

# **Credit Constraints, Heterogeneity of Firms and International Trade: An Empirical Analysis of Exports Determinants for India**

Madhu Bala\*

## **Abstract**

In India a number of studies have been conducted determining the factors responsible for export determinants. The factors have varied both from demand and supply side and include among others exchange rates and price responsiveness of the exports. The paper attempts to further this literature by applying the latest understanding on the theory of international trade, which says that international trade is influenced by heterogeneity of firms and credit constraints. We have applied the model where exports are a function of distance, firm productivity, GDP (of foreign country), GDP (of host country), cost of exports and private sector credit. It estimates the model by applying GMM techniques with fixed effect panel data model. The results confirm with the theory and indicate that firm productivity and private sector credit are most important variables for determining the exports from India with accurate signs.

**Key Words:** Macro Economic Modelling, Credit Constraints, Heterogeneity of Firms, international trade, exports, India, GDP.

Recent Financial Crisis had resulted in many countries reporting decline in their exports since October 2008. India was no exception. The CMIE, February, 2009 report confirmed that the trend of last three months continued. It said that 'during December, the exports declined by 1.1 percent as against 13 and 10 percent in the previous two months respectively'. The reasons quoted for this decline were among others the slump in global demand as a result of Global Liquidity Crisis and sharp fall in commodity prices. Further, forecasts by CMIE was that exports will fall further by 7 percent in the year 2009-10. The reason for this gloomy forecast is the forecast of IMF in January 2009 where it claims that world trade will decline in 2009 and international commodity prices led by crude oil will remain weak in 2009.

According to a study of ICRIER, the trade sector literally collapsed from January 2009 onwards with both exports and imports contracting sharply. The sharp contraction in exports is continuing and the average contraction of exports during January- June 2009 has been about 29%. The imports are also not far behind with the contraction much sharper at 34%. The non-oil imports are also contracting, with the average decline during January- June 2009 seen at around 20%.

In such a scenario, it has been found that the government has provided stimulus for raising domestic demand to revive the economics out of financial crisis and promote trade among economies. Therefore, it becomes imperative to delve into the reasons that determine the direction of Indian exports. A glance at the kind of research taken place previously in India will help us to understand what factors have traditionally been considered for the determination of exports from India. Roy (2002) analyses persistence in India's manufactured export performance during 1960-97 by taking into consideration various demand and supply factors, which have bearing on long run performance. The study finds out that the effects of real effective exchange rate, manufacturing value-added and world demand determine persistence in India's manufactured export performance. It points out that the trends in lower realised world demand, in turn, determine manufactured export growth in the long run. Though real effective exchange rate and GDP in manufacturing are significant factors explaining long run behaviour of manufactured exports, their effects are

---

\* Prof. Madhu Bala, Faculty of Economics, School of Social Sciences, Indira Gandhi National Open University (IGNOU), New Delhi, India

not as significant as that of world demand in determining persistence in manufactured export performance.

There is debate on whether relative prices are significant as a determinant in explaining export performance or they are less effective as an instrument in promoting exports. Bhagwati and Srinivasan (1975), Wadhwa (1988) and Srinivasan (1998), provide evidence on India's exports being price responsive. Virmani (1991), Joshi and Little (1994) and Krishnamurthy and Pandit (1995), also point to significant price responsiveness of exports. Lucas (1988), however, finds varying price responsiveness across commodities and thus, questions the validity of small country assumption across export categories. The relative price responsiveness of exports, as discussed in the literature, depends on the development strategy followed in an economy. While import substitution leads to biases against exports as a result of distortions in relative prices, liberalisation - through competition and access to cheaper inputs - aim at "right" relative prices for exports. However, Nayyar (1988), Ghosh (1990), Sarkar (1994), and Sinha Roy (2001b) take the opposite stand and argue that Indian exports are not necessarily price responsive as turning points in India's export performance were not often led by the movements in exchange rate.

