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

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Abstract

This paper contributes to two strands of literature on empirical models of trade flows and trade policy. The first and the older strand is that of gravity models of bilateral trade flows going back to Hans Linneman (1966) and Tinbergen (1962) and its recent applications, particularly by Adams et al (2003) and De Rosa (2007) in analyzing the impact of Preferential Trade Agreements (PTAs). Our focus is on applying the gravity model to analyze India's trade flows (exports and imports) with its trading partners around the world and to examine the impact of various PTAs in which India or its trading partner or both are members. Clearly this is of interest, since, from 1991 India is aggressively negotiating and concluding PTAs of which South Asian preferential trade (and later free trade) agreement is the most prominent. We find that India is not well served by its pursuit of PTAs and should instead push for multilateral trade liberalisation by contributing to conclusion of the Doha round of negotiations with an agreement beneficial to all WTO members.

The second and the more recent strand is the analysis of trade flows using data on exports of individual firms. It is well known that in all countries of the world relatively few firms participate in world trade, thus suggesting that characteristics of a firm (such as its size and productivity) are relevant besides country level barriers on trade matter for participation in world trade. This strand is rapidly growing. Ours is one of the very few attempts at modeling and estimating the decision of Indian firms on their participation using firm level data. The paper reports on our preliminary results. We have also collected primary data from a sample survey of firms to explore this issue deeper. While these data are yet to be fully analyzed, nevertheless some preliminary descriptive tables summarizing them are included in an Appendix.

Keywords:* *PTAs/RTAs, *Non-discriminatory trade liberalisation, Gravity model, Intrabloc trade effect, Trade diversion, Trade creation, Firm heterogeneity, Probability of exporting, Export performance, Logit, Probit, Fixed effect, Random effect, Tobit model, firm-specific effect, sunk cost, Hazard model.*

JEL Classifications: *F13, F14, F21.*

India in the Global and Regional Trade: Determinants of Aggregate and Bilateral Trade Flows and Firms' Decision to Export[1]

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1. Introduction

The standard theoretical 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 across sectors each of which produces a homogeneous commodity is determined by comparative advantage, which in turn, is driven by inter-country differences in technology in the Ricardian model and 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 large empirical literature on international trade for decades was based on aggregate data at sectoral and country levels after the Second World War and 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, without necessarily basing such flows in a theoretical model. In fact theoretical foundation for the gravity model (e.g. Anderson (1979), Deardorff (1998) and others) were developed much later than their use in empirical analysis, which was motivated primarily by analogy with Newtonian theory of forces of attraction and repulsion.

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 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 trade theory in the 1980s, by introducing economies of scale at the firm level and consumer preference for consumption of different varieties of the same commodity (or alternatively productivity enhancing effect of the use of many varieties of the same commodity as inputs of production) provided a theory of intra-industry trade (i.e. trade in differentiated products of the same

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industry) and also a motive for 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 flows of aggregate output and trade. The firm level data on production and trade showed 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. report that research dating back to mid 1990s, based on the firm level data on production and trade of a wide range of countries and industries found 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 recent and growing strand of the literature using Indian data. For nearly four decades since independence in 1947 India followed an industrialization strategy that insulated, through import restrictions and capacity licensing domestic firms both from competition and from imports and from each other. Import restrictions raised the prices of imported intermediates final goods. They had varied impacts on the rates of the effective protection depending on the share of intermediates in costs as well as in tariff rates on the final and intermediate products. In the mid-eighties a hesitant and limited relaxation of insulation from import and domestic competition was initiated. However the Indian import substitution policy regime was complex that, even in periods of severe import restrictions, allowed incentives for the exporters through various schemes including marketable entitlements for scarce imports, favourable exchange rates, and tariff rebates on imported intermediates they used (and also access to them of domestically produced intermediates at world prices) so that exporters faced close to world prices for their export sales and purchase of intermediates. Unfortunately the complexity of the regime was such that it varied across industries over time and even across firms due both heterogeneity among firms on input-output structure and to the discretionary, rather than rule based, nature of the import licensing regime, so that otherwise identical firms were not necessarily treated as the same way. Early analyses of this complex regime were in Bhagwati and Desai (1970) and Bhagwati and Srinivasan (1975). The post reform era is covered in Srinivasan and Tendulkar (2003), and Panagariya (2008) among others. A severe macro-economic and balance of payment crisis in 1991 led to an extensive and systemic break from the insulation strategy and opened the economy to import competition and to foreign direct investment. Aggregate real GDP growth accelerated, starting 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, using gravity models and contributes to the strand of literature using such models for the same purpose.

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 Indian Economy (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. Brief Review of Literature

2.1 Gravity Models of Bilateral Trade Flows

An extensively used empirical model dating back to the 1960s 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, 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 infer the welfare impacts on a country or on the members as a whole and on non-members of membership (in a RTA/PTA) from its trade diverting/ trade creating features alone. This cautionary 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. In Newtonian model a forces of attraction and repulsion could be very small but never zero, whereas bilateral trade flows could be (and often are) zero. Zeros may also be the result of the rounding errors if trade did not reach a minimum value. These zero observations in the dependent variable, bilateral trade flows creates a problem for the use of log-linear form of the gravity equation. Several methods, some purely empirical and others theoretically founded have been developed to deal with this problem, for example see Melitz et al (2008), Silva and Tenreyro (2006), Frankel (1997). 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 gravity model based studies which attempt to estimate the effect on bilateral trade flows of membership in PTAs is Soloaga and Winters (2001). 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 standard 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):

$$\sum_k b_k P_{ki} P_{kj} + \sum_k m_k P_{ki} + \sum_k n_k P_{kj} \tag{1}$$

where P_{ki} (P_{kj}) = 1 if country i(j) is a member of the k^{th} PTA (Soloaga and Winters consider nine PTAs) and zero otherwise. Thus b_k measures the <u>intrabloc effect</u>, i.e., the extent to which bilateral trade flow between i and j because of preferential trade liberalisation from both i and j being a member of PTA block k is larger than expected had trade liberalization been non-discriminatory and multilateral, 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 non-preferential trade liberalization by a country from the effect of preferential liberalisation through 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 same bloc and n_k measures the effect of j being in the bloc whether or not i is a member, $m_k + n_k + b_k$ measures the effect of both i and j being members of the same bloc. The last is the traditional intrabloc trade effect. Put another way m_k and n_k combine the effects of non-discriminatory trade liberalization and the effects of trade diversion from one of the trading partners being member of some PTA. while b_k measures the effect on <u>intra bloc</u> trade of a PTA of both being members of the same PTA over and above the effects of non-discriminatory liberalisation. 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 <u>all its trading partners</u> including with members of SAFTA. Then m_k and n_k represent the combined effect of Indian 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 way of capturing the effect of a PTA, Soloaga and Winters (2001) apply their model to annual data on non-fuel imports for 58 countries for the period 1980-96.

Adams et al (2003) is notable for its being comprehensive: they review the theory of PTAs and empirical evidence on them by recognizing the distinct features of the three waves of PTA formation starting from the 1950s, existing empirical evidence, before moving on to their own empirical analysis based on more recent data, and importantly analyzing the impact of non-trade provisions for investment etc in the PTAs of the most recent third waves. 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 PTAs, considered by them in detail, as many as 12 <u>have diverted more trade from non-members</u> than they <u>have created among members</u>. These trade diverting PTAs, surprisingly include the more liberal ones such as EU, NAFTA and MERCOSOUR;[4] 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) critically examines the findings of Adams et al. (2003) by using a variant of the gravity model of Andrew Rose (2002) and incorporating Soloaga and Winters (2001) dummies for PTA membership. His updated data cover the period 1970-99 and 20 PTAs, as compared to 1970-97 and 18 in Adams et al and 9 in Soloaga and Winters (2001). Although the author did not find any major faults in the methodology of Adams at all (2003), he comes to a conclusion diametrically 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 countries included 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) but only for India's trade flows. We have included a total of 21 PTAs, some of which are bilateral trade agreements.

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

$$\begin{aligned} Log\,X_{jt} &= a_0 + a_1\,Log(GDP_{jt}) + a_2\,Log(Pop_{jt}) + a_3\,Log(Distance\,j) + a_4\,LogTR_{jt} \\ &+ a_5 RER_{jt} + a_6 Lang_{jt} + a_7 D(t) + \Sigma b_k P_{kjt} + \Sigma m_k P_{kit} + e_{jt} \end{aligned} \tag{2}$$

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

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

4 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, Boli via, Chile, Colombia, Ecuador and Peru have associate member status in MERCOSUR since 2006.

