Exchange Rate Pass-through: An exploration on India's automobile sector

Sengupta, Darpajit and Sinha Roy, Saikat

Department of Economics,Jadavpur University,India, Department of Economics,Jadavpur University,India

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Darpajit Sengupta*
and
Saikat Sinha Roy**

Abstract

This study is aimed at estimating the Exchange Rate Pass Through (ERPT) to export prices of Indian Automobiles at HS 8 digit level classification. Using profit maximising approach of firms, in lines of Bailliu and Fujii (2004) theoretical specification this paper estimates the ERPT elasticities in the ambit of dynamic panel data technique. While the pass through is quite low for tractors and bicycles, the elasticities are high for vehicular spare parts and fighting equipment like tankers etc. Unlike in the short run, the pass through is relatively high in the long run. The dynamic panel results at the aggregate level show that trade openness and world demand are statistically significant variables in explaining the volatility of export prices in a small open economy like India. The findings on exchange rate pass through have implications for exchange rate being used as an important policy instrument for export promotion and growth on one hand, and in reducing current account deficit, on the other hand.

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*Corresponding author: Department of Economics, Jadavpur University, India.
Email:darpajit@rediffmail.com
**Professor, Department of Economics, Jadavpur University, India
Email: saikat.sinharoy@gmail.com

1.1 Introduction

The monetary policy exchange rate channel is of paramount importance mostly for small and open developing countries like India. The responsiveness of prices in general, prices of tradables and domestic prices in particular, to exchange rate fluctuations is termed as Exchange Rate Pass Through (henceforth ERPT). The process of pass-through to prices can be perceived in two stages. In the first stage, a unit change in exchange rate causes the import and export prices to change, while in the next stage such changes in prices of tradables affects domestic price and hence, inflation rates. ERPT has important implications for the transmission of shocks and optimal monetary policy in open macroeconomies. For example, the traditional argument for flexible exchange rates, dating back to Friedman (1953), is that such flexibility facilitates relative price adjustment in face of country-specific real shocks. The adjustment of relative prices generates an expenditure-switching effect between home and foreign goods that partially offsets the initial effect of the shock. This argument is based on the premise that domestic currency prices of imported goods respond to movements in nominal exchange rates. If the degree of exchange rate pass-through is low, that is, if import prices respond only weakly to movements in the exchange rate, the expenditure-switching effects will be small, thus limiting the short-run adjustment role of nominal exchange rates.

Complete pass-through refers to a one to one relationship, while pass-through is incomplete if prices change by a smaller amount than the exchange rate. In a perfectly competitive setting, theory would predict complete pass-through to import prices (Dornbusch,1987). Following the law of one price, arbitrage implies equal international prices. So, the price of a good in a host country is the same as it would be in exporter, as measured in the host's currency. Incomplete pass-through becomes possible when competitors interact strategically under imperfect competition, where strategic interaction allows for variable mark-ups. Exchange rate movements are either passed into prices, or absorbed into mark-ups, giving rise to inflationary trends. In a two-country model, monopolistic competitors set prices for their differentiated products depending on the demand facing each competitor, with price discrimination arising between the domestic and the export market because costs are assumed to be separable and convex in production of domestic and export goods**.** (Atkeson and Burstein, 2008; Yang, 1997;Clark and Farukee,1997).

Additionally, pass-through is tied to the balance of payments as relatively small reactions in prices to dollar appreciation or depreciation (low pass-through) cause a similar

reaction in overall import quantities. The better an importer can estimate the degree of pass-through to prices and how it is changing, the better it can predict the impact that currency devaluations will have on volume of trade. With high pass-through rates to import prices, a currency devaluation could improve the trade balance in that higher prices of imports could result in increased demand for domestic goods.

1.2 Literature Review

The literature on ERPT began to develop in the context of the weak response of US import prices to a sharp appreciation of dollar during 1980-1985 and subsequent depreciations[1]. While Hooper and Woo (1984) were the first to use the term 'pass-through', the idea of measuring the impact of the exchange rate on prices has been around for a much longer time. Dornbusch (1987) and Krugman (1976) discuss about the European economies in the early 1970s, showing that countries with high inflation tend to experience relative depreciations in currency

