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RIS Discussion Papers

Short-term Forecasting of India's Export: Developing a Framework by Countries and Commodities

Rajesh Mehta
Parul Mathur

RIS-DP # 62/2003



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**Short-term Forecasting of India's Export:
Developing a Framework by
Countries and Commodities**

by

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A Short Term Forecasting Model for India's Export Sector

RIS has launched a long-term project entitled "A Short Term Econometric Forecasting Model for India's Export Sector". The project is being carried out in collaboration with the Ministry of Commerce, Government of India, India. The importance of this project stems from its relevance to future policy and decision-making process for the Government of India in the trade sector. In this Study, short term forecasting of India's export sector will be carried out using econometric modelling. The main objective of the project is to predict the short-term annual forecast for India's export sector at regular intervals, which would be carried out for the principal trading partners and their principal commodities. The forecasts thus obtained would then be reviewed mid-year keeping in view the changes in the external and domestic markets. The forecasts will be used in strategic planning for India's exports. As per the schedule, the first draft containing the base run model was submitted to the Ministry of Commerce in October 2002. The forecasts have to be presented to the Ministry of Commerce at regular intervals. Preparation of such an econometric model would require huge data and information updates about the commodities behavioural patterns, therefore any kind of inputs or suggestions would be most welcome by our research team. For further details contact Dr Rajesh Mehta, Senior Fellow, RIS and coordinator of the project.rajeshmehta@ris.org.in, parulmathur@ris.org.in

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Short-term Forecasting of India's Exports: Developing a Framework by Countries and Commodities

To understand the behaviour of export from developing countries there exist a large number of studies¹ in the literature. For the Indian economy as well, several macro-econometric models² have been developed for capturing the behaviour of the trade sector. Infact, such models have their assumed importance in the policy and decision-making process not just for the entire economy only but also for the specific sectors as well. These kind of modelling exercises help in imparting a direction to the development and reform process of the economy. The existing country-wise models have not given due attention to the trade sector since most of them have been built keeping in view specific objectives, and a systematic effort is still required for building a short-term econometric forecasting model for India's export sector. It is with this view that this paper intends to fill one of the gaps in the existing Macro-econometric models for the trade sector.

The main objective of this paper is to develop a framework for forecasting of India's annual exports at regular intervals, which would be carried out for principal trading partners and their principal commodities. Individual country/commodity analysis takes into account the country/commodity wise characteristics such as non-tariff barriers, language differences, locational/distance differences, preferential and other trading arrangements etc., thus an analysis based on aggregate data would not give appropriate forecasts. Apart

¹ For a review of studies in India see V.R. Panchamukhi "Quantitative Methods and their Applications in International Economics" in K.L. Krishna (eds), *Econometric Applications in India*.

² See Krishnamurty K. (2002), *Macro econometric Models for India: Past, Present and Prospects*, Administrative Staff College of India, Hyderabad

from the above mentioned country/commodity specific characteristics it may be due to the demand conditions, differences in the degree of the sensitiveness of prices, which cannot be captured at an aggregate level. More so, India's exports are highly diversified in terms of its commodity basket. At the 6-digit HS classification, India exported a total of 4599 commodities out of the total no. of existing commodities of 5237 in 2001-02. This necessitates the need for following a commodity specific analysis of India's exports. Such country and commodity wise disaggregated analysis could be used in policy and decision making process of the government such as export promotion measures etc.

Section 1 starts with a brief review of the observed trends of India's exports and its position in Global trade. It examines the direction and composition of India's exports through 90's. Section 2 outlines the framework for the development of the short-term export forecasting model. A survey of the existing economy-wide forecasting models forms the first part of the section followed by the proposed model. The last part of the section constitutes the procedure of the selection of countries and commodities for the proposed model. Section 3 follows with the concluding summary of the paper.

1. India and the World Trading System – Recent Trends

The world trade structure has been changing at a very rapid rate in the recent years. As the observations of the WTO report 2003 indicates following are the noteworthy features of the world trading system to emerge in the last few years. Firstly, the growth in the share of South-South trade in the world trade owing largely to the growing liberalization of the trade and investment regimes of the developing countries. Secondly, it points to the decline and continued volatility of commodity prices with factors such as trade policies (particularly agricultural subsidies and tariff escalation) in developed countries, the structure of the international market for commodities and global macroeconomic conditions. And lastly, the proliferation of regional trade agreements over the past decades or so, which have severe implications on the world trade structure, costs and standards.

India is moving at a consistent rate towards establishing its presence in the world trade. In 2002, India ranked as the top30th-leading exporter amongst the leading exporters in world merchandise trade. Amongst the world's leading importers in the world merchandise trade 2002, India ranked 24th (Source: WTO). As indicated by India's EXIM Mid Term Policy³ (2002-2007), India

aims to have at least 1 percent share in total global exports from the level of 0.71 percent in 2001-2002, implying a compound annual growth rate of 11.9 percent (in dollar terms) over the Tenth Five year Plan, 2002-2007. Through the 1990's while World trade value has increased 1.9 times, India's exports in US \$ terms were up by 2.5 times. The percentage share of India's exports in global exports remained more or less at around 0.52 percent during early 1990's and showed a significant increase in 1995-96 to 0.60 percent remaining steady at around 0.63 thereafter till 1999. India's export value sharply accelerated in 2000, from 35.66 US \$ billion in 1999 to 43.3 US \$ billion in 2001.