Further, the emergence of a range of export sectors over time does not lend support to the observation that only relative prices are an important factor, but highlights the importance of various other demand and supply factors determining export performance particularly the importance of supply and other policy related constraints. For instance, Panchamukhi (1978) shows that domestic policies have significant effect on trade behaviour of developing countries. Bhagwati and Srinivasan (1975) highlight that an inward looking policy, with capacity constraints, lack of competition, and high domestic demand, do not signal enough incentives to export. Even export promotion policies are found to be insufficient for this purpose. In contrast, there are other studies that find the significance of world demand in the determination of exports. Nayyar (1976, 1988), for instance, argue that it is incorrect to suggest that the policy regime is the mainstay in explaining overall export performance, rather external constraints provide an upper limit to growth of exports from India. Sinha Roy (2001b, 2002) provides evidence on the primacy of world demand in determining India's exports growth pattern. Thus, the debate on whether India's exports are demand constrained or supply determined is far from being conclusive.

Internationally a study by Santos-Paulino (2008) pointed out that the pattern of exports and specialization has evolved during the last several years in developing countries, particularly in China, India, Brazil and South Africa (CIBS) and other newly industrialized countries. Several trends have emerged, including: first, a decline in the relative importance of primary product exports (principally food), which initially were weighty in most cases; second, initial importance and subsequent relative decline in textile, clothing and footwear exports from these economies; and, third, a rise in the export share of skill-, capital- and technology-intensive goods, such as electrical machinery, chemicals and pharmaceuticals, computer and communications equipment. India also portrays significant shares of primary product and low-medium technology manufactured exports. However, the proportion of primary products' exports (mostly foodstuff) has decreased by around 50 per cent during the last decade. There has also been a compositional shift from low technology to medium technology manufactures (i.e., more skill- and scale-intensive processes such as engineering). The study finds out that export productivity is, *inter alia*, determined by the countries' fundamentals, that is, real income and human capital endowment. Also, real exchange rates, country size, and institutional features explain the productivity of exports in the economies analysed.

The studies referred above were conducted mainly at aggregate level. However, the theory of international trade has evolved over the years. A plethora of research studies available earlier used the gravity equations (Tinbergen 1962; Feenstra 2002; Anderson and Wincoop 2003) as an explanation for determining the trade taking place among nations. Recent studies focus on financial development, heterogeneity of firms and international trade

(Manova 2008; Beck 2006; Chaney 2008; Helpman, Melitz and Rubinstein 2008) to ascertain the determinants of international trade and export performance by including commodities and firms along with countries. The present study applies these latest arguments and attempts an empirical analysis of the determinants for exports from India. The study endeavours to relate international trade to the credit constraints, level of financial development, productivity of firms, cost of exports, external demand (GDP of foreign country) and the size of the host country (GDP of the exporting country i.e. India in our case) along with the distance between the trading countries.

**Trends in exports from India**

A look at the trends in commodity-wise exports (given at appendix-I) reveals that the export of major commodities selected at 2-digit level HS code have either increased or remained stable. None of the commodities have shown decrease in exports during the period of study. While exports of commodities/sectors like mining, agriculture and animal husbandry, sewing and knitting of textiles, other textiles, iron and steel, transport equipment and electrical machinery has increased over the years; the exports of commodities like footwear, precious non-ferrous metals and engineering goods have remained more or less same.

**The Model and data specifications:**

Following Manova (2008), Chaney (2008), Helpman, Melitz and Rubinstein (2008), Hansen (1982), Green (2003) and Arellano and Bond (1991, 2001) the following model is used throughout the paper. In the n-variable case the model is as follows:

$$y = X\beta + e \dots\dots\dots(1)$$

Where  $y$  is an  $(N \times 1)$  vector containing  $N$  observations of the dependent variable i.e. exports,  $X$  is an  $(N \times K)$  matrix with  $K$  being the number of regressors including the intercept, i.e.  $X_i = [1 x_{2,i} \dots x_{k,i}]$ ,  $\beta$  is a  $(K \times 1)$  vector of coefficients remoteness from the country  $i$ , country sizes home and abroad, productivity of firms and, the bilateral trade costs, and a measure of the availability of credit available to private manufacturing sector, and  $e$  is an  $(N \times 1)$  vector of residuals with  $e \sim iid(0, \sigma^2)$ .

