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Determinants of Firm-level Export Performance: A Case Study of Indian Textile Garments and Apparel Industry*

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Working Paper No. 58

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ABSTRACT

This study uses the Censored Regression (Tobit) Model to identify the firm-level determinants of exports of Textile Garments and Apparel by modern small scale industrial units located in Delhi, India and surveyed as part of the census of such units carried out during 1987-88. Scale of operation, technical efficiency, share of wages and sales expenses and forms of business organisation have been found to govern the firm-level export performance. The findings strongly suggest two major changes in the existing government policy for improving export performance, namely, abolition of reservation of products for exclusive production in small-scale units and appropriate amendments in labour legislation to introduce labour market flexibility.

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1. Introduction

The macroeconomic situation that became unsustainable during the Eighties in terms of both external (balance of payments) and internal (fiscal) deficits, forced India to undertake fiscal stabilisation and structural adjustment programme since July 1991. As a consequence, India started opening its economy and liberalising regulations on domestic economic transactions to make the industrial structure more efficient and internationally competitive. The resulting changes in exchange rate and import regulation policy in addition to a variety of export incentives have created an enabling environment for export expansion. This is a necessary first step. How far these changes manage to expand exports depends on the response of individual economic agents to the changes in policy that have enhanced the profitability of selling in the external markets and to the available opportunities in the international market. In turn, this response gets reflected in several firm level variables like technology, scale of operation, product-mix and organisational efficiency apart from domestic market structure and relative factor prices. In this context, it is important to analyse the factors governing the export behaviour of individual enterprises. This paper proposes to examine firm level determinants of the exports of Textile Garments and Apparel by modern small scale industrial units located in Delhi on the basis of the census of such units carried out during 1987-88. Although the survey period of the census relates to the pre-reform period, it is reasonable to expect the firm-level determinants to remain the same during the pre and post-reform period. Two interesting features of the study deserve to be highlighted. One, the study is based on the units located in the same area where the firms may be expected to face the same input prices and pay the same wage rates so that the observed inter-firm differences in competitive export markets can be traced to differences in organisational efficiency as reflected in the firm-level variables. Two, firm-level technical efficiency estimated from stochastic frontier function has been introduced and found to be significant in explaining export performance.

Textile Garments and Apparel is one of the major export items of India. The garment exports accounted for about 9 per cent of total Indian exports during 1981-82. The share has almost doubled to 17 per cent by 1994-95.[1] These exports have been growing at an annual compound rate of 22 per cent through out the 1980s. The average annual rate of growth of garment exports for the period of 1985-86 to 1989-90, has been as high as 32 per cent.[2] Nearly, 33 per cent of the domestic production of Hosiery and Garments by small scale industrial units was exported during 1987-88.[3] The present study draws on the industrial organisation theory to suggest firm-level factors that impart competitive advantage, approximates them in data, uses the Censored Regression (Tobit) Model to verify them and finally brings out their policy implications for export expansion.

The paper is organised as follows. Section 2 discusses the possible factors that are expected to influence export performance of the selected units and specifies the export function. Next section indicates the data base and establishes the empirical relevance of the determinants of exports that are identified in section 2. Section 4 is devoted to measurement of technical efficiency, one of the variables chosen to explain the export performance of firms, taking into account the differences in the form of business organisation. In section 5, we estimate the export function as a Tobit model and discuss the empirical results. The final section summarises the findings and their implications for government policy.

2. Analytical Considerations

Export performance of any single commodity is governed by - (a) the character of the government policy regime in the exporting and importing countries; (b) external demand conditions and (c) supply response in terms of establishing and maintaining price and quality competitiveness in the external markets. In this section, we discuss these factors with reference to the Textile Garment and Apparel Industry.

