India in the Global and Regional Trade: Determinants of Aggregate and Bilateral Trade Flows and Firms' Decision to Export

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INTRODUCTION

The standard models of international trade such as the Ricardian, Hecksher-Ohlin-Samulelson (HOS) and specific factor models focus on explaining the commodity patterns of trade between countries and their determinants primarily comparative advantage. Constant returns to scale in production are assumed to prevail so that the structure of production in terms of firms is of no consequence. Further the pattern of trade is determined by comparative advantage, which in turn, is driven by differences in relative factor endowments in the HOS model. Thus for two countries to trade, their relative factor endowments have to differ, and the pattern of trade is inter-sectoral so that each country either exports or imports and not both, each commodity. The empirical literature on international trade for decades after the Second World War focused on basically two tasks. The first was testing predictions of Ricardian and Hecksher-Ohlin theories on patterns of intersectoral trade and explaining departures from the predictions while still remaining within their framework. For example, early studies of Leontief showed that the United States exported labour intensive commodities contrary to the prediction that as a capital-rich country would export capital intensive commodities. An explanation for this deviation was that adjusting for the higher skills of US workers, US in fact was a labour-rich country. The second task, of which the gravity model is the prime example, was to explain bilateral trade flows.

The observed pattern of trade, even at the most disaggregated level, however, showed significant intra-industry trade so that countries appear to export as well as import the same

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commodity. Moreover, countries with similar factor endowments trade more with each other than with countries which had very different factor endowments. The development of the so called new theory in the 1980s, by introducing economies of scale at the firm level and consumer preference for consumption of different varieties of the same commodities or alternatively productivity enhancing effect of the use of many varieties of the same commodities as inputs of production, provided a theory of intra-industry trade and also of trade between countries with similar factor endowments. In the stylized models of the new trade theory, all firms were identical so that all participate in trade. The most recent theory, the "new new" trade theory with its focus on the role of firms with considerable differences among them, suggested that such differences affected aggregate output. The firm level information on production and trade based on data sets show that only few firms participate in international trade and that too they export a very small fraction of their production. The data also showed that exporters are different from non exporters in many ways and also trade liberalization increases average productivity within industries. (WTO, 1998, Section II)

Bernard et. al. (2007) point out that only 4 percent of 5.5 million firms operating in the US in 2000 were exporters. This suggests that exporting firms differ from others. Bernard et. al. emphasized that research dating back to mid 1990s, based on the firm level data on production and trade has begun to explore the determinants of trading decisions of firms. One robust finding of this literature based on a wide range of countries and industries, is that exporting firms tend to be larger, more productive, more intensive in skill and capital and pay higher wages than non trading firms.

This paper is a contribution to this growing literature using Indian data. For nearly four decades since independence in 1947 India followed an industrialization strategy that insulated domestic firms from both competition from imports and from each other. In the mid-eighties a hesitant and limited relaxation of insulation was initiated. A severe macro-economic and balance of payment crisis in 1991 led to an extensive and systemic break from this strategy and opened the economy to import competition and to foreign direct investment. Aggregate real GDP growth accelerated from the eighties as compared to the three decades before and exports began to rise rapidly. It is therefore appropriate to examine the incentive to export of firms the period after 1991.

The post 1991 era is also notable for India's pursuit, like other countries, of regional/preferential agreements (PTA/RTAs). The conclusions from the vast literature on such agreements in force have been ambiguous with some finding them to be trade creating by and large and others finding them to be trade diverting. The paper also examines the impact of RTA/PTAS on India's bilateral trade flows.

In what follows, we start in section 2 with a brief review of relevant literature. Section 3 is devoted to the analysis of India's aggregate trade flows during 1981 to 2006 and the impact of RTAs. Section 4 analyzes the determinants of exports using three sets of firm level data from: (i) data from the PROWESS data base of the Centre for Monitoring Industries and Trade (CMIE) on firms producing labour intensive manufacturers, with labour intensity defined as capital-labour ratio. Sectors with a capital-labour value less than the simple average of 15.45 over all firms has been considered as labour intensive sector, (ii) time-series data for the period 1995-2006 on manufacturing firms (CMIE) and (iii) data from Confederation of Indian industry (CII) for the year 2004-05 on manufacturing firms. A survey of firms to supplement the analysis of CMIE and CII data with more detailed information on characteristics of firms was specially commissioned. Completed survey questionnaires have been received and are being edited. The findings from the survey data will be reported later. Section 5 concludes the paper.

2. LITERATURE REVIEW

2.1 Gravity Models of Bilateral Trade Flows

An extensively used empirical model dating back to the 1940s is the gravity model. It was inspired by Newtonian model of gravitational forces i.e. the force of attraction between two bodies is proportional to the product of their masses and inversely proportional to the square of the distance between their centres of gravity. In the simplest gravity model of bilateral trade flows between two countries are assumed to be proportional to the product of their gross domestic products and inversely proportional to a measure of the distance between. The model has been generalized to include other variables that could be expected to either facilitate (e.g. whether the countries share a common language, have common colonial heritage) or hinder (e.g. tariff and non-tariff, transactions costs) bilateral trade flows. Recent studies have introduced dummy variables for participation in RTA/PTA to analyze the potential for trade diversion/ creation from such membership.

The literature on gravity models, both theoretical studies that attempt to provide grounding for the model in economic theory and empirical studies estimating them is vast. We will not review this literature but briefly note three recent empirical studies that have a bearing on the model estimated by us, given our focus on the impact on trade flown of RTA/PTA membership. Before doing so, we would like to make two remarks. First it is well-known that one cannot refer the welfare impacts on a country or of the members as a whole or non-members of membership (in a RTA/PTA) from its trade diverting/ trade creating features. This fact has to be kept in mind in interpreting the results. Second, imports and exports of any country cannot be negative by definition. This means that a conventional regression model for explaining trade flows which does not take into account the fact trade flows cannot be negative is inappropriate. As is customary we address this issue by estimating a Probit (or Logit) model to explain the probability that an observed trade flow is positive rather than zero and also a Tobit model which models the actual flows (zero or positive), with a non-zero probability mass at zero flows and a conventional regression model for positive flows.

The oldest of the three studies is Soloaga and Winters (2001), which attempts to estimate the effect on trade of PTA. They estimate a modified gravity equation to identify the separate effects of PTA, on intrabloc trade, members' total imports and total exports. They find no indication that recent PTAs, boosted intrabloc trade significantly and that trade diversion is seen in the European Union (EU) and European Free Trade Area (EFTA). EFTA also exhibits export diversion by members, which imposes welfare costs on non-members. Since, the model we estimate is very close to theirs, let us briefly mention their modification of the gravity equation that enables them to assess the effect on trade of PTA. This consists of adding the following sum of three terms into the gravity equation explaining the logarithm of bilateral trade (export or import), flow $X_{i,j}$ between countries i and j, specifically value of imports of county i from j (i.e. exports from j to i)

$$\sum_k b_k P_{ki} P_{kj} + \sum_k m_k P_{ki} + \sum_k n_k P_{kj} \qquad (1)$$

where $P_{ki} = 1$ if country is a member of the k^{th} PTA (the authors consider nine PTAs) and zero otherwise. Thus b_k measures the <u>intrabloc effect</u>, i.e., the extent to which trade is higher than expected from general trade liberalization of both i and j being members of PTA bloc k, m_k that of i being a member of k on its imports from j (i.e. exports from j to i) relative to all countries and n_k the effect of j being a member of k on its exports to i (i.e., imports of i from j) relative to all countries. This parameterization helps to distinguish the trade effects of general trade liberalization by a country from the effect of membership in a PTA. Thus, while m_k measures the addition to the expected imports of i from j (i.e., exports of j to i) from i being a member of bloc k, whether or not j is in the bloc, n_k measures the effect of j being in the bloc whether or not i is a member and $m_k + n_k + b_k$ of both i and j being members of the bloc. The last is the traditional intrabloc trade effect. Put another way m_k and n_k combine the effects of general trade liberalization and trade diversion, while b_k measures the effect on intra bloc trade over and above the general trade effect. Concretely, say *i* represents India and *k* represents the South Asian Free Trade Area (SAFTA) of which India is a member. Suppose India engages in liberalisation of its trade with all its trading partners including other members of SAFTA. Then m_k and n_k represent the combined effect of India trade liberalisation and membership in SAFTA, while b_k measures the additional effect of its partner also being in the SAFTA. It is clear that this is a convenient ways of capturing the effect of PTA, Soloaga and Winters (2001) apply their model to annual non-fuel imports data for 58 countries for the period 1980-96.

Adams et al (2003) is notable for its being comprehensive by distinguishing three waves of PTA formation starting from the 1950s, including a review of the theory of PTA, and of the existing empirical evidence, before moving on to their empirical analysis based on more recent data, and importantly including the third wave PTAs which included non-trade provisions for investment etc. Their gravity model is very close to that of Soloaga and Winters (2001). Their full sample consists of 116 countries over 28 years (1970-97). Their two main findings are: First, of the 18 recent PTA, considered by them in detail, as many as 12 have diverted more trade from non-members than they have created among members. These trade diverting PTA, surprisingly include the more liberal ones such as EU, NAFTA and MERCOSOUR;[3] Second, although foreign direct investment (FDI) does respond positively to the non-trade provisions of a PTA, nonetheless the beneficial effects through higher FDI of the non-trade provisions seem to be offset by the negative effects of trade diversion from the trade provisions of that PTA.

Finally, De Rosa (2007) is a critical examination of findings of Adams et al. (2003) using a variant of the gravity model of Andrew Rose (2002) and incorporating Soloaga and Winters

[3] EU is European Union, NAFTA is North American Free Trade Area, and MERCOSOUR is the Free Trade Agreement concluded in 1991 among Argentina, Brazil, Paraguay and Uruguay, Bolivia, Chile, Colombia, Ecuador and Peru have associate member status in MERCOSUR since 2006.

(2001) dummies for PTA membership. Their updated data cover the period 1970-99 and 20 PTAs, as compared to 1970-97 and 18 in Adams et al. Although the author did not find any major faults in the methodology of Adams at all (2003), he comes to a conclusion opposite to theirs, namely that a majority of the 20 PTA, are trade creating.

It is evident that other recent studies on the effects of PTA, which we do not review here, taken together are also inconclusive as to whether PTAs are inherently trade diverting or trade creating. In fact their inconclusiveness is also a characteristic of earlier studies, with conclusions dependent on the model and the data set used and the time period covered. For this reason, and for the reason that our interest is on the effect of PTAs on India's trade flow rather than on the trade flows of all countries of the world, we estimate a gravity model very similar to that of Soloaga and Winters (2001) for India.

The estimated model for India's export flows Xj_t to country j in year t is:

$$\begin{aligned} Log\,X_{jt} &= \alpha_0 + \alpha_1 Log(GDP_{jt}) + \alpha_2 Log(Pop_{jt}) + \alpha_3 Log(Distance\,j) + \alpha_4 Log\,TR_{jt} \\ &+ \alpha_5 RER_{jt} + \alpha_6 Lang_{jt} + \alpha_7 D(t) + \Sigma \beta_k P_{kjt} + \Sigma m_k P_{kit} + \varepsilon_{jt} \end{aligned} \quad (2)$$

Where GDP_{jt} = GDP of country j in year t.

Pop_{jt} = Population of country j in year t.

Distance j = Distance between India and country j. Distance is measured as the average of distance between major ports.

TR_{jt} = Average effective import tariff country j.

RERjt = Real Exchange Rate of country j, units of foreign currency per Indian rupee (ratio of US dollar per Indian Rupee to US dollar/per unit of country j's currency)

Lang j = Measure of linguistic similarity between India and country j.

D(t) = Time dummy taking the value 1 for all observation of years and zero otherwise.

Pk_{jt} = A dummy taking the value 1 if country *j* is a member of *k*th PTA in year *t*. We consider 11 PTAs including the South Asian Free Trade area (SAFTA).

P_{kit} = A dummy which takes the value 1 if India is a member of *k*th PTA in year *t*.

ε_{jt} = Normally Distributed Random error term with mean zero and constant *n*

Two points are worth mentioning. Since we are estimating the flows of a single country, India, its GDP and population in year *t* and any other time varying aspects relating to India only are captured in the time dummy *D(t)*. Second, the parameter β_k combines the parameters b_k and n_k of Soloaga and Winters (2001) model.

The model for import flows of India is basically the same except the tariff variable, since it refers to India's average effective import tariff, is once again absorbed in the time dummy. The model for total trade flows is the same as that for export flows. Of course, the estimated coefficients for each variable would in general depend on the flows being modeled.

The *a priori* expected sign of the coefficient α_1, α_2 and α_6 is positive and that of α_3 and α_4 is negative. There are no prior expected signs for the other coefficients.

2.2. Determinants of Exports of Firms

Bernard et. al. (2007), pointed out that despite the fact that import and export are firm specific activities, economists generally devote little attention to the role of the firm while explaining international trade. Trade theorists, for the purpose of simplicity assumed that all firms in a given industry are identical. However the "new new" trade economists showed heterogeneity between firms and suggested that these differences affected overall output. The role of firms and the importance of estimating empirical models based on firm level data is very well explained in WTO (2008), Section II-C, 3(a).