But the year 2001 experienced the deepening and reinforcing of the global economic slowdown as depicted by the decline in the world trade from 6310.1 in 2000 to 6120.8 US \$ billion in 2001. The prevailing global slowdown was accentuated further by the terrorist attacks in the United States on September 11, 2001 which resulted in further downward growth projections for all most all major economic regions of the world. Owing to an increase in the value of India's exports from 42.1 to 44.2 US \$ billion, India's share in global exports increased from 0.67 to 0.71 percent from 2000 to 2001. As the trends point out the year 2002 witnessed a substantial rise in India's exports with a growth rate of 18.6%. This led to a jump in the share of India's exports from 0.71% to 0.80% in the global exports. From the phase of declining global exports and India's exports in the latter quarters of 2001, 2002 has been a phase of gradual but significant recovery as seen from the Table 1.1.

1.1 Changing Patterns of India's Exports by Countries and Commodities

Trade liberalization appears to have encouraged exports in new areas, and export-related imports declined after the reform even as overall exports increased⁴. The broad features emerging in context of the direction of India's exports by countries in the post-reform period are as follows. Eastern Europe's share in India's exports has seen a evident decline in the post reform period. United states and European union's share has seen a consistent rise through the nineties and together they now account for a sizeable 42% share in India's exports 2003-04. An important feature to note is that the share of the Asian developing countries has seen a considerable increase in its share through the post-reform period.

³ *Mid-term EXIM Policy of India (2002-2007)* as unveiled on 31st March 2002.

⁴ T.N. Srinivasan, S.D. Tendulkar (2003), *Reintegrating India with the World Economy*, Oxford University Press.

Table 1.1: India's Export growth

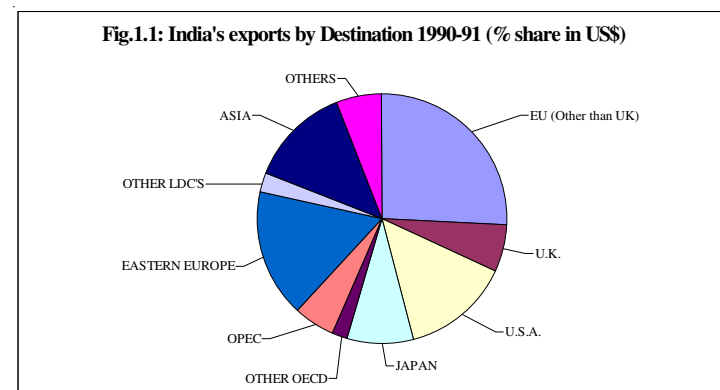
Calendar Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003**			
														Q1	Q2	MO6	MO7
Value of world export US\$ bill.	3438	3530	3757	3765	4281	5120	5339	5529	5440	5624	6362	6127	6406	n.a.	n.a.	n.a.	
Growth rate *	-	2.7	6.4	0.2	13.7	19.6	4.3	3.6	-1.6	3.4	13.1	-3.7	4.6	-	-	-	
Value of India's exports US\$ bill.	17	17	19	21	25	30	33	35	33	35	42	43	51	13.7	13.1		
Growth rate	-	0.0	11.8	10.5	19.0	20.0	10.0	6.1	-5.7	6.8	18.1	2.9	18.6	15.1	11.4	11	5.3
% Share of India in world trade (exports)	0.49	0.48	0.51	0.56	0.58	0.59	0.62	0.63	0.61	0.63	0.66	0.71	0.80	0.80			

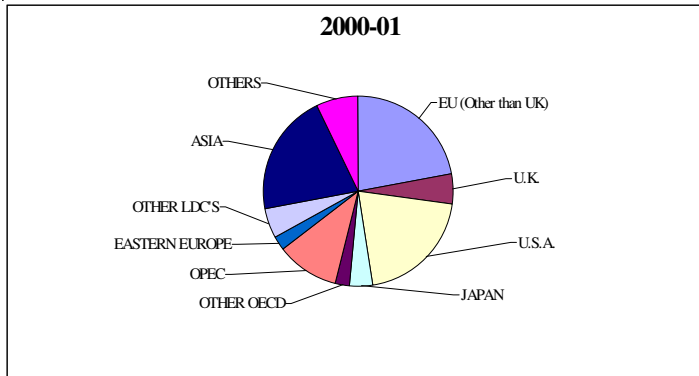
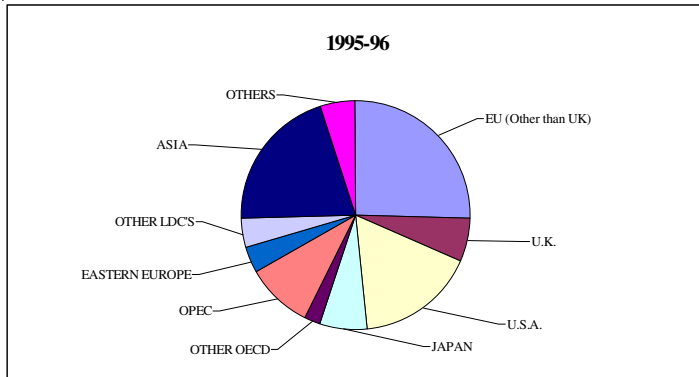
* % Change over the corresponding period of the previous year
 Source: IFS Online, Press Releases of Ministry of Commerce, Govt. of India-July-August2003
 ** Q1, Q2 –First & Second quarters of 2003; MO6, MO7-June & July 2003