As regards the domestic policy, predominantly inward-looking or import substitution strategy and the associated restrictive trade and industrial policies that India adopted till 1991, created a bias against exports. The trade policy package consisting of overvalued exchange rate and a variety of high tariff and quantitative restrictions on imports made effective exchange rate for exporters lower than that for importers and thus discriminated against exports.[4] Import restrictions along with the industrial policies like capacity licensing resulted in insulating the domestic producers from external as well as internal competition and provided sheltered domestic market to existing producers. The net overall impact of all these policies was to enhance the profitability of selling in the domestic market relative to that in the external markets. Economic policy reforms initiated in July 1991 aimed at liberalising the restrictions on domestic industry and globalising the economy. They involved devaluation of the currency, phased reduction in the rates as well as spread of import tariffs, removal of quantitative import restrictions except those on consumer goods and the removal of industrial licensing except for a short and well-defined negative list. In addition, government introduced or continued various export incentives like duty drawbacks and advance licensing. These policy changes created a favourable environment for exports by raising the profitability of selling in the international market.

The exports of textile garments and apparel have been subjected to quantitative restrictions in the importing developed countries under Multi Fibre Arrangement (MFA) since 1974. Under MFA quotas are fixed for each exporting country in terms of volume of exports for different textile products through bilateral negotiations. Many studies have observed that these non-tariff trade barriers did not restrict exports as apprehended.[5] Rather, according to some studies, quotas appeared to have benefited those developing countries that had just entered or had negligible presence in the international market.[6]

A major proportion of Indian garment exports has so far been directed to countries like USA, UK and Germany which have been enforcing quotas under MFA though the percentage share of these quota countries in Indian Textile exports has been declining over time.[7] Although there exists scope for diversification in terms of regions and products,[8] India's garment and apparel exports have been confined to a few product categories in the quota countries.[9] However, quotas are not expected to constrain exports because of the provisions for increasing their margins in bilateral agreements.[10] In any case MFA on quotas will be phased out by 2005.

Nurkse (1959) emphasised external demand as the most binding constraint on exports from low income countries.[11] This thesis was later challenged by Kravis (1970) who traced the stagnation in exports of less developed countries primarily to internal supply constraints. Kravis argument was corroborated by an empirical examination of this issue for the recent period (1970-87) by Panoutsopoulos (1992). This analysis showed that although the rate of growth of apparent consumption in the major industrial nations was low, the percentage share of imports especially from the developing countries in apparent consumption increased over time despite the imposition of non-tariff barriers in the case of all manufactures including Textile, Clothing and Footwear.[12] This was traced to the relocation of the corresponding industries away from the developed countries where labour costs had been rising and toward labour abundant developing countries. In other words, external markets did not appear to pose a problem for exports from developing countries.

The foregoing discussion as well as empirical evidence on garment exports seem to suggest that neither the volume of external demand nor non-tariff trade barriers like quotas have affected Indian garment exports in a significant way. It is, therefore, pertinent to focus on internal supply factors that affect the international competitiveness of firms and hence on factors influencing the inter-firm export performance. In this context. traditional trade theories emphasise economy-level *comparative advantage* originating in

relative labour productivities or relative factor endowments across countries as a source of potential competitiveness. The recent theoretical developments in the international economics put greater emphasis on firm level *competitive advantage* flowing from technology, product differentiation, imperfect competition and economies of scale.[13]

Production of Textile Garments and Apparel is a labour intensive activity which is expected to have potential comparative advantage in a labour abundant economy like India. *Ex post* Revealed Comparative Advantage (RCA) indices[14] for a three-digit product category namely, Women's Outer Garments - a major item in the Indian garment exports[15] confirm this by consistently having values well above unity during 1978-92 though declining over time.

As regards the market structure, the selected industry consists of a large number of small firms as the production of Ready-made garments had till recently been reserved exclusively for the small scale units.[16] Consequently, most of the garment exports are in the non-branded bulk export segment where cost competitiveness is more important than product differentiation. With no entry or exit barriers except for reservation, the market structure can, therefore, be taken to be competitive. Hence, considerations relating to imperfect competition and product differentiation are not relevant in gauging the competitive advantage at the firm level in this industry.