In general, the movement condition with  $K$  variables can be written as:

$$E\{Z'(y - X\beta)\} = 0 \dots\dots\dots(2)$$

where  $Z$  is a vector of regressors that contains  $X$  and instrument variables, and  $\beta$  is vector of coefficients. When there are  $J$  moment conditions and  $J$  is equal to  $K$ , the above model is just-identified. The model is under-identified if  $J$  is smaller than  $K$ . If  $J$  is greater than  $K$ , the model is over-identified.

In other words, as we know in GMM, instruments are required when  $X$  variables are endogenous or correlated with residual. Over-identification emerges when one or more instrument variables are employed, as follows: so that the number of moment conditions is greater than the number of variables in  $X$ . This gives rise to the GMM (Generalized Method of Moments). Let us define.

$$g(\beta) = E\{Z'(y - X\beta)\}$$

There are two features of the GMM. It first formulates a quadratic form of the distance, or the weighted quadratic moment conditions:

$$q(\beta) = g'(\beta)W_g g(\beta) \dots\dots\dots(3)$$

Then GMM estimators of  $\beta$ ,  $b$ , are derived as:

$$b = \arg \min_{\beta} q(\beta) = \arg \min_{\beta} g'(\beta) W_g g(\beta) \dots\dots\dots(4)$$

Where 'arg min' is the global minimization operation, the choice of weight matrices is important in implementing the GMM.

To actually implement the GMM, the two-step efficient GMM and iterated efficient GMM procedure are usually applied to derive GMM estimators of parameters. In the first step, an initial weight matrix that can be any arbitrary positive definite and symmetric matrix chosen for the global minimization operation. This initial weight matrix is usually an identity matrix. Therefore, the global minimisation process in the first step is amounted to:

$$b^1 = \arg \min_{\beta} q(\beta) = \arg \min_{\beta} g'(\beta) g(\beta)$$

The second step is to calculate a new weight matrix, and then derive GMM estimators using the new weight matrix. It is called efficient GMM estimator, which is the GMM estimator with an optimal weighting matrix  $W$ , one which minimizes the asymptotic variance of the estimator. This is achieved by choosing  $W_g = S^{-1}$  this is a heteroskedasticity consistent matrix.

$$W_g = S^{-1}$$

where

$$S = S_0 + \sum_{m=1}^l w_m (S_m + S'_m)$$

with  $w_m$  being the weight and

$$S_m = E \left\{ g_i(\theta) g'_j(\theta) \right\}_{m=j-i}$$

$i$  and  $j$  in the above equation represent different time periods for time series data as used within paper. That is, serial correlation or cross-correlation is taken into account in the weight matrix. The second step estimators are derived through the following global minimization:

$$\begin{aligned} b &= \arg \min_{\beta} q(\beta) = \arg \min_{\beta} g'(\beta) W_g g(\beta) \\ &= \arg \min_{\beta} g'(\beta) S^{-1} g(\beta) \dots\dots\dots(5) \end{aligned}$$

With the iterated efficient GMM procedure, the above two-step is repeated or iterated until convergence, i.e. when there is no significant difference in derived estimators from one iteration to the next.

GMM estimator posses the following asymptotic properties:

$$\sqrt{N} (b_{GMM} - \beta) \rightarrow N(0, V)$$

The asymptotic covariance matrix in the above distribution is calculated by setting the weight matrix to  $S^{-1}$ , then the asymptotic covariance matrix for efficient GMM estimator and is reduced to:

$$V = (\Omega' S^{-1} \Omega)^{-1}$$

In our analysis we have applied GMM techniques with fixed effect panel data model. As explained earlier, the model is estimated with all the constraints of GMM techniques i.e. positive semi-definite matrix, stationarity of vector process, estimation is based on orthogonality conditions and the matrix is heteroskedasticity consistent. Thus this estimation controls for the endogeneity of other explanatory variables. The instruments used are based on lagged values of the explanatory variables.