Distance j	= Distance between India and country j. Distance is measured as the average of distance between major ports of India and j.
TR_{jt}	= Average effective import tariff rate of 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 observations of year t and zero otherwise.
Pk_{jt}	= A dummy taking the value 1 if country j is a member of kth 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 kth PTA in year t.
e_{jt}	= Independently and Identically Normally Distributed Random error term with mean zero and constant variance.

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 b_k combines the parameters b_k and n_k of the 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 a_1, a_2 and a_6 is positive and that of a_3 and a_4 is negative. There are no prior expected signs for the other coefficients.

2.2. Determinants of Export Decision 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 economists who formulated the "new new" trade theory noted the observed heterogeneity between firms and argued that this heterogeneity affected overall output and trade flows. 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 among destinations and in value, the infrequency of export activity across firms, 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 among firms, it shows that it occurs in all manufacturing sectors in US. Exporting is more frequent in skill-intensive sectors than in 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 exports and ship many products to many destinations. Firms importing activity is relatively rarer than firms exporting activity, still 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. For a possible explanation of this one has to understand the role of transportation costs as proxied by the distance in gravity models as contrast with the standard "icerberg melting" formulation of transportation costs first proposed by Samuelson long ago.

The iceberg approach assumes that a certain fraction of a good melts away during its transport from its origin of production to its final destination as exports. Thus for one unit to be sold at the destination more than one unit has to be produced at the origin, the difference, which depends on the fraction that melts away, represents transportation costs valued in terms of unit cost of production, which does not depend on the price at destination.

Thus given its destination price, the attractiveness of a good as an export will be greater lower the fraction of it that melts away and higher its production cost. On the other hand, if the cost of transporting a good depends not on its production cost as in the iceberg (given the melting fraction) but on its bulk or weight, then given its destination price, it will be more attractive to export the lower is its weight or bulk. Alternatively given unit weight or bulk the more attractive it will be to export these goods that fetch higher values at the destination. The distance in the gravity model is closer in spirit in capturing weight or bulk related transportation costs than in the iceberg model.

An examination of the firm level evidence also reveals that exporters differ from non-exporters. The findings of Bernard et al (2007) 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. 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 show 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.

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 other 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 firm 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 firm characteristics are important and find that firm size, firm 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 mechanism 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.

India as a country is presumed to be relatively unskilled labour abundant and hence, its comparative advantage lies in industries using unskilled labour intensively. These industries suffered as expected from the foreign trade regime ignoring comparative advantage considerations. Besides other domestic interventions such as labour laws, education system and myriad others also discriminated against them. Moreover the liberalisation of the trade regime in the eighties and nineties did not liberalize the domestic intervention to a significant extent. In the comparison of China's and India's trade liberalization by Srinivasan (2002), India gained far less than China in gaining market share not only in global merchandise trade, but also in labour intensive exports. Given these aggregate facts, this section presents models determinants of exports in labour intensive manufacturing in India and also firms in manufacturing activities whether or not they are labour intensive in the sense have a higher capital/labour ratio as compared to the average for all firms in the sample.

This section identifies and quantifies the factors that increase the probability of exporting decision (probability of exporting) and exporting performance (quantity of exports) in the labour intensive sectors and in all 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 firm 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:

$$Y_{it}^{*} = a + bX_{it-1} + qY_{it-1} + m_{it} \text{ where} \qquad (3)$$

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

= 0 otherwise, with prob (Y_{it} = 1) = Prob (Y_{it}^{*} > 0)

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, conditional on exporting. The structure of the Tobit model would be balanced panel data.

Y_{it} = Yit* 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 between India and 189 countries. Data on GDP, GDP per capita, population, total exports, total imports and exchange rates were 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, India's exports, imports and total trade are measured in million constant (1995) US dollars. Population of the countries are considered in million. Data on the exchange rates are units in US $ per unit of national currency. Tariff rates both as effective applied rate, and MFN have been collected from WTO (2008).

MFN Tariff

The MFN tariff rates are taken from UNCTAD Handbook of Statistics database "Average applied import tariff rates on non-agricultural and non-fuel products." Our MFN tariffs are simple averages 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 (FE), Random effects (RE) and Tobit (RE) regression models have been used in the log-linear gravity model. Hausman test statistics reject 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.

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 as in almost all gravity models estimated in the literature, the coefficient of distance is negative and significant, while the coefficients of GDP and Population are positive and significant in almost all our 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. Similarity of Language between trading partners is significant only in OLS model.

The coefficient of exchange rate is negative and significant factor for India's export to the world only in FE model. 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 (i.e. an appreciation of the rupee) 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 reducing India's trade. Time dummy is significant for most of the years showing simply the effects of all time relevant factors and PTA dummy irrespective of the period it is in force.

We have used the standard gravity model augmented by dummy variables to see the impact of 21 preferential trade agreements including some of the bilateral PTAs. Tables 1A-1C display coefficients that estimate the impact of intra-bloc trade and also the impact of a PTA/RTA on India, in which India is not member. Two variables used for this purpose are, one (PTA_m), the importing country 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 variable whose coefficient indicates the effect on India's imports by an exporter who is a member of a PTA. The result in different export models indicates that of the three PTAs of which the partner countries are members 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 would gain from liberalization of its trade in a non-discriminatory fashion with all its trade partners of the world than preferentially with any of the PTA partners. The coefficients of the first PTA_m variable for EU, MERCOSUR, SACU, ASEAN are estimated to be positive and significant in most regressions while for CARICOM, OECD and Australia-New Zealand (AUSTNZ) it is positive and significant only in OLS indicating the occurrence of additional import creation in intra-block trade in these PTAs. Also these positive estimated coefficients indicate general openness of the PTA members. However the coefficients of PTA_m variables such as CIS, NAFTA and EFTA, APEC, ANDEAN and some of the bilateral PTAs like EU-South Africa, EU-Algeria, EU-Turkey 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, ANDEAN, Eu-Algeria and Austnz are negative and significant indicating India's "imports" are reduced because the "exporter" is a member of these PTAs. The coefficients of PTA variable GCC and APEC and CARICOM are positive and significant in OLS regression model but insignificant in other models. The coefficient of the PTA variable MERCOSUR and CIS are however positive and significant in FE and RE and Tobit (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 most of 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. The results of the total trade differ across OLS, FE, RE and Tobit (RE) models. Due to multicollinearity some of the explanatory variables are dropped in the different regressions and this creates problem of omitted variables in interpreting the result. However the model for total trade flows reveals that with respect to intra bloc trade effect, only BIMSTEC is trade creating while SAFTA and Bangkok Agreement are trade diverting.

Our analysis that the rapid global spread of bilateral PTA and RTA towards which India is moving rapidly is largely deleterious or insignificant from India's perspective in terms of impacts on trade flows. However, the welfare impacts of the PTA cannot be inferred, as noted earlier from the outcome of trade creation and trade diversion calculations. Nonetheless, these findings strongly argue question against preferential trade liberalization on that India and also the rest of the world over are pursuing through negotiating and concluding PTAs in contrast to pursuing multilateral non-discriminatory liberalization through concluding Doha negotiations as the better path for the global 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 data on 800 operating firms for 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 and we 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 (i.e. once incurred cannot be recovered) 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 cover 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. A firm may continue to export, rather than exit from exporting even though it is currently unprofitable to do so because profits may become positive in the future and it has already incurred an entry cost which is sunk. A once-for-all fixed entry cost can induce persistence in the time pattern of exporting by a firm. From the observed persistence in data we inferred the presence of such fixed costs. According to Roberts and Tybout (1998) this formulation of entry costs as sunk costs yields an option value to waiting in that waiting, instead of immediately exiting because of negative profits, has a value if in the future profits have a non-zero probability of becoming positive.

