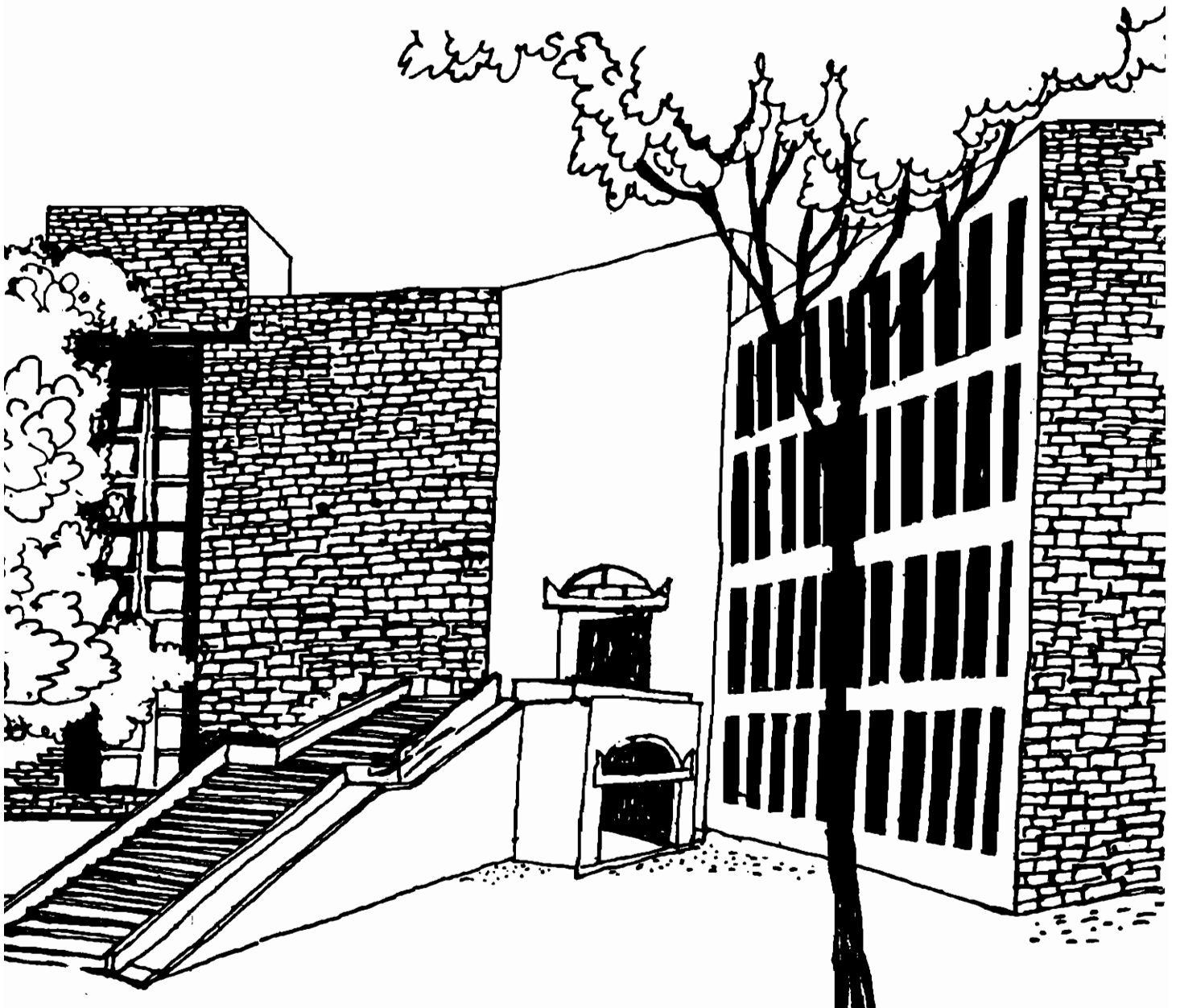





Working Paper



INCOME AND PRICE ELASTICITIES
IN INDIA'S TRADE

By
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WP1135

WP
1993
(1135)

W P No. 1135
August 1993

The main objective of the working paper series of the IIMA is to help faculty members to test out their research findings at the pre-publication stage.