One of the theoretical explanations for low pass-through is imperfect information. In a two-country model, monopolistic competitors set prices for their differentiated products depending on the demand facing each competitor, with price discrimination arising between the domestic and the export markets with costs being assumed to be separable and convex in production of domestic and export goods**.** Krugman (1987) presents evidence that certain exporters set prices differently to different trade partners, a phenomenon called "pricing to market".. Specifically, he shows that German exports of machinery to the United States maintain more stable prices (even rising) when facing an appreciating dollar, yet exchange rate movements are passed through to prices to a greater degree for the same category of goods exported to other countries. Based on Japanese data, Marston (1990) and Giovannini (1988) find low pass-through to prices with prices being pre-set in foreign currencies, where such rigidities only existing in the short run. However, Athukorala and Menon (1994) rejects the widely held view that Japanese exporting firms have relied more on pricing to market strategies during the period of yen appreciation in order to maintain market shares. Gagnon and Knetter (1995) also note the differences in short run versus long run responses to exchange rate movements in terms of lower short run pass-through for importers where goods are more frequently priced in local currencies (such as the United States), again implying that pricing to market is one component of incomplete pass-through. In a later study, Betts and Devereaux (2000) develop a theoretical model showing low pass-through on account of increased pricing to market, which leads to lower expenditure switching effects of exchange rate movements.

[1] See Mann (1986)

Froot and Klemperer (1989), supplement their theoretical model with evidence that exporters respond to exchange rate movements differently depending on their shares and potential competition inthe market. Knetter (1993) compares the pricing-to-market behaviour for exports from Japan, Germany,the UK and the US, focusing on the reduction of mark-ups in markets where currency has depreciated in value. He finds that if an exporter faces more competition in the destination market for a good, there is a tendency to hold prices more stable if currency values fluctuate in that market. Bacchetta and van Wincoop (2002) also argue that when domestic firms face significant competition from other domestic final goods producing sectors (e.g., the non-traded goods sector) they prefer to price in domestic currency, while exporting firms tend to price in the exporter's currency. In that case the pass-through to import prices is complete, while the pass-through to consumer prices is zero. More recently, Yang (1997), Campa and Minguez (2006),Garetto (2009), and Hong and Li (2013) also address the role of market structure in causing lowpass-through, basing their findings on evidence from a variety of countries.

In case of India, very few studies have analysed the issue of ERPT, that too limiting themselves to the estimation of degree of pass through at the aggregate level. Ghosh and Rajan (2007) observes that the exchange rate pass-through elasticity of the bilateral exchange rate of the Indian rupee with the USD to be about 40 per cent for the entire period in the long run, while it is inevitably smaller in the short run (10 per cent). For India's NEER, however, they do not find any evidence of significant pass-through even in the long-run. Pyne and Sinha Roy (2019) observes that in case of chemicals and manufacturing classified by materials, the degree of exchange rate passthrough to import prices is incomplete, while for food & food products, machinery & transport equipment exchange rate pass-through are more than proportionate. Mallick and Marques (2008) in a disaggregate study into India's import prices sectoral differences in the degree of pass through which is explained in terms of import penetration ratio and effective protection rate. Dholakia and Saradhi (2000), Dash and Narasimham(2011), Yanamandra (2015) find complete pass through in the short run and an even higher pass-through in the long run implying that exchange rate changes are likely to have a have a large impact on inflation.

Sinha Roy and Pyne (2011, 2014) observe a high, but incomplete, exchange rate pass-through into India's exports prices both at the aggregate as well as at the disaggregate levels. However, the extent of pass-through varies across product groups with near complete pass-through for export prices of chemicals, animal fats, vegetable oils and incomplete and low pass-through for prices of engineering goods, leather and leather manufactured exports.However, most of these studies ignored the likely asymmetrical ERPT to prices (inflation) underlined in

the theoretical models of pricing to market, where foreign exporters adjust the prices in the importing country in response to the size and direction of exchange of goods and services. Accordingly, recent studies consider nonlinearities and asymmetries in their investigation of the relationship between exchange rates and domestic prices in developed economies like Brun-Aguerre et al. (2012, 2016); Choudhri and Hakura (2015); Yanamandra (2015); Baharumshah et al. (2017); Vilavicencio (2012); Kassi et al. (2018).

A review of the existing literature reveals that studies analysing the phenomena of ERPT to export prices are handful both in India as well as at the international level. Moreover, none of the previous studies have examined both industry-wise and country-wise differences in pass-through elasticities and their determinants. Hence this paper aims to address some of these issues as exchange rate is an important policy instrument for export promotion and current account balance

The paper is organised as follows. Section 2 discusses the analytical model that forms the base for further econometric specifications. The following section provides in some details, a description of the method and data used in investigating the phenomenon Section 4 presents the estimation results and related interpretation .The final section concludes with the summery of the main findings and implications for policy.