We inferred the existence of sunk costs, as we said earlier, from the fact that the sequence of exporting and non-exporting years of a firm exhibits runs, rather than frequent and apparently random switching from year to year. In the absence of a direct measure of sunk costs incurred we use the firm's lagged export status as the proxy for sunk costs. More precisely, we look at the distribution of exporting sequences in the data and assume that firm characteristics 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. 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 firms (33 %) exports in <u>all seven</u> years and an equally large fraction, 30 %, never exports. This indicates an important degree of persistence in the exporting status in the labour intensive sectors. In addition firms 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. A larger (lower) share of firms never (always) exported as compared to labour intensive firms. Fraction of firms which never exported doubled to 41%, as compared to the 21% who exported throughout the period under consideration. However as in the case of 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 firm heterogeneity and sunk costs are likely to be important in the decision to export (probability of exporting) for as for all manufacturing firms, regardless of their labour intensity.

Foreign ownership

Foreign ownership is another variable that differs 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 Firm

In most of the previous literature of export performance, it has consistently been observed that exporters are large firms. Size is the proxy for several effects as observed by Bernard and Jensen (2001). Because of scale economies, larger firms may have lower average and or marginal costs, which would increase the likelihood of exporting. Larger firms have more resources for incurring costs of entry into 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 firm size and export propensity was found by Kumar and Sidharthan (1994), Willmore (1992), Wakelin (1998). In the present study firm size has been measured by the value of its total production.

R&D

Previous studies provide strong evidence that R&D intensity contributes to firm'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, and these 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 real wage it pays, the greater is the firm's competitive advantage, which is expected to result in higher volume of exports. Thus national comparative advantage from the relative abundance of labour endowments provides cost competitiveness for firms at micro-level. India has a relatively abundant endowment of labour. However it is not just the low real wage that leads to comparative cost advantage, but low real 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 or more precisely the share of wages, is expected to have, ceteris paribus, a negative association with the export performance. Wage share has been taken as a percentage of sale s.

Labour productivity

The entry in the foreign market is expected to be positively related to the quality of labour as firms can survive in the external market only if they can produce at a lower cost or higher quality products. To proxy for labour quality, the productivity of labour, has been used. 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 worker 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 of 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 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 based on 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.

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 led to expansion global logistics with special importance on advertisements and marketing links in the manufacturing sectors. Hence marketing and sales expenses can be taken as an indicator of the firm's higher product differentiation and actual efforts towards promoting the export. Based on these arguments, larger selling costs are expected to lead to a higher probability of exporting.

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. On the other hand as a cost it would adversely affect sales but only exports sales. We expected the quality effect to be dominant.

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 (i.e. total fixed assets net of accumulated depreciation) as a proportion of sale. 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 firms with higher profit per unit of sales are more probable of exporting and competing in world markets.

Import Intensity

In most of the cases we find that importers are generally also the exporters. There is high correlation between exports firms and imports of firms. Viewed one way this correlation implies firms with higher import intensity are more likely to export, although viewed the other way, it could be argued that higher import intensity reflects greater ability to import by exporting firms. We believe 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 estimated it using Probit and Logit model. The lagged export status variable is 0 if the firm did not export in the previous year, 1if it did. It also examines the determinants of export propensity with Tobit model for the same sample. Here the dependent variable is the total export as percentage of sale if the firm did export in that year, and is 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. We find that the coefficient on lagged export is positive and significant in Probit and Logit models suggesting that exporting in the previous year raises the probability of exporting in any year. This possibly reflects that once the sunk costs for gathering information and distributional costs are incurred as implied by the exporting decision of the previous year the probability to export and the quantities of exporting in current year are likely to rise. The coefficient of Selling cost, which is also a proxy for sunk cost, is positive and significant in some of the models of Probit, Logit but not in 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 users of relatively abundant factor (endowment driven comparative advantage). However wage per employee could also be an indicator of labour quality. Measured as net value added per worker it 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 (measured 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 results also found in other studies for technology based firms, could imply a positive relationship between quality (proxied by R&D intensity) and firm's export competitiveness (Wakeline, 1998; Anderton, 1999). From a policy perspective this result could be important if labour intensive firms cannot afford to support R&D activity in which case a policy of providing incentives for R&D could increase exports.

Interestingly coefficients of energy intensity and capital-intensity are negative and significant, both for probability of exporting and quantity of exports in the Probit and Tobit models thus rejecting the hypothesized positive signs. This suggests that both intensities are not indicators of firm productivity as the hypothesized positive signs for the coefficients but of costs of production.

The coefficient of 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 characteristics 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 are from CMIE, and cover the labour intensive sectors for 1995-2006. Estimation results (Table 3D) show 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. The coefficient of 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 and wage coefficients are all significant with the expected signs. We further investigated 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 a firm's 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 which 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 less positive effect on the export propensity of the capital intensive sector. However, 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 quantity exported in the current year on an average by 0.19 percent.

The coefficient for firm size for all manufacturing firms and is significant and positive determinant for probability of exporting and quantities of exports, which was also the case for labour intensive firms. 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 determinant for all manufacturing firms of their probability (and quantity) of exports 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 quantity 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 reason for this result could 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 both on probability of exporting and on 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 quantity of exports 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.

As in the case of labour-intensive firms energy-intensity and capital-intensity in the case of all manufacturing is also negative and a 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 Possible "Hazard" Model

We formulate a "Hazard" type 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 $t = d = 1/1+\exp(-h)$ where $h = h(x_{it}, t)$ is a function of a vector x_{it} the relevant characteristics of firm *i* and year *t*, including its history of exporting until t. In this general formulation h would vary over time and across firms. Without strong identifying assumptions, estimating the model empirically is impossible. One strong identifying assumption is that h or equivalently *d*, is constant over time for each firm, implying that only time-invariant characteristic of firm matter for its determination. This is an extremely strong assumption in that some of the time varying characteristics of the firm such as its exporting history and macroeconomic and macro environment are ruled out of the model. For the simple model the probability P_{ijt} that firm found to be category j is given by

$$P_{i1t} = (1-d)^{t-1} d \quad (5)$$

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

$$P_{i3t} = (1-d)(1-d)^{t-1} = (1-d) \quad (7)$$

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

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

$$h_i = a_1 + b_1^* X_{1i} + b_2^* X_{2i} + b_3^* X_{3i} \ldots\ldots\ldots b_n^* X_{ni} \quad (9)$$

where variables are the average values of characteristics 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 not the above simple model, but even a simpler multinomial Logit model for P_{ijt}. However it allows for the inclusion of time-invariant firm characteristics. 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

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

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

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

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

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

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

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

And hence,

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

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

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. The results are based on setting category 3 as the base. 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. 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 firms that exported in the prior year are more likely to export in the current year than an otherwise comparable firm that has never exported.

The results reveal that the probability of survival of new firms in the export market is less as compared to those who have been exporting in the prior years.

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 estimated 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 analyses of firm level data are from two different data sets. One is from the PROWESS data of the Centre for Monitoring the Indian Economy (CMIE) for the years 1995-2006. The other is that of Confederation of Indian Industry (CII) just for one year, 2004-05. Both data sets 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 both. 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 flows as broadly indicating 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.

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Table 1: Gravity Models

Table 1 A: Export Flows

Exports	OLS	Fixed Effects	GLS	Tobit
lngdp	0.588*** (0.036)	1.077*** (0.164)	0.731*** (0.092)	0.726*** (0.092)
lnpop	0.305*** (0.036)	0.935** (0.391)	0.206** (0.102)	0.194** (0.095)
lndist	-1.294*** (0.075)		-1.376*** (0.224)	-1.328*** (0.210)
lnexchrate	0.043 (0.014)	-0.050** (0.021)	-0.030 (0.019)	-0.029 (0.019)
langdummy	0.112 (0.084)		0.177 (0.282)	0.206 (0.273)
extplnmfn	-0.152** (0.063)	-0.162** (0.071)	-0.147** (0.067)	-0.142** (0.066)
safta_m	-0.496* (0.311)	-0.167 (0.240)	-0.053 (0.233)	-0.046 (0.229)
bimstec_m	0.499 (0.376)	-0.701*** (0.265)	-0.636** (0.264)	-0.633** (0.259)
bangkok_m	-0.310* (0.192)		-0.120 (0.769)	-0.020 (0.754)
gcc_m	0.127 (0.397)		-0.275 (0.785)	-0.216 (0.780)
asean_m	-0.746*** (0.234)	0.555*** (0.185)	0.506*** (0.183)	0.488*** (0.175)
sacu_m	2.053*** (0.492)		2.548*** (0.918)	2.553*** (0.915)
mercosur_m	0.268* (0.155)	0.993*** (0.240)	0.857*** (0.231)	0.858*** (0.227)
Eu_m	1.374*** (0.234)		0.953 (1.111)	0.941 (1.108)
efta_m	-1.268*** (0.340)		-0.909 (1.163)	-0.892 (1.157)
nafta_m	-0.755** (0.322)	-0.662*** (0.250)	-0.883*** (0.246)	-0.886*** (0.242)
cis_m	-1.076*** (0.287)	-0.526 (0.836)	-1.226*** (0.459)	-1.188*** (0.452)
indsr_m	-0.086 (0.760)	-0.312 (0.481)	-0.461 (0.479)	-0.464 (0.470)
indnep_m	0.418 (0.761)	-0.453 (0.468)	-0.422 (0.469)	-0.427 (0.461)
eusa_m	-0.389* (0.222)	-0.179 (0.135)	-0.253* (0.133)	-0.252* (0.130)
eualgr_m	-0.608*** (0.207)	-0.764*** (0.138)	-0.864*** (0.128)	-0.866*** (0.126)
euturk_m	-0.790*** (0.254)		-0.666 (1.136)	-0.620 (1.133)
apec_m	-0.286* (0.164)	-0.661*** (0.139)	-0.624*** (0.135)	-0.612*** (0.132)
andean_m	-1.185***	0.827	0.094	0.109