“Other Manufactured products” comprising of broadly Electronics goods, Drugs, Pharmaceuticals & Fine Chemicals, Handicrafts, Machinery Instruments, etc continued to occupy a dominant share in India’s exports by broad commodity groups post-reform period. Ready-made garments showed a significant decline post-reform period largely in the latter half of 90’s whereas cotton yarn and fabrics exhibited a continual rise in its share. As pointed out by the study of Srinivasan and Tendulkar, exports of textiles-ready made garments as well as more basic yarn, fabrics, made-ups and the like to countries that imposed quotas under the multi-fiber arrangement decreased in the 1990’s and exports of engineering goods became more concentrated in industrialized countries as outsourcing by Germany, UK and the United states increased.

India's Export by Countries

Figure 1.1 gives the direction of India’s exports by countries for 1990-91,1995-96 and 2000-01. EU, USA and Japan are India’s three major trade destinations. Besides, India is giving special emphasis on Latin American and African countries. These two hitherto neglected regions offer vast scope for Indian exports. It is to be noted in last one decade while Indian exports to Asia & Oceania; America and Africa have gone up, exports to East European countries nose dived to a negligible 2.4 percent in 2000-01 from 17.87 percent in 1990-91. During the ten-year period (1990-91 to 2000-01), India’s exports to Asia was up from 14.3 percent to 21.4 percent; USA’s 20.9 percent (against 14.7 percent in 1990-91) and to OPEC from 5.6 percent to 10.9 percent. Whereas the share of Japan declined steadily from 9.3 to 4 per cent along with UK showing a slight decline from 6.5 to 5.2 percent.

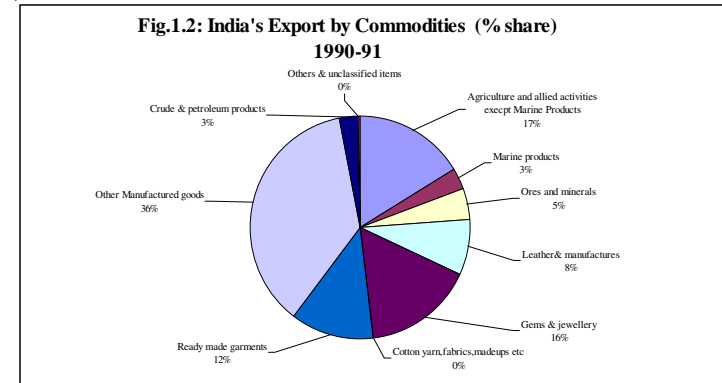




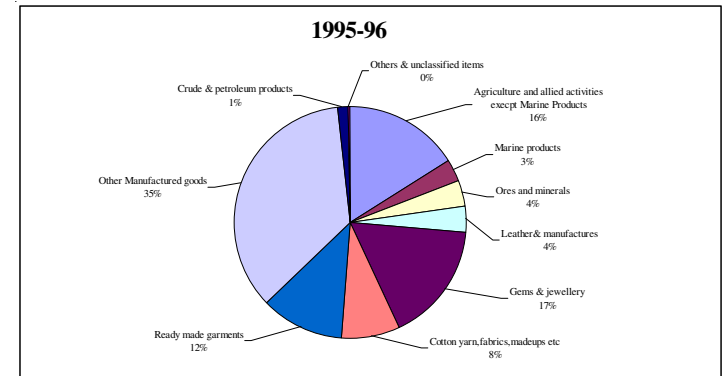
Source: Economic Survey – Various Issues