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Income and Price Elasticities in India's Trade

G.S. Gupta
and
H. Keshava¹

Summary

The paper estimates the export and import functions for India both at the aggregate (rest of the world) as well as the important individual country levels, using annual time series data for the period 1960-61 through 1990-91. It finds that the income elasticities of trade are significant and that this elasticity is significantly higher for imports than exports, implying the possibility of the worsening trade balance with the growth in economies. The trade is generally price inelastic but this elasticity is generally higher for exports than imports. The sum (absolute) of the two price elasticities generally exceeds unity and thus satisfies the Marshall-Lerner condition for the effectiveness of devaluation in regulating the trade imbalance. The impact of the 1966 devaluation is found significant more with regard to imports than exports, and the post 1980 liberalization policy has produced desirable impact on India's globalization. Based on the estimated trade elasticities and the last five years average growth rates in the trade determinants, the growth rates in India's real exports and imports have been projected at 4.1% and 5.4%, respectively, and accordingly a worsening of the trade imbalance has been foreseen in the coming years.

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Income and Price Elasticities in India's Trade

1. Introduction:

Trade deficit happens to be one of the major economic problems in India and unfortunately in spite of our best efforts not much progress has been achieved in controlling this even through the new economic policy. One of the methods to control the trade deficit is through devaluation, which makes Indian goods cheaper relative to foreign goods. However, the effectiveness of devaluation in this regard depends on the strengths of the price elasticities of imports and exports. The famous Marshall-Lerner conditions, regarding export-import price elasticities, spell out the conditions under which the devaluation of a country's currency results in improving the trade balance/balance of payments difficulties (Sodersten, 1985). Similarly, the income elasticities of imports and exports are significant as they together with the growth rates in incomes (domestic and foreign) exercise a commanding role in the size of imports and exports. The work of Harry Johnson (1958) is well known in this regard. He has argued that the direction of the movement of trade balance depends on the country's income elasticity of demand for its imports and the rest of the world's income elasticity of demand for its exports. To demonstrate this, consider a world with just two countries: A and B, and assume that the trade between these countries is just balanced, and the prices and the growth rate in incomes in both the countries are constant. Under such a situation, if the country A's income elasticity of demand for its imports (B's exports) is higher than the country B's income elasticity of demand for its own imports (A's exports), the imports of country A would grow faster than country B's imports, which, in turn, would lead to trade deficit in country A and trade surplus in country B. Further, if the gap between the two income elasticities is large, even a somewhat slower growth rate in country A's income than that in country B's income, may not be sufficient to maintain the zero trade balance. Thus, a study on trade elasticities is of immense value.

An analysis of India's trade data would reveal that India's exports and imports (in current rupees) during the last three decades, ending 1990-91, have grown at an annual rate of about 14% and 12%, respectively. Further, the trade balance has persistently been negative throughout this period and beyond barring 1973-74 and 1976-77. In terms of magnitudes, the trade deficit stood at Rs.480 crores in 1960-61, shooting to Rs.10,640 crores in 1990-91, falling to Rs.3,809 crores in 1991-92 and then again rising to Rs.9,572

crores in 1992-93. During March 1993, the deficit turned into a surplus of Rs.661 crores, and exports have witnessed a buoyancy in the first quarter of 1993-94. Since the international trade in invisibles, and transactions in money and capital goods is limited in India, the trade deficit plays the dominant role both in the current account and overall balance of payments. To cite some figures, the share of trade balance in current account balance and overall balance of payments stood at 122% and 150%, respectively in 1960-61. The said figures assumed values of 110% and 200% respectively in 1989-90. As a proportion to gross domestic product (GDP) (nominal), trade deficit was 2.9% in 1960-61, 4.3% in 1980-81, 3.3% in 1985-86, 2.0% in 1990-91, 0.6% in 1991-92, and 1.4% in 1992-93. Thus, the trade deficit as well as the various relevant ratios have witnessed significant volatilities. This argues for the need for a detailed study on export-import functions and trade elasticities.