	(0.174)	(0.563)	(0.453)	(0.450)
caricom_m	0.694*** (0.224)		0.562 (0.619)	0.499 (0.589)
oecd_m	0.484*** (0.145)		0.299 (0.500)	0.314 (0.498)
austnz_m	1.573*** (0.285)	-0.728* (0.417)	-0.471 (0.400)	-0.488 (0.394)
t 2	0.062 (0.258)	0.026 (0.154)	0.055 (0.154)	0.055 (0.151)
t 3	-0.188 (0.259)	-0.130 (0.155)	-0.095 (0.155)	-0.094 (0.152)
t 4 t 5	-0.233 (0.256) -0.288 (0.256)	-0.179 (0.155) -0.251 (0.157)	-0.115 (0.153) -0.165 (0.154)	-0.113 (0.151) -0.162 (0.151)
t 6	0.071 (0.256)	0.074 (0.159)	0.188 (0.154)	0.191 (0.151)
t 7	0.250 (0.257)	0.200 (0.163)	0.338 (0.155)	0.342** (0.152)
t 8	-0.039 (0.242)	0.096 (0.158)	0.241 (0.148)	0.245* (0.145)
t 9	0.774*** (0.261)	0.826*** (0.175)	1.017*** (0.160)	1.019*** (0.157)
t 10	0.510** (0.249)	0.529*** (0.172)	0.740*** (0.153)	0.743*** (0.150)
t 11	0.722*** (0.249)	0.870*** (0.177)	1.102*** (0.154)	1.106*** (0.151)
t 12	1.133*** (0.249)	1.039*** (0.181)	1.300*** (0.155)	1.306*** (0.152)
t 13	1.169*** (0.242)	1.049*** (0.181)	1.319*** (0.153)	1.324*** (0.150)
t 14	1.255*** (0.260)	1.259*** (0.193)	1.555*** (0.162)	1.560*** (0.159)
t 15	1.627*** (0.247)	1.777*** (0.207)	2.127*** (0.161)	2.134*** (0.157)
t 16	1.724*** (0.250)	1.813*** (0.218)	2.193*** (0.165)	2.201*** (0.161)
t 17	2.029*** (0.246)	1.983*** (0.218)	2.394*** (0.161)	2.402*** (0.158)
t 18	2.158*** (0.261)	1.918*** (0.229)	2.354*** (0.169)	2.366*** (0.165)
t 19	1.960*** (0.247)	1.969*** (0.237)	2.430*** (0.166)	2.438*** (0.162)
t 20	2.206*** (0.241)	2.147*** (0.241)	2.638*** (0.164)	2.647*** (0.160)
t 21	2.074*** (0.227)	2.135*** (0.244)	2.650*** (0.159)	2.657*** (0.155)
t 22	2.319*** (0.220)	2.385*** (0.247)	2.896*** (0.157)	2.908*** (0.154)
t 23	2.518*** (0.240)	2.496*** (0.259)	3.033*** (0.169)	3.043*** (0.165)
t 24 t 25	2.820*** (0.243) 2.975***	2.683*** (0.267) 2.819***	3.265*** (0.170) 3.431***	3.273*** (0.166) 3.443***

	(0.226)	(0.272)	(0.164)	(0.160)
t 26	3.116*** (0.811)	2.791*** (0.520)	3.342*** (0.483)	0.474*** (3.350)
Cons	8.185*** (0.806)	-25.054*** (7.230)	6.611*** (2.428)	6.448*** (2.274)

OLS Results

R Squared	0.742
Adjusted R Squared	0.733
Root MSE	1.371
Prob > F	0.000
No. of Observations	1566

Fixed-effects (within) regression

R Square Within	0.722
R Square Between	0.414
R Square Overall	0.486
Prob >F	0.000
No. of Observations	1566

Random effects GLS regression

R Square Within	0.720
R Square Between	0.568
R Square Overall	0.698
Prob >Chi2	0.000
No. of Observations	1566

Random-effects Tobit regression

Log Likelihood	-2021.163
Prob >Chi2	0.000
No. of Observations	1566

Table 1B: Import Flows

Imports	OLS	Fixed Effects	GLS	Tobit
lngdp	0.847*** (0.041)	0.549*** (0.136)	0.759*** (0.100)	0.821*** (0.093)
lnpop	0.304*** (0.043)	0.866** (0.356)	0.407*** (0.127)	0.314*** (0.111)
lndist	-0.728*** (0.093)		-0.962*** (0.315)	-1.087*** (0.288)
lnexchrate	0.065*** (0.014)	0.033* (0.018)	0.040** (0.017)	0.043** (0.017)
langdummy	0.529*** (0.101)		0.516 (0.388)	0.804** (0.378)
safta_x	-0.646 (-0.468)	-0.652* (0.346)	-0.667* (0.343)	-0.674** (0.340)
bimstec_x	1.683*** (0.533)	1.332*** (0.385)	1.298 (0.384)	1.281*** (0.381)
bangkok_x	-1.191*** (0.298)		-1.001 (1.144)	-1.055 (1.174)
gcc_x	2.869*** (0.304)	-0.169 (0.452)	0.341 (0.425)	0.288 (0.425)
asean_x	-0.795** (0.323)	-0.524** (0.257)	-0.564** (0.254)	-0.570** (0.252)
sacu_x	-1.896*** (0.385)		-1.324 (0.381)	-1.096 (1.404)
mercosur_x	0.213 (0.359)	0.757* (0.389)	0.741* (0.381)	0.741** (0.379)
Eu_x	0.476 (0.529)	-0.172 (1.148)	0.323 (0.820)	0.295 (0.817)
efta_x	-0.050 (0.363)		0.048 (1.461)	-0.135 (1.490)
nafta_x	-0.820 (0.511)	-0.722* (0.374)	-0.721* (0.372)	-0.733** (0.368)
cis_x	-0.863*** (0.262)	0.476* (0.256)	0.456* (0.236)	0.504** (0.233)
indsr_x	0.078 (1.009)	-0.150 (0.686)	-0.188 (0.684)	-0.192 (0.678)
indnep_x	1.497 (1.298)	-0.165 (0.799)	-0.058 (0.800)	-0.050 (0.793)
eusa_x	0.246 (0.335)	-0.037 (0.201)	-0.065 (0.199)	-0.077 (0.197)
eualgr_x	-0.262 (0.305)	-0.288 (0.191)	-0.337* (0.184)	-0.342* (0.182)
euturk_x	0.079 (0.532)	-0.021 (1.151)	0.370 (0.826)	0.352 (0.818)
apec_x	0.913*** (0.223)	0.016 (0.194)	0.017 (0.190)	0.000 (0.189)
andean_x	-1.632*** (0.286)		-1.236 (1.117)	-0.790 (1.136)
caricom_x	1.230*** (0.223)	0.091 (1.611)	0.730 (0.714)	0.789 (0.533)
oecd_x	0.083 (0.199)		0.328 (0.695)	0.630 (0.672)