An important source of cost competitiveness at the firm level that has been discussed in trade theories is the advantage imparted by scale of operation which results in lower average costs and hence improve their competitiveness in the market. The three major sources of scale-based advantage are: (a) economies in the production process due to the presence of increasing returns to scale; (b) economies in the bulk purchases of materials and (c) economies in marketing and selling costs. In the case of Garments and Apparel, production process is expected to be scale neutral. There exist, however, economies in bulk purchase of materials and in the sale of output. Given the fact that the

industry is material intensive (average share of materials in gross output is 0.60), economies in bulk purchase of materials are expected to be greater, the larger is the scale of operation. Material intensity also implies higher working capital requirements for which larger scale enables better access. Overhead marketing costs per unit would also decline with a rise in sales volume. Since the outlay on materials as well as volume of sales are directly related to the magnitude of production, we consider the value of production as a preferred proxy for scale advantage. As the magnitude of production increases, average costs are expected to fall thereby increasing the firm level competitiveness and hence exports. We, therefore, expect *ceteris paribus*, a positive association between value of production and export intensity.

Given the scale advantage, another important source of competitiveness relates to technology. As regards production technology, garment production involves four basic operations viz., cutting, stitching, embroidery / zipping / button holing & stitching and finishing. Almost all the operations can be done manually or by manually operated or power driven machines. While specialised operation-specific machines can ensure uniformity in specifications and quality and reduce the time required for completing a given operation, the viable scale would inevitably go up. The same operations can be manually carried out by skilled workers who may either be specialised in one or a few related operations or who may be general purpose tailors specialised in stitching certain type(s) of garments. Similarly, the organisation of production can be either in batch production of parts of a given garment to be stitched together at the final stage or it can take place in a sequential fashion in the same unit. The production process thus lends itself to a wide variety of factor combinations involving different types of specialised and general purpose machines and using manual/ mechanical/ electronic devices, skilled and unskilled labour as also diversity in organising the production activity. Surveys, however, do not provide quantifiable information on these aspects which have to be crudely approximated by available quantifiable indicators. In the present study we expect the wage share and technical efficiency variables to reflect the impact of technology on

export performance. The productivity per worker that is implicit in the wage share provides a possible operational approximation to a firm's technology. For the given technology, the extent to which firm operates on the frontier is indicated by the technical efficiency. We turn now to an interpretation of both the wage share and technical efficiency.

Economy-level potential comparative advantage originating in relative factor endowments provides an enabling environment of cost competitiveness for firms at micro level. Firm-level organisational factors translate the potential comparative advantage at the economy-level into firm-specific competitive cost advantage. Comparative advantage of India, as mentioned earlier, is expected to originate in its relatively abundant factor namely, labour. However, it is not just cheap labour in terms of low wage rate per worker that leads to comparative cost advantage but low wage *in relation to* productivity of that labour. This is captured at the firm level in the share of wages in the value of production. It can be seen from the following relation.

$$(W/P) = (W/L) \div (P/L)$$

Where, W = Wage Bill,

P = Value of production,

L = Number of employees.

Notice that the wage bill reflects the skill composition of firm level work force so that the (implicitly weighted) average wage is a skill composition adjusted wage rate. Similarly, productivity per worker may be taken to reflect the choice of technology at the firm level. Given the material intensity, the lower the wage share, the lower is the (skill adjusted) wage rate in relation to labour productivity and greater is the firm level competitive advantage which is expected to result in higher volume of exports. Thus, the wage share taken to be a ratio of wage bill to value of production, is expected to have *ceteris paribus* a negative association with the export performance of a firm.

Given the input prices, scale advantage and technology, technically more efficient firm would obviously possess a cost advantage as well. Technical efficiency defined as firm's ability to produce maximum possible output from its observed combination of inputs and technology is measured through an econometrically estimated frontier function.[17] In the frontier model, technical efficiency is calculated as a ratio of observed production to maximum possible production (calculated from the production frontier for observed input combinations). In this study, technical efficiency is measured assuming different technologies (frontiers) for three broad forms of business organisation (more on this in section 4). Technical efficiency at a firm level can be attributed to organisational factors like nature of management, plant layout, material handling, waste control and work methods.[18] Firms using their available resources with selected technologies more efficiently are able to produce at lower costs and hence improve their competitiveness in the market and thus expected to have a positive impact on exports.