Recent firm level empirical studies which have important bearings on our study include the study by Bernard et al.(2007). It analyses a number of new dimensions of international trade, including the concentration of exports, the infrequency of export activity, the range of products that firms export and the number of destinations to which firm's exports are shipped. The first point to note is that the share of exporting firms in the total number of firms is relatively small and each serves a very small number of destinations. Although exporting is a relative rare activity, it shows that it occurs in all manufacturing sectors in US. Exporting is more frequent in skill-intensive sectors than labour-intensive sectors. In 2002 in US manufacturing sector they found that 8% of firms were exporting in the apparel sector compared with 38% in the computer and electronics products. Evidence also showed that firms exporting to 5 or more destinations account for 13.7% of exporters but 92.9% of export value. Multiproduct exporters are also very important as firms exporting 5 or more products account for 98% of export value. Very small number of firms dominates US export that ship many products to many destinations. Firms importing is relatively rarer than firms exporting but 41% of exporters are also importers and 79% of importers also export.

They also distinguish between the firms' extensive margin that is, the number of products that firms trade, and their number of export destinations and their intensive margin-that is the value they trade per product per country. They show that adjustment along the extensive margins is central to understanding the well known gravity model of international trade which emphasizes the role of distance in dampening the trade flows between countries. They find that distance has a strong negative effect on the number of firms that sell to an export market as well as number of products per firm exported. Thus, the number of exporting firms and number of exported products decreases with distance to destination country and increase with importers' income. Interestingly, the intensive margin, that is average sales of individual products, is increasing with distance. Explanation for this is given as variable costs may operate in different manner than standard iceberg formulation of transport costs in trade literature.

The iceberg approach assumes that a certain fraction of goods produced for export melt away during exporting process. Thus the increased cost of producing a certain number of units for exports is proportional to the initial production costs. If these costs depend on quantity or weight then only high unit value products would be worth exporting. For instance, the costs of exporting depend on the number of bottles of wines rather the quality of their content. Hence increasing in distance or reduction in importers income may force to change the composition of exports towards higher value products, for which it is profitable to incur, fixed and variable costs of trading.

An examination of the firm level evidence also reveals that exporters differ from non-exporters. The findings suggest that US firms that export are more capital-intensive and skill-intensive with respect to their choice of inputs than the firms that do not. Also exporters are more productive than non-exporters (Bernard et al (2007). US exporters are more productive than non-exporters by 14% in terms of value added per worker and 3% for total factor productivity. Mayer and Ottaviano (2007) estimate that French exporters are showing 15% higher total factor productivity than non-exporters and 31% more labour productivity. The finding that exporters are systematically more productive than non-exporters raises the questions of whether higher productivity firms self select into export markets or whether exporting causes productivity growth through some form of “learning by exporting”. Results from almost every study reveals that across industries and countries higher productivity causes firms to enter into the export markets. Most of the studies also find little or no evidence of improved productivity as a result of beginning to export. However some recent research on low-income countries finds productivity improvement after entry. Van Biesebroeck (2005), for example finds that exporting increases productivity for Sub-Saharan African manufacturing firms.

Heterogeneous firm models are integrated into the standard trade theory of Helpman and Krugman (1985) in Bernard et al (2007), which explains that it is due to the endowment driven comparative advantage that some countries export more in certain industries than in others. Firm level product differentiation combined with increasing returns to scale is the reason for why two way trade is observed within same industries and productivity of the firm is the cause behind why within industries some firms export and others do not.

Baldwin's so-called "new new" trade theory differ from the "new" trade theory with respect to firms' marginal costs and fixed entry costs that are added to the standard fixed cost for developing heterogeneous products. Firms can enter the export market by paying a fixed entry cost, which is thereafter sunk (Melitz, 2003). According to Roberts and Tybout (1998), this formulation of entry costs as sunk costs yields an option value to waiting. Roberts and Tybout (1997) model the dynamics of the export decision by a profit-maximizing firm and measure the magnitude of sunk costs using a sample of Colombian firms. Their econometric model can discriminate between sunk costs and multiple factors that are responsible for exporting in one year and not exporting in another. An empirical test of the sunk-cost hysteresis model was used to examine entry and exit patterns in plant level panel data. They found that sunk costs are important to influence the export performance. At the same time they also provide evidence to support that plant characteristics are important and find that plant size, plant age and the structure of ownership are positively related to the propensity to export (Roberts and Tybout (1997) and Aitken, Hanson and Harrison (1997).

We now turn to the findings of Melitz (2003) which is based on the modeling of trade with differences among firms (Baldwin, 2006). A number of key features are emphasized, such as the impact of liberalisation on average industry productivity through selection mechanism. Incorporating entry costs in his dynamic framework, Melitz (2003) provides a means for today's export decision by the firm to influence its future decision to export. The firms may continue to export even though it is temporarily unprofitable. Once the sunk cost is paid, a firm draws its productivity from a fixed distribution. Productivity remains fixed thereafter but the firm faces a constant exogenous probability of death. These fixed production costs imply that firms having a productivity level below some lower threshold (zero-profit cut-off) would make negative profits if they continue to produce, and therefore these firms choose to exit the industry. Fixed and variable costs of exporting ensure that only those who draw a productivity level above the threshold (the export productivity cut-off) find it profitable to export in equilibrium. In this model if there is reduction in trade barriers it will increase the profits of the exporters in foreign markets and reduce the export productivity cut-off. Labour demand within the industry rises due to the expansion of existing exporters and also due to new firms beginning to export. This increase in labour demand bids up factor prices and reduces the profits of non-exporters. This reduction in the profits in the domestic market induces the low productivity firms to exit the industry. As low productivity firms exit the output and employment are reallocated towards higher productivity firms and average industry productivity increases.

Heterogeneous firm models capture the interaction between firm heterogeneity and international trade with the explanation that the most productive firms will self select into exporting. The shift of resources from low to high productive firms generates improvement in aggregate productivity. During this process exporters grow more rapidly than non-exporters (Melitz, 2003).

Thus research on both theoretical and empirical international trade indicates that firms that trade differ significantly from those that do not and these differences have important consequences for evaluating the gains from trade. Given the above backdrop, this section attempts to present the influence of determinants of exports in labour intensive manufacturing in India along with industry-specific effects through intercepts using the model as discussed below.

This section identifies and quantifies the factors that increase the probability of exporting decision (probability of exporting) and exporting performance (quantities of exports) in the labour intensive sectors and manufacturing sectors. In our model the dependent variable is a binary dummy variable for export status. Because the variable to be explained is a binary dummy, we estimate the effects of the determinants of the export decision using Probit, Logit. We also estimate a less satisfactory linear probability models with industry fixed effects.

Since the direction of causality remains uncertain (whether the firm-specific characteristics drives the firms into export markets or whether exporting causes productivity growth through learning by exporting) in the analysis, we lag all plant characteristics and other exogenous variables one year to avoid this simultaneity problems. We make the model considering the role of firm characteristics, sunk costs, spillovers (region-specific, industry-specific and local to the industry and region) and government export promotion.

Our model (probit or logit) is:

$$Y_{it} = \alpha + \beta X_{it-1} + \theta Y_{it-1} + \mu_{it} \quad \text{where} \qquad (3)$$

$Y_{it} = 1$ if firm *i* exports at time *t*

= 0 otherwise

where, X_{it-1} are the firm-specific characteristics like firm size, labour productivity, R&D, selling costs, wages & salaries, net fixed assets, foreign ownership dummy etc., in year *(t-1)*. Y_{it-1} the lagged export status is the proxy for sunk costs. μ_{it} is the error term.

Firms' export performance (quantities of exports) is captured by the binary form of the export propensity as a percentage of total sales if the firm exported in year t and 0 otherwise. The appropriate model of this would be the Tobit model with binary observations which incorporates the decision of whether or not to export and the level of exports relative to sales. The structure of the Tobit model would be balanced panel data.

$Y_{it} =$ if $Y^*_{it} > 0$ (the value exported as a percentage of sale by firm *i* in year *t)* (4)

$=$ 0 otherwise with Y^*_{it} *given by* (3)

3. Data and Specification of Econometric Models

3.1 Gravity Model

The data used are annual bilateral trade flows of India for the period 1981-2006 for 189 countries. Data on GDP, GDP per capita, population, total exports, total imports and exchange rates are obtained from the *World Development Indicators (WDI*) database of the World Bank, the *International Financial Statistics (IFS).* Data on India's exports of goods, India's imports of goods, and India's total trade in goods (exports plus imports) with the world are obtained from the *Direction of Trade Statistics Yearbook* (various issues) of IMF.

GDP, GDP per capita are in constant 1995 US dollars. GDP, total exports, total imports, India's exports, India's imports and India's total trade are measured in million current US dollars. Population of the two countries are considered in million. Data on the exchange rates are units in US $ per unit of national currency. Tariff data both as effective applied rate and MFN has been collected from WTO (2008).

MFN Tariff

The MFN tariff is taken from UNCTAD Handbook of Statistics database "Average applied import tariff rates on non-agricultural and non-fuel products." Here the MFN is taken as a simple average of tariffs for "Manufactured Goods, Ores and Metals".

The actual classification as per SITC code is

Manufactured goods: 5+6+7+8-68

Ores and Metals: 27+28+68

The codes are defined as per SITC rev.2

5.0 Chemicals and related products

6.0 Manufactured goods classified chiefly by material

7.0 Machinery and transport equipment

8.0 Miscellaneous manufactured articles

27 Crude fertilizers and crude materials (Excluding Coal)

28 Multi ferrous ores and metal scrap

68 Non ferrous metal

Ordinary Least Square (OLS), Fixed effects, Random effects and Tobit regression models have been used in the present log-linear gravity model. Hausman test statistics rejects fixed effects model against random effects model. Tobit random effects model has been used to estimate the gravity model parameters by maximum likelihood method on the assumption that the error term is normally distributed and there are binary observations for dependent variable.

3.1.1 Gravity Model Estimation Results

The regression results for export, import and total trade (Tables 1A, 1B and 1C) are consistent with expectations. The explanatory variables such as distance, GDP, population, tariff, exchange rate bear the anticipated signs and are generally significant. For example the coefficient of distance is negative and significant, while the coefficients of GDP and Population are positive and significant in almost all the models. These results reveal that greater distance reduces bilateral trade and a larger GDP and population of the trading countries enhance trade. A positive elasticity coefficient for GDP and Population reveals that size of the economy is an important determining factor explaining the inflow and outflow of goods and services. It also suggests that larger countries are endowed with more resources and thus would be more self-sufficient to stimulate trade flows. Language is not significant except in OLS model.

The coefficient of exchange rate is not a significant factor for India’s export from the world. However for India’s export/import tariff by countries under consideration is an important determining factor. An increase by one percent in import tariff imposed by other countries shows a decline in India's export by more than 10 percent in FE, RE and Tobit model. The coefficient of exchange rate is significant and positive in all the models for India's imports, which implies that an increase in the exchange rate in terms of INR increases India's imports. Distance as expected is negative and highly significant for India's exports as well imports. This depicts distance which is a proxy for transportation cost is a significant factor in determining India's trade negatively. Time dummy is significant for most of the years controlling for time and showing simply the effects of all time relevant factors and PTA dummy irrespective of period in force.

We have used the standard gravity model augmented by dummy variables to see the impact of number of individual preferential trade agreements. Tables 1A-1C display coefficients that estimate the impact of intra-bloc trade and also the impact of a PTA/RTA on India, for which India is not member of the agreement. Two variables used for this purpose are, one (PTA_m), the importing country supplementary dummy, whose coefficient in general reveals the effect on India's exports to a country which is a member of a PTA. The second is (PTA_x), the supplementary variable whose coefficient indicates the effect on India's imports by an importer who is a member of a PTA. The result in different export models indicate that of the three intra bloc trade partners two are trade diverting. The coefficients of intra bloc trade are negative and significant for SAFTA and Bangkok Agreement in OLS regression while the coefficient for BIMSTEC is negative and significant in FE, RE and Tobit models showing trade diversion. Taken together the PTA dummy coefficients show that India's comparative advantage is in doing trade with the world than doing trade with any of the PTA partners. The coefficients of the first supplementary PTA_m variable for EU, MERCOSUR, SACU, ASEAN are estimated to be positive and significant in most regressions indicating the occurrence of additional import creation in intra-block trade under these PTAs. Also these positive estimated coefficients indicate general openness of the PTA members. EU and GCC are also showing positive but insignificant effects in Fixed Effect (FE), Random Effect (RE) and Tobit (RE) models. However the coefficients of PTA_m variables such as CIS and NAFTA and EFTA are estimated to be negative and significant, indicating the occurrence of appreciable import diversion under these PTAs.