2. Analytical Framework.

In this section the analytical framework is presented that will form the basis of the econometric specification to estimate the exchange rate pass through coefficient. The standard specification (Bailliu and Fujii,2004) used in the pass-through literature is based on the pricing behaviour of exporting firms. It might be useful to consider a simple static profit-maximization problem faced by an exporting firm, as commonly seen in the literature. Let us consider a foreign firm that exports its product to the domestic country. The exporting firm solves the following profit-maximization problem:

$$Max\ \mathbb{\Pi} = e^{-1}pq - C(q) \qquad (1)$$

where $\mathbb{\Pi}$ denotes profits (expressed in the foreign currency), e is the nominal exchange rate measured in units of the domestic currency per unit of the foreign currency, p is the price the good (denominated in the domestic currency), $C(.)$ is the cost function (in foreign currency units), and q is the quantity demanded for the good.

Solving equation (1) yields the following first-order condition:

$$p = e\ C_q \mathscr{M} \qquad (2)$$

where C_q is the marginal cost and $\mathscr{M}$ is the markup of price over marginal cost. The mark-up is further defined as $\mathscr{M} = \acute{\eta}/\acute{\eta}-1,$ (3)

where ή is the price elasticity of demand for the good. The expression for the price level in equation (2) emphasizes that the price of the good in local currency terms can change as a result of a change in the exchange rate, a change in the firm's marginal cost, and/or a change in the firm's mark-up. Note that the firm's marginal cost and markup may change independently of the exchange rate. For instance, an increase in the price of a locally provided input (in the foreign country) can raise the marginal cost. Also, demand shocks emanating in the importing country can alter the exporter's mark-up. It is thus important to control for the movements in these other determinants of the price, when estimating pass-through to properly isolate the effects of exchange rate changes on export prices.

Consequently, a simple log-linear, reduced-form equation may be expressed as follows:

$$p_t = \alpha + \lambda e_t + \tau w_t + \eta y_t + \varepsilon_t \qquad (4)$$

where w_t and y_t are measures of the exporter's marginal cost and the importing country's demand conditions, respectively. The coefficient thus measures ERPT. As discussed in Goldberg and Knetter (1997), variants of equation (4) are widely used as empirical specifications in the pass-through literature.

3.Empirical Methodology and Data Description

3.1Econometric Modelling

For the macro analysis, we need to consider Eqn.(4) to be suitable for estimating an aggregate ERPT for the Indian automobile exports as a whole within a panel data framework. There are various models of panel data analysis, depending on the nature of cross-sectional heterogeneity. When the cross- sectional heterogeneity is correlated with other explanatory variables, fixed effect model provides consistent estimates. If the unobserved cross-sectional heterogeneity is assumed to be uncorrelated with other explanatory variables of the model, then random effect model provides efficient estimator of the parameter. Hausman Specification Test helps to distinguish random effect and fixed effect model. If Null hypothesis of the Hausman test is rejected fixed effect model is preferred to random effect model as the cross-sectional heterogeneity is actually correlated with other explanatory variables.

However, it is well-known that the responses of export prices to exchange rate changes may not be fully manifested instantaneously, especially when domestic firms take time to adjust their prices in the domestic currency. Therefore, as emphasized by some empirical studies, it is important to account for the potential inertial behaviour of export prices by estimating a dynamic model (see e.g., Bussière, 2013; Olivei, 2002; Yang, 2007). This is typically accomplished by including lagged export prices as an explanatory variable, which allows for the possibility of delayed adjustment of export prices. Hence we modify Eqn.(4) to have all elements of a dynamic panel model

$$p_{it} = \alpha_i + \mu_t + \beta_1 \Delta e_{it} + B_2 Z_{it} + \beta_3 p_{it-1} + \varepsilon_{it} \qquad (5)$$

where α_i is a product classification-specific effect, μ_t is a time dummy, p is the domestic currency export prices, e is the nominal exchange rate, z is an array of control variables, $p_{it-1}$the lagged term to capture the inertia in the export prices dynamics, and the disturbance term assumed to follow the standard assumptions. In Eqn.(5), it is possible to estimate the immediate effect of the exchange rate on export prices, *i.e.* the short-run ERPT given by the coefficient β_1 .Moreover, due to the lagged adjustment of export-price inflation, the long-run ERPT can be computed as $\boldsymbol{\beta_1/(1-\beta_3)}$.

