frequent and would have a lower impact. Hence any exchange rate changes between these markets do not reflect the case of incomplete ERPT.

On the other hand, Indian exporters have been able to take advantage of trade liberalisation in the BRICS markets. They do not change their export prices in the G3 markets in response to changes in tariffs as in general G3 countries impose lower levels of protection compared to emerging markets. Not only the WTO allows developing countries to maintain higher levels of protection, but also many of these countries have joined the WTO more belatedly. China, for example, has become a WTO member in 2003, opening up new trade possibilities with India. Hence there is still a large scope for gains from liberalising trade among emerging markets by means of a decrease in export prices worldwide. The contribution of this decrease to worldwide deflation becomes even more important as the share of intra-BRICS trade in world trade increases.

To conclude, Indian exporters are more sensitive to exchange rate changes in the G3 markets and to tariff changes in the BRICS markets as they balance the maintenance of their market shares with increasing their mark-ups. Thus we conclude that macroeconomic policy, external demand conditions and tariff structures play an important role in relating exchange rate depreciations to price declines in the buyers' currency, thus establishing the evidence of differences in PTM between India's two key groups of export destinations.

References

Adolfson, M. (2001) Export price responses to exogenous exchange rate movements, *Economics Letters*, 71 (1): 91-96.

Aksoy, Y., and Y.E. Riyanto (2000) Exchange Rate Pass-Through in Vertically Related Markets, *Review of International Economics*, 8 (2), 235–251.

Alexius, A. and A. Vredin (1999) Pricing-to-market in Swedish Exports, *Scandinavian Journal of Economics*, 101 (2), 223–239.

Athukorala, P. and Menon, J. (1994), Pricing-to-Market Behaviour and Exchange Rate Pass-through in Japanese Exports, *Economic Journal,* 104 (423), 271-81.

Balaguer, J., V. Orts and J.C. Pernías (2004) Measuring Pricing to Market in the Eurozone: The Case of the Automobile Industry, *Open Economies Review*, 15 (3): 261-271.

Banik, N. and B. Biswas (2007) Exchange rate pass-through in the U.S. automobile market: A cointegration approach, *International Review of Economics & Finance*, 16 (2): 223-236.

Barhoumi, K. (2006), Differences in Long Run Exchange Rate Pass-through into Import Prices in Developing Countries: An Empirical Investigation, *Economic Modelling*, 23, 926-51.

Bergin, P.R. and Feenstra, R.C. (2007), "Pass-through of exchange rates and competition between floaters and fixers", NBER Working Paper 13620.

Betts, C., and Devereux M.B. (1996) The exchange rate in a model of pricing-to-market, *European Economic Review*, 40 (3): 1007-1021.

Burnside, C. and Dollar, D. (2000), Aid, Policies, and Growth, *American Economic Review*, 90, 847-68.

Campa, J. M. and Goldberg, L. S. (2005), Exchange Rate Pass-through into Import Prices, *Review of Economics and Statistics,* 87, 679-90.

Campa, J.M., and J.M.G. Minguez (2006) Differences in exchange rate pass-through in the euro area, *European Economic Review*, 50 (1): 121-145.

Choudhri, E.U. and D.S. Hakura (2006) Exchange rate pass-through to domestic prices: Does the inflationary environment matter? *Journal of International Money and Finance*, 25 (4): 614-639.

Choudhri, E.U., H. Faruqee and D.S. Hakura (2005) Explaining the exchange rate pass-through in different prices, *Journal of International Economics*, 65 (2): 349-374.

Devereux, M.B. and J. Yetman (2003) Predetermined Prices and the Persistent Effects of Money on Output, *Journal of Money, Credit and Banking,* 35 (5): 729–41.

Dwyer, J., and Kent, C. (1994) Exchange rate pass-through: Testing the small country assumption for Australia, *Economic Record*, 70 (211): 408-423.

Faruqee, H. (2006) Exchange Rate Pass-Through in the Euro Area, *IMF Staff Papers*, 53 (1): 63-88.

Feenstra, R. (1989), Symmetric Pass-through of Tariffs and Exchange Rates under Imperfect Competition: An Empirical Test, *Journal of International Economics,* 27, 25-45.

Feenstra, R., Gagnon, J. and Knetter, M. (1996), Market Share and Exchange Rate Pass-through in World Automobile Trade, *Journal of International Economics,* 40, 187-207.

Frankel, J., Parsley, D. and Wei, S. (2005), Slow Pass-through around the World: A New Import for Developing Countries?, *NBER Working Paper,* 11199.

Froot, K.A. and Klemperer, P.D. (1989) Exchange Rate Pass-Through When Market Share Matters, *American Economic Review*, 79 (4): 637-654.

Gagnon, J.E., and J. Ihrig (2004) Monetary policy and exchange rate pass-through, *International Journal of Finance & Economics,* 9 (4): 315-338.

Gagnon, J. and Knetter, M. (1995), Markup Adjustment and Exchange Rate Fluctuations: Evidence from Panel Data on Automobile Exports, *Journal of International Money and Finance,* 14, 289-310.

Gaulier, G., Lahrèche-Révil, A., and Méjean, I. (2008) Exchange-rate pass-through at the product level, *Canadian Journal of Economics*, 41 (2): 425-449.

Gil-Pareja, S. (2003) Pricing to market behaviour in European car markets, *European Economic Review*, 47 (6): 945-962.

Goldberg, P. and Knetter, M. (1997), Goods Prices and Exchange Rates: What Have We Learned?, *Journal of Economic Literature,* 35, 1243-72.

Gopinath, G., Itskhoki, O. and Rigobon, R. (2007), *Currency Choice and Exchange Rate Pass-Through*, NBER Working Paper No. W13432; Available at SSRN: http://ssrn.com/abstract=1016343.

Gopinath, G. and R. Rigobon (2006) *Sticky Borders*, NBER Working Paper No. 12095, NBER: Cambridge, MA.

Gottfries, N. (2002) Market Shares, Financial Constraints and Pricing Behaviour in the Export Market, *Economica,* 69 (276): 583–607.

Gron, A. and D.L. Swenson (1996) Incomplete Exchange-Rate Pass-Through and Imperfect Competition: The Effect of Local Production, *The American Economic Review*, Papers and Proceedings, 86 (2): 71-76.