austnz_x	-5.943*** (0.468)	-1.812** (0.825)	-2.379*** (0.763)	-1.943*** (0.675)
t 2	-0.102 (0.326)	0.195 (0.195)	0.185 (0.195)	0.189 (0.193)
t 3	-0.276 (0.327)	-0.047 (0.196)	-0.050 (0.196)	-0.052 (0.194)
t 4	-0.094 (0.326)	0.264 (0.197)	0.249 (0.196)	0.249 (0.194)
t 5	0.089 (0.326)	0.445** (0.198)	0.434** (0.196)	0.435** (0.194)
t 6	0.056 (0.325)	0.429** (0.198)	0.421** (0.196)	0.419** (0.194)
t 7	-0.109 (0.325)	0.259 (0.200)	0.253 (0.196)	0.254 (0.194)
t 8	-0.094 (0.324)	0.303 (0.201)	0.296 (0.196)	0.295 (0.194)
t 9	-0.055 (0.324)	0.448** (0.205)	0.444** (0.197)	0.446** (0.196)
t 10	-0.093 (0.319)	0.521** (0.205)	0.517*** (0.195)	0.520*** (0.193)
t 11	-0.260 (0.318)	0.331*** (0.207)	0.334* (0.195)	0.338* (0.193)
t 12	-0.042 (0.318)	0.575*** (0.208)	0.589*** (0.194)	0.594*** (0.193)
t 13	0.234 (0.316)	0.862*** (0.209)	0.880*** (0.194)	0.888*** (0.192)
t 14	0.368 (0.317)	0.904*** (0.215)	0.928*** (0.195)	0.933*** (0.193)
t 15	0.558* (0.319)	1.166*** (0.225)	1.196*** (0.198)	1.200*** (0.197)
t 16	0.729** (0.321)	1.282*** (0.229)	1.315*** (0.200)	1.318*** (0.198)
t 17	0.726** (0.321)	1.288*** (0.233)	1.317*** (0.200)	1.321*** (0.199)
t 18	0.676** (0.321)	1.243*** (0.236)	1.273*** (0.201)	1.276*** (0.199)
t 19	0.912*** (0.322)	1.552*** (0.243)	1.583*** (0.202)	1.586*** (0.200)
t 20	0.800** (0.323)	1.448*** (0.247)	1.476*** (0.203)	1.478*** (0.201)
t 21	0.931*** (0.322)	1.574*** (0.251)	1.607*** (0.203)	1.608*** (0.201)
t 22	0.689** (0.317)	1.473*** (0.252)	1.489*** (0.202)	1.490*** (0.200)
t 23	1.014*** (0.319)	1.735*** (0.256)	1.759*** (0.203)	1.757*** (0.201)
t 24	1.157*** (0.320)	1.906*** (0.262)	1.923*** (0.205)	1.920*** (0.203)
t 25	1.499*** (0.320)	2.238*** (0.267)	2.238*** (0.206)	2.234*** (0.204)
t 26	1.648*** (0.322)	2.412*** (0.271)	2.450*** (0.206)	2.456*** (0.205)
Cons	-3.220*** (1.010)	-11.622** (5.790)	-1.437 (3.479)	-0.644 (3.298)

OLS Results

R Squared	0.510
Adjusted R Squared	0.503
Root MSE	2.719
Prob > F	0.000
No. of Observations	3783

Fixed-effects (within) regression

R Square Within	0.256
R Square Between	0.434
R Square Overall	0.376
Prob >F	0.000
No. of Observations	3783

Random effects GLS regression

R Square Within	0.255
R Square Between	0.548
R Square Overall Prob >Chi2	0.476 0.000
No. of Observations	3783

Random-effects Tobit regression

Log Likelihood	-7329.793
Prob >Chi2	0.0000
No. of Observations	3783

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

Total Trade	OLS	Fixed Effects	GLS	Tobit
lngdp	1.591*** (0.084)	2.301*** (0.371)	1.790*** (0.175)	1.792*** (0.177)
lnpop	0.563*** (0.085)	5.758*** (0.890)	0.410** (0.186)	0.485*** (0.172)
lndist	-2.203*** (0.163)		-1.841*** (0.406)	-1.774*** (0.474)
lnexchrate	0.070** (0.033)	0.041 (0.048)	0.069 (0.043)	0.066 (0.042)
langdummy	0.231 (0.194)		0.387 (0.497)	0.351 (0.465)
extplnmfn	0.325** (0.146)	0.579*** (0.168)	0.512*** (0.153)	0.536*** (0.151)
safta_m	-1.687** (0.707)	-1.295** (0.541)	-0.611 (0.528)	-0.590 (0.512)
bimstec_m	2.380*** (0.869)	1.638*** (0.596)		1.466** (0.583)
bangkok_m	-1.484*** (0.441)		-1.182 (1.325)	-1.084 (1.548)
gcc_m	1.775* (0.916)		2.121 (1.400)	2.368 (1.552)
asean_m	-5.198** (2.307)	-0.982 (1.334)	-0.900 (1.368)	-0.850 (1.323)
sacu_m	-0.043*** (1.134)		0.947 (1.628)	1.082 (1.842)
mercosur_m	-1.460*** (0.499)	1.106** (0.549)	-1.355 (1.852)	-1.391 (2.152)
eu_m	2.409*** (0.628)	1.055 (1.220)	1.699 (1.056)	1.547 (1.048)
efta_m	-1.412* (0.785)		-1.258 (2.012)	0.144 (0.982)
nafta_m	12.159*** (2.983)	2.323 (2.152)	3.805* (2.109)	3.429* (2.026)
cis_m	-1.259* (0.676)	-0.895 (1.912)	-1.308 (0.878)	-1.309 (0.808)
indsr_m	0.285 (1.756)	0.208 (1.090)	-0.814 (1.107)	-0.812 (1.070)
Indnep_m	1.664 (1.758)	-2.187** (1.057)	-1.624 (1.081)	-1.684 (1.045)
eusa_m	-0.572 (2.277)	-0.621 (1.308)	-1.040 (1.341)	-1.086 (1.278)
Eualgr_m	6.539*** (1.742)	-0.996 (1.167)	-0.061 (1.165)	-0.166 (1.129)
Euturk_m	-1.539 (1.139)	0.663 (1.256)	-0.279 (1.164)	-0.150 (1.134)
apec_m	4.058* (2.304)	0.846 (1.314)	0.949 (1.350)	0.900 (1.305)

andean_m	3.231*** (0.937)	1.686*** (0.583)	1.875*** (0.597)	1.847* (0.577)
caricom_m	0.704 (0.577)		0.869 (1.105)	1.171 (1.224)
oecd_m	-8.859*** (0.810)	-2.819** (1.272)	-3.763*** (1.140)	-3.427*** (1.118)
austnz_m	3.877*** (0.660)	-0.661 (0.950)	0.114 (0.898)	-0.025 (0.888)
safta_x				
bimstec_x			1.489 (0.601)	
bangkok_x				
gcc_x				
asean_x	3.564 (2.324)	1.015 (1.316)	0.954 (1.353)	0.924 (1.307)
sacu_x				
mercosur_x	1.262* (0.674)		2.149 (1.930)	2.210 (2.218)
eu_x	0.606 (0.928)	0.654 (1.304)	0.303 (1.210)	0.249 (1.200)
efta_x				
nafta_x	-13.298*** (2.938)	-3.399 (2.218)	-5.690 (2.166)	-5.280*** (2.058)
cis_x				
indsr_x				
indnep_x				
eusa_x	-0.606 (2.281)	0.840 (1.305)	0.808 (1.338)	0.868 (1.277)
eualg_x	-7.243*** (1.727)	0.198 (1.182)	-1.410 (1.162)	-1.321 (1.127)
euturk_x	0.270 (1.311)		-0.046 (1.576)	0.201 (1.532)
apec_x	-4.000* (2.291)	-0.853 (1.308)	-1.067 (1.345)	-1.026 (1.299)
andean_x	-5.330*** (0.886)		-4.423*** (1.365)	-4.441*** (1.543)
caricom_x				
oecd_x	9.308*** (0.858)		4.384*** (1.453)	3.747*** (1.387)
austnz_x				
t 2	-0.220 (0.567)	0.028 (0.330)	0.067 (0.339)	0.079 (0.327)
t 3	-0.947* (0.571)	-0.681** (0.336)	-0.558 (0.343)	-0.541 (0.331)
t 4	-0.764 (0.565)	-0.524 (0.336)	-0.295 (0.340)	-0.278 (0.329)
t 5	-0.429 (0.565)	-0.290 (0.341)	0.048 (0.341)	0.065 (0.329)
t 6	-0.222	-0.185	0.278	0.295