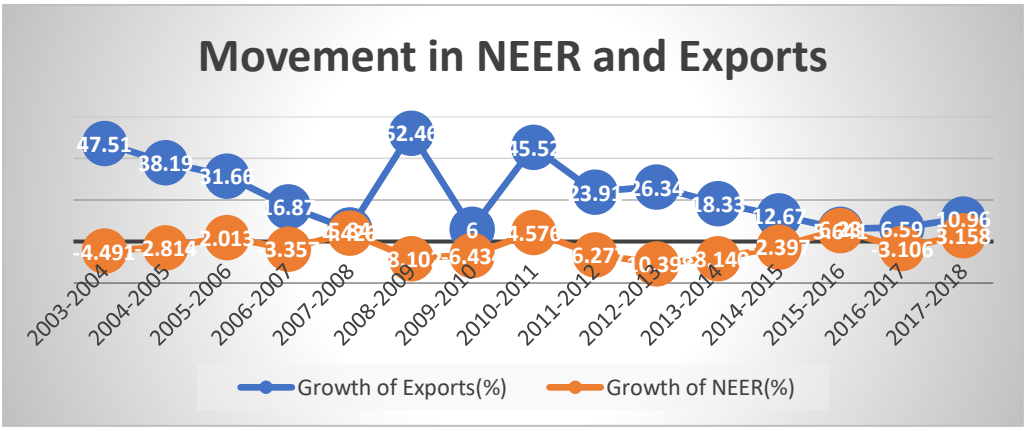
Due to presence of lagged dependent variable p_{it-1},there might be presence of auto-correlation where standard OLS technique to estimate panel data models might give inconsistent results. To deal with these problems, fixed effect Instrumental Variable(IV) estimation can be used. However Arellano and Bover (1995) showed that in the first-stage statistics of the 2SLS regressions, many instruments are often weak. and with weak instruments, the fixed-effects IV estimators are likely to be biased in the way of the OLS estimators. So, in our analysis, we employ the System Generalized Method of Moments estimator (SYS-GMM) developed by Arellano and Bover (1995), which combines a regression in differences with one in levels. Moreover, we undertake a specification tests to address the consistency of the SYS-GMM estimator. We implement the Sargan/Hansen test of overidentifying restrictions that examines the overall validity of the instruments by comparing the moment conditions with their sample counterpart. Further in the literature there exists a substantial amount of debate regarding the micro and macro level perspectives to explain ERPT. In this regard ,Campa and Goldberg(2005) had shown differences in responsiveness of import prices to exchange rate movements which has to do with the micro economic foundations of the models. To provide a micro level analysis of ERPT we run separate regressions within our previous dynamic ERPT Eqn.(5) for each "product *i* – time *t*" pair using disaggregated export price data.

3.2 Data

For the purpose of estimation of the degree of ERPT on India's export prices, disaggregated (commodity level) annual data on bilateral exports at the HS 8-digit level is used for the period 2003-2013.The study is made at a disaggregate level because commodities may be priced at different level in different markets specially if a price discriminating monopolist operates in the market (Pricing to Market). Disaggregation at HS-8 digit level helps us to find the unit prices through which the phenomena of ERPT can be studied and analysed. This data is provided by Directorate General of Commercial Intelligence and Statistics (DGCI&S), Kolkata under Ministry of Commerce, Government of India. Unit values are computed at 8-

digit HS level by dividing the export values with the quantities. The unit values in rupee terms serve as proxies for India's export prices. Pollard and Coughlin (2006) show that exchange rate pass-through to import prices for US manufacturing industries vary depending on the types of exchange rate indexes. Hence, the data on nominal effective exchange rate becomes important for the study. The exchange rate data used in the study is nominal effective exchange rate (NEER) based on 36-country bilateral weights compiled from Handbook of Statistics on Indian Economy, published by Reserve Bank of India (RBI). The base year for NEER is 2007-08=100.The data on World Demand is proxied by World Growth (%),is obtained from World Integrated Trade System(WITS) data base. Trade openness index is calculated using data on value of export, value of import and GDP ,obtained from Handbook of Indian Economy published by RBI.