Gross, D.M. and N. Schmitt (2000) Exchange rate pass-through and dynamic oligopoly: an empirical investigation, *Journal of International Economics*, 52 (1): 89-112.

Halpern, L. and M. Koren (2007) Pricing to Firm: an Analysis of Firm- and Product-level Import Prices, *Review of International Economics*, 15 (3): 574–591.

Kardasz, S.W., and Stollery, K.R. (2001) Exchange rate pass-through and its determinants in Canadian manufacturing industries, *Canadian Journal of Economics*, 34 (3): 719-738.

Knetter, M.M. (1993) International Comparisons of Pricing-to-Market Behavior, *The American Economic Review*, 83 (3): 473-486.

Krugman, P. (1987) Pricing to Market When the Exchange Rate Changes, in Arndt, S.W., J.D. Richardson (Eds.), *Real-Financial Linkages among Open Economies*, MIT Press, Cambridge, MA.

Lee, J. (1997) The response of exchange rate pass-through to market concentration in a small economy: The evidence from Korea, *Review of Economics & Statistics*, 79 (1): 142-145.

Mallick, S. K. and Marques, H. (2008a) Exchange rate transmission into industry level export prices: A tale of two policy regimes in India, *IMF Staff Papers*, 55 (1): 83-108.

Mallick, S. K. and Marques, H. (2008b) Pass-through of exchange rate and tariffs into import prices of India: Currency depreciation versus import liberalisation, *Review of International Economics*, 16 (4): 765-782.

Mallick, S. K. and Marques, H. (2006), Sectoral Exchange Rate Pass-Through: Testing the Impact of Policy Reforms in India, *Scottish Journal of Political Economy,* 53, 280-303.

Marazzi, M. and N. Sheets (2007) Declining exchange rate pass-through to U.S. import prices: The potential role of global factors, *Journal of International Money and Finance*, 26 (6): 924-947.

Marston, R. (1990), Pricing to Market in Japanese Manufacturing, *Journal of International Economics*, 29 (3-4): 217-236.

Menon, J. (1995), Exchange Rate Pass-Through, *Journal of Economic Surveys,* 9, 197-231.

Menon, J. (1996), The Degree and Determinants of Exchange Rate Pass-Through: Market Structure, Non-Tariff Barriers and Multinational Corporations, *Economic Journal,* 106 (435): 434-44.

Naug, B., and Nymoen, R. (1996) Pricing to market in a small open economy, *Scandinavian Journal of Economics*, 98 (3): 329-350.

Parsley, D.C. (2004) Pricing in International Markets: a ‘Small-country’ Benchmark, *Review of International Economics*, 12 (3), 509–524.

Rauch, J. E. (1999) Networks Versus Markets in International Trade, *Journal of International Economics*, 48(1), 7-35.

Reyes, J. (2007) Exchange Rate Pass-through Effects and Inflation Targeting in Emerging Economies: What is the Relationship?, *Review of International Economics*, 15 (3), 538–559.

Rogoff, K. (1996) The Purchasing Power Parity Puzzle, *Journal of Economic Literature*, 34: 647-68.

Sasaki, Y.N. (2002) Pricing-to-Market Behavior: Japanese Exports to the US, Asia, and the EU, *Review of International Economics*, 10 (1): 140-150.

Taylor, J. B. (2000), Low Inflation, Pass-through, and the Pricing Power of Firms, *European Economic Review,* 44, 1389-408.

Yang, J. (1998), Pricing-to-Market in US Imports and Exports: A Time Series and Cross-Sectional Study, *Quarterly Review of Economics and Finance,* 38 (4), 843-61.

Yang, J. (1997), Exchange Rate Pass-through in US Manufacturing Industries, *Review of Economics and Statistics,* 79 (1): 95-104.