The last four decades are characterized by many important developments both at the national as well as the global level. In India, there were devaluations in September 1966 and July 1991, inflation rate rose sharply during mid 1970s and it has always been a volatile variable, and the growth rate of the economy averaged 3.5% during 1951-1980, 5.4% during 1980s, 1.4% in 1991-92 and about 4% in 1992-93. At the global level, the foreign exchange rate, which was stable under the Bretton Woods system during 1945 to 1971, fluctuated sharply during the last two decades, the inflation rate was rather high in early 1970s due to the OPEC crisis, Japan, Asian tigers and China have surpassed the growth rates of the erstwhile economically powerful nations, and the debt crisis and growth of multinationals and foreign direct investments have attracted significant attentions. It is in the light of these developments that the present paper attempts to use the relevant time series data, estimate the export-import functions, compute and analyze trade elasticities, and examine their implications on India's trade balance in future.

2. Literature and Methodology:

There were many studies during 1940s, estimating trade elasticities for various countries (Orcutt, 1950). The results indicated low price elasticities and thus supported the hypothesis that devaluation/depreciation of the currency is not quite effective in improving the trade balance. Houthakker and Magee (1969) estimated the income and price elasticities of trade for a number of countries, using annual data for the period 1951 through 1966. They found that while income elasticities were statistically

significant and assumed relatively stable values, ranging between one and two, the price coefficients in export-import functions turned out to be usually insignificant and unstable. The results reveal that the income elasticity of imports was significantly higher than that for exports for countries having serious adverse balance of payments problems, and the gap between the two elasticities was exactly the reverse with regard to countries experiencing unexpected balance of payment positions. Further, the US trade equations were estimated in dis-aggregated versions as well, where these were fitted by major trading country and important commodity groups. The results indicate that the U.S. income elasticity of demand for its imports was much higher than the income elasticity of demand by other countries for U.S. exports. This disparity was much larger in case of manufactured goods than non-manufactured goods. Thus, a strong evidence was found towards the deterioration of U.S. trade balance over time, particularly against Japan and Canada. For India, there have unfortunately been not many studies exclusively devoted to the estimation of import and export functions. A rather recent and important study is due to Da Costa (1988). He estimated import and exports functions for India, using annual data for the period 1970-71 to 1984-85. He tried these functions in linear form only. He found exports to be positively and significantly related to the world income, and negatively to the real effective exchange rate. The two elasticities (mean) turned out to be +1.31 and -0.59, respectively. Imports were found to be directly related to the domestic income and inversely to the import price relative to domestic price. The corresponding mean elasticities were found to be +1.40 and -0.35, respectively.

On the basis of the economic theory and literature, the export and import functions are hypothesized as follows:

$$\text{Export function: } X = f(Y_w, P_x/P_w, D_1, D_2) \dots\dots (1)$$

$$f_1 > 0 > f_2 \quad f_3, f_4$$

$$\text{Import function: } M = g(Y, P_m/P, D_1, D_2) \dots\dots (2)$$

$$g_1, g_3 > 0 > g_2, g_4$$

In function (1) real exports (X) are postulated to depend positively on the world real income (Y_w), negatively on the price of Indian exports (P_x) relative to the price of India's competitors in exports in the corresponding markets (P_w), two dummies (D_1, D_2). In function (2), real imports (M) are hypothesized to vary directly with real domestic income (Y), inversely with the price of imports (P_m) relative to domestic price (P) [as a proxy for the price of

import computing goods at home), and two dummies (D_1 , D_2). The dummy variables D_1 , D_2 are incorporated to analyze the effects of 1966 devaluation, and economic liberalization of 1980s and onwards, respectively. D_1 takes a value of one during pre-1966 period and zero elsewhere while D_2 assumes a value of one for all periods until 1980-81 and zero thereafter. Since devaluation is expected to encourage exports and discourage imports, and economic liberalization is to foster globalization, the dummies are expected to enter the two functions with the signs hypothesized for them in functions (1) and (2).

The theoretical export-import functions need to be imparted empirical content through their estimation, using data on the variables involved in the functions. Once their estimated versions are obtained, they could be used to derive trade elasticities, which, in turn, could be analyzed to infer implications on the trade balance, among other things. These efforts are made in the sections that follow.