Considering the coefficients PTA_x variables, PTAs such as ASEAN, SACU and NAFTA are negative and significant indicating India's exports are reduced because the importer is a member of these PTAs. The coefficients of PTA variable GCC and EU are positive and significant in OLS regression model but insignificant in other models. The coefficient of the PTA variable MERCOSUR and CIS are however negative and significant in OLS, but positive and significant in FE and RE models with country effects. Regarding the intra bloc effect, the coefficient estimates for import in SAFTA and Bangkok Agreement are negative and significant in all the models. This reflects that trade are diverted with respect to India's PTA partners. Only the coefficient estimate for import in BIMSTEC is positive and significant in OLS, RE and FE models indicating import creation. Trade model has some different results when comparing the OLS method and Fixed effects, Random effects and Tobit models. Due to multicollinearity many of the variables are dropped and this creates problem in interpreting the result. However the cumulative effect for the total trade model reveals that with respect to the intra bloc trading partners only BIMSTEC is trade creating while SAFTA and Bangkok Agreement are trade diverting. The coefficients of combined effects of exports and imports PTAs namely GCC, ASEAN, MERCOSUR, SACU and EU indicate the occurrence of trade creation, whereas the coefficients of NAFTA, CIS and EFTA are showing trade diversion under these PTAs.

Our analysis that the rapid global spread of bilateral PTA and RTA towards which India is moving rapidly is largely counterproductive. However, the welfare impacts of the PTA cannot be inferred from the outcome of trade creation and trade diversion calculations. Nonetheless, these findings would pose question whether trade negotiations which India is trying with the world over are making agreements only to the disadvantage of the world economy or multilateral liberalisation is by far the better path for trading system.

3.2 Determinants of Exporting Decisions

To understand the determinants of the decision to export by firms in labour-intensive sectors, we assembled a sample of 800 operating firms from 1995 to 2006. The data collected covers six types of labour-intensive manufacturing activity at the 4-digit level. The PROWESS database of firm level panel data collected by the CMIE is used for this analysis, although we do not exploit the panel features in our estimation. The activities covered are food processing, cotton textile, leather products, auto-ancillary, bicycle and gems & jewellery. We also tried the same exercise with PROWESS data on all manufacturing sectors (Drug and Pharmacy, Electrical Machinery, Electronics, Inorganic chemical, Organic Chemical, Plastic & Plastic Products, Non-Electrical Machinery, Rubber and Rubber Products, Textiles, Transport Equipment, Petroleum, Tyres, Paper and Paper Products, Tea and Coffee) for the same period 1995-2006 (total 1,365 firms). Firms in the sample include both exporters and non-exporters. We further investigate the effect of ownership and firm's other attributes on the probability of exporting using CII data for just one year 2004-05 for all manufacturing sectors (total number of firms 3,724).

3.2.1 Description of variables

The rationale behind the selection of the variables and their possible relations with export propensity are discussed below:

Sunk costs

One focus of the exiting literature on the decision to export (probability of exporting) has been the role of sunk costs. These are costs associated with entering foreign markets that may have the character of being sunk in nature. These include the cost of collecting information about demand conditions abroad or cost of establishing a distribution system and service network (Baldwin, 1988) and covers also the costs of launching product or brand advertising. Potential Firms can enter the export market by paying a fixed entry cost, which is thereafter sunk (Melitz, 2003). Incorporating entry costs in a dynamic framework provides a means for today's export decision by the firm to influence its future decision to export. The firms may continue to export even though it is temporarily unprofitable because it has already incurred an entry cost which is sunk. According to Roberts and Tybout (1998) this formulation of entry costs as sunk costs yields an option value to waiting.

We infer the existence of sunk costs from the fact that the sequence of exporting and non-exporting years of a firm exhibit runs, rather than random switching from year to year. We also use the firm's lagged export status as the proxy for sunk costs. Thus, we look at the distribution of exporting sequence in the data. The assumption is that firm charteristics affect only the fraction of total time in which a firm is found to be exporting, but not the particular pattern of exporting years within the total time span exporting in the consecutive periods. If firm specific effects are important we expect to see some firms exporting in most years and others not exporting in most years, Bernard and Jensen (2001).

Table 2A shows the distribution of firms in labour-intensive activities across all the 103 possible sequences of exporting and non-exporting for the seven years from 2000-2006. It shows a large fraction of plants (33 %) exports in all seven years and an equally large fraction, 30 %, never exports. In addition plants are more likely to export once (5.4 %) or for six years (8.3%) than for three years (4.38%) or four years (2.35%). Sequences with runs of exporting and non-exporting such as 1110000 and 0000111 are more frequent than those without runs, 0010101 and 1010010.

When the same exercise was done for *all manufacturing firms* (Table 2B), and not just firms in labour intensive sectors, the picture was different. Fraction of firms who never exported doubled to 41%, as compared to the 21% who exported throughout the period under consideration. Like the labour intensive sectors, sequence with runs of exporting and non-exporting is more frequent than those without runs.

The overall results suggest that both unobserved plant heterogeneity and sunk costs are likely to be important in the decision to export (probability of exporting) for labour-intensive as well as for all manufacturing sectors.

Foreign ownership

Foreign ownership is another variable that differ greatly between exporters and non-exporters. The percentage of firms with majority foreign capital participation in the group of exporters is 30.85, whereas in the group of non-exporters the rate of foreign participation is 16.22 in the CII data. Thus the degree of foreign owned companies in the population of exporters is high and is expected to be positively related to exporting. Foreign ownership is a dummy variable which is equal to 1 if the firm have a Joint Venture (JV) or has foreign Collaboration or a foreign parent and 0 otherwise.

Size of the Plant

In most of the previous literature of export performance, it has consistently been observed that exporters are large plants. Size is the proxy for several effects as observed by Bernard and Jensen (2001). Larger firms may have lower average or marginal costs, which would increase the likelihood of exporting. Larger firms have more resources with which to enter foreign markets. Wakelin (1998) observes that this may be important, if there are fixed costs to exporting such as information or marketing expenses which may benefit larger firms disproportionately. Economies of scale may be important to overcome these initial costs but they may be less significant in firm's export activity. A non-linear relationship between plant size and export propensity was found by Kumar and Sidharthan (1994), Willmore (1992), Wakelin (1998). In the present study size has been measured by the value of total production.

R&D

Previous studies provide strong evidence that R&D intensity contributes to plant's export performance. Veugelers and Cassiman, 1999; Lover and Roper, 2001 provide evidence that R&D expenditure and investment both have positive effect on firm's export intensity. R&D expenditure has the potential to enhance quality and to generate economy in the production process, the factors that may increase the likelihood of entering the export market. We assume that the effect of R&D on exporting is likely, ceteris paribus, to be positive.

Wages

The lower is the real wage, the greater is the firm level competitive advantage, which is expected to result in higher volume of exports. This is the comparative advantage from the relative factor endowments which provide cost competitiveness for firms at micro-level. India has a relatively abundant endowment of labour. However it is not just the cheap labour that leads to comparative cost advantage, but low wage in relation to productivity of that labour which determines the export performance. This variable has been captured by the variable quality of labour. Thus the total wage bill is expected to have, ceteris paribus, a negative association with the export performance. Wages has been taken as a percentage of sales.

Labour productivity

The entry in the foreign market is expected to be positively related with the quality of labour as firms can survive in the external market only if they can produce lower cost or higher quality products. To proxy for labour quality, the productivity of labour has been measured as net value added per worker. Productivity per worker may be taken as the choice of technology at the firm-level. Labour productivity is measured both as net value added per workers and as a ratio of net value added to total wages and salaries. The PROWESS database does not contain data on the number of employees in the firms. Instead, data on salary and wages are provided. From the data on salary and wages, an estimate of employment was derived in the same way as in Goldar et al (2003). First data on total emoluments and total employees were taken from the Annual Survey of Industries (ASI) for various three-digit industries belonging to the six labour-intensive activities viz. bicycle, auto ancillary, cotton textile, gems & Jewellery, leather and food-processing. The data series covered 1995-2005 for most industries. Using these data, emoluments per employee was computed for the period 1995-1996 to 2005-2006 by extrapolating (using EXCEL software) the series for seven years for bicycle, auto-ancillary and gems & Jewellery since ASI data series ended in 1995. For other industries like cotton textile, leather and food-processing the series was extrapolated just for 2006. The firms in the samples were matched into the three-digit industrial classification of ASI considering the products of the firms. Then, for each firm, the series on salaries and wages obtained from the CMIE database was divided by the computed series on emoluments per employee for the corresponding three-digit ASI industry. This yielded an estimate of employment in the firm. Another proxy for wage share has been measured as the ratio of net value added to wages and salaries.

Selling costs

A firm requires a distributional network, especially if it has to operate in the international market. Increasing globalization of the product system has lead to global logistics that puts special importance on advertisements and marketing links in the manufacturing sectors. Hence marketing and sales expenses can be taken as an indicator of the firms actual efforts towards promoting the export. Based on these arguments, selling costs are expected to have a positive relation with export performance.

Energy intensity

Energy-intensity, measured in terms of power and fuel expenditure as a proportion of sale, is another important factor that may influence export performance. A positive relationship between export and energy-intensity can be expected if an industry with higher energy intensity is deemed more productive and hence competitive in the foreign markets.

Capital Intensity

Firms can gain a technological advancement not only through their own innovation but also through purchases of new capital or intermediate goods from other sectors. Capital intensity, measured in terms of net fixed asset as a proportion of sale is total fixed assets net of accumulated depreciation. Net fixed assets include capital, work-in-progress and revalued assets.

Profit Intensity

Roberts and Tybout (1997) found that the most productive firms find it profitable to incur the sunk costs in export markets. Higher profit earning firms can more easily face competitiveness in the foreign markets. The existence of fixed production costs implies that the firms producing below the zero-profit productivity cut-off would make negative profits if they produce and therefore they choose to exit the industry. Only those who can produce above the export productivity cut-off can export in equilibrium (Melitz, 2003). Hence we hypothesize that only a profit earnings firms can survive in the exporting market.

Import Intensity

In most of the cases we find that importers are generally also the exporters. There is high degree of correlation between exporting firms and importing firms – firms that import are more likely to export than non-importing firms. Higher import intensity is thus expected to have a higher probability of exporting, although it could be argued that higher import intensity reflects greater ability to import by exporting firms. We think that this latter relationship should have been considerably weakened after the abolition of import licensing and the award of import entitlements as incentives to export.

3.2.2 Estimation Results: Determinants of Export Decision

We first consider the determinants of export decision for labour intensive activities and then for all manufacturing sector. Accordingly, we have framed our export decision making equation and estimating it using Probit and Logit model. The lagged export status variable is 0 if the plant did not export last year, 1if it did. The study also examines the determinants of export propensity with Tobit model for the same sample. Here the dependent variable is binary, i.e., the total export as percentage of sale if the firm did export in that year, and it is equal to 0 otherwise. Lagged export is also considered in the Tobit model as this factor could be important for quantities exported. All other factors are expected to govern the quantities of exports in the same way as the probability of exporting. The parameters from Probit, Logit and Tobit Models are presented in Tables 3A, 3B and 3C, respectively.

Most of the firm specific variables are significant as hypothesized. The study finds that the coefficient on lagged export is positive and significant in Probit and Logit models suggesting that exporting last year raises the probability of exporting this year. This possibly reflects the possibility that once the cost for gathering information and distributional costs are incurred it becomes sunk in nature. The coefficient of Selling cost, which is proxy for sunk cost, is positive and significant in all the models of Probit, Logit and Tobit. Hence ability to access market abroad reflected in marketing and advertisements expenditure increases the export performance of these labour-intensive sectors. As expected the coefficient of wage intensity is negative and significant in all the models. A reduction in total wage bill increases the probability of exporting and the quantities of exports. This confirms that exporting units are more efficient user of relatively abundant factor (endowment driven comparative advantage). However wage employed is also an indicator of labour quality which is measured as net value added per worker is significant and positively correlated with exporting. More productive firms have higher probabilities of exporting. Higher productivity makes a firm competitive in the foreign market. The coefficient of profit intensity taken as ratio of profit to sale is also positive and significant in all the three models. This shows that only those firms that have productivity above a threshold level (export-productivity cutoff) find it profitable to export.

The coefficient of R&D is also positive and significant showing that higher R&D capability contributes to increased export propensity. This positive R&D are found in other studies for the technology based firms which also suggest a positive relationship between non-price quality and plant's export competitiveness (Wakeline, 1998; Anderton, 1999). From policy terms this result may be important as there may be unwillingness to support R&D activity in these labour-intensive firms.

Interestingly coefficients of energy intensity and capital-intensity are negative and significant both for probability of exporting and quantities of exports in the Probit and Tobit models unlike hypothesized. This suggests that both intensities are not indicators of productivity but of costs of production. The existing empirical literature shows that there is a marked difference in the factor intensity between exporters and non-exporters. The intensity with which the firms use inputs reflects the characteristics of the goods they produce, hence firms which are more capital and skill -intensive are producing goods that are more consistent with country's comparative advantage. Hence the exporting firms in labour abundant developing countries which specialize in goods consistent with their comparative advantage; they would be labour-intensive rather capital or energy- intensive. This result is also confirmed by Mayer and Ottaviano (2007), who provide evidence that the export performance of European countries is better in those industries where they have a comparative advantage.