Figures and Tables

Figure 1: India's share in export markets

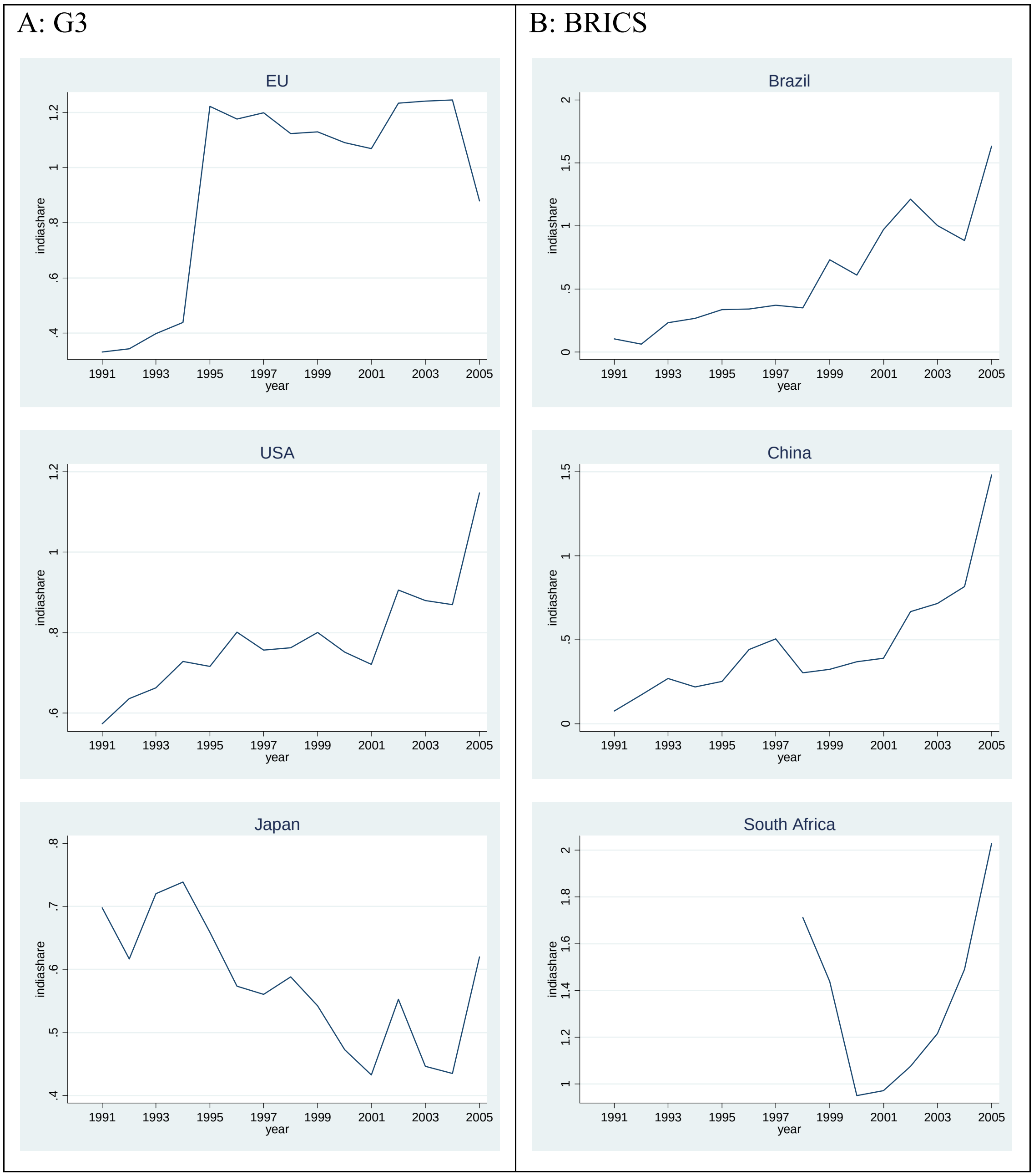


Figure 2: Annual bilateral exchange rates against the rupee

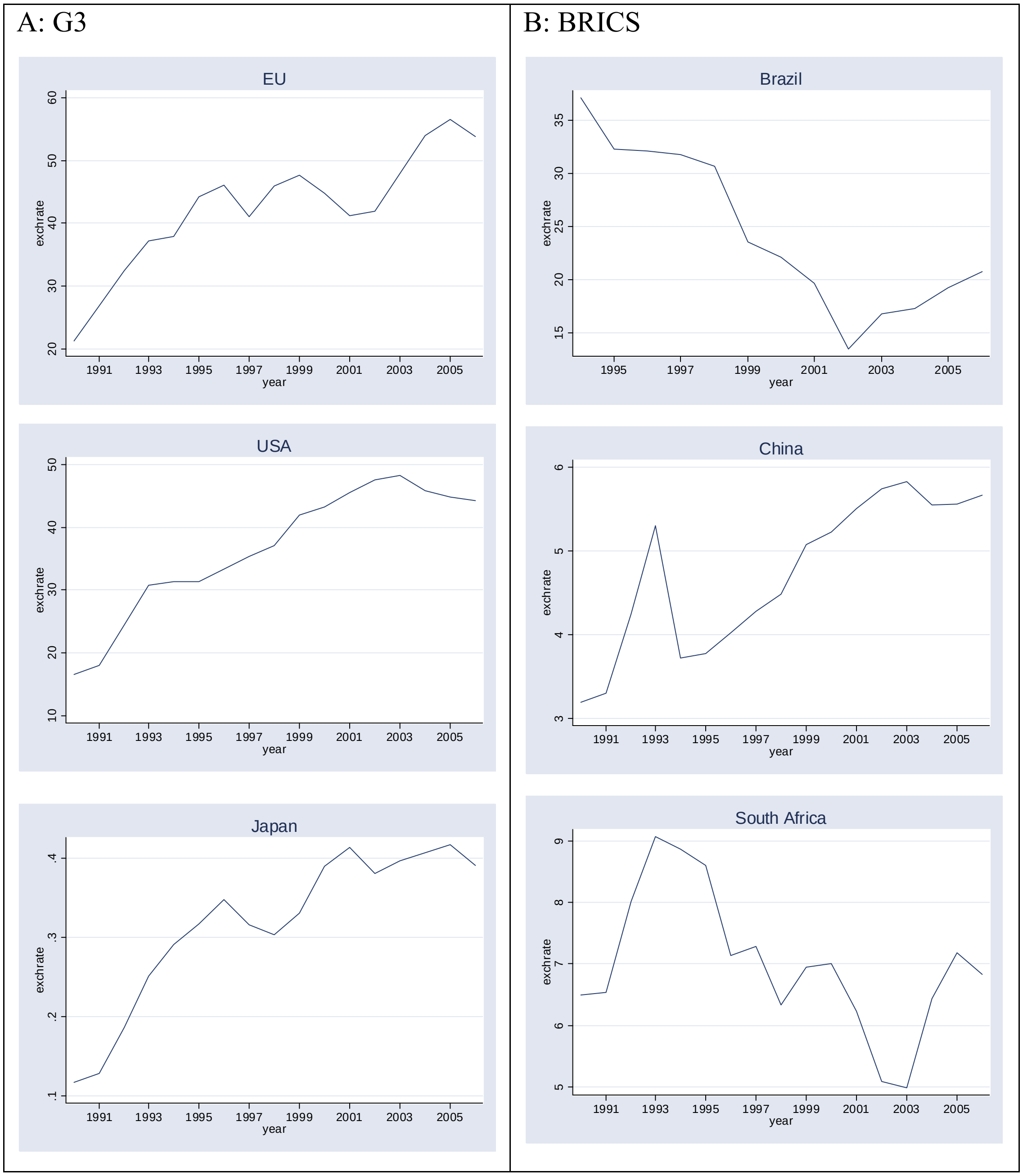


Figure 3: Distribution of PTM responses to exchange rate fluctuations in the full sample