	(.563)	(0.346)	(0.340)	(0.329)
t 7	0.020 (0.565)	-0.069 (0.353)	0.498 (0.342)	0.514 (0.330)
t 8	0.028 (0.558)	-0.117 (0.360)	0.553 (0.340)	0.571* (0.329)
t 9	0.604 (0.572)	0.170 (0.379)	1.027*** (0.351)	1.035*** (0.340)
t 10	0.451 (0.571)	0.082 (0.388)	1.013*** (0.350)	1.027*** (0.339)
t 11	0.661 (0.575)	0.361 (0.402)	1.401*** (0.354)	1.418*** (0.343)
t 12	1.306** (0.575)	0.663 (0.410)	1.807*** (0.354)	1.821*** (0.343)
t 13	1.408** (0.563)	0.435 (0.414)	1.669*** (0.352)	1.673*** (0.341)
t 14	1.369** (0.606)	0.806* (0.440)	2.071*** (0.375)	2.081*** (0.363)
t 15	2.344*** (0.575)	1.537*** (0.475)	3.155*** (0.369)	3.172*** (0.359)
t 16	2.520*** (0.593)	1.484*** (0.503)	3.268*** (0.380)	3.280*** (0.369)
t 17	2.930*** (0.578)	1.574*** (0.502)	3.413*** (0.372)	3.422*** (0.363)
t 18	3.193*** (0.607)	1.506*** (0.528)	3.469*** (0.389)	3.478*** (0.379)
t 19	3.203*** (0.588)	1.598*** (0.547)	3.713*** (0.382)	3.727*** (0.372)
t 20 t 21	3.234*** (0.565) 3.328*** (0.542)	1.582*** (0.557) 1.798*** (0.565)	3.828*** (0.376) 4.097*** (0.367)	3.838*** (0.367) 4.110*** (0.359)
t 22	3.475*** (0.515)	2.002*** (0.570)	4.328*** (0.356)	4.355*** (0.350)
t 23 t 24	4.208*** (0.563) 4.573*** (0.563)	2.384*** (0.600) 2.742*** (0.619)	4.811*** (0.384) 5.332*** (0.387)	4.826*** (0.376) 5.345*** (0.380)
t 25	4.923*** (0.523)	3.008*** (0.630)	5.682*** (0.372)	5.705*** (0.366)
t 26 Cons	4.602** (1.885) 2.414 (1.688)	2.229* (1.192) -117.567*** (16.701)	4.818*** (1.125) -4.283 (4.391)	4.825*** (1.088) -6.278 (5.284)

OLS Results

R Squared	0.735
Adjusted R Squared	0.724
Root MSE	3.167

Prob > F	0.000
No. of Observations	1621

Fixed-effects (within) regression

R Square Within	0.596
R Square Between	0.428
R Square Overall	0.403
Prob >F	0.000
No. of Observations	1621

Random effects GLS regression

R Square Within R Square Between	0.584 0.685
R Square Overall	0.704
Prob >Chi2	0.000
No. of Observations	1621

Random-effects tobit regression

Log Likelihood	-3407.353
Prob >Chi2	0.0000
No. of Observations	1621

Table 2 A: 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

Sequence	Count	% of Firms
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 00 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

Sequence	Count	% of Firms
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 10 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

Sequence	Count	% of Firms
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

Sequence	Count	% of Firms
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

Sequence	Count	% of Firms
1100111	7	0.21
1101000	8	0.24
Total Plants	3388	

Table 3: Labour Intensive Activities: The Decision to Export

Table 3 A: 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 3 C: 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 3 D: 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 4 A: CMIE Data, Logit And Probit Models (Panel)

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 (Panel)

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 4 C: 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 4 D: 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 Log odds

Table 5 A: Model I

Log Odds of Category j Relative to Category 3, *j* = 1, 2 and 4			
Scale	Category 3 and 1 0.007*** (0.002)	Category 3 and 2 0.016*** (0.001)	Category 3 and 4 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 IMP	-0.00 (0.00) 0.001*** (0.00)	-0.01*** (0.00) 0.001*** (0.00)	-0.00 (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,

h_{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

h_{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

h_{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:

h_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**

h_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**

h_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 (h_1) / 1+ exp (h_1) + exp (h_2) + exp (h_4) = exp (-3.47974) / 1+ exp (-3.47974) + exp (1.189427) + exp (0.0870501) = **0.005699**

Pr (Category =2) = exp (h_2) / 1+ exp (h_1) + exp (h_2) + exp (h_4) = exp (1.189427) / 1+ exp (-3.47974) + exp (1.189427) + exp (0.0870501) = **0.607586**

Pr (Category =4) = exp (h_4) / 1+ exp (h_1) + exp (h_2) + exp (h_4) = exp ((0.0870501) / 1+ exp (-3.47974) + exp (1.189427) + exp (0.0870501) = **0.201768**

Pr (Category =3) = 1 / 1+ exp (h_1) + exp (h_2) + exp (h_4) = 1 / 1+ exp (-3.47974) + exp (1.189427) + exp (0.0870501) = **0.184947**

Table 5 B: 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 5 C: 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 5 D: 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 I: List of RTAs Covered

SACU

South Africa
Lesotho
Swaziland
Botswana
Namibia

GCC

Bahrain
Kuwait
Oman
Qatar
UAE

BIMSTEC

Bangladesh
Bhutan
Nepal
Sri Lanka
Thailand
Myanmar
India

Bangkok

Bangladesh
Laos
Republic of Korea
Sri Lanka
Philippines
Thailand
India

EFTA

Norway
Switzerland
Iceland
Liechtenstein

ASEAN

Indonesia
Malaysia
Philippines
Singapore
Thailand
Brunei
Vietnam
Lao PDR
Myanmar
Cambodia

SAFTA

India
Bangladesh
Bhutan
Nepal
Sri Lanka
Pakistan
Maldives

MERCOSUR

Spain
Portugal
Brazil
Argentina
Uruguay
Paraguay
Bolivia
Chile
Columbia
Ecuador
Peru

CIS

Azerbaijan
Armenia
Belarus
Georgia
Kazakhstan
Kyrgyz
Moldova
Russia
Tajikistan
Uzbekistan
Ukraine

NAFTA

Canada
USA
Mexico

EU

Austria
Belgium
Bulgaria
Cyprus
Czech Rep
Denmark
Estonia
Finland
France
Germany
Greece
Hungary
Ireland
Italy
Latvia
Lithuania
Luxembourg
Malta
Netherlands
Poland
Portugal
Romania
Slovakia
Slovenia
Spain
Sweden
United Kingdom

Asia-Pacific economic Cooperation (APEC)

Australia
Brunei Daruss
Canada
Chile
People's Republic of China
Hong-Kong
China
Indonesia
Japan
Republic of Korea
Malaysia
Mexico
New Zealand
Papua New Guinea
Peru
Philippines
Russian Federation

Andean Community

Bolivia
Columbia
Ecuador
Peru
Venezuela

***Caribbean* Community & Common Market (Caricom)**

Antigua & Barbuda
Bahamas
Barbados
Belize
Dominica
Grenada
Guyana
Haiti
Jamaica

Organization for Economic Cooperation & Development (OECD)

Australia
Austria
Belgium
Canada
Czech Republic
Denmark
Finland
France
UK
USA
Turkey
Switzerland
Sweden
Spain
Slovakia
Portugal

Singapore	Montserrat	Germany	Poland
Chinese Taipei	Saint Kitts & Nevis	Greece	Norway
Thailand	Saint Lucia	Hungary	New Zealand
USA	Saint Vincent & Grenadines	Iceland	Netherlands
Vietnam	Surinam	Italy	Mexico
	Trinidad & Tobago	Japan	Luxemburg
		South Korea	

Bilateral PTAs

EU-South Africa

EU-Algeria

EU-Turkey

India-Srilanka

India-Nepal

Australia- New Zealand

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

Commodities	2005-06 April-Feb	2006-07 April-Feb	% 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 III: SURVEY RESULTS

The above discussed paper is basically a part of the ongoing project on Global Trading and Financial Systems: Multilateralism of the World Trade Organization versus Regionalism.