For testing the  $\beta^*$  we used as is normally done in GMM  $\chi^2$  -test for the existence of  $\beta^*$ , i.e. a test of the movement conditions and wald test for overall validity of the model.

Given these specifications of the model we have used panel data from 1996-97 to 2006-07 for 10 sectors/commodities and 14 countries where India exports. For 10 sectors selected, three digit level firm data is used. The sectors selected are those in which India exports the most. These are agricultural & animal husbandry services, mining, textiles, other textiles, footwear, Basic Iron and steel, precious non ferrous metals, engineering goods, Electrical machinery and transport equipment. Selection of the countries is made based on two countries chosen from each sub-continent around the world where India exports the maximum as compared to the other countries in the same sub-continent. Therefore the countries selected are Bangladesh, China, Egypt, Germany, Hong Kong, Indonesia, Italy, Japan, Kenya, Singapore, Sri Lanka, UAE, UK and USA.

### **Propositions/hypothesis**

The main hypothesis of the model is that the exports from India are positively related with the economic development of the country. Hypotheses of the model include that

- Productivity of the firms which are heterogeneous in nature is most important factor influencing the exports and is positively related to exports.
- The more is the cost of export or the more are the trade barriers the lesser are the export to other countries and vice-versa.
- The lower the level of financial development the more is the need for credit and it is negatively related to exports. Therefore similar to the cost of export, private sector credit, which is also a cost of exports, is negatively related to exports i.e. the more credit firms have to arrange for themselves the lesser are the exports.
- As against the literature which says that trade is negatively linked with the distance; in case of India, distance does not really matter as its roots are found in its historical legacy since it may be positively related with far off countries and negatively related with nearer countries.
- Gross Domestic Product or foreign demand from developed countries is negatively related to the exports from India as compared to developing countries whose GDP or foreign demand is positively related.

### **Data Sources and Variables**

Data sources for the study are many. It include Annual survey of industries data for various years, Export-import data provided by the ministry of commerce, RBI data, economic survey data, the World Bank data, CEPII data, IMF data and UN data.

*Firm Productivity*—it is firm specific variable taken from 3 digit level firm data collected from Annual survey of Industries as provided in PROWESS. It is assumed that less productive firms are not able to generate enough profits abroad to cover the fixed cost of entering foreign markets. Exporters are therefore only a subset of domestic firms. This subset varies with the characteristics of the foreign market.

*Private Credit*— it is national level data indicating loans to the private sector from bilateral and multilateral government and non-government institutions.

*Distance*— An aggregate index of  $i$ 's remoteness from the other bilateral countries is given by  $\beta_{ij}$ . It is reminiscent of the "multilateral resistance variable" introduced by Anderson and Eric Van Wincoop (2003).

*Cost of Exports*—it is a firm level index of total cost of exports. This variable is again a trade resistance variable, taken from the World Bank data for India on trade of cost.

*GDP*—this variable is taken on comparable basis GDP data at constant prices in US dollars.

All these variables are taken at constant prices in their log transformations.

### **Empirical Results of the Model:**

Our results are shown in table 1 given below which shows that firm productivity and private sector credit are the two most important factors determining the flow of exports to the foreign countries. While the former is positively related to the volume of exports; the latter is negatively related. It is true for all the countries irrespective of the fact that whether they are developed or developing countries. Similarly cost of export is also negatively related with the volume of exports. It confirms with the theoretical foundations which say that trade barriers (i.e. cost of trade and private credit) are negatively related to the exports (Chaney 2008 and Manova 2008). Alternatively it also shows that level of financial development of an economy will determine the flow of exports. That the more developed an economy is lesser is the need for credit and firms generate their own resources for exporting their manufactured products (Beck 2002).