Size measured as total sales is positive and significant as expected in all the models. Firm size is generally expected to have a positive effect on export propensity as larger firms have more resources to enter foreign markets. Economies of scale may be important to overcome the initial cost barrier particularly fixed costs such as information gathering or marketing expenses. Afterwards it may not be significant in determining the extent of firm's export activity. Import intensity is also positive and significant in all the three models showing its importance as a determinant for exporting. Import-intensive firms exports more, for example 79% of importers in US are also exporters (Bernard et. al., 2007).

The linear probability model includes the industry fixed effects in the explanatory variables to control the differences in firm characterstics across industries. Because export performance is assumed to be correlated with industry characteristics, controlling for industry effects reduces these coefficients. Data used for Linear Probability Model with fixed effects is from CMIE, and cover the labour intensive sectors for 1995-2006. Estimation results (Table 3D) shows that size which is measured as the number of employees is not a significant factor. The coefficient of capital intensity measured as net fixed asset as a proportion of number of employees is negative and significant. The result is consistent with the endowment driven old trade theory, that is, relatively a labour abundant country like India does not have a comparative advantage in capital intensive activities.. However, the coefficient of R&D intensity is positive and significant showing that firms have to upgrade their technology and skill to compete in foreign markets. Wage intensity is negative but not significant, although the coefficient of labour productivity is positive and significant. Finally, the coefficient of selling cost measured as marketing and advertisement expenses is positive and significant suggesting the presence of sunk entry cost into export markets that only the most productive firms find it profitable to incur.

Turning to all manufacturing activities, Tables 4A-4B present the coefficients from Logit, Probit, and Tobit models based on CMIE data. It is seen that lagged sales (proxy for scale), Energy Intensity, Wage coefficients are significant with the expected signs. We further investigate the effect of ownership and firm's other attributes on the probability of exporting using the CII data for one year (2004-05) for all manufacturing sectors. The results (Tables 4C and 4D) show that foreign ownership has a significant and positive impact on probability of exporting. There are several reasons why the share of foreign ownership matters for firm-level export performance. First foreign direct investment brings skills and technologies that help improve the physical productivity of the firms. Second reason is that firms with foreign ownership are more likely to access the overseas business markets or have their own cross-border network and channels which facilitate their exporting activities.

Unlike the labour-intensive sector the export sequence for the all manufacturing depicted in Table 2B shows that the proportion of firms who did not export for any of the years under consideration were double that of the firms that exported in all the years. This shows that past experience of the firm or sunk entry costs have a positive effect on the export propensity. The coefficient of the past export experience, measured as lag of export, is identical and consistent in Tobit model and indicates that export experience of the previous year increases the probability of the current year exporting on an average by 0.19 percent.

The result for firm size is similar to labour-intensive sector and is significant and positive determinant for probability of exporting and quantities of exports. The coefficient in the Tobit model (Table 4D) can be interpreted as an increase in scale by one percent raises the probability of exporting by 2.1 percent. The wage share is also an important factor for all manufacturing that could determine the probability of export performance. Wage share measured as net value added divided by the wages and salaries is positive and significant for probability of exporting but not for quantities of exports. However wage intensity is an important factor for entering the export market and its coefficient is negative and significant across all models. One of the reasons might be that average wage can also be taken as a proxy for labour quality which determines the probability of exporting in the long run but the firms' decision to export in the short run could be influenced by the low average wages.

Other firm characteristics such as R&D intensity and import intensity have a positive effect equally on probability of exporting and quantities of export as in labour intensive sectors. However profit intensity which is insignificant in Probit and Logit models, is positive and significant in the Tobit model indicating profit to be a determining factor on the quantities of exports of the manufacturing sector but not on probability of exporting. The Tobit model shows that an increase in the profit by one percent increases the performance of exporting by 23 percent. The coefficient of selling costs in the all manufacturing sectors is positive and significant in the Probit and Tobit model. This indicates that advertisement and marketing costs are equally important factor to capture foreign market like quality of labour, profit and size of the firms which are imperative for the overall manufacturing sector.

Like the labour-intensive sector energy-intensity and capital-intensity in the all sector model is negative and significant determining factor both for probability of exporting and quantities of exports. As argued before this is because the exporting firms in any sectors in labour abundant developing countries which specialize in goods consistent with their comparative advantage; they would be labour-intensive rather than capital or energy- intensive.

3.3. Export Propensity of Firms: A "Hazard" Model

We formulate a "Hazard" model of the probability of a firm exporting in any year based on its characteristics and its previous history of exporting. The actual model that we estimate is not quite a "Hazard" model, but a multinomial logistic model that is loosely related to it. Data on manufacturing firms in India during 1995-2006 are used for this purpose. We first categorized all the firms into four categories as follows:

Category 1 = exported in t and did not export in any of the prior years

Category 2 = exported in t and exported at least in one of the prior years

Category 3 = did not export in t and not prior to t

Category 4 = did not export in t but at least in one of the prior years.

Let the probability of exporting in $t = \delta = 1/1 + \exp(-\eta)$ where $\eta = \eta(x_{it}, t)$ is a function of a vector x_{it} the relevant characteristics of firm *i* and year *t*. in this general formulation η would vary over time and across firms. For simplicity, consider the case in which η or equivalently δ, is constant over time for each firm. This in turn implies that only time-relevant characteristic of firm matter for its determination. For the simple model the probability P_{ijt} that firm found to be category j is given by

$$P_{i1t} = (1-\delta)^{t-1}\,\delta \qquad (5)$$

$$P_{i2t} = \delta\left\{1-(1-\delta)^{t-1}\right\} \qquad (6)$$

$$P_{i3t} = (1-\delta)\,(1-\delta)^{t-1} = (1-\delta) \qquad (7)$$

$$P_{i4t} = (1-\delta)\left\{1-(1-\delta)^{t-1}\right\} \qquad (8)$$

With $\delta = 1/1+\exp(-\eta_i)$; where η_i could be specified as a linear function.

$$\eta_i = \alpha_1 + b_1^* X_{1i} + b_2^* X_{2i} + b_3^* X_{3i} + \ldots\, b_n^* X_{ni} \qquad (9)$$

where variables are the average values of characterstics over all the observations for firm *i*. One could estimate the parameters b_j, *j = 0, 1, 2, 3 and 4* by maximizing the log likelihood $\sum_{t=1}^{T}\sum_{i=1}^{I}\sum_{j=1}^{4} D_{ijt} \log P_{ijt}$, where D_{ijt} is a dummy variable which takes the value 1 if firm is in category *j* in year *t* and zero otherwise.

The model which we estimated is a simpler multinomial Logit model for P_{ijt}. In other words, given that $\sum_{j=1}^{4} P_{ijt}$ = 1 by definition, treating the third category as the reference category, we postulate that log odds of category j relative to 3 as

$$Log(P_{ijt}/P_{i3t}) = \alpha_j + \sum_{k=1}^{n} b_{jk} X_{kit} \text{ , for } j = 1, 2, 4 \qquad (10)$$

$\{X_{kit}\}$ are characteristics of firms *i* in year *t*. Once α_j and $\{b_k\}$ have been estimated, an average of log odds

$$Log\left(\frac{\overline{P_j}}{\overline{P_3}}\right) = Log\left(\frac{\tilde{P}_j}{\tilde{P}_3}\right) \qquad (11)$$

can be computed by substituting in (6) the average given by:

$$\text{(total number of observations)}^* \; \overline{X_{kt}} = \sum_t \sum_i X_{kit} \qquad (12)$$

From log odds we can recover the probabilities $\tilde{P}_j$ by noting that

$$Exp\left(Log \frac{\tilde{P}_j}{\tilde{P}_3} \right) = \left(\tilde{P}_j \big/ \tilde{P}_3 \right) \qquad (13)$$

And hence,

$$\tilde{P}_3 = \frac{1}{1 + \sum \tilde{P}_j \big/ \tilde{P}_3} \qquad (14)$$

$$\tilde{P}_j = \tilde{P}_3 . \left(\frac{\tilde{P}_j}{\tilde{P}_3} \right), \text{ j} = 2, 3, 4 \qquad (15)$$

We consider the following four alternative clusters of firm level characteristics:

Model I = Scale, Wage intensity, R&D intensity, Selling cost intensity, Profit intensity, Net Fixed Asset intensity, Import intensity

Model II = Wage intensity, Selling Cost intensity, Profit intensity, Net fixed Asset intensity, Net Value Added as a percentage of Wages, Import intensity

Model III = Lagex, Wage intensity, wage share, R&D intensity, Selling Cost intensity, Profit intensity, Net Fixed Asset intensity, Import intensity.

Model IV = Lagex, Energy intensity, Wage intensity, Selling Cost intensity, Profit intensity, Import intensity.

3.3.1 Estimation Results (Maximum Log Likelihood Estimates)

The estimation results (Tables 5A–5D) indicate that firms under different categories have significantly different characteristics from each other (here the results are only for the base category 3, however we have tried by changing the base category and the results are found to be the same). For example the coefficients in the multinomial Logistic regression models estimating the firm effect between different sets of categories reveals that firms that have never exported are significantly different from the firms which have exported once or more. The exporting firms (either exported in current year or in prior years) are significantly bigger, more R&D intensive, low wage intensive, more profit intensive etc. than those who have never exported. Although we investigated not the multiplicative Hazard model, but log likelihood estimates, these findings are consistent with previous studies.

In addition, it was found that the probability of the firms which fall in category 2 (exported in t and exported in at least one of prior years) is highest as compared to the probability of the firm being in category 1 (exported in t and did not export in any of the prior years) in all the four models. The probability of firms in category 1 is lowest in all the models except the fourth. However the probability of the firm in category 4 i.e. those firms which have not exported in t but exported in at least one of the prior years, is more as compared to the category 3 (firms that are not exporting in t and also not exporting in the prior years) in all four models except the second.

The results reveal that the probability of survival of the new firms are more difficult in the industry than those who have been exporting in the prior years characterized by economies of scale, profit intensity, wage intensity and sunk costs etc.

Description of Export Share

The export share in different manufacturing sector for the period 2006-07 is given in the appendix. It shows that engineering sector has the highest percentage share in total exports comprising of 20.61%, followed by Petroleum products which is 15.02%, textile 12.87%, chemicals and related products 14.04%, gems and Jewellery 12.26%, Machinery 9.12% and electronics 2.29%.

4. Conclusions

Our objectives in the paper were basically two. First, following the recent trend in the literature, we wished to analyse the determinants of the decision to export by Indian firms. To the best of our knowledge ours is one of the very few, if not the only, contribution to the literature based on Indian data. Second, India like almost all members of the WTO, is pursuing trade liberalization on a preferential basis with many countries including most important with its South Asian neighbours. Following some very recent contributions to the analysis of preferential trade agreements, we also estimate a modified version of the well-known gravity model of bilateral trade flows of India with 189 trading partners for the period 1981-2006.

Our analysis of firm level data is based on two different databases. One is from the PROWESS data of the Centre for Monitoring the Indian Economy (CMIE) for the years 1985-2006. The other is that of Confederation of Indian Industry (CII) just for one year, 2004-05. Both databases have many limitations, the most serious of which is that it is not mandatory for firms to supply data to CMIE or CII, and it is not known how representative of the industry is the membership of the two organizations. However, it is widely believed that the large firms which account for a large percentage of the industrial production and foreign trade are members of the two. We use a variety of models, such as Probit, Logit, Tobit, Multinomial Logistic (as a base approximation to a hazard model of exporting decisions over time) and a linear probability model. By and large, the results from the various models appear broadly consistent. While this is comforting, still the limitations of the data sets used by us have to be kept in mind in interpreting the results.

We will be brief in stating our principal findings. Keeping in mind that one cannot infer Welfare effects directly from the trade creation and trade diversion effects of preferential trade, we interpret our results from the coefficient estimates (OLS, Fixed Effects, Random Effects and Tobit) from our gravity model of export, import and total trade broadly indicate that the pursuit of preferential trade agreements is counterproductive. India's superior policy option continues to be unilateral and multilateral trade liberalization.

The findings from our firm level data analysis confirm what has been found in similar analysis by others. Firm heterogeneity is seen in the decision to export. For example, firms that have never exported are significantly different from those who have exported for one or more years in the past. Exporting firms are significantly larger, more R&D intensive, low wage intensive, and more profitable than non-exporting firms. Our analysis of the firm level data is very suggestive. We hope it will stimulate more such analysis.

References

Adams, Richard, Phillipa Dee, Jyothi Goli and Greg McGuire (2003) "The Trade and Investment Effects of Preferential Trading Arrangement-Old and New Evidence" Staff Working Paper. Canberra: Australia Productivity Commission.

Aitken, Brian & Hanson, Gordon H. & Harrison, Ann E. (1977), " Spilloers, foreign investment and export behavior," Journal of International Economics, Elsevier, 43(1-2), 103-132.