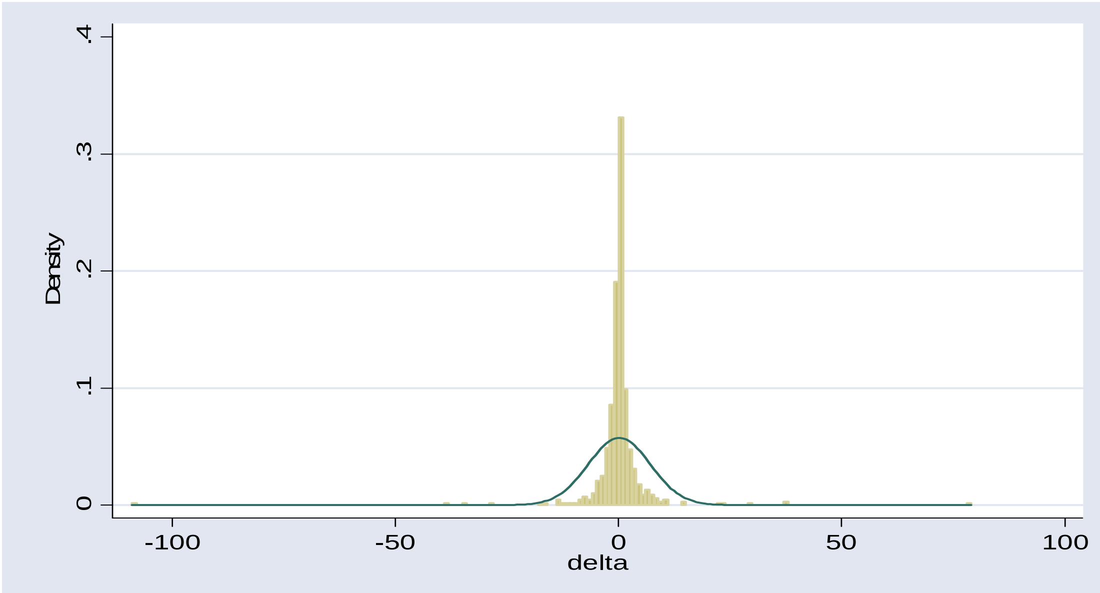
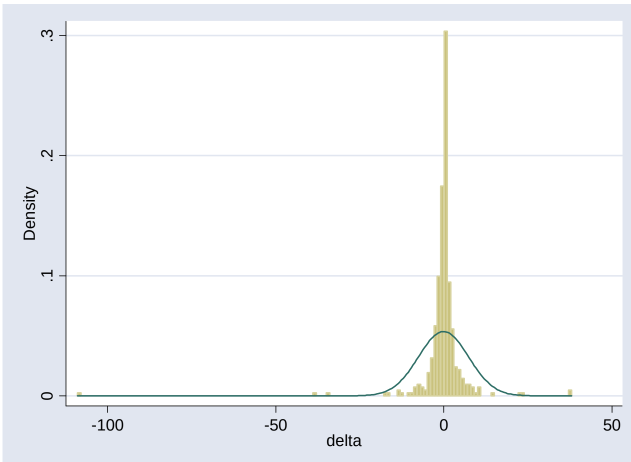
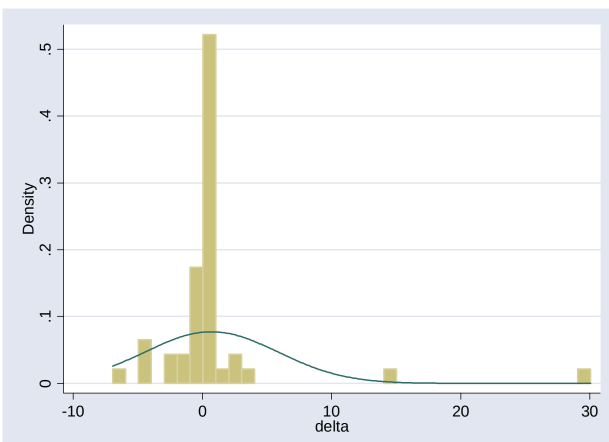


Figure 4: Distribution of PTM responses to exchange rate fluctuations according to the Rauch (1999) classification

A: Homogeneous goods



B: Reference-priced goods



C: Differentiated goods

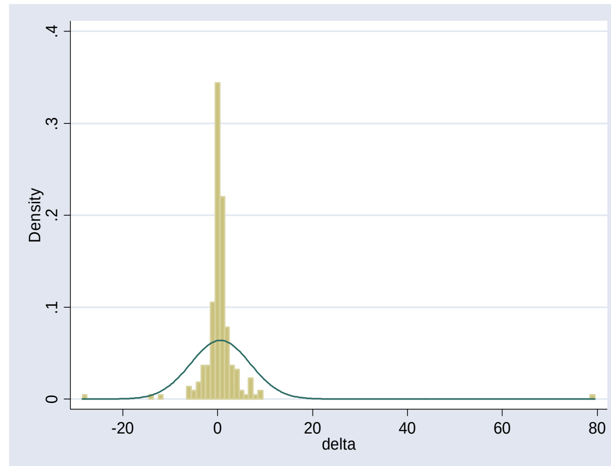


Table 1: Number of 4-digit unit value observations			
	Differentiated	***Reference-priced***	***Homogeneous***
Conservative classification	570	361	96
Liberal classification	534	338	155

Table 2: Share of 4-digit products (liberal classification)			
	Differentiated	***Reference-priced***	***Homogeneous***
BRICS	***60%***	***33%***	***7%***
G3	***59%***	***34%***	***6%***

Table 3: 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)
Note: The number of 4-digit products in each group is indicated in parenthesis.		

Table 4: Regression results with common coefficients (dependent variable: rupee export price)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
dexchrate	0.043***††† (0.013)	0.058***††† (0.014)	0.053***††† (0.014)	0.057***††† (0.014)	0.056***††† (0.014)	0.171***††† (0.023)	0.174***††† (0.023)	0.178***††† (0.024)	0.179***††† (0.025)	0.180***††† (0.024)
dtariff		-0.016*††† (0.009)	-0.017*††† (0.009)	-0.017**††† (0.009)	-0.015*††† (0.008)	-0.012††† (0.008)	-0.014*††† (0.008)	-0.015*††† (0.009)	-0.015*††† (0.009)	-0.015*††† (0.009)
prodshare			0.001*** (0.000)	0.001*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
indiashare				-0.037*** (0.008)	-0.019** (0.009)	-0.014 (0.009)	0.002 (0.010)	0.002 (0.010)	-0.000 (0.010)	-0.000 (0.010)
policy					-0.066*** (0.014)	-0.059*** (0.014)	-0.142*** (0.014)	-0.143*** (0.014)	-0.134*** (0.015)	-0.137*** (0.015)
inflation						0.024*** (0.004)	0.024*** (0.004)	0.024*** (0.004)	0.024*** (0.004)	0.024*** (0.004)
openness							-0.004 (0.018)	-0.004 (0.018)	0.001 (0.018)	0.000 (0.018)
Brics								0.004 (0.007)	0.002 (0.007)	0.003 (0.007)
Libref									-0.006 (0.010)	
Libdif									0.003 (0.010)	
Conref										0.005 (0.011)
Condif										0.012 (0.011)
Constant	0.046*** (0.003)	0.043*** (0.003)	0.034*** (0.004)	0.070*** (0.008)	0.150*** (0.018)	0.130*** (0.019)	0.229*** (0.016)	0.228*** (0.015)	0.217*** (0.019)	0.212*** (0.019)
Wald Chi-Sq	11.10***	19.98***	33.07***	53.12***	77.93***	126.85***	255.60***	347.24***	243.98***	300.61***
Log-likelihood	-42758.55	-21821.49	-21815.33	-19900.31	-19889.45	-19870.95	-17858.99	-17857.51	-17858.19	-17857.52
Symmetry test		19.39***	16.59***	19.48***	18.66***	56.07***	59.08***	56.11***	56.15***	56.51***
Homogeneity test		3304.39***	3319.29***	3428.63***	3564.18***	1161.26***	1182.21***	1039.14***	1021.41***	1026.48***
Observations	40622	24302	24302	22097	22097	22097	19726	19726	19726	19726
4-digit products	1027	877	877	860	860	860	835	835	835	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.