4.1 AGGREGATE RESULTS FROM A DYNAMIC PANEL DATA MODEL: A MACRO ANALYSIS OF THE PASS-THROUGH



Source: Author's calculations

The figure above indicates that growth rate of exports in India has been mostly low expect for in the years of 2007-2008 and again in 2010-2011. The trough was reached in 2009-10 when the dreadful aftermaths of the world recession caused by the financial crisis was realised .In order to provide some insight into the above situation and analyse aggregate ERPT in India, we start by estimating the panel data benchmark specification which is as follows

$$p_{it} = \alpha_i + \mu_t + \beta_1 e_{it} + B_2 Z_{it} + \varepsilon_{it} \qquad (6)$$

where where α_i is a product specific effect, μ_t is a time dummy, p is the domestic currency export prices, e is the nominal exchange rate, z is an array of control variables and the disturbance term is assumed to follow the standard assumptions. In Eqn.(6), it is possible to estimate the immediate effect of the exchange rate on export prices, *i.e.* the short-run ERPT

given by the coefficient β_1. Model 1 represents a fixed effects panel regression where cross-sectional heterogeneity is explained. While model 2 employs random effects panel regression to capture time variant characteristics, Model 3 captures robust specifications using Maximum Likelihood (random effect) panel estimation. As the models are specified in log linear form,

Table1.Panel Regression Estimates

Variables	Model 1 (Fixed Effect)	Model 2 (Random Effect)	Model 3 (ML Random effect)
Ln(neer)	-1.742579*** (-3.57)	-0.739587*** (-3.57)	-0.739529*** (-3.57)
Ln(Wldd)	.0945225** (1.89)	.0942984** (1.89)	.094294** (1.89)
Ln(Trade)	.6140459*** (3.66)	.6145931*** (3.67)	.6146038*** (3.67)
Constant	7.076439*** (3.40)	7.127877*** (3.40)	26.07569*** (2.80)
Number Of Observations	1399	1399	1399
Hausman Test	$\chi^2(3)=0.02$ Prob > χ^2 = 0.992		

Source: Author's own calculation
Note: Numbers in brackets are Z/ t values based on the null hypothesis of zero ERPT.
[*** indicates p-value <1% ** indicates p-value<5% * indicates p-value<10%]

the estimated coefficients represent pass-through elasticities. The estimated coefficient of NEER is statistically significant with expected sign. As the exchange rate depreciates relative price of the domestic goods fall in the international market, making them more competitive and this increases the volume of domestic exports. However for the fixed effect model, the elasticity value does not lie within the conventional bounds of -1 to 0.The value of the ERPT coefficient depends on how own currency and cross currency exchange rate co-move. Negative co-movements exaggerate the own currency effect leading to ERPT value less than -1. Positive co-movements counter-act own currency effect leading to ERPT value greater than zero [2].The results(in Table 1) show that a random effect is more appropriate than fixed effect model in explaining pass through behaviour as indicated by the Hausman Test.

Further to estimate the short run and the long run coefficients of ERPT, we build a dynamic panel model which is in tandem with econometric specification of Eqn.5.To estimate this model we employ Arellano Bover (1995) Systems Generalised Estimation(SYS-GMM) method. The

[2] See Nakoi (2013)

main advantage of this estimation procedure is that variables at levels can be combined with variables at first differences. Since cross sectional units are very large and time period is relatively shorter, Arellano-Bover estimator is consistent.

Table 2:Dynamic Panel Estimates in Short Run and Long Run

Variables	Coefficients
Ln(neer(-1))	0.0270877 (0.93)
ΔLn(neer)	-0.613304** (-2.04)
Ln(Wlddd)	.2362862* (1.27)
Ln(Trade)	0.9879495*** (2.69)
LR ERPT	-0.630379** (2.71)
No of Observations No of Instruments	1213 36
Sargan-Hansen Test	10.87 (0.287)

Source :Author's Calculations

Note: Numbers in brackets are Z values based on the null hypothesis of zero ERPT.

[*** indicates p-value <1% ** indicates p-value<5% * indicates p-value<10%]

Long-run ERPT can be computed as $\beta_1/(1-\beta_3)$.