3. Data and Empirical Results:

The study is based on the annual time series data for the period 1960-61 through 1990-91. Further, the trade functions have been estimated for India vis-a-vis the rest of the world (RoW) as well as India vis-a-vis each of the most important eleven countries with respect to foreign trade with India on which data were available. The countries included (with their percentage share in India's exports during 1990-91 given inside the brackets) are Australia (1.0), Belgium (3.8), Canada (1.0), France (2.4), Germany (7.8), Italy (3.1), Japan (9.3), Netherlands (2.0), Switzerland (1.2), U.K. (6.5) and USA (14.7). Trade functions with respect to some otherwise important countries like those in East Europe, and USSR could not be estimated due to non-availability of some important data. For India vis-a-vis RoW, the two dependent variables were defined in two alternative ways, viz. real exports and real imports, and quantum exports and quantum imports. However, for India vis-a-vis individual countries, the dependent variables were defined only in real magnitudes.

Data on India's nominal exports and imports with respect to RoW and country-wise, real GDP, unit value indices of exports and imports, and wholesale price index were directly available in RBI Bulletin, Report on Currency and Finance, Economic Survey and India Database (Vol.2). The nominal magnitudes were divided by the corresponding unit value index to yield data on real exports and real imports. The data on the world real income (Y) (1985 prices) were obtained as the weighted average real GDP at factor cost for the eleven chosen countries, where the weights corresponded

to the shares of India's total exports to them in the corresponding years. The data on real GDP and unit value indices of imports (in dollar prices) for various countries and unit value indices of imports for industrial countries as a whole (in dollar prices) were collected from the IMF publication, the International Financial Statistics Yearbook. India's unit value indices of exports, adjusted for dollar prices, were used as the proxy for the price of India's exports. The unit value indices of imports of the industrialized countries served as proxy for the price of India's competitors in case of RoW and unit value index of imports of the respective country in the case of individual countries. The unit value indices of India's imports was taken as the price India's imports. The wholesale price index was used to represent the domestic price. While the data on India were available in Indian financial years, those on foreign variables were available in calendar years. To obtain consistent data, foreign data were converted into Indian financial year through the weights of 3/4 and 1/4 (e.g. 1960-61 data were obtained as 3/4 of 1960 + 1/4 of 1961).

All money magnitudes of India are denominated in crores of rupees, while those of foreign in billions of US dollars. The unit value index of imports for industrial countries and for individual countries other than India have the base of 1985 = 100 and all other price index variables have the base of 1960-61 = 100.

The models (1) and (2) were estimated through the application of the ordinary least-squares (OLS) method. The alternative functional forms tried included the linear and log linear (D_1 , and D_2 in linear) forms. Also, alternative combinations of the four independent variables in each of the two functions were tried to generate all alternative estimates. The best equation for each of the two functions was chosen on the basis of the a priori expected signs of the coefficients of independent variables and the statistical tests, such as the t-test for the significance of regression coefficient, the Durbin-Watson (DW) test for autocorrelation, and the magnitudes of R^2 (\bar{R}^2). When the Durbin-Watson value failed to rule out autocorrelation and the estimation results were otherwise good, the Cochrane-Orcutt iterative procedure was used to correct the autocorrelation problem. The estimation results of the best equation for each of exports and imports functions and for RoW and each of the eleven selected countries are provided in Table-1.

Barring the India's exports to Japan function, which is linear, all the selected equations are log-linear. Incidentally note that in a log-linear equation, the

coefficients are directly the corresponding elasticities. In contrast, in linear functions, the coefficients are the corresponding multipliers, and the elasticities vary from year to year. In order to compute unique estimates for elasticities in a linear function, mean elasticities were computed and the same, instead of the estimated multipliers are reported in Table-1.

The estimation results in Table-1 are quite encouraging. All the explanatory variables enter with the a priori expected signs and their coefficients are usually significantly different from zero at 5% significance level. The R^2 value exceeds 0.8 in 18 out of 26 equations and most all of the DW values indicate zero autocorrelation. In terms of the list of explanatory variables, income variable enters in all the 26 equations, relative price is present in all but one import functions and in 8 out of the 13 export equations, D_1 finds a place in 9 of the 13 import functions and in 2 of the 13 export equations, and D_2 is present in 3 of the 13 import functions and 8 out of 13 export equations. Thus, all the four arguments in each of the two functions are relevant both theoretically as well as empirically.