The results also confirm with the literature which points out that the considerations of the heterogeneity of firms and the level of financial development of the exporting country have distorted the gravity theory considerations where distance was the only factor determining the flow of exports and thus the factor determining for international trade (Helpman, Melitz and Rubinstein 2008). In fact with the introduction of the heterogeneous firms exporting based on the firm productivity and the trade barriers; distance variable does not show a clear trend which is as per theory should be negatively related to the international trade. Our results reveal that it is positively related with some countries e.g. UK and Germany and wherever it is negatively related; it is not significant. Moreover this result has its roots in the direction of trade history of India, according to which India's trade has traditionally been taking place with European countries. However, its direction of trade has changed to USA later on. It is only a recent phenomenon that India's direction of trade has shifted to East Asian countries. Therefore distance as a factor was never an important determinant in the direction of exports from India.

**TABLE -1 EXPORTS DETERMINANTS FOR INDIA**

Country	Distance	Cost of Export	GDP	GDP INDIA	Firm Productivity	Private Sector Credit	Chi square test (with 14 dof)	Wald test
<b>Bangladesh</b>	-0.02157 (-0.64)	0.14027 (0.96)	1.97628 (0.51)	-0.74706 (-0.96)	0.00926 (0.20)	-0.53439 (-2.03)*	1.61 (0.99998)	0.05 (0.8239)
<b>China</b>	0.01070 (0.40)	-0.0664 (-0.51)	2.25071 (4.56)*	0.34436 (0.33)	0.07720 (1.71)**	-0.80360 (-3.88)*	2.8 (0.99938)	4.56 (0.0327)
<b>Egypt</b>	0.02303 (0.75)	-0.1038 (-0.65)	-0.05297 (-0.05)	4.39058 (5.84)*	0.22811 (4.41)*	0.66933 (1.70)**	8.25 (-0.87587)	2.89 (0.0893)
<b>Germany</b>	0.03769 (3.22)*	-0.2105 (-3.60)*	-1.17035 (-3.12)*	1.52409 (5.25)*	0.06356 (3.34)*	-0.29572 (-2.86)*	8.03 (0.88774)	0.01 (0.91101)
<b>Hong Kong</b>	-0.04307 (-1.89)*	0.20140 (1.81)*	2.38857 (2.02)*	-1.22305 (-1.07)	0.18333 (5.09)*	-0.16919 (-0.95)	4.01 (0.99543)	4.07 (0.0437)
<b>Indonesia</b>	0.02305 (0.81)	-0.1053 (-0.73)	0.32959 (2.09)*	0.91588 (1.24)	0.08305 (1.50)**	-0.66913 (-2.55)*	6.50 (0.95223)	0.30 (0.5817)
<b>Italy</b>	0.04099 (1.61)**	-0.2070 (-1.57)**	-1.42363 (-1.59)**	0.22642 (0.34)	0.16820 (3.93)*	-0.28287 (-1.21)	43.73 (0.00007)	2.05 (0.1525)