Here, SYS-GMM model specifications pass all the standard diagnostic tests, whose p-value is given in Table 2. In particular, there is no evidence of residual second-order autocorrelation, and the validity of the instruments is always confirmed by the Sargan-Hansen test. The coefficients of the key variables are statistically significant with the expected signs. The negative sign associated with ΔLn(neer) indicate that, depreciation of Indian Rupee leads to a fall in India's export prices. Further negative values of exchange rate coefficients imply that there is a tendency to stabilize local currency prices in the Indian automobile market, for example , a coefficient of -0.4 implies that a 10 percent depreciation of the INR would result in an increase of the mark-up in the Indian automobile market by 4 percent. In other words pass through to export prices is incomplete in the short run. This is indicative of high degree of absorption in home currency term and almost near zero pass through in foreign currency terms, following exchange rate changes. This result is in concordance with the findings of incomplete pass through literature. A low pass through coefficient may be also due to increased shifts in marginal cost curve arising due to change in the imported input cost that follow exchange rate changes(Sinha Roy&Pyne.2014).Further, considering Mallick and Marques(2012) results into

account, it can be said that ERPT is also due to the predominance of advanced countries as India's export markets destinations. In the long-run, a 1% change in the rate of depreciation leads to 0.63% decrease in the export-prices. The long-run ERPT is slightly higher than in the short-run, but still incomplete. Besides, the estimated pass-through elasticities reported here are close to Campa and Gonzàlez (2006) with average elasticities of 0.62 and of 0.64 in the short and long-run, respectively. Overall, our results corroborate the conventional wisdom that the degree of ERPT is incomplete in the short-run. However, in the long-run, we found no evidence of complete pass-through.

4.2 A SECTORAL ANALYSIS OF THE PASS-THROUGH

As discussed before, an aggregate measure may hide a potential dispersion in the ERPT rates across the different product classification.[3] To assess this possible differences at 8 digit HS level in our sample, we start by providing individual estimates of the degree of pass-through by aggregating the products at 8 digit HS level to 4 digit HS level. In fact, there is a substantial debate concerning the dominance of micro or macro factors in explaining the ERPT. A prominent study cited in this regard is Campa and Goldberg's (2005); they differentiate micro-economic from macro-economic explanations for the recent decline in the responsiveness of import prices to exchange rate movements. The authors conclude that changes in the composition of imports towards goods whose prices are less elastic to exchange rate volatility, such as differentiated goods in the manufacturing sector, have been the primary cause behind ERPT changes among several OECD countries in the recent times. Known as the "Campa-Goldberg compositional-trade hypothesis", this phenomenon is believed to explain the lion's share of the decline in pass-through over the past decades. The methodology for estimation is drawn from Campa et al. (2005) and Campa and Gonzàlez (2006), Therefore, we run separate regressions within our previous dynamic ERPT Eqn(5) for 8 digit level product classification which are finally aggregated at 4 digit level for estimation purpose. The results seem to be quite asymmetric. In the short run most of products have expected signs with significant ERPT coefficients. Even though the pass through is incomplete, the range of variations in the degree of incomplete pass through is wide. While tractors (HS code-8701) and bicycles (HS code-8712) have pass through elasticities less than 35%, products with HS Codes 8706,8707,8709,8711,8716 have relatively higher elasticities in the range of 36% to 70%. However products with HS codes 8710 and 8714 have near complete pass through elasticities in the short run. Results obtained here corroborate with most of the empirical researches that infer incomplete pass through to export prices in short run. Further inspection reveals that pass through is quite high in the long run indicating the reduction in absorptive capacity of the firm to absorb the exchange

[3] Auer and Mehrotra (2014) underlined the limitation of country-level data since it is difficult to control for all the relevant factors that could possibly affect price co-movement at an aggregate level.