Table 5: Regression results with separate coefficients for G3 and BRICS countries (dependent variable: rupee export price)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
dexrate_G3	0.379***††† (0.031)	0.385***††† (0.034)	0.375***††† (0.034)	0.358***††† (0.035)	0.310***††† (0.036)	0.274***††† (0.036)	0.283***††† (0.038)	0.286***††† (0.038)	0.286***††† (0.038)
dexrate_ BRICS	-0.030**††† (0.014)	-0.012††† (0.016)	-0.016††† (0.016)	-0.005††† (0.016)	-0.005††† (0.016)	0.025††† (0.034)	0.048††† (0.034)	0.045††† (0.034)	0.047††† (0.034)
G3 vs. BRICS test	139.73***	111.37***	106.24***	84.94***	60.43***	24.10***	21.18***	21.72***	21.46***
dtariff_ G3		0.002††† (0.011)	0.003††† (0.011)	0.004††† (0.009)	0.005††† (0.008)	0.005††† (0.009)	0.005††† (0.009)	0.005††† (0.010)	0.005††† (0.009)
dtariff_ BRICS		-0.047***††† (0.017)	-0.049***††† (0.017)	-0.079***††† (0.019)	-0.083***††† (0.019)	-0.081***††† (0.019)	-0.088***††† (0.019)	-0.089***††† (0.019)	-0.089***††† (0.019)
G3 vs. BRICS test		6.03***	6.63***	15.99***	18.50***	16.53***	19.23***	19.11***	19.30***
pshare_ G3			0.000*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
pshare_ BRICS			0.001 (0.001)	-0.000 (0.001)	0.001 (0.001)	0.001 (0.001)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)
G3 vs. BRICS test			0.28	0.48	0.01	0.01	0.05	0.03	0.03
ishare_ G3				-0.026*** (0.010)	-0.040*** (0.013)	-0.051*** (0.013)	-0.051*** (0.018)	-0.052*** (0.019)	-0.052*** (0.019)
ishare_ BRICS				-0.018** (0.009)	0.018 (0.013)	0.017 (0.013)	0.027*** (0.010)	0.024** (0.011)	0.025** (0.011)
G3 vs. BRICS test				1.10	9.51***	13.13***	13.92***	13.01***	13.07***
policy_ G3					-0.035** (0.014)	-0.031** (0.014)	-0.108*** (0.020)	-0.104*** (0.021)	-0.107*** (0.020)
policy_ BRICS					-0.070*** (0.018)	-0.058*** (0.018)	-0.104*** (0.023)	-0.100*** (0.024)	-0.102*** (0.023)
G3 vs. BRICS test					7.74***	4.48**	0.05	0.05	0.07
infl_ G3						1.254*** (0.284)	1.027*** (0.326)	1.020*** (0.330)	1.004*** (0.330)
infl_ BRICS						0.005 (0.005)	0.007 (0.005)	0.007 (0.005)	0.007 (0.005)
G3 vs. BRICS test						19.33***	9.76***	9.40***	9.13***
open_ G3							0.039 (0.025)	0.042* (0.025)	0.042* (0.025)
open_ BRICS							-0.080* (0.046)	-0.078* (0.046)	-0.080* (0.046)
G3 vs. BRICS test							5.10**	5.16**	5.34**
Libref								-0.007 (0.010)	
Libdif								0.000 (0.010)	
Conref									0.004 (0.011)
Condif									0.009 (0.011)
Constant	0.033*** (0.003)	0.030*** (0.003)	0.023*** (0.004)	0.044*** (0.008)	0.108*** (0.020)	0.091*** (0.021)	0.181*** (0.025)	0.179*** (0.027)	0.173*** (0.027)
Wald Chi-Sq	150.83***	136.80***	145.63***	155.21***	170.75***	191.36***	268.49***	253.68***	252.83***
Log-likelihood	-42690.92	-21764.01	-21759.78	-19849.38	-19842.97	-19835.37	-17825.88	-17825.74	-17825.95
Symmetry test G3		120.95***	112.09***	97.14***	68.06***	52.16***	52.04***	51.82***	52.10***
Symmetry test BRICS		2.09	1.93	8.09***	8.91***	7.36***	11.90***	11.60***	11.91***
Homogeneity test G3		290.82***	294.95***	305.00***	334.66***	365.66***	337.32***	326.38***	330.09***
Homogeneity test BRICS		2324.81***	2332.28***	2122.28***	2095.47***	730.97***	700.43***	701.11***	699.12***
Observations	40622	24302	24302	22097	22097	22097	19726	19726	19726
4-digit products	1027	877	877	860	860	860	835	835	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.