The magnitude of the income elasticity of India's imports varies between 0.39 (USA) and 3.91 (Belgium), and it takes values of 1.02 and 1.18 for RoW on real and quantum imports, respectively. The said elasticity for India's exports varies between 0.18 (Canada) and 1.76 (France), and it assumes values of 0.49 and 0.50 for RoW on real and quantum exports, respectively. These reflect a sizeable gap between the income elasticity of imports and income elasticity of exports, and, of course, between each of these elasticities across countries. The former is a serious matter, for the high income elasticity of import relative to that of export is a pointer to the worsening of the trade deficit in the phase of growing income. The relative price elasticity of India's imports varies between -0.01 (Switzerland) and -1.79 (U.K.), and it assumes values of -0.26 and -0.17 for RoW on real and quantum imports, respectively. These numbers indicate a generally price inelastic imports of India. This finding appears reasonable in view of the high proportion of essential (bulk) imports in India's total imports. The price elasticity of exports is usually higher than that of imports. The former varies between -0.05 (Japan) and -1.78 (Italy), and takes values of -0.94 and -0.68 for RoW on real and quantum exports, respectively. Thus, even India's exports are generally price inelastic, though they are more price elastic than India's imports. Incidentally note that

the sum of the absolute values of price elasticities of exports and imports generally exceeds unity, and thus satisfies the Marshall-Lerner condition for the effectiveness of devaluation in regulating the trade imbalance.

The 1966 devaluation (D_1) had an expected bearing more spread on India's imports than on India's exports, while quite the reverse is true with regard to the post 1980 economic liberalization policy.

A further analysis of the country-wise results would reveal that

- a) income elasticity of India's imports is high with regard to imports from Belgium, Switzerland and France, and low with regard to those from USA and Canada.
- b) income elasticity of India's exports is high with regard to exports to France, Belgium, Switzerland and Germany, and low with regard to those to Canada, Japan, Australia and U.K.
- c) price elasticity of India's imports is high with respect to imports from U.K., Japan and Germany, and low with regard to those from Switzerland and Australia.
- d) price elasticity of India's exports is high with regard to export to Italy, and low with respect to those to Japan, U.K. and Germany.

4. Implications and Conclusions

The empirical results of trade functions have been used here to infer projections for the growth rates in India's real exports and real imports. This is done through the procedure of computing the growth rate in the dependent variable using the calculus method. To explain, this, consider a general two independent variables function:

$$Y = f (X_1, X_2) \quad \dots\dots (3)$$

Taking the total differentiation of equation (3) and dividing the results by Y, we get

$$\begin{aligned} \frac{dY}{Y} &= f_1 \frac{dX_1}{Y} + f_2 \frac{dX_2}{Y} \\ &= \left(f_1 \frac{X_1}{Y}\right) \left(\frac{dX_1}{X_1}\right) + \left(f_2 \frac{X_2}{Y}\right) \left(\frac{dX_2}{X_2}\right) \\ \text{OR, } g_y &= e_1 g_1 + e_2 g_2 \dots \dots \dots (4) \end{aligned}$$

where g_y = growth rate in Y, g_1 = growth rate in X_1 , g_2 = growth rate in X_2 , e_1 = elasticity of Y with respect to X_1 , and e_2 = elasticity of Y with respect to X_2

Equation (4) indicates that the growth rate in a dependent variable can be computed if the corresponding elasticities and growth rates in explanatory variables are known. We have used this equation to project growth rates in India's real exports and real imports. Table-2 contains the results. The income and price elasticities are taken from the estimated results in Table-1 and the growth rates in real GDP and the relative prices are computed from the data. Since we wish to infer projections for future, the average annual growth rates in the last 5 years in the corresponding series is used as the proxy for the growth rates in those variables. The projected growth rates are computed separately as contributed by income changes only, relative price changes only, and changes in both these variables. The results are available in Table-2, Columns 9-14.

The results reveal that India's real exports are expected to grow at an annual rate of 4.1%, while its imports from RoW at 5.4%. Since there is already a trade deficit in India, these results imply only a worsening of the trade imbalance over time. The results on these rates for India's trade with individual countries are available in Table-2 for a disaggregated analysis.