<b>Japan</b>	-0.05414 (-3.18) *	0.28373 (3.23) *	-0.48567 (-0.90)	-0.02066 (-0.05)	0.05872 (2.07) *	-0.44329 (-2.85) *	14.37 (0.42233)	0.77 (0.3795)
<b>Kenya</b>	0.01654 (0.71)	-0.0527 (-0.44)	1.06280 (1.38)	-0.48689 (-0.75)	0.06679 (1.70) **	-0.33891 (-1.74) **	7.24 (0.92513)	0.12 (0.7343)
<b>Singapore</b>	-0.2331 (-1.13)	0.14333 (1.40)	8.24952 (6.10) *	-8.24798 (-6.17) *	0.14735 (4.25) *	-0.75761 (-4.58) *	13.96 (0.45236)	0.65 (0.4217)
<b>Sri Lanka</b>	0.02044 (0.83)	-.05193 (-0.45)	0.25217 (0.39)	0.22538 (0.42)	0.18879 (4.91) *	-0.34371 (-1.78) **	21.71 (0.08480)	0.12 (0.7339)
<b>UAE</b>	-0.04717 (-3.59) *	.24523 (4.05) *	1.21601 (3.12) *	-0.14869 (-0.25)	0.15993 (7.86) *	-0.39516 (-4.09) *	11.24 (0.66719)	9.04 (0.0026)
<b>UK</b>	0.02497 (2.33) *	-0.1385 (-2.46) *	-0.86736 (-2.01) *	1.07036 (2.29) *	0.09268 (4.73) *	-0.25798 (-2.88) *	5.97 (0.96726)	0.05 (0.81700)
<b>USA</b>	-0.00368 (-0.34)	.02581 (0.43)	-0.70709 (-1.19)	0.77989 (1.73) **	0.08622 (4.04) *	-0.22248 (-2.27) *	8.41 (0.86688)	0.01 (0.9197)

**Source:** Author's Calculations

**Note:** t values are given in the parentheses

\* stands for significant at 5% level of significance

\*\* stands for significant at 10% level of significance

Foreign demand (GDP of foreign countries) is positively related in the case of developing or the newly developed countries and is negatively related to exports to the developed countries like Germany, Italy, Japan, UK and USA indicating that the higher is their GDP the lesser are the exports to these countries. The domestic supply (or the GDP of Host country i.e. India) is negatively related to developing and newly developed countries.

### Conclusions:

In this paper we have tried to apply the theoretical understanding on the theory of international trade, which says that international trade is influenced by heterogeneity of firms and credit constraints. We have attempted to apply the same model to India and have tried to prove empirically that firm heterogeneity and credit constraints are the two most important factors determining the exports from India. The model applied defines that exports are a function of Distance, firm productivity, GDP (of foreign country), GDP (of host country), cost of exports and private sector credit. The Export data is taken at HS 2 digit level classification and firm level data is taken at 3 digit level NIC classification. Cost of export is again at firm level data based on NIC classification. Data has been brought to a point where it is comparable. GDP and private sector credit are aggregate figures taken at constant prices. Paper first estimates the trends in the export of commodities over the years of study. It then estimates the model by applying GMM techniques with fixed effect panel data model. The results confirm to the theory and indicate that firm productivity and private sector credit along with the cost of exports are most important variables. The former is positively related indicating more productive the firms are, the more is the export of their product. Latter two variables negatively related to the exports indicate that more are trade barriers the lesser is the trade and vice-versa. Similarly higher the level of financial development of the economy, lesser is the credit and more are the exports in the commodities under study.

### References:

- Anderson, James E., and Eric van Wincoop.** 2003. "Gravity with Gravitas: A Solution to the Border Puzzle." *American Economic Review*, 93(1): 170-92.
- Arellano, M., and S. Bond.** 1991. 'Some Tests of Specification for Panel Data: Monte Carlo Evidence and Application to Employment Equations'. *Review of Economic Studies*, 58 (2): 227-9.
- Arellano, M., and S. Bond.** 2001. 'Panel Data Models'. In J. Doornik and D. Hendry (eds), *Econometric Modelling Using PcGive 10*, vol. 3. London: Timberlake Consultants TCL, 63-69.
- Beck, T.** 2002. "Financial Development and International Trade. Is There a Link?" *Journal of International Economics* 57, p.107-31.
- Bhagwati, J., and T. N. Srinivasan,** 1975. *Foreign Trade Regimes and Economic Development: India*, New York: Columbia University Press (for the NBER).
- Chaney Thomas;** 2008. Distorted Gravity: The Intensive and Extensive Margins of International Trade, *American Economic Review*, 98(4): 1707-1721

**Feenstra, Robert C. 2002.** "Border Effects and the Gravity Equation: Consistent Methods for Estimation," *Scottish Journal of Political Economy*, 49, 491–506.