Anderson, R. (1999),"UK Trade Performance and the Role of Product Quality, Variety, Innovation and Hysteresis: Some Preliminary Results". *Scottish Journal of Political Economy*, Volume 46, November, 553-570.

Baldwin, Richard E. (2006) "The Euro's Trade Effect," Working Paper Series 594, European Central Bank.

Baldwin, Richard E. (1988) "Some Empirical Evidence on Hysteresis in Aggregate US Import Prices," no. 2483.

Bernard, Andrew B., J. Bradford Jensen, Redding and Peter K. Schott (2007) "Firms in International Trade" NBER Working Paper # 13054.

Bernard, Andrew B. and Jensen Bradford (2001) "Why Some Firms Export" NBER Working Paper no. W8349.

Cassiman, Bruno & Veugelers, Reinhilde (1999) "Importance of International Linkages for Local Know-How Flows: Some Econometric Evidence from Belgium," CEPR Discussion Papers 2337, C.E.P.R. Discussion Papers.

Centre for Monitoring Indian Economy

De Rosa, Dean A. (2007) "The Trade Effects of Preferential Arrangements: New Evidence from the Australia Productivity Commission" Working Paper Series no.: WP 07-1. Washington: Peterson Institute for International Economics.

Goldar, B.N., V.S. Raganathan, Rashmi Banga (2003), "Owenrship and Efficiency in Enginereering Firms in India 1990-91 to 1999-2000," Working Paper 15, ICRIER, New Delhi.

Government of India, Annual Survey of Industries, Various Issues, CSO, New Delhi

Helpman, Elhanan and Paul Krugman (1985) "Market Structure and Foreign Trade: Incraesing Returns, Imperfect Competition and the International Economy", MIT Press, Cambridge, MA.

Kumar Nagesh and N.S. Sidharthan (1994) "Technology, firms Size and Export behavior in Developing Countries: The Case of Indian Enterprises, *Journal of Development Studies,* 31(2), 289-309.

Mayer T. and G. Ottaviano (2007) "The happy few: new facts on the internationalisation of European firms", *Bruegel-CEPR EFIM2007 Report, Bruegel Blueprint Series.*

Melitz, M. (2003) "The Impact of Trade on Intra-Industry Reallocation and Aggregate Industry productivity", *Econometrica*, 71, 1965-1725.

Roberts, Mark J. and James Tybout (1997) "The Decision to Export in Colombia: an Empirical Model of Entry with Sunk Costs", *American Economic Review*, 87(4), 545-64.

Roper, Stephen & Love James H, (2001) "The Determinants of Export Performance: Panel Data Evidence for Irish Manufacturing Plants," Working Papers NIERC 69, Economic Research Institute of Northern Ireland.

Rose Andrew K. (2002) "Do WTO members have more liberal trade policy?" NBER Working Paper 9347.

Soloaga, Isidro and L. Alan Winters, (2001) "Regionalism in the Nineties: What Effect on Trade?" *North American Journal of Economics and Finance* 12(1), 1-29.

UNCTAD (2006) Handbook of Statistics Database, Geneva,United Nations Conference on Trade and Development

Van Biesebroeck, Johannes (2005) "Exporting raises productivity in Sub-Saharan African Manufacturing Firms", *Journal of International Economics*, 67(2), 373-391.

Wakelin, K., (1998), "Innovation and Export Behaviour at the Firm Level", *Research Policy, 26*, 829-841.

Willmore, Larry (1992) "Industrial policy in Central America," *Cepal Review*, No. 48, 95-105.

WTO (2008) *World Trade Report,2008*., Geneva, World Trade Organization.

Table 1: Gravity Models

Table 1A: Export Flows

	OLS	Fixed Effects	Random Effects	Tobit
exchangerate	-0.013	0.018	0.020	0.013
	(0.014)	(0.021)	(0.019)	(0.019)
$LnTariff_{jt}$	-0.091**	-0.136***	-0.114***	-0.090**
	(0.062)	(0.070)	(0.067)	(0.066)
Langdummy	0.260***		0.215	0.173
	(0.085)		(0.280)	(0.240)
LnGdp	0.679***	1.042***	0.628***	0.612***
	(0.029)	(0.165)	(0.081)	(0.076)
LnPop	0.169***	2.437***	0.328***	0.325***
	(0.033)	(0.322)	(0.095)	(0.087)
$lnDist_{ij}$	-1.354***		-1.175***	-1.121***
	(0.070)		(0.211)	(0.191)
safta_m	-0.679**	-0.146	0.234	0.249
	(0.318)	(0.242)	(0.236)	(0.233)
Bimstec_m	0.566	-0.596**	-0.616**	-0.618**
	(.367474)	(0.256)	(0.258)	(0.254)
Bangkok_m	-0.331*		-0.299	-0.100
	(0.194)		(0.760)	(0.756)
Gcc_m	-0.065		0.368	0.534
	(0.405)		(0.779)	(0.777)
asean_m	-0.973***	0.276	0.376**	0.395**
	(0.208)	(0.169)	(0.168)	(0.160)
Sacu_m	1.964***		2.237**	2.307**
	(0.515)		(0.921)	(0.932)
mercosur_m	0.052	1.141***	0.961***	0.976***
	(0.149)	(0.244)	0.234)	(0.231)
eu_m	0.386***		0.130	0.234
	(0.120)		(0.378)	(0.371)
Efta_m	-0.684**		-0.425	-0.346
	(0.334)		(1.089)	(1.105)

Table 1A (continued)

	OLS	Fixed Effects	Random Effects	Tobit
nafta_m	-0.828***	-0.624***	-0.840***	-0.826***
	(0.302)	(0.241)	(0.241)	(0.238)
cis_m	-0.958***	-0.270	-1.117**	-0.970**
	(0.299)	(0.853)	(0.466)	(0.431)
t 2	0.031	0.0174	0.073	0.073
	(0.268)	(0.157)	(0.159)	(0.157)
t 3	-0.155	-0.187	-0.095	-0.095
	(0.268)	(0.157)	(0.159)	(0.157)
t 4	-0.200	-0.259*	-0.114	-0.112
	(0.265)	(0.156)	(0.158)	(0.156)
t 5	-0.249	-0.359**	-0.165	-0.161
	(0.265)	(0.158)	(0.158)	(0.156)
t 6	0.108	-0.054	0.190	0.195
	(0.265)	(0.159)	(0.158)	(0.156)
t 7	0.300	0.040	0.336**	0.342**
	(0.267)	(0.162)	(0.159)	(0.157)
t 8	-0.003	-0.118	0.199	0.207
	(0.251)	(0.157)	(.152)	(0.150)
t 9	0.712***	0.459***	0.858***	0.867***
	(0.270)	(0.170)	(0.163)	(0.160)
t 10	0.439*	0.120	0.559***	0.567***
	(0.260)	(0.165)	(0.155)	(0.153)
t 11	0.681***	0.452***	0.936***	0.946***
	(0.256)	(0.169)	(0.156)	(0.154)
t 12	1.071***	0.634***	1.147***	1.157***
	(0.258)	(0.172)	(0.158)	(0.156)
t 13	1.153***	0.615***	1.134***	1.146***
	(0.251)	(0.171)	(0.156)	(0.154)
t 14	1.241***	0.828***	1.394***	1.400***
	(0.271)	(0.184)	(0.167)	(0.165)

	OLS	Fixed Effects	Random Effects	Tobit
t 15	1.427***	1.084***	1.705***	1.715***
	(0.249)	(0.181)	(0.158)	(0.156)
t 16	1.624***	1.089***	1.775***	1.789***
	(0.252)	(0.188)	(0.162)	(0.159)
t 17	1.832***	1.278***	2.004***	2.020***
	(0.248)	(0.189)	(0.159)	(0.157)
t 18	1.991***	1.183***	1.955***	1.978***
	(0.262)	(0.199)	(0.167)	(0.164)
t 19	1.768***	1.170***	1.980***	1.99***
	(0.254)	(0.202)	(0.165)	(0.163)
t 20	2.033***	1.336***	2.193***	2.209***
	(0.2474)	(0.205)	(0.164)	(0.162)
t 21	1.917***	1.294***	2.196***	2.213***
	(0.233)	(0.206)	(0.160)	(0.157)
t 22	2.139***	1.520***	2.440***	2.461***
	(0.226)	(0.209)	(0.157)	(0.155)
t 23	2.345***	1.597***	2.551***	2.577***
	(0.246)	(0.220)	(0.168)	(0.166)
t 24	2.617***	1.754***	2.787***	2.806***
	(0.249)	(0.226)	(0.169)	(0.167)
t 25	2.789***	1.881***	2.983***	3.004***
	(0.232)	(0.229)	(0.163)	(0.161)
t 26	3.240***	1.855***	2.904***	2.925***
	(0.850)	(0.513)	(0.500)	(0.493)
_cons	8.560***	-48.209***	5.383**	5.251**
	(0.790)	(6.245)	(2.251)	(2.076)

OLS Results

R Squared	0.712
Adjusted R Squared	0.704
Root MSE	1.439
Prob > F	0.000
No. of Observations	1579

Fixed-effects (within) regression

R Square Within	0.708
R Square Between	0.396
R Square Overall	0.438
Prob >F	0.000
No. of Observations	1579

Random effects GLS regression

R Square Within	0.697
R Square Between	0.573
R Square Overall	0.684
Prob >Chi^2	0.000
No. of Observations	1579

Random-effects tobit regression

Log Likelihood	-2093.621
Prob >Chi^2	0.000
No. of Observations	1579

Table 1B: Import Flows

	OLS	Fixed Effects	Random Effects	Tobit
exchangerate	-0.052***	0.036**	0.046***	0.100***
	(0.014)	(0.018)	(0.017)	(0.036)
LangDummy	0.382***		0.535	0.806
	(0.102)		(0.400)	(0.539)
LnGDP	0.773***	0.545***	0.728***	0.424**
	(0.033)	(0.134)	(0.093)	(0.201)
Lnpop	0.331***	1.180***	0.444***	0.727***
	(0.039)	(0.307)	(0.123)	(0.210)
Lndist	-0.713***		-0.914***	-0.808*
	(0.087)		(0.298)	(0.436)
safta_x	-0.631	-0.652*	-0.609*	11.112
	(0.472)	(0.343)	(0.339)	(580.128)
bimstec_x	1.743***	1.331***	1.278***	-0.219
	(0.527)	(0.372)	(0.371)	(2384.095)
bangkok_x	-0.794***		-0.960	13.769
	(0.295)		(1.187)	(131.124)
Gcc_x	3.014***	-0.163	0.376	12.686
	(0.305)	(0.451)	(0.425)	(126.819)
asean_x	-0.005	-0.474**	-0.473**	0.203
	(0.286)	(0.236)	(0.232)	(1.255)
Sacu_x	-1.882***		-1.512	-2.432*
	(0.400)		(1.416)	(1.307)
mercosur_x	-0.885***	0.803**	0.749**	13.717
	(0.254)	(0.388)	(0.379)	(699.445)
eu_x	1.001***	-0.193	0.679	2.298
	(0.154)	(1.146)	(0.496)	(1.477)
Efta_x	0.187		0.411	-0.309
	(0.329)		(1.411)	(2.290)
nafta_x	0.632	-0.613*	-0.612*	9.947
	(0.511)	(0.356)	(0.354)	(2522.485)

Table 1B *(continued)*

	OLS	Fixed Effects	Random Effects	Tobit
cis_x	-0.762***	0.582**	0.520**	-0.443
	(0.267)	(0.250)	(0.233)	(0.903)
t 2	-0.005	0.184	0.180	0.676
	(0.333)	(0.194)	(0.195)	(0.591)
t 3	-0.252	-0.096	-0.100	0.520
	(0.333)	(0.195)	(0.195)	(0.588)
t 4	-0.079	0.204	0.191	0.984
	(0.332)	(0.196)	(0.195)	(0.618)
t 5	0.083	0.378*	0.376*	1.339**
	(0.332)	(0.196)	(0.195)	(0.634)
t 6	0.044	0.349*	0.356*	0.965
	(0.331)	(0.197)	(0.195)	(0.608)
t 7	-0.119	0.174	0.188	0.843
	(0.332)	(0.198)	(0.195)	(0.611)
t 8	-0.102	0.210	0.229	0.723
	(0.330)	(0.196)	(0.195)	(0.611)
t 9	0.142	0.3445*	0.373*	1.524**
	(0.329)	(0.200)	(0.195)	(0.662)
t 10	0.0283	0.400**	0.433**	0.609
	(0.324)	(0.199)	(0.192)	(0.601)
t 11	-0.132	0.206	0.251	0.569
	(0.323)	(0.200)	(0.192)	(0.596)
t 12	0.019	0.437**	0.492*	0.313
	(0.323)	(0.201)	(0.192)	(0.603)
t 13	0.279	0.707***	0.768***	0.833
	(0.321)	(0.202)	(0.192)	(0.627)
t 14	0.370	0.740***	0.815***	0.973
	(0.322)	(0.207)	(0.197)	(0.642)
t 15	0.515	0.942***	1.019***	0.844
	(0.319)	(0.208)	(0.193)	(0.642)