Table 3:Sectoral ERPT Elasticities at 4 digit HS level

HS Code	Short Run Pass Through Coefficient	Long Run Pass Through Coefficient
8701:TRACTORS (OTHER THAN TRACTORS OF HEADING 8709)	-0.275138*** (-2.66)	0.264741*** (3.05)
8702: PUBLIC-TRNSPRT TYPE PASSENGER MOTOR VHCLS	0.1229165 (0.88)	0.139237 (0.52)
8703: MOTR CARS AND OTHR MOTR VHCLS FR TRNSPRT OF PERSONS(EXCL OF 8702)INCL RCNG CARS ETC	-0.9299636 (-1.88)	-1.014882* (-2.58)
8704: MOTOR VEHICLES FOR THE TRANSPORT OF GOODS	-1.238791 (-0.97)	-1.65949 (-1.01)
8705: SPCL PURPOSE MOTOR VHCLS(E.G.BRKDOWN LORRIES,CRANE LORRIES,FIRE-FIGNTNG VHCLS, CONCRETE MIXR LORRIES,ROAD SWEEPR	-3.518324* (-1.54)	-2.77210 (-0.85)
8706: CHASSIS FITTED WITH ENGINES, FOR THE MOTOR VEHICLES OF HEADINGS 8701 TO 8705	-0.518324** (-1.44)	-0.9644925** (3.32)
8707: BODIES (INCLUDING CABS), FOR THE MOTOR VEHICLES OF HEADINGS 8701 TO 8705	-0.420608* (-1.58)	-0.379494* (-1.75)
8708: PARTS AND ACCESSORIES OF MOTOR VEHICLES OF HEADINGS 8701-05	-4.005316 (-1.54)	-3.922238 (-0.97)
8709: WRKS TRUCKS,USD IN FCTRS,DOCK AREA/AIRPORTETC FR SHRT DSTNC TRNSPRT OF GOODS;TRCTRS USD ON RLWAY PLTFORMS	-0.509719** (-2.56)	-0.631382** (-1.93)
8710: TANKS AND OTHER ARMOURED FIGHTING VEHICLES, MOTORISED etc	-0.89348** (-4.44)	-1.025140** (-3.76)
8711: MOTORCYCLES (INCLUDING MOPEDS) AND CYCLES FITTED WITH AN AUXILIARY MOTOR, WITH OR WITHOUT SIDE-CARS;	-0.609719* (-1.98)	-0.516533* (-1.93)
8712: BICYCLES AND OTHER CYCLES (INCLUDING DELIVERY TRICYCLES), NOT MOTORISED	-0.3143007** (-3.42)	-0.424969** (-2.98)
8713: INVALID CARRIAGES,W/N MOTIRISED/OTHERWISE MECHANICALLY PROPELLED	1.742712 (0.57)	2.259916 (0.18)
8714: PRTS AND ACCSSRS OF VHCLS OF HDG 8711-8713	-0.823831** (-2.71)	-0.932733** (-2.98)
8715: BABY CARRIAGES AND PARTS THEREOF	-1.087902 (-0.63)	-0.937746 (-0.83)
8716: TRAILERS AND SEMI-TRAILERS; OTHER VEHICLES, NOT MECHANICALLY PROPELLED; PARTS THEREOF	-0.5002013*** (-4.18)	-0.795309*** (-3.97)

Source: HS 8 digit level data, DGCI&S Kolkata and author's own calculations

Note: Numbers in brackets are Z values based on the null hypothesis of zero ERPT.

[*** indicates p-value <1% ** indicates p-value<5% * indicates p-value<10%]

rate volatilities by changing their mark-ups. Except for tractors which have low pass through coefficient even in the long run, most of the products have very high pass through elasticities indicating a near complete pass through phenomenon. Although most statistically significants lie within the conventional range of 0 to 1, products with HS codes 8703 and 8710 depart slightly from the theoretically verified range. As discussed earlier the value of the ERPT coefficient depend on how own currency and cross currency exchange rate co-move. Negative co-movements exaggerate the own currency effect leading to ERPT value less than -1.In other words the exporters face an relatively elastic demand curve in the world market. So in a nutshell we observe that ERPT to export prices of Indian automobiles is incomplete in short run as well as in long run but relatively the elasticities are higher in the long run.

5. Conclusion.

The study shows incomplete and low exchange rate pass through into India's automobile export prices at the disaggregate level. However the extent of pass through varies across various products grouped according to HS 4 digit level classifications. While the pass through is quite low for tractors and bicycles, the elasticities are high for vehicular spare part s and fighting equipment like tankers etc. Unlike in the short run, the pass through is relatively high in the long run. The observed behaviour in this study indeed questions the assumption of "smallness" of India across different products of Indian automobiles in the world market and the pricing behaviour of exports. The dynamic panel results of the aggregate level analysis that trade openness and world demand are statistically significant variables in explaining the volatility of export prices and thereby value of the exports. The results bring about an empirical verification of the traditional theoretical wisdom that depreciation of exchange rate bring about a fall(rise) in export prices making products more(less) competitive in the world market and leading to rise(fall) in export volumes. The findings on exchange rate pass through have implications for exchange rate being used as an important policy instrument for export promotion and growth on one hand, and in reducing current account deficit, on the other hand.

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