In addition to the trade theoretic variables (relevant for technical viability) two more factors are relevant for commercial viability, namely, access to capital markets and efforts made to access the international product markets.

Form of business organisation of a firm is taken to approximate the firm's access to capital market as the survey data do not provide any quantifiable information in this regard. Three forms of business organisation are distinguished in the data source of the selected industry. They are - single proprietorship, partnership and companies incorporated under the Companies Act. Two distinguishing features of these forms of business relate to the liability of owners in the case of bankruptcy and legal life of the business entity. Both single proprietorship and partnership are characterised by *unlimited liability* but *limited life*.[19] In contrast, limited companies have *unlimited life* and its shareholders have *limited liability*. One shareholder's death or selling away the shares do not affect the legal existence of the company. Limited liability makes it possible for firms to access finances from a potentially large number of limited liability shareholders.[20] The

form of business organisation determines the firm's capacity to raise finances - the basic resource at firm level and hence probability of its undertaking production for exports. Form of business organisation is represented through dummy variables in the export function.

Finally, firms need to put in efforts to explore, establish and continuously expand markets to survive in a competitive environment. For this purpose firms require to develop distribution networks. The need for it is all the more so if the firm operates in the international market. Increasing globalisation of the product systems that has led to global commodity chains and the special importance of distribution and marketing links in the garment and apparel product chain enhances the importance of this factor.[21] Development of the markets and distribution networks involve expenses which are expected to be higher per unit of sales volume in the context of international markets[22] so that marketing and sales expenses can be taken as an indicator of firm's actual efforts towards accessing markets and distribution networks and are expected to promote exports and thus would bear *ceteris paribus* a positive relation with export performance. It is defined as a ratio of sales expenses to value of production.

We have thus identified scale advantage, wage share, technical efficiency, share of sales expenses and form of business organisation as the possible determinants of exports of Garments and Apparel at the firm level. Export performance is measured as a ratio of exports to production and is used as the dependent variable in the export function. Accordingly, the export function of the study is specified as

$$Y = f(x_1, x_2, x_3, x_4, d_1, d_2) \qquad (2.1)$$

Where, Y = Ratio of exports to production,

x_1 = Value of production,

x_2 = Technical efficiency index

= Ratio of observed production to maximum possible production,

x_3 = Ratio of wage bill to production,

x_4 = Share of sales and other expenses in production,

d_1 = 1 for proprietorship, otherwise 0,

d_2 = 1 for partnership, otherwise 0.

d_1 and d_2 are intercept dummies. The coefficient of d_1 (d_2) gives the difference between proprietorship firms' (partnership firm's) intercept and the intercept of limited companies that we get from the estimated equation (2.1). Since we expect the average export performance of limited companies to be higher than that of partnership firms which, in turn, are expected to perform better than proprietorship firms, the coefficients of d_1 and d_2 are expected to have a negative sign and absolute value of d_1 to be higher than that of d_2.

3. Data Base and Relevance of Identified Factors

This section is devoted to a brief discussion of the data base used in the present study and empirical relevance of the factors identified in the last section.

As mentioned earlier, this study relates to the Manufacture of Textile Garments including Wearing Apparel (264) [23] located in Delhi. This industry includes Ready-made Garments (2641) and Custom-made Wearing Apparel (2642). Textile Garments and Apparel industry had 395 units in Delhi. [24] These had been surveyed during the Second census of small Scale industrial units (CSSIU2) as the industry had been reserved for small scale units. Unit level data for all those small scale industrial units registered with the State Directorates of Industries in India were collected under CSSIU2 conducted in 1989 for the reference year April 1987 - March 1988. We have obtained CSSIU2 data for Delhi from the office of the Development Commissioner, Small Scale Industries. For the purpose of census, *Small Scale Industrial Unit* was defined as an undertaking having original investment in plant and machinery not exceeding Rs. 3.5 millions.