Table 6: USA – Regression results with common coefficients (dependent variable: rupee export price)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dexchrate	0.584***††† (0.027)	0.626***††† (0.039)	0.624***††† (0.039)	0.667***††† (0.049)	0.616***††† (0.051)	0.568***††† (0.053)	0.615***††† (0.066)	0.597***††† (0.066)	0.627***††† (0.065)
Dtariff		-0.026***††† (0.008)	-0.033***††† (0.006)	-0.031***††† (0.007)	-0.033***††† (0.005)	-0.041***††† (0.004)	-0.028***††† (0.009)	-0.026***††† (0.010)	-0.029***††† (0.009)
prodshare			0.001*** (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000* (0.000)	0.000* (0.000)	0.000 (0.000)
indiashare				0.050 (0.031)	0.202*** (0.054)	0.270*** (0.055)	0.335** (0.139)	0.294** (0.141)	0.349** (0.140)
Policy					-0.109*** (0.032)	-0.167*** (0.035)	-0.364*** (0.060)	-0.307*** (0.063)	-0.415*** (0.057)
Inflation						2.543*** (0.673)	2.108* (1.162)	1.869 (1.172)	2.202* (1.167)
Openness							1.113*** (0.362)	0.792** (0.374)	1.350*** (0.352)
Libref								-0.034** (0.014)	
Libdif								-0.009 (0.014)	
Conref									-0.015 (0.017)
Condif									-0.003 (0.016)
Constant	0.020*** (0.002)	0.014*** (0.004)	0.004 (0.006)	-0.031 (0.028)	0.003 (0.030)	-0.034 (0.031)	-0.088 (0.112)	-0.031 (0.114)	-0.086 (0.114)
Wald Chi-Sq	454.45***	269.28***	279.64***	262.46***	275.18***	314.20***	305.18***	271.31***	472.09***
Log-likelihood	-8529.685	-4294.302	-4294.152	-4023.894	-4020.11	-4012.788	-3395.825	-3389.09	-3396.804
Symmetry test		269.07***	276.06***	198.44***	157.57***	132.23***	92.98***	86.31***	97.72***
Homogeneity test		104.55***	112.48***	54.84***	66.09***	77.88***	39.56***	42.26***	37.77***
Observations	10421	6396	6396	5885	5885	5885	4964	4964	4964
4-digit products	980	663	663	646	646	646	611	611	611

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 omitted dummy variable stands for homogeneous goods in the Rauch classification.

Table 7: EU – Regression results with common coefficients (dependent variable: rupee export price)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
dexchrate	0.313***††† (0.027)	0.309***††† (0.030)	0.308***††† (0.030)	0.193***††† (0.032)	0.198***††† (0.032)	0.136***††† (0.033)	-0.006††† (0.037)	-0.007††† (0.037)	-0.005††† (0.037)
dtariff		0.013††† (0.010)	0.014††† (0.010)	0.004††† (0.008)	0.005††† (0.009)	0.017***††† (0.004)	0.013††† (0.008)	0.014*††† (0.008)	0.014††† (0.008)
prodshare			0.000 (0.000)	0.000** (0.000)	0.000** (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
indiashare				-0.106*** (0.009)	-0.097*** (0.010)	-0.041*** (0.014)	0.008 (0.017)	0.009 (0.017)	0.008 (0.017)
policy					-0.032** (0.012)	-0.019 (0.012)	0.038 (0.024)	0.042* (0.024)	0.043* (0.025)
inflation						3.064*** (0.511)	2.913*** (0.574)	2.979*** (0.571)	2.956*** (0.575)
openness							-0.516*** (0.082)	-0.518*** (0.082)	-0.515*** (0.082)
libref								-0.013 (0.010)	
libdif								-0.010 (0.010)	
conref									-0.010 (0.011)
condif									-0.006 (0.011)
Constant	0.043***	0.045***	0.039***	0.150***	0.184***	0.045	0.251***	0.254***	0.248***
	(0.003)	(0.003)	(0.005)	(0.011)	(0.018)	(0.028)	(0.044)	(0.045)	(0.046)
Wald Chi-Sq	134.23***	108.03***	109.82***	230.95***	238.53***	331.05***	356.39***	372.96***	357.70***
Log-likelihood	-8373.688	-5393.744	-5393.923	-4974.07	-4970.557	-4952.107	-4605.451	-4604.351	-4605.271
Symmetry test		93.19***	91.44***	33.98***	35.80***	12.45***	0.29	0.37	0.29
Homogeneity test		445.28***	443.80***	567.83***	556.72***	661.33***	609.11***	611.03***	600.03***
Observations	11779	8659	8659	8020	8020	8020	7409	7409	7409
4-digit products	1010	796	796	779	779	779	752	752	752

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 omitted dummy variable stands for homogeneous goods in the Rauch classification.

Table 8: Japan – Regression results with common coefficients (dependent variable: rupee export price)									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
dexchrate	0.255***††† (0.022)	0.172***††† (0.026)	0.206***††† (0.031)	0.223***††† (0.044)	0.244***††† (0.046)	0.036††† (0.040)	0.195***††† (0.071)	0.178**††† (0.071)	0.211***††† (0.073)
dtariff		-0.032††† (0.028)	-0.033††† (0.028)	-0.026††† (0.027)	-0.030*††† (0.018)	-0.028††† (0.021)	-0.020††† (0.031)	-0.019††† (0.031)	-0.021††† (0.031)
prodshare			-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
indiashare				0.353*** (0.053)	0.289*** (0.050)	0.121** (0.053)	-0.122 (0.157)	-0.117 (0.157)	-0.112 (0.156)
policy					-0.024 (0.015)	0.009 (0.019)	-0.178* (0.099)	-0.160 (0.099)	-0.189* (0.099)
inflation						6.832*** (0.549)	4.969*** (0.999)	5.362*** (0.982)	4.715*** (1.023)
openness							0.434 (1.055)	0.325 (1.053)	0.526 (1.061)
libref								0.017 (0.018)	
libdif								0.030 (0.018)	
conref									0.032 (0.020)
condif									0.044** (0.020)
Constant	0.041*** (0.004)	0.060*** (0.003)	0.056*** (0.004)	-0.151*** (0.030)	-0.089** (0.037)	-0.023 (0.038)	0.262 (0.255)	0.237 (0.255)	0.214 (0.256)
Wald Chi-Sq	131.33***	43.27***	48.94***	100.97***	102.00***	351.97***	141.52***	153.33***	141.43***
Log-likelihood	-6090.02	-1938.384	-1936.176	-1755.407	-1750.262	-1772.496	-1474.379	-1473.552	-1470.645
Symmetry test		26.03***	29.40***	22.27***	29.47***	1.89	7.33***	6.07**	8.15***
Homogeneity test		552.14***	435.56***	257.86***	256.66***	506.24***	120.25***	123.58***	110.67***
Observations	6752	2951	2951	2678	2678	2678	2196	2196	2196
4-digit products	799	357	357	344	344	344	308	308	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 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 omitted dummy variable stands for homogeneous goods in the Rauch classification.