Table 1B *(continued)*

	OLS	Fixed Effects	Random Effects	Tobit
t 17	0.674**	1.037***	1.1207***	2.327***
	(0.321)	(0.214)	(0.195)	(0.785)
t 18	0.630**	0.984***	1.073***	2.461***
	(0.321)	(0.217)	(0.196)	(0.802)
t 19	0.906***	1.280***	1.371***	3.022***
	(0.324)	(0.222)	(0.198)	(0.882)
t 20	0.801**	1.174***	1.267***	3.195***
	(0.325)	(0.225)	(0.199)	(0.908)
t 21	0.896***	1.292***	1.390***	1.965***
	(0.324)	(0.227)	(0.200)	(0.747)
t 22	0.701**	1.194***	1.287***	1.193*
	(0.319)	(0.228)	(0.198)	(0.688)
t 23	1.024***	1.454***	1.558***	2.298***
	(0.320)	(0.232)	(0.199)	(0.795)
t 24	1.205***	1.615***	1.719***	2.335***
	(0.322)	(0.236)	(0.201)	(0.815)
t 25	1.532***	1.937***	2.033***	2.624***
	(0.322)	(0.241)	(0.202)	(0.879)
t 26	1.722***	2.101***	2.242***	1.512**
	(0.324)	(0.242)	(0.202)	(0.736)
_cons	-2.266**	-16.447***	-1.759	0.484
	(0.935)	(5.134)	(3.267)	(4.705)

	OLS Results
R Squared	0.477
Adjusted R Squared	0.472
Root MSE	2.798
Prob > F	0.000
No. of Observations	3800

	Fixed-effects (within) regression
R Square Within	0.254
R Square Between	0.419
R Square Overall	0.353
Prob >F	0.000
No. of Observations	3800

	Random effects GLS regression
R Square Within	0.253
R Square Between	0.526
R Square Overall	0.452
Prob $>Chi^2$	0.000
No. of Observations	3800

	Random-effects tobit regression
Log Likelihood	-1205.549
Prob $>Chi^2$	0.000
No. of Observations	4175

Table 1C: Total Trade (Export and Import) Flows

	OLS	Fixed Effect	Random Effect	Tobit
exchangerate	-0.035	0.055	0.119***	0.105***
	(.034)	(0.047)	(.043)	(.074)
langdummy	0.305		.540	1.453*
	(.200)		(.166)	(.762)
extplnmfn	0.270*	0.599***	.534***	1.415***
	(.149)	(0.163)	(0.152)	(0.255)
lngdp	1.906***	2.358***	1.816***	1.779***
	(.072)	(0.360)	(.166)	(.200)
lnpop	0.209***	6.471***	.459**	.870***
	(.080)	(0.714)	(.196)	(.197)
lndist	-2.361***		-1.846***	-2.271***
	(.162		(.436)	(.540)
safta_m	-1.774**			
	(.754)			
bimstec_m	2.433***			
	(.887)			
bangkok_m	-1.446***			
	(.469)			
gcc_m	1.355			
	(.978)			
asean_m	4.635*	.876	.733	-1.013
	(2.547)	(1.322)	(1.355)	(2.583)
sacu_m	-1.763826			
	(1.206241)			
mercosur_m	0.300		1.769	1.697
	(.661)		(1.863)	(2.661)
eu_m	2.307***	0.586	1.662**	-8.811***
	(.447)	(1.309)	(.725)	(1.142)
efta_m	-0.918			2.714
	(.809)			(3.099)
nafta_m	-9.027***	-1.135	-2.087	-8.487***
	(1.798)	(1.260)	(1.268)	(1.953)
cis_m	-0.634			
	(.737)			

	OLS	Fixed Effect	Random Effect	Tobit
safta_x		-1.413***	-.395	-.203
		(0.537)	(.524)	(.913)
bimstec_x		1.505 ***	1.291**	2.133**
		(0.570)	(.577)	(1.048)
bangkok_x			-1.704	-1.761
			(1.540)	(2.033)
gcc_x			2.280191	3.985**
			(1.591)	(1.868)
asean_x	-5.910**	-.750	-.327	1.692
	(2.509)	(1.320)	(1.355)	(2.584)
sacu_x			.468	4.184
			(1.883)	(.913)
mercosur_x	-1.190**	1.369**	-.607	-.035
	(.477)	(0.545)	(1.785)	(2.471)
eu_x	-1.552***	-.766	-1.093**	13.141***
	(.451)	(0.492)	(.470)	(.873)
efta_x			-.640	
			(2.207)	
nafta_x	7.702***	.317	.783	7.897***
	(1.892)	(1.138)	(1.159)	(2.009)
cis_x		-.676	-1.175	-.171
		(1.917)	(.981)	(1.441)
t 2	-2.081***	-0.009	0.048	-1.182*
	(.555)	(0.331)	(.340)	(.613)
t 3	-2.706***	-0.760**	-0.608*	-1.628**
	(.559)	(0.335)	(.342)	(.613)
t 4	-2.530***	-0.621*	-0.357	-0.917
	(.550)	(0.334)	(.339)	(.612)
t 5	-2.198***	-0.404	-0.021	-0.507
	(.549)	(0.337)	(.340)	(.613)
t 6	-2.001***	-0.325	0.187	-0.167
	(.545)	(0.340)	(.339)	(.613)
t 7	-1.763***	-0.224	0.406	-0.267
	(.548)	(0.346)	(.341)	(.614)

t 8	-1.700***	-0.260	0.478	2.230***
	(.537)	(0.350)	(.339)	(.617)
t 9	-1.228**	0.003	0.902***	0.020
	(.544)	(0.360)	(.344)	(0.623)
t 10	-1.247**	-0.120	0.888***	2.492***
	(.547)	(0.367)	(.344)	(0.625)
t 11	-0.982*	0.173	1.308***	3.182***
	(.550)	(0.378)	(.348)	(0.632)
t 12	-0.439	0.467	1.664***	3.762***
	(.550)	(0.383)	(.350)	(.640)
t 13	-0.241	0.240	1.483***	3.439***
	(.534)	(0.383)	(.348)	(.633)
t 14	-0.286	0.623	1.929***	3.957***
	(.590)	(0.411)	(.374)	(.679)
t 15	0.240	1.023**	2.459***	4.688***
	(.525)	(0.405)	(.351)	(.638)
t 16	0.612	0.925**	2.545***	4.561***
	(.537)	(0.423)	(.360)	(0.656)
t 17	0.711	1.028**	2.696***	4.989***
	(.523)	(0.425)	(.354)	(0.641)
t 18	0.966	0.932**	2.696***	4.841***
	(.558)	(0.445)	(.370)	(0.672)
t 19	0.665	1.148**	3.003***	4.963***
	(.538)	(0.453)	(.367)	(0.661)
t 20	0.961*	1.102**	3.097***	5.183***
	(.517)	(0.463)	(.365)	(.660)
t 21	1.068**	1.265***	3.327***	5.180***
	(.485)	(0.466)	(.356)	0.632)
t 22	1.239***	1.453***	3.587***	5.986***
	(.452)	(0.469)	(.347)	(0.619)
t 23		1.785***	3.987***	6.030***
		(0.496)	(.373)	(.669)
t 24	2.319***	2.113***	4.493***	6.750***
	(.513)	(0.510)	(.375)	(.674)

t 25	2.738***	2.369***	4.883***	7.431***
	(.469)	(0.518)	(.361)	(.643)
t 26	3.107787	1.532	4.003***	5.745***
	(2.040964)	(1.152)	(1.129)	(2.141)
_cons	4.011**	-130.6***	-5.646	-13.482**
	(1.751)	(14.026)	(4.594)	(6.27)

OLS Results

R Squared	0.674
Adjusted R Squared	0.665
Root MSE	3.482
Prob > F	0.000
No. of Observations	1634

Fixed-effects (within) regression

R Square Within	0.587
R Square Between	0.429
R Square Overall	0.411
Prob >F	0.000
No. of Observations	1634

Random effects GLS regression

R Square Within	0.565
R Square Between	0.654
R Square Overall	0.657
Prob >Chi^2	0.000
No. of Observations	1634

Random-effects tobit regression

Log Likelihood	-4852.159
Prob >Chi^2	0.000
No. of Observations	1758

Table 2A: Labour Intensive Activities, Export sequence 2000-06

Sequence	Count	% of Firms
0 0 0 0 0 0 0	577	30.15
0 0 0 0 0 0 1	16	0.84
0 0 0 0 0 1 0	9	0.47
0 0 0 0 0 1 1	20	1.04
0 0 0 0 1 0 0	6	0.31
0 0 0 0 1 0 1	3	0.16
0 0 0 0 1 1 0	4	0.21
0 0 0 0 1 1 1	12	0.63
0 0 0 1 0 0 0	1	0.05
0 0 0 1 0 1 0	1	0.05
0 0 0 1 1 0 0	4	0.21
0 0 0 1 1 0 1	3	0.16
0 0 0 1 1 1 0	5	0.26
0 0 0 1 1 1 1	13	0.68
0 0 1 0 0 0 0	7	0.37
0 0 1 0 0 0 1	2	0.10
0 0 1 0 0 1 0	1	0.05
0 0 1 0 0 1 1	1	0.05
0 0 1 0 1 0 0	1	0.05
0 0 1 0 1 0 1	2	0.10
0 0 1 0 1 1 1	1	0.05
0 0 1 1 0 0 0	8	0.42
0 0 1 1 0 0 1	1	0.05
0 0 1 1 0 1 0	1	0.05
0 0 1 1 0 1 1	4	0.21
0 0 1 1 1 0 0	1	0.05
0 0 1 1 1 0 1	2	0.10
0 0 1 1 1 1 0	1	0.05
0 0 1 1 1 1 1	12	0.63
0 1 0 0 0 0 0	14	0.73
0 1 0 0 0 1 0	1	0.05
0 1 0 0 1 0 0	2	0.10
0 1 0 0 1 1 0	1	0.05
0 1 0 0 1 1 1	2	0.10
0 1 0 1 0 0 0	2	0.10
0 1 0 1 0 1 1	1	0.05
0 1 0 1 1 0 0	4	0.21
0 1 0 1 1 0 1	1	0.05
0 1 0 1 1 1 0	4	0.21
0 1 0 1 1 1 1	4	0.21
0 1 1 0 0 0 0	4	0.21
0 1 1 0 0 0 1	2	0.10
0 1 1 0 0 1 0	2	0.10
0 1 1 0 0 1 1	1	0.05
0 1 1 0 1 0 0	1	0.05
0 1 1 0 1 1 0	1	0.05
0 1 1 0 1 1 1	2	0.10
0 1 1 1 0 0 0	1	0.05
0 1 1 1 0 0 1	1	0.05
0 1 1 1 0 1 1	2	0.10

0 1 1 1 1 0 0	3	0.16
0 1 1 1 1 0 1	2	0.10
0 1 1 1 1 1 0	4	0.21
0 1 1 1 1 1 1	49	2.56
1 0 0 0 0 0 0	64	3.34
1 0 0 0 0 0 1	1	0.05
1 0 0 0 0 1 0	1	0.05
1 0 0 0 0 1 1	3	0.16
1 0 0 0 1 0 0	4	0.21
1 0 0 0 1 0 1	2	0.10
1 0 0 0 1 1 0	1	0.05
1 0 0 0 1 1 1	4	0.21
1 0 0 1 0 0 0	4	0.21
1 0 0 1 0 1 0	1	0.05
1 0 0 1 0 1 1	2	0.10
1 0 0 1 1 0 0	2	0.10
1 0 0 1 1 1 1	7	0.37
1 0 1 0 0 0 0	5	0.26
1 0 1 0 0 1 1	1	0.05
1 0 1 1 0 0 0	2	0.10
1 0 1 1 0 1 1	2	0.10
1 0 1 1 1 0 0	2	0.10
1 0 1 1 1 0 1	1	0.05
1 0 1 1 1 1 0	5	0.26
1 0 1 1 1 1 1	19	0.99
1 1 0 0 0 0 0	42	2.19
1 1 0 0 0 0 1	4	0.21
1 1 0 0 0 1 1	4	0.21
1 1 0 0 1 0 0	2	0.10
1 1 0 0 1 0 1	1	0.05
1 1 0 0 1 1 1	3	0.16
1 1 0 1 0 0 0	4	0.21
1 1 0 1 0 1 1	1	0.05
1 1 0 1 1 0 1	1	0.05
1 1 0 1 1 1 0	8	0.42
1 1 0 1 1 1 1	26	1.36
1 1 1 0 0 0 0	37	1.93
1 1 1 0 0 0 1	2	0.10
1 1 1 0 0 1 0	1	0.05
1 1 1 0 0 1 1	5	0.26
1 1 1 0 1 0 0	3	0.16
1 1 1 0 1 0 1	1	0.05
1 1 1 0 1 1 0	3	0.16
1 1 1 0 1 1 1	22	1.15
1 1 1 1 0 0 0	26	1.36
1 1 1 1 0 0 1	3	0.16
1 1 1 1 0 1 0	2	0.10
1 1 1 1 0 1 1	19	0.99
1 1 1 1 1 0 0	31	1.62
1 1 1 1 1 0 1	11	0.57
1 1 1 1 1 1 0	56	2.93
1 1 1 1 1 1 1	633	33.07
Total	**1914**	