The study is being carried out in two phases. Phase I of the research on the above mentioned theme is based on preliminary estimation from secondary data. Phase II of the project will present findings based on primary data collected from a survey of firms that is field. The survey is done with an objective that it would throw light on incentives and constraints on the firms in entering and exporting to different markets and its linkages with productivity and profitability after opening trade particularly with its PTA partners. It would also help to break new grounds in analyzing the issues of India's regional and multilateral trade liberalisation from a micro perspective.

We have not done a detailed analysis of the survey data, however some description of the preliminary findings are given here. The survey extends to different locations in India covering all regions, north, south, east and west by selected industry segment. To ensure representative sample of firms from each manufacturing sectors, we have used the stratified sampling technique. In this case the strata are industry segment. The sample size for each segment was distributed broadly by the relative shares of the industry in the manufacturing exports of the country. The table 1 below shows the number of respondents in each industry segment.

Table 1.

Industry Segments	Respondents
Minerals & Fuels	81
Gems & Jewellery	85
Textiles & Apparels	95
Metals	39
Machinery	39
Chemicals	28
Plastics	5
Pharmacy	7
Leather	21
Total	400

The Centers selected were Delhi and other areas of National Capital Region; Mumbai, Pune and Ahmedabad from West; Kolkatta from East; Chennai and Bangalore from South. While the field operations were centered in the above cities, the businesses were from several locations in the country.

The data analyses have been conducted from two perspectives, industry angle and export intensity since the target is to measure and analyze factors affecting export activities. From these two perspectives other parameters have been examined.

Export performance is represented by export intensity, which is measured as share of exports in total sales turnover expressed in percentage.
Export intensity has been divided into four levels:

a) below 10%
b) 11 to 25%
c) 26 to 50%
d) over 50%

From these two perspectives we have tried to analyze different parameters such as characteristics of the firms, the incentives and the barriers to export.

1. Characteristics

1.i. Ownership Pattern of the Firms

Indian private ownership - The stakes of Indian private investors in all surveyed firms is very high.
96 % of the firms holding controlling stakes (over 70%).

Industry Segment - Pharmaceuticals, leather, textile and plastics, Indian private investors hold the controlling stake (over 70%). In other it is very high in the range of 92-98%.

Export Intensity - Across all firms (except plastics) have export quotient of over 50%, have 70% stake by private investors. Lower export quotient in some cases, such as minerals & Fuels and Metals, have relatively lower stake by private investors.

Table 2.

Export Intensity? **Private stake ?**	Below 10%	11-25%	26-50%	Over 50%	Total
No stake 1-30%	4	2	0		1 0
31-50%		1	0		1
51-70%		1	3		2
Over 70%	96	96	97	100	96

Government Ownership - In 97% cases government has no stake
In 2% cases ownership was restricted to less than 30%.
In 1% cases ownership accounts for over 70%

Industrial Segment - Pharmaceuticals, leather, textiles and plastics – no government ownership

Export Intensity - Export quotient of over 50% (except metals) have less than 10% government controls.

Table 3.

Export Intensity? **Private stake ?**	Below 10%	11-25%	26-50%	Over 50%	Total
No stake	98	96	97	98	97

1-30%			3	2	2
Over 70%	2	2			1

Foreign Ownership - In 95% of the surveyed firms – no foreign investment
In 3% of the firms – foreign stakes are in the range of 1-30%
Only 1% firms have higher foreign control (with 31-50% foreign stake).

Industry Segment - Pharmaceuticals, leather and Plastics – no foreign stake

Export Intensity - Export quotient of over 50% has no foreign ownership

Table 4.

Export Intensity? **Private stake?**	Below 10%	11-25%	26-50%	Over 50%	Total
No stake	96	97	94	100	95
1-30%	2	2	5		3
31-50%		1	1		1
51-70%					0
Over 70%	2				1

I.ii. Employee Structure

Of the total 43% of the sample firms had employee strength of 51 to 100 employees and 39% of over 100 employees. Of the remaining 16% have a complement of between 31 and 50 employees and 3% less than 30.

The employee strength across industry segments is reported as follows:

Table 5.

(Responding firms %)

	Employment ranges			
	<30	**31-50**	**51-100**	**>100**
Minerals & fuels	-	6	41	53
Gems & Jewellery	8	48	38	6
Metals	3	3	45	50
Machinery	5	15	48	33
Chemicals	4	18	50	29
Pharmaceuticals	-	-	80	20
Leather	5	10	57	29
Textiles	-	6	34	60
Plastics	-	-	100	-
Total	**3**	**16**	**42**	**39**

The matrix reveals a highly variegated pattern of employment. Most segments have small proportion of firms employing less than 30 employees. Some have a more dominant position in 31 to 50 brackets, others in the higher brackets. All respondents in plastics and 80% in the pharmaceutical segment have reported their employee strength between 51 to 100. More than half of the firms in minerals and fuels, metals and textiles segments have each reported more than 100 employees per firm.

The table below shows the export intensity across different employment levels.
Table 6.

Export Intensity ? Employment ?	Below 10%	11-25%	26-50%	Over 50%	Total
< 30	2	2	3	2	3
31-50	12	13	17	20	16
51-100	34	49	44	30	41
> 100	52	35	36	48	40
Total	100	100	100	100	100

Export intensity is more dominant in the entire export quotient where employment is more than 100.

I. iii. Age of the Sample Firms

4% of the firms were established before 1950
81% were established during the period from 1950-2000
Rest 15% were established during the period 2000-2007

Table 7.

Export Intensity %	Below 10%	11-25%	26-50%	Over 50%	Total
Very Old (before 1950)	4	4	4	3	4
Fairly Old (1950-2000)	74	87	79	83	81
New Establishment (after 2000)	22	9	17	14	15
Total	100	100	100	100	

I.iv. Distribution of Firms by Total Assets

Of all the firms 16% were small, 32% were medium and 48% were large sized firms. All the firms in plastics have total assets in excess of Rs 50 crores. Most other segments with this high range of total assets varied from 33% in leather to 54% in minerals and fuels. Two segments, with much higher than the overall response are chemicals (68%) and pharmaceuticals (80%).

Table 8.

	Total Assets (Rs cr.)		
% of Firms	**small (<10)**	**medium (10 to 50)**	**large(>50)**
Minerals and fuels	17	27	54
Gems and jewellery	22	38	45
Metals	11	39	45
Machinery	20	38	38
Chemicals	07	21	68
Pharmaceuticals	-	20	80
Leather	14	29	33
Textiles	16	31	45

Plastics	-	-	100
Total	**16**	**32**	**48**

Export Intensity - In the entire export quotient the large firms were dominating the export share. 54% of the firms having asset more than 50 crores were in the export quotient of below 10%, 50% of them were in the export quotient 11 to 25% and also in the highest range (over 50%) and 44% were in the range of 26 to 50%.

Table 9.

Export Intensity %	Below 10%	11-25%	26-50%	Over 50%	Total
Small firms (Up to Rs 10cr)	20	19	13	20	16
Medium firms (> Rs 10-50cr)	22	30	37	23	32
Large firms (above Rs 50cr)	54	50	44	50	48
NR (non-respondents)	4	1	6	7	4
Total	100	100	100	100	

I.v. R&D

About 3/4th of the responding firms reported to acquire new technology.

Industry-segment – about 9 out of every 10 firms in leather admitted to have acquired new technology in last 3 years
84% of Gems & Jewellery, 82% of metals and 80% of pharmaceuticals

Export Performance - Firms with newer technology have higher export quotients (over 50%) over those with older technology.
Mineral & fuels (100%), Metals (100%) and Gems& Jewellery (100%) have export quotient of more than 50% have acquired new technologies

Table 10.

Export Intensity %	Below 10%	11-25%	26-50%	Over 50%
Inducted (new technology)	64	78	76	78
Not Inducted (new technology)	36	22	24	23
Total	100	100	100	100

I. vi. R & D expenditure to sales

13% of the firms incurred 0.5% to 1% of their sales as expenditure on R&D. while 5% spent up to 0.2% of sales, a lowly 3% of respondents spent between 0.2% and 0.5% of their sales.

Industry Segment - The large spender in the highest bracket (>0.5% to 1%) were, 43% firms from leather to only 20% in pharmaceuticals. Most other are in the range of 11% and 17% firms spending 0.5% to 1% of their sales on design and R&D. the least number were from minerals & fuels (5%) spending that much.

Table 11.