Table 9: China – Regression results with common coefficients (dependent variable: rupee export price)									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
dexchrate	0.166***††† (0.044)	0.078††† (0.050)	0.064††† (0.065)	0.048††† (0.073)	-0.024††† (0.073)	0.257**††† (0.114)	0.141††† (0.115)	0.139††† (0.116)	0.167††† (0.114)
dtariff		-0.148***††† (0.026)	-0.152***††† (0.026)	-0.166***††† (0.024)	-0.138***††† (0.027)	-0.104***††† (0.031)	-0.168***††† (0.034)	-0.170***††† (0.035)	-0.167***††† (0.034)
prodshare			0.000 (0.000)	0.000 (0.001)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.001 (0.000)
indiashare				0.018 (0.014)	0.210*** (0.028)	0.201*** (0.028)	-0.028 (0.084)	-0.032 (0.085)	-0.029 (0.084)
policy					-0.363*** (0.052)	-0.306*** (0.052)	-0.219 (0.134)	-0.222* (0.134)	-0.232* (0.138)
inflation						0.567*** (0.161)	0.257 (0.200)	0.246 (0.203)	0.285 (0.203)
openness							0.088 (0.307)	0.095 (0.308)	0.104 (0.312)
libref								0.009 (0.022)	
libdif								0.008 (0.024)	
conref									0.023 (0.024)
condif									0.016 (0.023)
Constant	0.034*** (0.004)	0.013*** (0.004)	0.013** (0.006)	0.001 (0.012)	0.424*** (0.063)	0.322*** (0.063)	0.279*** (0.079)	0.273*** (0.081)	0.275*** (0.084)
Wald Chi-Sq	14.42***	36.03***	38.17***	49.40***	99.03***	87.74***	175.85***	182.61***	217.66***
Log-likelihood	-3367.594	-1671.385	-1671.768	-1672.332	-1667.295	-1663.962	-1364.715	-1364.513	-1365.472
Symmetry test		16.46***	10.37***	8.35***	2.36	10.31***	7.09***	7.03***	8.37***
Homogeneity test		349.45***	225.50***	197.30***	210.18***	46.94***	68.23***	67.67***	66.02***
Observations	3475	1983	1983	1983	1983	1983	1626	1626	1626
4-digit products	657	434	434	434	434	434	372	372	372

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 omitted dummy variable stands for homogeneous goods in the Rauch classification.

Table 10: Brazil – Regression results with common coefficients (dependent variable: rupee export price)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
dexchrate	-0.033***††† (0.013)	0.025*††† (0.014)	0.015††† (0.015)	0.009††† (0.017)	-0.007††† (0.018)	0.122***††† (0.033)	0.050††† (0.037)	0.052††† (0.036)	0.097***††† (0.031)
dtariff		-0.151***††† (0.029)	-0.138***††† (0.030)	-0.117***††† (0.035)	-0.122***††† (0.036)	-0.111***††† (0.037)	-0.093**††† (0.038)	-0.092**††† (0.038)	-0.095**††† (0.037)
prodshare			-0.000 (0.001)	-0.001 (0.002)	0.002 (0.002)	0.001 (0.001)	0.001 (0.001)	0.002 (0.001)	0.002* (0.001)
indiashare				0.007 (0.019)	-0.008 (0.029)	0.028 (0.028)	0.169*** (0.046)	0.177*** (0.053)	0.165*** (0.060)
policy					0.061 (0.054)	-0.009 (0.054)	0.312*** (0.109)	0.297*** (0.110)	0.214** (0.108)
inflation						0.018*** (0.004)	0.014*** (0.005)	0.014*** (0.005)	0.018*** (0.004)
openness							-1.617*** (0.576)	-1.682*** (0.600)	-1.453** (0.610)
libref								-0.040* (0.021)	
libdif								-0.015 (0.019)	
conref									-0.013 (0.035)
condif									0.028 (0.034)
Constant	0.022*** (0.005)	0.043*** (0.001)	0.039*** (0.003)	0.031* (0.017)	-0.066 (0.066)	0.016 (0.067)	-0.159** (0.066)	-0.105 (0.068)	-0.061 (0.076)
Wald Chi-Sq	6.86***	27.19***	20.65***	16.92***	23.39***	58.88***	65.45***	57.37***	108.55***
Log-likelihood	-2265.525	-1290.632	-1290.947	-1291.069	-1294.493	-1294.729	-1296.429	-1294.396	-1294.802
Symmetry test		25.54***	17.63***	8.20***	6.05**	18.50***	5.89**	6.22**	12.78***
Homogeneity test		1363.60***	1302.91***	1162.93***	1114.87***	520.45***	497.28***	510.08***	546.06***
Observations	2551	1669	1669	1669	1669	1669	1669	1669	1669
4-digit products	467	302	302	302	302	302	302	302	302

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 omitted dummy variable stands for homogeneous goods in the Rauch classification.

Table 11: South Africa – Regression results with common coefficients (dependent variable: rupee export price)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
dexchrate	-0.026††† (0.029)	0.021††† (0.031)	0.047††† (0.032)	0.100**††† (0.043)	0.034††† (0.059)	0.440***††† (0.130)	0.058††† (0.144)	0.028††† (0.143)	0.049††† (0.143)
dtariff		-0.004††† (0.013)	-0.007††† (0.013)	-0.025*††† (0.013)	-0.028**††† (0.013)	-0.026**††† (0.013)	-0.027**††† (0.013)	-0.026**††† (0.013)	-0.025*††† (0.013)
prodshare			0.005*** (0.000)	-0.004*** (0.001)	-0.002 (0.002)	-0.003* (0.002)	-0.003* (0.002)	-0.003* (0.001)	-0.003** (0.001)
indiashare				0.031*** (0.011)	0.018 (0.012)	0.030** (0.014)	-0.077*** (0.015)	-0.085*** (0.016)	-0.085*** (0.016)
policy					0.054** (0.026)	0.064** (0.029)	0.269*** (0.032)	0.296*** (0.032)	0.290*** (0.031)
inflation						2.992*** (0.833)	3.874*** (0.827)	3.991*** (0.831)	4.030*** (0.828)
openness							-1.766*** (0.219)	-1.904*** (0.214)	-1.862*** (0.209)
libref								0.034*** (0.013)	
libdif								0.009 (0.011)	
conref									0.055*** (0.019)
condif									0.039* (0.020)
Constant	0.028*** (0.003)	0.027*** (0.002)	0.021*** (0.001)	-0.018 (0.020)	-0.086** (0.044)	-0.275*** (0.066)	0.436*** (0.120)	0.459*** (0.117)	0.418*** (0.117)
Wald Chi-Sq	0.78	0.59	185.75***	72.07***	39.15***	45.73***	169.06***	374.61***	516.54***
Log-likelihood	-4452.435	-1683.757	-1682.566	-976.7739	-979.9098	-978.6279	-978.8251	-976.02	-976.0246
Symmetry test		0.58	2.51	7.77***	1.07	12.87***	0.34	0.14	0.27
Homogeneity test		776.91***	764.23***	408.17***	270.14***	19.97***	44.47***	47.91***	45.81***
Observations	5644	2644	2644	1862	1862	1862	1862	1862	1862
4-digit products	787	430	430	378	378	378	378	378	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 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 omitted dummy variable stands for homogeneous goods in the Rauch classification.