Table 2B: Manufacturing Activities: Export sequence from 2000-06

Sequence	Count	% of Firms
1111111	716	21.13
0000000	1398	41.26
0000001	75	2.21
0000010	30	0.88
0000011	55	1.62
0000100	22	0.65
0000101	13	0.38
0000110	18	0.53
0000111	47	1.39
0001000	13	0.38
0001001	2	0.06
0001010	2	0.06
0001011	6	0.18
0001100	11	0.32
0001101	6	0.18
0001110	25	0.74
0001111	60	1.77
0010000	15	0.44
0010001	6	0.18
0010010	1	0.03
0010011	2	0.06
0010100	4	0.12
0010101	2	0.06
0010111	5	0.15
0011000	17	0.50
0011001	3	0.09
0011010	2	0.06
0011011	6	0.18
0011100	4	0.12
0011101	4	0.12
0011110	7	0.21
0001110	25	0.74
1001000	5	0.15
0100001	1	0.03
1011111	27	0.80
0100010	1	0.03
0100111	4	0.12
0110010	1	0.03
0110011	2	0.06
0111110	21	0.62
1011000	5	0.15
0101100	6	0.18
0111000	10	0.30
1010010	1	0.03
0101001	2	0.06
0110110	2	0.06
1010101	1	0.03
1001001	1	0.03
0111111	71	2.10
1011011	5	0.15

0111100	13	0.38
1000100	3	0.09
1010111	2	0.06
0100110	3	0.09
1100011	4	0.12
0101101	2	0.06
1011101	1	0.03
0101000	1	0.03
0101111	10	0.30
1001011	2	0.06
0111101	7	0.21
0111011	2	0.06
0110000	11	0.32
1010000	13	0.38
0111001	4	0.12
1000000	95	2.80
1000011	1	0.03
0100100	4	0.12
0101011	2	0.06
1000110	2	0.06
1101110	6	0.18
1101100	4	0.12
1111110	64	1.89
1111101	19	0.56
1111100	34	1.00
1111011	25	0.74
1111010	5	0.15
1111001	4	0.12
1111000	37	1.09
1110101	4	0.12
1001110	3	0.09
1100110	2	0.06
0110111	5	0.15
0100000	27	0.80
0000010	30	0.89
0011111	44	1.30
0101010	1	0.03
0101110	4	0.12
0110001	2	0.06
0110100	2	0.06
1000001	2	0.06
1000111	7	0.21
1001010	2	0.06
1001100	1	0.03
1001111	12	0.35
1011010	1	0.03
1011100	4	0.12
1011110	5	0.15
1100000	54	1.60
1100001	6	0.18
1100100	5	0.15
1100101	2	0.06
1100111	7	0.21

1101000	8	0.24
Total Plants	3388	

Table 3: Labour Intensive Activities: The Decision to Export

Table 3A: Probit Model

Explanatory Variable	**Model I**	**Model II**	**Model II**	**Model IV**
Lagex	0.02***(0.00)		0.03*** (0.00)	
Scale $_{it-1}$				0.00*** (0.00)
Energy $_{it-1}$			-0.00 (0.00)	
Wage $_{it-1}$	-0.01*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)
LP $_{it-1}$	0.18** (0.07)			
RD $_{it-1}$	0.55*** (0.08)			0.57*** (0.08)
SelCost $_{it-1}$	-0.07 (0.01)	0.14** (0.00)	-0.08 (0.01)	-0.12 (0.00)
Profit $_{it-1}$	0.00** (0.00)	0.00*** (0.00)	0.00** (0.00)	0.00*** (0.00)
NFA $_{it-1}$	-0.00** (0.00)	-0.00 (0.00)	-0.00** (0.00)	-0.00** (0.00)
Wshare1 $_{it-1}$		0.00*** (0.00)		
IMP $_{it-1}$		0.01*** (0.00)		0.00*** (0.00)
Intercept	0.24*** (0.02)	0.54*** (0.02)	0.25*** (0.02)	0.30*** (0.02)
R^2	0.16	0.05	0.15	0.09

Note: standard error in parenthesis;
* significant at 10 percent, ** significant at 5 percent, *** significant at 1 percent
Dependent variable Y = 1 for exporting years
= 0 for non-exporting years

Table 3B: Logit Model

Explanatory Variable	**Model I**	**Model II**	**Model II**	**Model IV**
Lagex	0.09***(0.00)			0.08***(0.01)
Scale $_{it-1}$		0.01***(0.00)		
Energy $_{it-1}$	-0.00**(0.00)			
Wage $_{it-1}$	-0.01***(0.00)	-0.02***(0.00)	-0.02***(0.00)	-0.02***(0.00)
LP $_{it-1}$				0.39**(0.15)
RD $_{it-1}$		1.07***(0.19)		1.30***(0.19)
SelCost $_{it-1}$	-0.00(0.00)	-0.00(0.00)	0.00**(0.00)	-0.00(0.00)
Profit $_{it-1}$	0.00**(0.00)	0.00*(0.00)	0.00***(0.00)	0.00**(0.00)
NFA $_{it-1}$	-0.00*(0.00)	-0.00**(0.00)	-0.00(0.00)	-0.00*(0.00)
WS $_{it-1}$			0.00***(0.00)	
IMP $_{it-1}$	0.00***(0.00)	0.00***(0.00)	0.01***(0.00)	0.00***(0.00)
Intercept	0.24**(0.04)	0.35***(0.04)	0.20***(0.04)	0.21***(0.05)
R^2	0.16	0.11	0.06	0.19

Note: standard error in parenthesis;
* significant at 10 percent, ** significant at 5 percent, *** significant at 1 percent
Dependent variable Y = 1 for exporting years
= 0 for non-exporting years

Table 3C: Tobit Model

Explanatory variables	Model I	Model II	Model III	Model IV
Lag EX	0.19***(0.01)			0.19***(0.00)
$Energy_{it-1}$	-0.00(0.00)			
$Wage_{it-1}$	-0.73***(0.06)	-0.86***(0.06)	-0.94***(0.06)	-0.71**(0.06)
RD_{it-1}		0.24(0.61)		0.11(0.59)
$SelCost_{it-1}$	0.00(0.00)	0.00(0.00)	0.00(0.00)	-0.00(0.00)
$Profit_{it-1}$	0.00***(0.00)	0.00(0.00)	0.00***(0.00)	1.68(2.09)
LP_{it-1}				0.44(0.39)
IMP_{it-1}	0.00**(0.00)		0.01***(0.00)	
$Size_{it-1}$		0.03***(0.00)		
$Wshare_{it-1}$			0.01**(0.00)	
NFA_{it-1}	-0.00(0.00)	-0.00*(0.00)	-0.00(0.00)	-0.00**(0.00)
Constant	14.05***(0.78)	15.88***(0.87)	19.05***(0.79)	14.79***(0.82)
R^2	0.02	0.01	0.01	0.02

Note: standard error in parenthesis
Dependent variable = 0 for the non-exporting years
and export as percentage of total sales if they did export in period t.

Table 3D: Linear Probability Model

Explanatory Variable	Fixed Effects
No. of employee	-0.00 (0.00)
NFA/employ	-4.433(1.526)***
Wage	-0.00 (0.00)
R&D	4.48 (1.24)***
LP	25.012(4.41) ***
Selcost	2.488(0.169)***
Profit	0.04(0.05)
Intercept	14.306(1.24) ***

Table 4: Manufacturing Sector

Table 4A: CMIE Data, Logit And Probit Models

Explanatory variables	**Logit**	**Probit**
$Scale_{it-1}$	0.00***(0.00)	0.01*** (0.00)
$Energy_{it-1}$	-0.03***(0.00)	-0.02*** (0.00)
$Wage_{it-1}$	-0.01***(0.00)	-0.01*** (0.00)
$R\&D_{it-1}$	0.01***(0.00)	0.01*** (0.00)
PBT_{it-1}	-0.00(0.00)	-0.00 (0.00)
IMP_{it-1}	0.02***(0.00)	0.01*** (0.00)
$Wshare_{it-1}$	-0.00(0.00)	0.00*(0.00)
$Sellcost_{it-1}$	0.001(0.00)	0.01** (0.00)
NFA_{it-1}	-0.001***(.000)	-0.00*** (0.00)
_cons	0.34***(0.03)	0.36*** (0.01)
R^2	0.13	0.09
No. of obs.	17167	17167

Note: Std Error in the parentheses
* Significant at 10 percent, ** significant at 5 percent, *** significant at 1 percent
Dependent variable Y = 1 for exporting years;
= 0 for non-exporting years

Table 4B: CMIE Data, Tobit Model

Explanatory variables	**Model I**	**Model II**
LagEx		0.02***(0.00)
$Scale_{it-1}$	0.00 (0.00)	
$Energy_{it-1}$	-0.01***(0.00)	-0.01*** (0.00)
$Wage_{it-1}$	-0.01***(0.00)	-0.00*** (0.00)
$R\&D_{it-1}$	0.01(0.00)	0.01 (0.00)
PBT_{it-1}	-0.00(0.00)	-0.00 (0.00)
IMP_{it-1}	0.02***(0.00)	0.01*** (0.00)
$Wshare_{it-1}$	0.03***(0.00)	0.02***(0.00)
$Sellcost_{it-1}$	0.001(0.00)	-0.01 (0.00)
NFA_{it-1}	-0.001(.000)	-0.00 (0.00)
_cons	4.73***(0.05)	4.44*** (0.05)
No. of obs.	17167	17167

Note: Std Error in parentheses
* Significant at 10 percent, ** significant at 5 percent, *** significant at 1 percent

For Tobit Model: Dependent variable = 0 for the non-exporting years
Export as percentage of total sales if they did export in period t.

Table 4C: Manufacturing Activities (CII data): Probit and Logit Model

Variables	Probit Model	Logit Model
Scale	0.57*** (0.20)	0.99*** (0.35)
Own	0.86***(0.19)	1.50*** (0.34)
Sale/no of emp	-0.42(0.58)	-0.74(0.95)
CP	-5.00e-07(1.55e-06)	-2.80e-07(9.75e-07)
Const	0.07(0.09)	0.11(0.15)

Note: standard error in parenthesis
Dependent variable = 1 for exporting firms and
= 0 for non-exporting firms
Scale is a dummy that takes value 1 if it is a large firm and 0 otherwise
Own is a dummy variable which is equal to 1 if firm either have a JV/Collaboration /foreign parent and 0 otherwise
C P (capital productivity) = total turnover/ investment

Table 4D: Manufacturing Activities (CII data), Tobit Model

Variables	Tobit Model
Scale	1.80***(0.94)
Own	2.39***(0.85)
Sale/no of emp	-0.23(2.88)
CP	-2.30e-07 (4.74e-06)
Const	4.82***(0.48)

Note: standard error in parenthesis
Dependent variable = 0 for the non-exporting years
Export as percentage of total sales if they did export in period t.
Scale is a dummy that takes value = 1 if it is a large firm
and = 0 otherwise
Own is a dummy that takes value = 1 if firm either have a JV/Collaboration /foreign parent and 0 otherwise
CP (capital productivity) = total turnover/ investment

Table 5: Multinomial Logistic Model of Logodds

Table 5A: Model I

Log Odds of Category j Relative to Category 3, *j* = 1, 2 and 4			
	Category 3 and 1	Category 3 and 2	Category 3 and 4
Scale	0.007*** (0.002)	0.016*** (0.001)	0.011*** (0.00)
Wage	-0.035*** (0.011)	-0.022*** (0.002)	-0.00 (0.00)
R&D	0.893** (0.418)	1.212*** (0.230)	0.253 (0.223)
Sel Cost	-0.133*** (0.034)	0.003** (0.001)	0.004*** (0.00)
Profit	0.001(0.00)	0.001*** (0.00)	0.00* (0.00)
NFA	-0.00 (0.00)	-0.01*** (0.00)	-0.00 (0.00)
IMP	0.001*** (0.00)	0.001*** (0.00)	-0.001 (0.001)
Const	-1.356*** (0.156)	0.673*** (0.059)	-0.491*** (0.063)
Pseudo R^2	0.093	0.093	0.093

Here,

η_{1i} = -1.356 + 0.007 *$Scale_i$ – 0.035*W_i + 0.893* RD_i – 0.133* $Selcost_i$ + 0.001* P_i – 0.000* NFA_i + 0.001* Imp_i

η_{2i} = -0.673 + 0.016 *$Scale_i$ – 0.022*W_i + 1.212* RD_i + 0.003* $Selcost_i$ + 0.001* P_i – 0.000* NFA_i + 0.001* Imp_i