India's Export by Broad Commodities/Commodity Groups

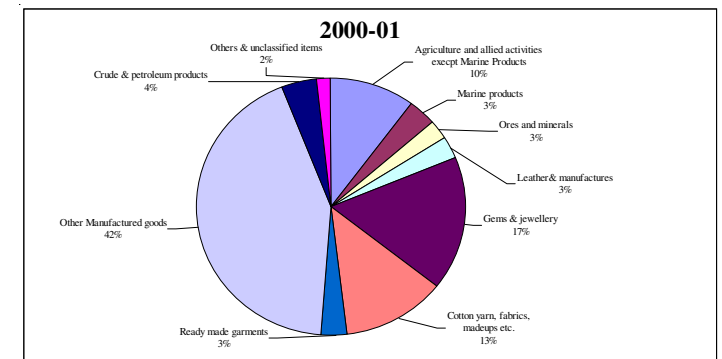
Figure 1.2 shows the composition of India's exports by broad commodities/commodity groups for 1990-91, 1995-96 and 2000-01. 'Other manufactured goods' constitute the largest share in India's export basket and have shown a considerable rise from 36.5 in 1990-91 to 42.9 percent in 2000-01. This category broadly includes Electronics goods, Drugs, Pharmaceuticals & Fine Chemicals, Handicrafts, Machinery Instruments, etc. Agriculture and allied activities excluding marine products showed a significant decline from 16.5 percent in 1990-91 to 10.4 in 2000-01. The share of gems and jewelry remained more or less constant at 16 percent in the ten-year period whereas that of cotton yarn and fabrics showed an increase from 8.1 to 12.5%. Ready made garments depicted a very significant fall from 12.3 to 3.1 percent in the ten year period along with leather & manufactures and ores and minerals which also showed declining share in the commodity basket.



Value: US\$ 18142 Million



Value: US\$ 31797.1 Million



Value: US\$ 44894 Million

Source: Economic Survey, 2001-02.

2. Short term Export Forecasting Model

2.1 A Survey of the Existing Economy-wide forecasting Models

A review of the macro-econometric models developed in India is given in the last presidential address of Indian Econometric Society⁵. There are basically three economy-wide forecasting econometric models⁶ available for the Indian Economy. The focus of most of these models is on different sectors of the economy, including trade sector. The econometric analysis pertaining to the export sector is generally carried out by models, which take into account different factors relating to its demand and supply. In particular, they consider the role of commodity composition, relative prices, domestic resources, and influence of domestic and importing countries' policies on a country's exports. To be specific, they analyse the impact of international prices, domestic prices, growth in different sectors of economy, level of protection, etc.

Existing economy-wide models giving forecasts of India's exports include:

- (i) **IEG-DSE** research team had developed several dynamic macro econometric models of Tinbergen-Klein type, which have a disaggregated treatment of foreign trade. A revision of the model was made in 1999 and with close to 350 equations is the largest of its kind in India. It is used to provide biannual forecasts of major economic variables and is a part of the Global LINK model. The trade block explains the merchandise trade flows by single-digit SITC classification. The Export sector employs three broad commodity groups used in the LINK system. These are SITC 0-1, SITC 2 and 4, and SITC 5-9. Both volume and unit value of exports are explained in all the cases.

Three important factors taken in context of the volume of Exports are: (i) world economic activity represented by world real GDP index. (ii) Incentive for the importers/competitiveness represented by export unit value in dollars relative to the world export unit value for the relevant category. (iii)

⁵ Krishnamurty, K. (2001), Macro econometric Models for India: Past, Present and Prospects, Presidential Address, TIES, and see also working paper of Administrative Staff College of India, Hyderabad, 2002, for revised version of the paper.

⁶ NCAER, IEG-DSE (or CDE) and PC-DPC-IEG. A number of other forecasts are also available by private sector (like J.P. Morgan, ABN-AMRO, Consensus Forecasts, etc.) and Reserve bank; but these forecasts are not based on econometric modelling, to our knowledge.

and the incentive to the exporters represented by the export unit value (in rupees) relative to the appropriate domestic price level. Unit value of exports are obtained by linking them with the international prices and exchange rate variations.

The equation used in the model for Merchandise exports, DGCIS for three categories including SITC 0-1, SITC 2 and 4, and SITC 5-9 is as follows:

$$\text{Log}(ZEX_i) = \alpha_i + \beta_{1i} \text{Log}[(ZGDPW(-1))] + \beta_{2i} \text{Log}[(EXUV_i/WEUV_i(-1)*100)/INXRSUS]*100) + \beta_{3i} \text{Log}[(EXUV_i/WPI_i*100)] + \beta_{4i} \text{Log}[(ZEX_i(-1))]$$

Where:

- i = SITC 0-1, SITC 2-4, SITC 5-9
 ZEX_i = Total Exports for ith category (real);
 ZGDPW = Index of Real Gross Domestic Product of World, (Base: 1985 = 100-IMF);
 EXUV_i = Index of Export Unit values for the ith category (Base 1980-81=100); DGCIS & S;
 WEUV_i = Unit Value Index of the ith category of World in US Dollars, (Base: 1980=100 –UN Trade statistics);
 INXRSUS = Index of Exchange Rate –Rupees per Dollar; (Base 1980-81=100);
 WPI_i = Wholesale Price Index of ith category

The lagged value of the Dependent variable (ZEX_i (-1)) is included as an Independent variable only for the equation of categories SITC5-9. The Independent variable, ratio of Index of export unit value to Wholesale Price index is [(EXUV_i/WPI_i*100)] is included for categories SITC0-1 and SITC5-9.