Analysing the causes of the trade imbalance problem, we must recall that income elasticity is higher for imports than for exports, and on the top of it, the data indicate that the growth rates in real income of India has been higher than that of the world real income. One redeeming feature is that the growth rate in the relative price variable in the export function has been negative, implying that the Indian goods are becoming cheaper over time, and thus exports are likely to increase due to the price factor. Furthermore, growth rate in the relative price variable in the import function has been positive, which would cause dampening effect on our imports.

Given the projections on the growth rates in real exports and imports, implying worsening of the trade balance over time, and the underlying causes of the same, what solutions could be recommended to avoid the problem? The results on the effectiveness of the 1966 devaluation and the post 1980 liberalization policy indicate that the recourse to such measures and other non-tariff factors can very well help India to alleviate or atleast reduce its external imbalance problem. Needless to say, the projected growth rates in real exports and imports are based on the last five years average growth rates in incomes and relative prices, and thus if the actual growth rates in these variables differ significantly from these projections, our projections would deviate from actual growth rates in real exports and imports.

References

1. Da Costa, G.C. (1988), "India's Trade Balance: 1970-71 to 1984-85, Analysis and Policy Implications," Artha Vijnana, 30(3), 221-240.
2. Houthakker, H.S. and Magee, S.P. (1969), "Income and Price Elasticities in World Trade," Review of Economics and Statistics, 51(2), 111-125.
3. Johnson, H.G. (1958), International Trade and Economic Growth, Cambridge, Harvard University Press.
4. Joshi, Vijay and Little, I.M.D. (1993), "Future Trade and Exchange Rate Policy for India," Economic and Political Weekly, 28(31), 1599-1605.
5. Mukherjee, Smriti (1988), "Fluctuations in World Economy and India's Export Sector," Margin, 20(2), 65-73.
6. Orcutt, Guy H. (1950), "Measurement of Price Elasticities in International Trade," Review of Economics and Statistics, 32(2), 117-132.
7. Sodersten, Bo, (1985), International Economics, MacMillan, London.

Table-1: Estimation Results of Import and Export Functions

India's Import Functions						Country	India's Import Functions						
Constant	Elasticity		Coeffts. of		2 R DW (P)		Constant	Elasticity		Coeffts. of		2 R DW (P)	
	Income	Relative Price	D 1	D 2				Income	Relative Price	D 1	D 2		
-1.29 (0.78)	1.02 (6.90)	-0.26 (2.15)	0.27 (4.00)	-0.30 (3.75)	0.95 1.32	Row (Real magnitudes)	9.98 (6.28)	0.49 (3.44)	-0.94 (4.36)	-0.23 (2.93)	-0.20 (2.22)	0.91 1.20	
-8.47 (9.79)	1.18 (4.86)	-0.17 (1.95)		-0.28 (5.27)	0.98 1.71	Row (Quantum Indices)	4.44 (3.62)	0.50 (4.25)	-0.68 (4.04)		-0.20 (2.63)	0.88 1.11	
-8.19 (3.40)	1.21 (5.31)	-0.11 (0.25)			0.56 1.47	Australia	1.72 (1.22)	0.53 (2.00)			-0.12 (1.08)	0.51 (0.48)	
-36.47 (6.62)	3.91 (7.66)	-0.83 (1.30)	0.47 (1.33)		0.93 1.31 (0.54)	Belgium	-2.04 (1.31)	1.53 (4.72)			-0.37 (1.62)	0.90 1.61 (0.55)	
2.34 (0.49)	0.42 (0.98)	-0.37 (0.78)			0.57 2.17 (0.65)	Canada	4.85 (1.67)	0.18 (0.44)	-0.34 (1.18)			0.53 1.68 (0.76)	
-18.73 (9.28)	2.08 (12.05)		0.24 (1.70)		0.89 1.73	France	-6.61 (3.41)	1.76 (5.99)			-0.40 (2.68)	0.89 2.10 (0.44)	
-9.90 (3.81)	1.80 (7.46)	-1.01 (3.50)	0.46 (2.70)		0.90 1.83 (0.56)	Germany	-2.77 (1.30)	1.42 (7.81)	-0.18 (0.62)			-0.21 (1.58)	0.97 2.28 (0.62)
-12.20 (3.61)	1.70 (5.50)	-0.53 (1.44)	0.35 (1.63)		0.83 1.68 (0.52)	Italy	8.39 (1.85)	0.76 (1.71)	-1.78 (3.62)			-0.58 (2.04)	0.78 1.31
-11.93 (4.20)	2.00 (7.81)	-1.08 (2.95)	0.23 (1.19)		0.89 1.91 (0.43)	Japan		0.49 ^a -0.05 ^a				0.96 2.3	
-7.58 (1.62)	1.35 (3.12)	-0.64 (1.61)		-0.32 (1.21)	0.87 1.51 (0.48)	Netherlands	-0.15 (0.04)	1.24 (5.22)	-0.28 (0.46)			0.85 1.06	
-22.53 (7.90)	2.32 (9.07)	-0.01 (0.02)	0.91 (4.62)		0.79 2.11	Switzerland	-2.79 (4.04)	1.52 (9.62)				0.91 1.81 (0.40)	
-4.96 (1.22)	1.67 (4.72)	-1.79 (6.50)	0.30 (1.62)		0.89 1.52 (0.76)	United Kingdom	2.99 (1.16)	0.55 (1.73)	-0.09 (0.35)			-0.30 (2.84)	0.33 0.71
4.88 (1.89)	0.39 (1.68)	-0.46 (1.31)	0.53 (2.93)		0.29 1.00	U.S.A.	-2.26 (1.47)	1.13 (6.09)				-0.27 (2.74)	0.86 0.59