η_{4i} = -0.491 + 0.011 *$Scale_i$ – 0.000*W_i + 0.253* RD_i + 0.004* $Selcost_i$ + 0.000* P_i – 0.000* NFA_i - 0.001* Imp_i

The average values of the explanatory variables are:

Variables	**mean**
Scale	51.98795
W	21.83567
RD	0.064151
Selcost	13.34933
P	-71.0495
NFA	2.212833
Imp	27.13816

From the above we get:

$\boldsymbol{\eta_1}$ = -1.356 + 0.007 *51.98 – 0.035*21.83 + 0.893* 0.064 – 0.133* 13.349 + 0.001* (-71.049) – 0.000* 2.21 + 0.001* 27.13 = **-3.47974**

$\boldsymbol{\eta_2}$ = -0.673 + 0.016 *51.98 – 0.022*21.83 + 1.212* 0.064 + 0.003* 13.349 + 0.001* (-71.049) – 0.000* 2.21 + 0.001* 2.21 = **1.189427**

$\boldsymbol{\eta_4}$ = -0.491 + 0.011 *51.98 – 0.000*21.83 + 0.253* 0.064 + 0.004* 13.349 + 0.000* (-71.049) – 0.000* 2.21 - 0.001* 27.13 = **0.0870501**

From these we can compute the probabilities as:

Pr (Category = 1) = exp (η_1) / 1+ exp (η_1) + exp (η_2) + exp (η_4) = exp (-3.47974) / 1+ exp (-3.47974) + exp (1.189427) + exp (0.0870501) = **<u>0.005699</u>**

Pr (Category =2) = exp (η_2) / 1+ exp (η_1) + exp (η_2) + exp (η_4) = exp (1.189427) / 1+ exp (-3.47974) + exp (1.189427) + exp (0.0870501) = **<u>0.607586</u>**

Pr (Category =4) = exp (η_4) / 1+ exp (η_1) + exp (η_2) + exp (η_4) = exp ((0.0870501) / 1+ exp (-3.47974) + exp (1.189427) + exp (0.0870501) = **<u>0.201768</u>**

Pr (Category =3) = 1 / 1+ exp (η_1) + exp (η_2) + exp (η_4) = 1 / 1+ exp (-3.47974) + exp (1.189427) + exp (0.0870501) = **<u>0.184947</u>**

Table 5B: MODEL II

Log Odds of Category j Relative to Category 3			
	Category 3 and 1	Category 3 and 2	Category 3 and 4
Wage	-0.026*** (0.010)	-0.023*** (0.002)	-0.001*** (0.00)
Sel Cost	-0.15*** (0.037)	0.007*** (0.002)	0.006*** (0.002)
Profit	0.00 (0.00)	0.001*** (0.00)	0.00 (0.00)
NFA	-0.001***(0.00)	-0.001*** (0.00)	-0.001*** (0.00)
NVA/W	0.003 (0.00)	0.005*** (0.001)	-0.007** (0.003)
IMP	0.005*** (0.001)	0.005*** (0.001)	-0.006*** (0.003)
Const	-1.16*** (0.0147)	1.457*** (0.048)	-0.077 (0.053)
Pseudo R^2	0.045	0.045	0.045
No. of obs	5384	5384	5384

Similarly with the same argument as before the probabilities for different categories for model II are as follows:

Pr (category 1/ Z_1, Z_2, --------- Z_k) = 0.009113533

Pr (category 2/ Z_1, Z_2, --------- Z_k) = 0.395313519

Pr (category 4/ Z_1, Z_2, --------- Z_k) = 0.263265701

Pr (Category 3/ Z_1, Z_2, --------- Z_k) = 0.332307247

Table 5C: MODEL III

Log Odds of Category j Relative to Category 3			
	Category 3 and 1	Category 3 and 2	Category 3 and 4
LagEx	-0.011 (0.091)	0.501*** (0.036)	0.457*** (0.036)
Wage	-0.037*** 0.011	-0.011*** (0.002)	-0.000* (0.00)
NVA/W	0.163 (0.318)	0.222 (0.175)	-0.070 (0.233)
R&D	0.897*** (0.379)	1.166*** (0.235)	0.138 (0.231)
Sel Cost	-0.033 (0.026)	0.003** (0.001)	0.003*** (0.001)
Profit	0.00 (0.00)	-0.00* (0.00)	8.86E-05 (0.00)
NFA	0.00 (0.00)	-0.001*** (0.00)	-3.6E-05 (0.00)
IMP	0.002 (0.002)	0.007*** (0.001)	-0.00 (0.001)
Const	-1.404*** (0.138)	0.258*** (0.057)	-0.745*** (0.058)
Pseudo R^2			

Similarly with the same argument as before the probabilities for different categories for model III are as follows:

Pr (category 1/ Z_1, Z_2, --------- Z_k) = 0.0000544

Pr (category 2/ Z_1, Z_2, --------- Z_k) = 0.840455725

Pr (category 4/ Z_1, Z_2, --------- Z_k) = 0.158680631

Pr (Category 3/ Z_1, Z_2, --------- Z_k) = 0.000809

Table 5D: MODEL IV

Log Odds of Category j Relative to Category 3			
	Category 3 and 1	Category 3 and 2	Category 3 and 4
LagEx	0.307*** (0.036)	0.507*** (0.034)	0.457*** (0.034)
Energy	-0.017*** (0.004)	0.000 (0.003)	0.004 (0.004)
Wage	0.001*** (0.000)	-0.010*** (0.002)	0.000 (0.001)
Sel cost	0.001 (0.001)	0.000 (0.001)	0.002*** (0.001)
Profit	0.001 (0.001)	0.000 (0.000)	0.000*** (0.000)
IMP	0.071*** (0.005)	0.007 (0.005)	0.000 (0.006)
Const	-1.436*** (0.076)	0.096 (0.060)	-0.885***(0.065)
Pseudo R^2			

Similarly as analyzed previously, the probabilities for different categories are:

Pr (category 1) = 0.08253465

Pr (category 2) = 0.75683073

Pr (category 4) = 0.159717171

Pr (Category 3) = 0.000917444

Appendix: Table A: List of RTAs Covered

SACU	GCC	BIMSTEC	Bangkok	EFTA
South Africa	Bahrain	Bangladesh	Bangladesh	Norway
Lesotho	Kuwait	Bhutan	Laos	Switzerland
Swaziland	Oman	Nepal	Republic of Korea	Iceland
Botswana	Qatar	Sri Lanka	Sri Lanka	Liechtenstein
Namibia	UAE	Thailand	Philippines	
		Myanmar	Thailand	
		India	India	

ASEAN	SAFTA	MERCOSUR	CIS	NAFTA	EU
Indonesia	India	Spain	Azerbaijan	Canada	Austria
Malaysia	Bangladesh	Portugal	Armenia	USA	Belgium
Philippines	Bhutan	Brazil	Belarus	Mexico	Bulgaria
Singapore	Nepal	Argentina	Georgia		Cyprus
Thailand	Sri Lanka	Uruguay	Kazakhstan		Czech Republic
Brunei	Pakistan	Paraguay	Kyrgyz		Denmark
Vietnam	Maldives	Bolivia	Moldova		Estonia
Lao PDR		Chile	Russia		Finland
Myanmar		Columbia	Tajikistan		France
Cambodia		Ecuador	Uzbekistan		Germany
		Peru	Ukraine		Greece
					Hungary
					Ireland
					Italy
					Latvia
					Lithuania
					Luxembourg
					Malta
					Netherlands
					Poland
					Portugal
					Romania
					Slovakia
					Slovenia
					Spain
					Sweden
					United Kingdom

Appendix: Table B: Export of Principal Commodities (in US $) from India (April-February, 2005-06 and 2006-07)

(US $ Million)				
	April-February			
Commodities	2005-06	2006-07	% Growth	% Share
I. Plantation	**673.75**	**787.85**	**16.94**	**0.7**
1. Tea	359.25	409.61	14.02	0.36
2. Coffee	314.5	378.24	20.27	0.34
II. Agri & Allied Products	**6365.16**	**7492.72**	**17.71**	**6.66**
III. Marine Products	**1446.44**	**1413.53**	**-2.28**	**1.26**
IV. Ores & Minerals	**5283.2**	**5959.08**	**12.79**	**5.3**
V. Leather & Mfrs.	**2434.8**	**2657.68**	**9.15**	**2.36**
1. Footwear	947.27	1124.53	18.71	1
2. Leather & mfrs.	1487.54	1533.15	3.07	1.36
VI. Gems & Jewellery	**13867.33**	**13785**	**-0.59**	**12.26**
VII. Sports Goods	**120.35**	**116.56**	**-3.15**	**0.1**
VIII. Chemicals & Related Products	**13823.27**	**15787.94**	**14.21**	**14.04**
1. Basic chemls., Pharma & cosmetics	7971.03	9223	15.71	8.2
2. Plastics & Linoleum	2539.82	2892.45	13.88	2.57
3. Rubber, glass & other products	2664.88	3008.09	12.88	2.68
4. Residual chemls. & allied products	647.54	664.39	2.6	0.59
IX. Engineering Goods	**16860.21**	**23171.06**	**37.43**	**20.61**
A. Machinery	**8375.28**	**10251.05**	**22.4**	**9.12**
1. Machine tools	207.02	212.47	2.64	0.19
2. Machinery & Instruments	4468.17	5839.53	30.69	5.19
3. Transport equipments	3700.09	4199.04	13.48	3.73
B. Iron and Steel	**3134.38**	**4680.62**	**49.33**	**4.16**
C. Other Engineering items	**5350.54**	**8239.39**	**53.99**	**7.33**
1. Ferro Alloys	227.81	312.19	37.04	0.28
2. Aluminium other than prods.	180.52	262.37	45.34	0.23
3. Non-ferrous metals	1112.46	3154.76	183.58	2.81
4. Manufacture of metals	3767.87	4439.47	17.82	3.95
5. Residual Engineering Items	61.89	70.61	14.09	0.06
X. Electronic Goods	**1994.56**	**2569.2**	**28.81**	**2.29**
1. Electronics	1910.51	2522.76	32.05	2.24
2. Computer Software in physical form	84.06	46.44	-44.75	0.04
XI. Project Goods	**134.84**	**90.88**	**-32.6**	**0.08**
XII. Textiles	**13836.19**	**14467.43**	**4.56**	**12.87**
1. Readymade garments	7626.46	7844.17	2.85	6.98
2. Cotton, yarn, fabrics, made-ups, etc.	3533.86	3674.37	3.98	3.27
3. Manmade textiles made-ups, etc.	1813.95	2104.62	16.02	1.87
4. Natural silk textiles	394.29	396.32	0.51	0.35
5. Wool & woollen mfrs.	77.15	75.36	-2.33	0.07
6. Coir & coir mfrs.	122.28	129.26	5.71	0.11
7. Jute mfrs.	268.18	243.34	-9.26	0.22

XIII. Handicrafts	**421.93**	**339**	**-19.65**	**0.3**
XIV. Carpets	**762.5**	**812.92**	**6.61**	**0.72**
XV. Cotton Raw Incl. Waste	**504.63**	**1107.29**	**119.43**	**0.98**
XVI. Petroleum Products	**10624.02**	**16889.83**	**58.98**	**15.02**
XVII. Unclassified Exports	**2299.34**	**4989.7**	**117.01**	**4.44**
Grand Total	**91452.54**	**112437.68**	**22.95**	**100**

Source: Ministry of Commerce & Industry, Govt. of India
Note: US Dollar Exchange Rate of April-February 2005-06 is 44.2546 and April-February 2006-07 is 45.4019

Appendix Table C:

Table E.4: Share and Growth of India's Major Export Commodities (April-December, % $ Value)

Commodity/ Commodity Groups	Share in Total Exports		Growth Rate	
	2004-05	2005-06	2004-05	2005-06
I. Agricultural & Allied Products	10.2	9.8	12.2	22.7
II. Ores & Minerals	5.0	5.5	92.1	41.9
III. Manufactured Goods *of which*	73.3	70.0	19.5	22.2
1. Leather & Leather Manufactures	3.0	2.7	11.6	12.6
2. Chemicals & Related Products	9.6	9.6	17.4	27.2
3. Engineering Goods	20.4	20.5	33.4	28.7
4.Textiles (excl RMG)	8.0	6.8	6.5	9.0
5. Readymade Garments (RMG)	7.8	8.1	2.3	34.1
6. Gems and Jewellary	16.7	15.4	17.5	18.1
7. Handicrafts	0.5	0.4	-25.2	10.3
8. Carpets	0.8	0.8	6.0	31.5
9. Other Manufactured Products	6.4	5.5	47.7	9.9
IV.Petroleum & Crude Products	8.8	11.2	92.4	63.5
V. Other Commodities	2.7	3.5	23.1	64.6
All Commodities	100.0	100.0	25.3	28.0
USD per SDR*			4.8	-1.1
REER (Appreciation/ Depreciation)#			-1.1	3.2

* A negative/positive sign indicates appreciation/depreciation of the US Dollar vis-à-vis SDR
# A positive/negative sign indicates appreciation/depreciation of the Indian Rupee
Source: DGCI&S