- (ii) **NCAER's** short-term multi sectoral computable general equilibrium model since the early eighties has been used to provide short-term (annual) forecasts and to provide for a framework for assessing the impact of various policy changes and shocks on key macro economic variables and for providing short-term annual forecasts. It has Social accounting matrix (SAM) at it's core i.e. the bench marking is based on the 1991-92 input-

output matrix brought out by the planning commission. It incorporates Behavioral as well as technical linkages between the sectors in the economy. It consists of models for the nine blocks of the economy for India including the Trade Block, each with equations for 12 selected sectors (agricultural sector, 12 manufacturing sectors, and two infrastructural and service sectors). Export and Import equations reflect the sensitivity of trade to domestic prices relative to international prices, economic activity, tariffs, subsidies and exchange rate changes. The export equation specified is as follows:

$$\text{Log } E(i) = A(i) + b \text{Log } [P(i) \cdot s / PW(i) \cdot e] + c \text{Log } \text{WGDP}$$

Where,

- E(i) : Exports(quantum) from sector i
- A(i) : Parameter
- P(i) : Domestic Price
- s : Subsidy per unit of exports
- PW(i) : World Price of ith sector's output
- e : Exchange Rate of the rupee(nominal, Rs/US\$)
- WGDP : World GDP (real, trade weighted)
- b,c : Parameters

A distinction has been made in the specification of the agricultural exports which considered as supply determined rather than demand determined.

- (iii) The Development Planning Centre (DPC) of the Institute of Economic Growth (IEG) has constructed a large macro-econometric model for the Indian Economy based on the behavior of the various sectors of the economy including the external sector, that is constantly updated, both in terms of the theoretical framework of the model as well as the database that is used to estimate the model. IEG-CPB-IPC model describes the Indian economy in the framework of a market-oriented economy. The objective of this model as stated in the working paper of IEG titled "Short and Medium-run growth and stability: A Macro econometric Analysis and Forecasts for India" is to track the growth path of the economy and provide a framework for forecasting in future. The model has the flexibility to simulate policy scenarios and can be used to make annual forecasts. The equation used to estimate exports model is as follows:

$$\begin{aligned} X77WN &= X77WN(-1) \cdot (1 + .01 \cdot X77VP) \\ X77VP &= 2.31 + 0.24 \cdot \text{EXRPLVP} + 0.399 \cdot \text{D93EXRPLVP} + \\ & 0.71 \cdot \text{MWTVP} - 0.18 \cdot \text{WPIPP} + 8.27 \cdot \text{DUMEXP} \end{aligned}$$

Where:

- X77WN = Exports of goods in dollars
- X77VP = Exports of goods in dollar growth rate
- EXRPLVP = Exchange rate growth rate
- D93EXRPLVP = Slope dummy for exchange rate growth rate
- MWTVP = World imports growth rate
- WPIPP = Wholesale price growth rate
- DUMEXP = Dummy for exports

- (iv) A number of private forecasters/agencies also give forecasts for India's Exports. Eleven economic forecasters/agencies for India are: Credit Suisse First Bstn., Tata Services (DES), Deutsche Bank, UBS War burg, Dresdner Bank, Hindustan Lever, Merrill Lynch, Global Insight, SSB Citibank, JP Morgan Chase.

A review of the existing forecasting Econometric models for the Indian economy brings out the need for a model, which caters specifically to the trade sector. Even though the existing macro-econometric models include the external/trade sector, they don't take into consideration the details of India's export by commodities and by countries. It is in this context that the need for such kind of a model arises which specifically caters to the export sector in a disaggregated manner by its principal destination countries and their principal commodities. Such an attempt would have vast policy implications for the trade sector.

2.2 The Proposed Model

One of the foremost achievements of developing a framework for modeling of the short-term forecasting is that it is an attempt to generate forecasts of merchandise exports in a highly disaggregated manner i.e. by specific commodities at a level of 6-digit HS Classification and by specific countries. The advantages of carrying out the analysis for commodities at the 6-digit HS classification level is that firstly the data at this level is applicable world over and beyond this level even though there is a comparable classification existing, it is not mandatory to be followed by all the countries. Secondly, even at the 6-digit level the top 20 commodities form a sizeable proportion of the total India's export to the destination country thereby forming a well-representative

share in the export basket for e.g. in 2001-02, the top 16 commodity codes at 6-digit HS classification level of India's export to USA formed a percentage share of 41.95% in total India's export to USA. Thirdly, the estimates of foreign prices (unit value) are more reliable at dis-aggregate level as compared to estimates based on the average price of the commodity groups. Such Disaggregated analysis could then be used to India's advantage in trade policy and decision-making by concentrating on selected commodity codes for future trade. An additional advantage of such an exercise is that it can be used for estimating specific commodity codes specific elasticity and countries specific elasticities. For the Purpose, the use of panel data/pooled cross-section & time series data would be made.