Notes: 1. ^a Represent mean elasticities 2. Numbers in parentheses underneath coefficients represent t-values and underneath DW value give the value of the autocorrelation parameter (P), if applicable.

Table-2: Trade Elasticities, Growth rates in Income and Relative Prices, and Projected Growth Rates in India's Trade

Country	Foreign Income Elasticity of Demand for India's Exports	India's Income Elasticity of Demand for Imports	Relative Price Elasticities		Average Annual Growth Rate during 1985-86 to 1990-91 in		Projected growth rate in exports due to		Projected growth rate in imports due to				
			India's Exports	India's Imports	Real GDP	Relative Price Export Import	Income Change only	Both income and relative price changes	Income Change only	Both income and relative price changes			
1	2	3	4	5	6	7	8	9	10	11	12	13	14
India													
Rest of the World (ROW)													
Australia	0.49	1.02	-0.94	-0.26	6.0	-2.5	2.0	1.7	2.4	4.1	6.1	-0.7	5.4
Belgium	0.53	1.21	-	-0.11	5.4	-2.9	-	2.9	-	2.9	7.3	-0.3	7.0
Canada	1.53	3.91	-	-0.83	13.9	-4.0	-	21.3	-	21.3	23.5	-2.3	21.2
France	0.18	0.43	-0.34	-0.37	6.2	0.00	0.00	1.1	-0.03	1.1	2.6	-1.0	1.6
Germany	1.76	2.00	-	-	12.1	-4.1	-	21.3	-	21.3	12.5	-	12.5
Italy	1.42	1.00	-0.18	-1.01	14.1	-4.4	-	20.0	0.0	20.0	10.0	-2.0	0.0
Japan	0.76	1.70	-1.70	-0.53	11.3	-3.6	-3.6	0.6	6.4	15.0	10.2	-3.2	7.0
Netherlands	0.49	2.00	-0.05	-1.00	13.0	1.1	1.1	6.0	-0.05	6.75	12.0	-3.0	9.0
Switzerland	1.24	1.35	-0.28	-0.64	14.3	-4.2	-4.2	17.7	1.2	10.9	0.1	-1.0	6.3
U.K.	1.62	2.32	-	-0.01	12.0	-	-	19.5	-	19.5	13.9	-0.03	13.9
U.S.A.	0.05	1.60	-0.09	-1.79	0.9	-4.4	-4.4	4.9	0.4	5.3	10.1	-5.0	5.1
	1.13	0.39	-	-0.46	2.6	0	0	2.0	0	2.0	2.3	-1.3	1.0

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