We study the salient features of the selected industry in terms of differential characteristics of units grouped on the basis of the form of business organisation and exporting and non-exporting units separately to examine the empirical relevance of the determinants of exports discussed in section 2. We consider the following economic variables namely, scale of operation, capital intensity, labour productivity, average (skill adjusted) wage rate and factor shares. All these structural ratios are presented in Table 4 in the appendix.

Of the total 395 units in the selected industry, 178 (45%) units are proprietary units, 145 (37%) are partnership firms and 70 (18%) are limited companies. Of the 178 proprietary concerns only 57 units exported either full or part of their production contributing 19 per cent of exports of the selected industry. Out of 145 partnership firms, 66 units exported their production constituting 32 per cent of the industry's exports. As many as 64 out of 70 limited companies engaged in export activity accounting for 49 per cent exports of the selected industry.

We may recall at this stage, one significant aspect of the data base used in this study mentioned in the introduction. We have analysed units producing a narrow range of output (mainly 2641 and 2642) and located in the same area viz., Delhi. All the firms, therefore, can be reasonably assumed to face similar prices of inputs and pay same wage rates so that observed inter-firm differences in export performance can be traced to differences in organisational efficiency as captured in the quantifiable variables and non-quantifiable forms of business organisation

Notice (Table 4 in appendix) that material intensity does not differ significantly either across exporting and non-exporting units or across forms of business organisation. Given the form of business organisation, exporting units have a considerably higher scale of operation than non-exporting units that results from a higher capital-labour ratio and consequent higher labour productivity but a lower share of wages in gross output. The

lower wage share reflects lower skill-adjusted wage (but in absolute terms higher) in relation to productivity. This enhances competitive advantage and hence higher volume of exports and consequently enables payment of higher wage rate as well as higher share of employment in exporting units. In other words, larger size efficient units provide higher volume as well as better quality employment. Following our discussion in section 2, a higher share of sales expenses in exporting units is only to be expected in accessing international distribution chains in an export-oriented industry.

Focusing on exporting units across forms of business organisation, notice (Table 4 in the appendix) that wage share is virtually the same. In other words, all the exporting units are equally efficient users of labour in relation to productivity. This is also reflected in skill-adjusted wage rate per employee and labour productivity being not very different across forms of business organisation among the exporting units. Scale of operation, however, increases sharply in moving from proprietorship to partnership firms but much more gradually from partnership firms to limited companies. This would enable better access to finance, materials and markets.

4. Measurement of Technical Efficiency

It is self evident that technically more efficient firms are expected to possess competitive cost advantage and hence exhibit better export performance. This section is, therefore, devoted to the discussion of technical efficiency as its measurement and interpretation warrant separate treatment. In the present study, on the basis of econometric analysis, technical efficiency is measured with separate frontiers for three forms of business organisation namely, proprietorship, partnership and limited companies as they are expected to differ widely in access to finance and hence to technology.

Technical Efficiency is taken to represent firm's capabilities either to produce maximum possible output given the input combination and technology or to use

minimum possible input combination given technology to produce a given level of output. The survey based data enables an approximation to the former concept and consequently technical efficiency is measured as the ratio of observed output to maximum producible output with observed input combination. It has been estimated through the stochastic production frontier model which is described below. Let the production function be

$$Y = f(X)\ e^{-u} \tag{4.1}$$

From (4.1) e^{-u} can be written as

$$e^{-u} = Y / f(X) \tag{4.2}$$

i.e., the ratio of observed output (Y) to maximum producible output [f(X)]. Thus, e^{-u} can be taken as a measure of technical efficiency. As the production function is expected to represent the maximum producible output, the observed output (Y) would always be less than or equal to maximum output so that $0 \leq e^{-u} \leq 1$. We rewrite (4.1) in log-linear form