In somewhat general form the analysis of India's export market will be based on following equations of the exports demand and export supply.

$$\ln X = \beta_0 + \beta_1 \ln (PX/P_w) + \beta_2 \ln Y_m + \beta_3 Z \quad \dots\dots\dots(2.1)$$

and

$$\ln X = a_0 + a_1 \ln PX/PD + a_2 \ln PX (-L)/PD(-L) + a_3 \ln YP + a_4 D + a_5 t \dots(2.2)$$

Where,

- X = the quantity of exports (in volume),
- PX = the price of the exports
- P_w = the international price (or the domestic price of importing country)
- Y_m = the real income (sectoral income or production) of the importing countries,
- Z = other factors of demand, like level of protection in the importing countries,
- PD = the domestic price in international currency
- YP = overall productive capacity of the exporting countries
- D = other factors reflecting supply, like export incentives, oil shock, etc.
- t = time trend, which may reflect the long-term changes to capture the supply of exports
- L = time lag
- ln = Natural Log

The above equations can capture most of the important factors of demand and supply.

In equation (2.1), β_1 represents the elasticity of demand of exports with respect to the divergence in export prices vis-à-vis international price, β_2 is the export demand for the commodity with respect to the output (real). It is expected that the value of the coefficient β_1 will be negative and that of β_2 positive.

In the supply equation, it is hypothesised that the exports will rise if the export prices are higher than the domestic price. Further a lagged price variable is also taken to capture the impact of delayed supply adjustment. Further, it is expected that an increase in total supply will increase the exports of the commodity. D represents the other factors to capture some of the supply shocks. It is expected that the parameter a_1 , a_2 and a_3 will have positive sign.

Based on above-mentioned model, the following equation of exports can be estimated, separately, for different countries (d=1,2,...):

$$\ln X_{Id} = b_0 + b_1 \ln M_d + b_2 \ln (PX/PXCC) + b_3 Z \quad \dots\dots\dots(2.3)$$

Where

- X_{Id} = India's export to d-th customer country;
- PX = India's export price (or unit value) to customer country
- PXCC = Export Price (or unit value) of Competitive Countries in Customer Country d
- M_d = Total Import of Customer Country
- Z = Other variables which may effect India's trade with Customer Country d

b_0 , b_1 and b_2 are constant parameters.

To be specific, the following equation can be estimated separately for India's important destination countries. India's export to a country d could be analysed using following equation.

$$\ln X_{Id_{it}} = \alpha_1 + \alpha_{1i} \ln M_{d_{it}} + \alpha_{2i} \ln (PX_{it}/PXCC_{it}) + \alpha_{3i} Z + \epsilon_{it} \quad \dots\dots\dots(2.4)$$

Where

- X_{Id_{it}} = India's export to the d-th customer country for commodity group i in year t
- PX_{it} = India's export price (or unit value) to the d-th customer country US for commodity group i in year t

$PXCC_{it}$ = Export price of competitive countries (other than India) in the d-th customer country, of commodity group i in year t
 Md_{it} = Total import of the d-th customer country of commodity i in year t
 Z = Other factors, like imposition of Trade embargo after Pokhran test, ASEAN Economic Crisis, Non-tariff Barriers
 t = time-period
 = 1,2,...,T
 i = Important commodity groups of India's Export to the d-th customer country
 = 1,2,...,N
 $\alpha_1, \alpha_{1i}, \alpha_{2i}$ and α_{3i} are co-efficients, which are different for different commodity groups (to be estimated).

The above-mentioned equation (2.4) would give the estimated value of coefficients (or elasticities), which are different for different commodity groups. These commodity groups for d-th customer country can be identified on the basis of India's export basket to d-th country.

The above equation should be estimated separately for different "customer countries", e.g., the USA, the EU, Japan, Hong Kong, China, Singapore, Malaysia, Thailand, Canada, Bangladesh and 'Rest of World'. In some cases of customer countries one should make changes in above-mentioned econometric equation (2.4). This will be carried out to capture the specific trade relation between India and customer countries. To quote an example, Bangladesh has given tariff preferences to India under SAARC. It is also envisaged that Bangladesh will give free tariff to India under SAFTA. In such cases the above-mentioned equation (2.4) can be written as

$$\ln XIBD_{it} = a_1 + a_{1i} \ln [PX_{it}(1+BDTRI_{it})/PXCC_{it}(1+BDTRCC_{it})] + a_{2i} \ln MBD_{it} + a_{3i}Z + e_{it} \dots\dots\dots(2.5)$$

Where
 $XIBD_{it}$ = India's export to the Bangladesh for commodity group i in year t
 PX_{it} = India's export price (or unit value) to the Bangladesh for commodity group i in year t
 $PXCC_{it}$ = Export price of competitive countries (other than India) in the Bangladesh, of commodity group i in year t

MBD_{it} = Total import of the Bangladesh of commodity i in year t
 Z = Other factors, representing preferential trading arrangement between India and Bangladesh.
 i = Important commodity groups of India's Export to the Bangladesh
 = 1,2, ..., N
 t = time-period
 = 1,2, ..., T
 $BDTRI_{it}$ = Preferential Tariff rate (if any) of Bangladesh (exports) to India of commodity i in year t
 $BDTRCC_{it}$ = MFN Tariff rate of Bangladesh of commodity i in year t.
 a_1, a_{1i}, a_{2i} and a_3 are co-efficients, which are different for different commodity groups (to be estimated).