Table 12: Regression results with separate coefficients for different product categories according to Rauch's liberal classification (dependent variable: rupee export price)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
der_libdif	0.022††† (0.017)	0.068***††† (0.020)	0.059***††† (0.020)	0.062***††† (0.020)	0.062***††† (0.020)	0.187***††† (0.033)	0.194***††† (0.034)	0.195***††† (0.034)
der_libref	0.052**††† (0.021)	0.051**††† (0.022)	0.049**††† (0.022)	0.053**††† (0.023)	0.052**††† (0.023)	0.162***††† (0.040)	0.173***††† (0.040)	0.174***††† (0.040)
der_libhom	0.134***††† (0.043)	0.047††† (0.054)	0.038††† (0.055)	0.046††† (0.056)	0.042††† (0.056)	0.220***††† (0.078)	0.205**††† (0.080)	0.206**††† (0.080)
Rauch categories test	6.02**	0.40	0.20	0.14	0.17	0.51	0.21	0.21
dt_libdif		-0.048***††† (0.015)	-0.047***††† (0.015)	-0.046***††† (0.016)	-0.043***††† (0.016)	-0.041***††† (0.016)	-0.044***††† (0.016)	-0.044***††† (0.016)
dt_libref		-0.001††† (0.013)	-0.003††† (0.013)	-0.007††† (0.011)	-0.008††† (0.012)	-0.006††† (0.012)	-0.010††† (0.013)	-0.010††† (0.013)
dt_libhom		0.017††† (0.023)	0.017††† (0.023)	0.014††† (0.025)	0.014††† (0.026)	0.015††† (0.026)	0.025††† (0.027)	0.025††† (0.027)
Rauch categories test		7.84**	7.10**	5.77*	4.77*	4.75*	5.54*	5.55*
pshare_libdif			0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001** (0.000)	0.001** (0.000)
pshare_libref			0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
pshare_libhom			0.001* (0.000)	0.001 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.001)	0.000 (0.001)
Rauch categories test			2.33	2.35	1.96	1.84	3.99	4.01
ishare_libdif				-0.039*** (0.009)	-0.025* (0.013)	-0.019 (0.013)	-0.007 (0.014)	-0.006 (0.014)
ishare_libref				-0.034*** (0.009)	-0.014 (0.015)	-0.009 (0.015)	-0.001 (0.018)	-0.001 (0.018)
ishare_libhom				-0.033** (0.013)	-0.012 (0.026)	-0.005 (0.025)	0.002 (0.031)	0.002 (0.031)
Rauch categories test				0.38	0.42	0.39	0.09	0.09
policy_libdif					-0.053*** (0.014)	-0.050*** (0.014)	-0.111*** (0.019)	-0.113*** (0.019)
policy_libref					-0.058*** (0.015)	-0.053*** (0.015)	-0.134*** (0.019)	-0.136*** (0.019)
policy_libhom					-0.058*** (0.019)	-0.056*** (0.019)	-0.124*** (0.025)	-0.126*** (0.025)
Rauch categories test					0.16	0.13	2.35	2.34
infl_libdif						0.025*** (0.005)	0.025*** (0.005)	0.026*** (0.005)
infl_libref						0.021*** (0.006)	0.023*** (0.006)	0.023*** (0.006)
infl_libhom						0.058*** (0.019)	0.055*** (0.020)	0.055*** (0.020)
Rauch categories test						3.38	2.50	2.50
open_libdif							-0.029 (0.027)	-0.030 (0.027)
open_libref							0.048 (0.032)	0.048 (0.031)
open_libhom							0.008 (0.058)	0.007 (0.058)
Rauch categories test							3.46	3.48
BRICS								0.002 (0.008)
Constant	0.045*** (0.003)	0.042*** (0.003)	0.034*** (0.004)	0.068*** (0.008)	0.133*** (0.016)	0.118*** (0.017)	0.201*** (0.021)	0.203*** (0.021)
Wald Chi-Sq	17.14***	27.87***	42.71***	57.83***	78.72***	120.00***	171.20***	174.41***
Log-likelihood	-42756.38	-21818.98	-21811.83	-19899.52	-19890.15	-19870.71	-17860.76	-17860.61
Symmetry test DIF		21.45***	17.58***	17.75***	16.74***	38.98***	40.41***	39.83***

Symmetry test REF		4.02**	4.02**	5.40**	5.60**	16.86***	19.41***	19.26***
Symmetry test HOM		0.26	0.12	0.26	0.21	6.31*	4.59**	4.61**
Homogeneity test DIF		1606.53***	1625.90***	1584.45***	1577.21***	542.52***	521.26***	510.73***
Homogeneity test REF		1364.53***	1362.60***	1450.75***	1436.08***	409.00***	395.10***	384.10***
Homogeneity test HOM		256.34***	254.33***	237.39***	240.65***	86.64***	82.24***	81.72***
Observations	40622	24302	24302	22097	22097	22097	19726	19726
Number of 4-digit products	1027	877	877	860	860	860	835	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 Rauch categories test is a Chi-Sq test where H0: DIF coeffs = REF coeffs = HOM coeffs. The omitted dummy variable stands for G3.

Table 13: 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.