$$\ln Y = \ln [\ f(X)\ ] - u \tag{4.3}$$

so that $0 \leq u \leq \infty$. Hence, an appropriate way of estimating a production function is to treat u as a random variable with (0, ∞) range and drawn from a one-sided statistical distribution. By assigning a suitable statistical distribution to u, we can estimate the parameters of the distribution along with the parameters of production function. In this way production function represents a frontier as given by its definition. This frontier model is employed to estimate technical efficiency. We postulate a stochastic Translog production frontier specified as

$$\ln Y = \alpha_0 + \alpha_k \ln K + \alpha_l \ln L + \alpha_e \ln E + 1/2\ \gamma_{kk} (\ln K)^2 + \gamma_{kl}\ \ln K \ln L + \gamma_{ke}\ \ln K \ln E + 1/2\ \gamma_{ll} (\ln L)^2 + \gamma_{le} \ln L \ln E + 1/2\ \gamma_{ee} (\ln E)^2 + \varepsilon \tag{4.4}$$

Where, Y = Value of production,

K = Fixed capital,

L = Total employees,

E = Value of energy consumed and

$\varepsilon = v - u$ is composed error term.

It is assumed that $v \sim N(0, \sigma_v^2)$ is a two-sided error term representing the usual statistical noise. Inclusion of v makes the frontier stochastic by allowing the random effects on production. $u \geq 0$ is one-sided error term representing the technical efficiency. It is assumed to have been drawn from the Exponential distribution.[25] Accordingly, probability density function of u is written as

$$f(u) = \exp(-u / \sigma_u) / \sigma_u \qquad (4.5)$$

conditional mean of u can be derived from the moments of residuals as below

$$E(u/\varepsilon) = \sigma_v[(f(A) / 1 - F(A)) - A] \qquad (4.6)$$

where $A = (\varepsilon/\sigma_u) + (\sigma_v + \sigma_u)$

Frontier is estimated using the maximum likelihood method. Technical efficiency (TE) is calculated as $1 / \exp[E(u / \varepsilon)]$.

In the estimation, we have to exercise choice with reference to a given data set in two dimensions, namely, choice between alternative specifications of the frontier and choice between a single frontier or separate frontiers for the three forms of business organisation. For this purpose, we follow a two step procedure. In the first step, we carry out an econometric test for choosing between Translog and Cobb-Douglas specifications with regard their appropriateness for the data set. Given this choice, the next step employs the Chow test to determine whether or not three separate frontiers for the three forms of business organisation (single proprietorship, partnership and limited companies) are to be considered.[26] Since Cobb - Douglas is a restricted form of Translog, we test the relevant restrictions on the Translog parameters to accept/ reject the Cobb - Douglas specification. In the first step, based on the relevant F-statistic being significant, Translog specification is accepted. In the second step, the validity of the single vis-à-vis the separate Translog frontiers for three forms of business organisation is tested using the Chow test for the stability of the coefficients of the common Translog frontier for all the units in the selected industry. Based on a significant value of the relevant F-statistic, we use separate Translog stochastic frontiers for the three organisational forms to measure technical efficiency.[27] Estimated mean technical efficiency index is 0.66 for proprietary

concerns and the variation around the mean is smaller (0.17) for this group. Average efficiency index for partnership firms is 0.58 with coefficient of variation being 0.30. Mean technical efficiency index for limited companies is 0.56 with 0.37 as coefficient of variation. It is important to note here that one cannot interpret these efficiency indices to indicate that proprietorship firms are more technically efficient compared to the other two forms of business organisation as the technical efficiency indices are the deviations from their *respective* and *different* frontiers and hence cannot be directly compared. It is possible for limited companies to produce higher outputs, for an overlapping common range of input combinations, than say, partnership firms while the frontier for limited companies may lie nearer to the origin of input space than that for the proprietorship firms, for the same level of output.