**Ghosh, 1990.** "Exchange Rates and Trade Balance Some Aspects of Recent Indian Experience", *Economic and Political Weekly*, 441-445, March.

**Green, H. 2003.** *Econometrics Analysis* (New Jersey: Prentice Hall 5<sup>th</sup> Edition)

**Helpman, E., Melitz, M. and Y. Rubinstein, 2008.** "Estimating Trade Flows: Trading Partners and Trading Volumes." *Quarterly Journal of Economics* 123, p. 441-87.

**Joshi, V. and I.M.D. Little, 1994.** *India: Macroeconomics and Political Economy, 1964-1991*, Delhi: Oxford University Press.

**Krishnamurthy, K. and V. Pandit, 1995.** 'India's Trade Flows: Alternative Policy Scenarios: 1995-2000', *Working Paper No.: 32*, Delhi: Centre for Development Economics, Delhi School of Economics.

**Lucas, R. E. B., 1988.** "Demand for India's Manufactured Exports", *Journal of Development Economics*, 29 (1): 63-75.

**Manova, K. 2008.** "Credit Constraints, Heterogeneity of Firms and International Trade". *NBER working paper no.14531*. available at [www.nber.org](http://www.nber.org) accessed on February 19, 2009.

**Nayyar, D., 1976.** *India's Exports and Export Policies in the 1960s*, Cambridge: Cambridge University Press.

**Nayyar, D., 1988.** 'India's Export Performance: Underlying Factors and Constraints', in R.E.B. Lucas and G.F. Papanek (eds.), *The Indian Economy: Recent Development and Future Prospects*, Delhi: Oxford University Press.

**Panchamukhi, V.R., 1978.** *Trade Policies in India: A Quantitative Analysis*, Delhi: Concept Publishing Company.

**Roy, S. S. 2002.** *Persistence in India's Manufactured Export Performance* RIS-DP # 29. Research and Information System for the Non-Aligned and Other Developing Countries, New Delhi.

**Santos-Paulino, Amelia U. 2008.** "Export Productivity and Specialization in China, Brazil, India and South Africa". *UNU-WIDER Research Paper No. 2008/28*. available at [www.unu-wider.org](http://www.unu-wider.org) accessed on March 10, 2009.

**Sinha Roy, S. 2002.** *The Determinants of India's Exports: A Simultaneous Error-Correction approach*. RIS-DP # 37 Research and Information System for the Non-Aligned and Other Developing Countries, New Delhi.

**Sarkar, P., 1994.** 'India's Balance of Payment and Exchange Rate Behaviour since 1971: A New Approach', *Economic and Political Weekly*, 29: 43-48.

**Sinha Roy, S., 2001 a.** 'India's Trade Database: Contours, Inconsistencies and Ways Ahead', *Economic and Political Weekly*, 36: 51-58.

**Sinha Roy, S., 2001 b.** 'Post-reforms Exports Growth in India: An Exploratory Analysis', *RIS Discussion Paper # 13*, New Delhi: Research and Information System for the Non-aligned and Other Developing Countries.

**Srinivasan, T.N., 1998.** 'India's Export Performance: A Comparative Analysis' in I.J. Ahluwalia and I.M.D. Little (eds.), *India's Economic Reforms and Development: Essays for Manmohan Singh*, Delhi: Oxford University Press.

**Tinbergen, Jan, 1962.** *Shaping the World Economy* (New York: The Twentieth Century Fund).

**Virmani, A., 1991.** "Demand and Supply Factors in India's Trade", *Economic and Political Weekly*, 309-314 February.

**Wadhwa, C.D. 1988.** 'Some Aspects of India's Export Policy and Performance', in R. Lucas and G. Papanek (eds), *The Indian Economy*, New Delhi: Oxford University Press.

## Appendix –I

### Graphs showing the commodity-wise total exports to the foreign countries during 1996-97 to 2006-07