Export Intensity? R&D to sale?	Below 10%	11-25%	26-50%	Over 50%	Total
Up to 0.2%	8	2	6	5	5
>0.2 to 0.5%	6	5	1	5	3
>0.5% to 1%	16	9	15	13	14

I.vii. Experience in Exporting

Over 78% of the firms have a fairly long exposure to foreign markets are in the business for more than 5 years. 18% of the total firms have medium term export experience (3 to 5 years) and firms with short experience (up to 2 years) account for 4% of the total.

Table 12.

Export Intensity %	Below 10%	11-25%	26-50%	Over 50%	Total
Short (Up to 2 years)	10	1	4	3	4
Medium (3 to 5 years)	20	23	17	5	18
Long (over 5 years)	70	76	79	92	78
Total	100	100	100	100	

I. viii. Total cost to sales

40% of the respondents reported that their cost to sale was up to 80%. By implication it means that these firms made a profit of more than 20% on sales. Another 4% reported total cost in the range of 80% - 90% and 6% in the range of 90% - 100%. Out of the 40% of the firms which had good profit, the number of firms which achieved export quotient of 11 to 25% was as high as 51%.

Table 13.

Export Intensity? Cost to Sale?	Below 10%	11-25%	26-50%	Over 50%	Total
Up to 80%	44	51	37	28	40
>80 to 90%	2	7	4	5	4
>90 to 100	16	3	3	10	6
>100	6	21	28	18	23

I. ix. Net profit after tax to sales

Nearly 24% of the responding firms have secured a net profit less tax in excess of 5% of sales. 8% have realized less than 2% of their sales as net profit after tax. 8% of the firms have achieved net profit after tax in a range of 2% to 5% of sales.

80% of the firms in pharmaceuticals, 31% in textiles have reported net profit (less tax) to sales in excess of 5%.

Table 14.

Export Intensity? PAT to sale?	Below 10%	11-25%	26-50%	Over 50%	Total
Up to 2%	12	5	8	8	8
> 2 to 5%	8	5	5	5	5
>5%	28	20	22	32	24

2. Incentives

2.i. Export Subsidy under export promotion schemes

76% of the firms surveyed received subsidies under export promotion scheme and 24% of the firms did not receive any such subsidy.

Table 15.

Export Intensity %	Below 10%	11-25%	26-50%	Over 50%	Total
Receivers	86	81	70	85	76
Non Receivers	14	19	30	15	24
Total	100	100	100	100	100

Most firms among industry segment performed well in the export range of 26 to 50%, with gems & Jewellery 78%, pharmaceuticals 75% and leather 65%. Other industry averaged closed to half of their sample size among firms receiving subsidies.

Table 16.

Export Subsidy under Export Promotion Schemes

Industry /Export Intensity		**Receivers**	**Non-receivers**
		%	**%**
Minerals & Fuels	Below 10%	83	17
	11% to 25%	78	22
	26% to 50%	81	19
	Above 50%	80	20
Total		**(80)**	**(20)**
Gems & Jewellery	Below 10%	100	
	11% to 25%	67	33
	26% to 50%	63	37
	Above 50%	100	
Total		**(65)**	**(35)**
Metals	Below 10%	100	
	11% to 25%	100	
	26% to 50%	74	26
	Above 50%	100	
Total		**(84)**	**(16)**

Industry /Export Intensity		Receivers %	Non-receivers %
Machinery	Below 10%	67	33
	11% to 25%	86	14
	26% to 50%	60	40
	Above 50%	75	25
Total		**(68)**	**(32)**
Chemicals	Below 10%	100	
	11% to 25%	100	
	26% to 50%	71	29
	Above 50%	75	25
Total		**(82)**	**(18)**
Pharmaceutical	26% to 50%	75	25
	Above 50%	100	
Total		**(80)**	**(20)**
Leather	11% to 25%	100	
	26% to 50%	64	36
	Above 50%	67	33
Total		**(67)**	**(33)**
Textile & Apparels	Below 10%	89	11
	11% to 25%	79	21
	26% to 50%	80	20
	Above 50%	93	7
Total		**(83)**	**(17)**
Plastics	Below 10%	100	
	26% to 50%	50	50
Total		**(67)**	**(33)**

3. Barriers

3.i . Infrastructural Barriers

a) *Telecommunication*

A major portion (71%) of firms across all industry segments considers telephone as very important to operate their business. More than half of the responding firms do not consider inadequacy or inefficiency of telecommunication as an obstacle. However 31% of the respondents do find it as a minor obstacle. 7% consider it as a moderate obstacle.

b) *Electricity Supply*

About 44% reported it as a minor or moderate obstacle. 35% consider electricity supply as major problem of which 8% found it to be a very serious obstacle to their operations. In terms of quality of electricity supply, nearly half (44%) firms felt that the availability was limited, and another 35% indicated it to be of poor quality.

Industry segment - The position was however different from industry to industry. In minerals & fuels as many as 9% considered it as no deterrent or only minor deterrent. In machinery segment while 25%

considered it as no problem, an equal number found it to be a serious problem, while 50% consider it as a minor problem.

In textiles, there was a well spread out pattern with 33% considering it as a major problem and 12% as a very serious problem.

No clear picture emerges about the impact on export performance. Nevertheless, it seems that supply of electric power is a fairly pervasive problem and it certainly impacts exports.

c) *Transportation*

61% consider problem related to transportation as a minor or moderate, 11% of the respondents consider problem related to transportation as serious constraint in their business. Only $1/4^{th}$ of the respondents did not consider transportation as any bottlenecks to their operations.

In respect of responses to the quality of roads, while 50% accepted that there was limited availability of road transport system, 35% held these were of poor quality. On the responses to quality of railways, 15% thought these to be of limited quality, 47% of poor quality and 21% as poorly managed.

Most of the firms have highlighted the importance of seaports, out of which 84% are from gems and Jewellery.

With regard to the quality of airports, 24% find these of limited availability, 38% of poor quality and 23% as poorly managed.

d) *Cost of Transportation*

A total of 31% of responding firms stated that they spent up to 5% of their sales in transporting export to ports. 2% spent between 6 to 10% and another 2% over 10% of their sales.

Industry Segment - 95% of the firms in the gems & jewellery, 33% in plastic, 48% in leather, 43% in chemicals segment spent up to 5% of sales to transport their wares to ports for exports. Other responding firms ranged between 16% for minerals & fuels and 20% for textile & apparels.

The only significant proportion paying over 10% of sales for transporting export consignment to ports were 17% of plastics firms.

Due to the problem on domestic shipments, 89% firms suffered losses in production of up to 10% and 1% suffering over 50% losses.

e) *Access to financing*

Limitation in accessing financial resources are not considered a deterrent by 31% of the respondents.

While 12% considered it as a major obstacle, more than half (57%) considered it as a minor or moderate obstacle.

Industry Segment - In pharmaceuticals 80% considered it as minor obstacle, while 20% did not consider it as one. Access to financing was considered to be major obstacle by 11% in minerals & fuels of which 1% considered to be serious, 19% in gems & Jewellery of which 5% were facing serious problem, 21% in chemicals of which 7% had a serious obstacle and 6% in textile.

3.ii. Intensity of Competition

73 % of the respondents consider the business as fairly competitive.

20% of the respondents consider the business as normally competitive

2% think that there is no competition

Industry Segment - 94% of Gems & jewellery, 62% of leather and 56% of metals experience an intense competition.

Table 17.

Export Intensity	Below 10%	11-25%	26-50%	Over 50%	Total
Very intense	18	24	47	28	36
Intense	44	43	33	35	37
Normal	28	29	18	38	25
No competition	4	2			2

Export Performance - Data fail to establish any significant correlation between export performance and intensity of competition.

3.iii. Tariff Rates on Exports

64% firms paid up to 15% of tariff on their exports. 23% of the firms paid 16 to 25% of the levy, whereas only 2% firms paid over 50% tariffs. Another 11% of firms paid 26 to 50% tariff on their exports.

Table 18.

Export Intensity? **Tariff rate ?**	Below 10%	11-25%	26-50%	Over 50%	Total
0-15%	80	75	55	65	64
16- 25%	16	20	26	20	23
26-50%	4	3	16	13	11
0ver 50%		2	3	3	2

Industry Segment - Of those paying up to 15% tariff, the firms realizing 26 to 50% and over 50% intensity had a major share of firms across industry segment.