2.3 Selection of Countries and Commodities for the Proposed Model

Selection of Countries

Selection of the countries should be carried out on the basis of (i) exports in recent past (or India's export value rankings), and (ii) growth of export in recent past for few years, say 1996-2002. On the basis of those rankings one can shortlist the list of the selected Countries/region to be included in the proposed model. The selection of those countries/region could be based on the following criteria: (i) Top 20 Countries of India's export market, (ii) Availability of data, and (iii) Share of the countries in India's total export. The selected period for estimation of econometric model would vary from country to country depending on the data availability with respect to each of the selected country. For European Union it would be difficult to get a long time series data since in the pre-1996 era, the EU member countries were only 12 and presently there are 15 members. Therefore to ensure consistency of data (and objective of the study) one would have to reduce the number of years and can increase the number of commodities (HS codes) to ensure higher degrees of freedom. Generally, the sample year would vary from country to country as per the availability of data.

Table 2.1 shows the growth rate of India's export of the selected countries. In 1996-97 US growth was 18.55 per cent in 1998 per cent, while in 1997-98 it was 3.48. With Canada, the growth rate, during 1997-98, was 22.49 per cent whereas the Growth rate, during 1998-99, was 9.13; and again in 1999-2000 the growth was 22.78. In EU, there was negative growth in 1996-97, 1998-99

Table 2.1: Growth Rates of India's Export to Selected Countries

(Percent per annum based on US\$)

Countries	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Canada	15.91	22.49	9.13	22.58	13.63	-11.04	16.04
USA	18.55	3.48	5.79	17.05	11.06	-8.62	26.61
Bangladesh	-17.22	-9.46	26.41	-36.01	47.05	7.37	-13.46
China	84.54	16.89	-40.68	26.52	54.37	11.18	100.03
Hong Kong	1.45	4.26	-3.21	33.49	6.17	-10.33	3.19
Japan	-9.59	-5.42	-13.11	2.31	6.65	-16.53	21.23
Malaysia	35.03	-7.77	-34.46	39.23	36.24	27.45	-4.61
Singapore	9.18	-20.28	-34.26	31.01	31.24	11.05	48.95
Thailand	-5.33	-23.1	-7.04	40.69	18.02	19.54	11.2
European Union	-0.77	5.64	-2.39	5.03	11.59	-5.62	13.88
World	5.12	6.05	-5.26	11.05	21.47	-1.5	16.7

Source: India Trade, CMIE.

and 2001-02. With China there was a very high Growth in 1996-97 but there was a heavy downfall in 1998-99 which goes down to -40.68, but in later years there is significant increasing growth rate. Overall from Table 1.1 it seems that there was certainly downfall in India's Export in 1998-99, and again in 2001-02. 2002-03 showed a significant rise in the India's export with a double-digit growth for almost all the selected destination countries. China showed outstanding growth of approx. 100% during the period.

Table 2.2 shows the trend of percent share of selected countries in India's total export from 1996 to 2001. US's per cent share shows the increase in export upto 1999-00 and there is a decline in 2000-01, Canada also shows the consistent increasing trend upto 1999-00 but slight decrease in 2000-01. The share of India's export to China shows the sudden downfall in 1998-99, and after 1998-99 exports share again increased. Hong Kong trend shows the declining trend share till 1997-98, but there is increase in 1998-99 and very speedy jump in 1999-00 and again it declines in 2000-01. 2002-03 showed very minor fluctuations in the percentage share of selected countries in India's exports. EU declined by approx. 1.5% whereas china captured a share of 3.68% during the period.

Table 2.2: Percentage Share of Selected Countries in India's Total Exports

(Per cent per annum based on US\$)

Countries	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2002-03
Canada	0.97	1.07	1.24	1.43	1.57	1.47	1.32
USA	17.64	19.89	19.41	21.67	22.84	20.88	21.01
Bangladesh	3.35	2.64	2.25	3.01	1.73	2.1	1.7
China	1.06	1.87	2.06	1.29	1.47	1.87	3.68
Hong Kong	5.82	5.62	5.52	5.64	6.78	5.93	4.77
Japan	7.08	6.09	5.43	4.98	4.59	4.03	3.56
Malaysia	1.26	1.61	1.4	0.97	1.22	1.36	1.44
Singapore	2.85	2.96	2.23	1.54	1.82	1.97	2.83
Thailand	1.51	1.36	0.99	0.97	1.22	1.19	1.38
European Union	27.75	26.2	26.1	26.89	25.43	23.36	21.82

Source: India Trade, CMIE.**Selection of Commodities**

Selection of commodities for each country would be prepared on the basis of their value ranking and percentage share in the India's total export towards the destination country. For each country/region selected, we would select the top 20 commodities⁷ at 6-Digit level because beyond this disaggregation e.g. at 8-digit the classification would differ from country to country but at 6-digit level data is comparable for all countries. Another reason for selecting the 6-digit classification is that even at such high level of disaggregation the top 20 commodities of India's export to a destination country carries a major share (for e.g. for USA it is more than 40% in 2002-03) in its total export value to that destination country. Third reason is that the estimates of foreign prices (unit value) are more reliable⁸ at disaggregate level as compared to estimates obtained from using the average price of commodity groups.

The final selection of commodities would be carried out using following criteria:

⁷ 40 commodities for EU.

⁸ The estimate of econometric equations using average price of commodity groups is not reliable.

- (i) Significant share in total exports (top commodities)
- (ii) Growth rate in recent past
- (iii) Availability of reliable data
- (iv) Exact matching between trade classifications HS-92, HS-96 and HS-2002, and
- (v) Specific factors relating to country/commodities

At 6-digit level total number of defined commodities, which are exported by India, are around 4645. During Mar02-Feb03, Table 2.3 shows that India exports 3339 number of commodities (at 6-digit HS level) to US, 1850 number of commodities to Japan, 3708 number of commodities to EU, 1982 number of commodities to Bangladesh, 1366 number of commodities to China, 1469 number of commodities to Hong Kong, 1834 number of commodities to Canada, 1571 number of commodities to Thailand, 2112 number of commodities to Malaysia and 2297 number of commodities to Singapore. Table 2.3 reveals that even at a highly disaggregated commodity level of 6-digit HS classification, the top 20 commodities of India's exports to most of the countries occupies a major portion of the share of India's total exports to the country.

3. Concluding Summary

This paper is an attempt to highlight the need for developing a framework for forecasting of India's exports at a disaggregated level. The key features that emerge out of this paper are:

- i. The world trade structure has been changing at a very rapid rate in the recent years. As the observations of the WTO report 2003 lists the three noteworthy features of the trading system to emerge in the last few years. Firstly, the growth in the share of South-South trade in the world trade owing largely to the growing liberalization of the trade and investment regimes of the developing countries. Secondly, it points to the decline and continued volatility of commodity prices with factors such as trade policies (particularly agricultural subsidies and tariff escalation) in developed countries, the structure of the international market for commodities and global macroeconomic conditions. And lastly, the proliferation of regional trade agreements over the past decades or so, which have severe implications on the world trade structure, costs and standards.
- ii. India is moving at a consistent rate towards establishing its presence in the world trade. In 2002, India ranked as the top30th-leading exporter amongst the leading exporters in world merchandise trade. Amongst the world's

Table 2.3: Share of Selected Commodities Export in India's Total Export

Countries	All Commodities Exported at HS 6-Digit in Mar02-Feb03		Top 20 Commodities at 6-Digit HS Classification share and value in total India's exports by Destination in Mar02-Feb03		
	Total No. of Commodities at HS 6-Digit traded	Total Value of Commodities at Mill. US\$	No. of Commodity codes at HS-6-digit	Value of Selected Commodities at Mill. US\$	% Share in India's total to customer country Export
United States	3339	10681	20	4657	43.60
Japan	1850	1814	20	983	54.17
European Union	3708	11201	20	3587	31.36
Bangladesh	1982	982	20	548	55.82
China	1366	1744	20	553	31.69
Hong Kong	1469	2161	20	1782	82.46
Canada	1834	668	20	280	38.47
Thailand	1571	655	20	442	67.51
Malaysia	2112	676	20	339	50.13
Singapore	2297	1276	20	837	65.57
Rest of World	-	19956	-	-	-
World	4645	50492	-	-	-

Source: India Trades, CMIE

leading importers in the world merchandise trade 2002, India ranked 24th (Source: WTO).

- iii. India's exports are highly diversified by commodities and countries. Out of the total number of 5237 commodities existing at the 6-digit classification level, India exported an overwhelming number of 4599 commodities in 2001-02. India exported to a dominant number of 223 countries out of the list of 252 countries in 2001-02.
- iv. Given the growing importance of India's trade sector in the world trade, the need for a model arises which specifically caters to the export sector in a disaggregated manner by its principal destination countries and their principal commodities. The existing country-wise models have not given due attention to the trade sector since most of them have been built keeping in view specific objectives, and a systematic effort is still required for building a short-term econometric forecasting model for India's export sector. For conducting a modeling exercise with an objective of generating forecasts for the export sector at a disaggregated level of commodities and countries as outlined by this paper, the primary consideration lies with the accessibility and availability of such data. With an increasing number of data sources providing trade data at a highly disaggregated level in the recent years, it has now become possible to conduct such exercises with greater reliability.

In view of the above emerging conclusions, this paper makes a modest attempt towards developing a framework for forecasting of India's exports by countries and commodities.

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