5. Estimated Censored Regression (Tobit) Model[28] and Discussion of Empirical Results

Censored sample is the one in which dependent variable is censored. That is, the values of dependent variable in a certain range (say, ≤ 0) are all transformed into a single value ($= 0$) which sets a limit.[29] Censored variable has, thus, a mixture of discrete and continuous distributions. If a given sample data has a significant proportion of observations for which the dependent variable takes a limit value, conventional regression method fails to account for these observations. Censored Regression or Tobit model was developed to deal with the censored sample data. Since we have a good number of non-exporting units for which the dependent variable takes a zero value, export function of the study is specified in the form of Tobit model as follows:

$$Y^* = \beta' X + e \qquad (5.1)$$

Y^* = Dependent variable

= Ratio of exports to production

β' = Vector of unknown parameters

X = Vector of explanatory variables

$= [\, x_1, x_2, x_3, x_4, d_1, d_2 \,]$

e = error term $e \sim N(0, \sigma^2)$

Assuming $\mu = \beta' X$

$Y^* / X \sim N(\beta'X, \sigma^2)$

Y^* is a censored random variable with a limit from below at zero. Now, let us define a new random variable Y such that

$Y = 0$ if $Y^* \leq 0$

$Y = Y^*$ if $Y^* > 0$

In the first part, probability of the entire censored region ($Y^* \leq 0$) is assigned to censoring point ($= 0$) which constitute the discrete portion of the distribution of the variable. From this, the conditional mean function of Y can be derived as

$$E(Y/X) = F(\beta'X/\sigma)\ (\beta'X + \sigma\lambda) \qquad (5.2)$$

Where, $\lambda = f(\beta' X/\sigma) / F(\beta' X/\sigma)$

$f(.)$ is the standard normal pdf

$F(.)$ is the standard normal cdf

What we actually observe is Y and estimate the conditional mean function of Y. This function is estimated using maximum likelihood method. Assuming Y_i are independent of each other, log-likelihood function for the conditional mean function can be derived as

$$\ln L = \Sigma_{Y>0} -1/2\, [\, \ln(2\Pi) + \ln\sigma^2 + (y_i - \beta' X)^2 / \sigma^2 + \Sigma_{Y=0} \ln(1-\Phi)(\beta'X/\sigma^2) \qquad (5.3)$$

This is not a standard likelihood function since it is a combination of discrete and continuous distributions. The first part ($\Sigma_{Y>0}$ ...) correspond to the classical regression for the non-limit observations and the second part ($\Sigma_{Y=0}$ ...) give the relevant probabilities for the limit observations. This function is maximised with respect to β and σ^2 to get the maximum likelihood estimates of the parameters. The estimated export share equation is presented below.

$$Y = 1.3143 + 0.0005\, x_1 + 0.0007\, x_2 - 2.1186\, x_3 + 0.6991\, x_4 - 1.2003\, d_1 - 0.5134\, d_2 \qquad (5.4)$$

(7.001) (2.983) (4.103) (-5.165) (3.901) (-6.749) (-4.927)

t-values given in the parentheses indicate that all the parameter estimates are statistically significant and directionally consistent with *a priori* expectations.

The estimated parameters (β) are not marginal coefficients. Marginal coefficient for a given explanatory variable x_j is derived as below.

$$\partial E(Y/x_j) / \partial x_j = \beta \Phi(\beta'X/\sigma) \qquad (5.5)$$

j = 1..... 6 refers to individual explanatory variables

From (5.5), it is clear that the marginal coefficients are proportional to parameter estimates (β). We, however, preferred marginal coefficients for clarity in interpretation. Using the intercepts and mean values of the explanatory variables specific to each form of business organisation, we have derived separate sets of marginal coefficients for the three organisational forms of single proprietorship, partnership and limited companies. They are presented in Table 1.

Table 1: Tobit Estimates of Export Share Equation and Marginal Coefficients

			Marginal Coefficients		
Variable		β	**Proprietorship**	**Partnership**	**Limited Co**
(1)		(2)	(3)	(4)	(5)
Constant		1.3143	0.1140	0.8009	1.3143
Scale (Rs. lakhs)	(x_1)	0.0005	0.0002	0.0002	0.0003
Technical efficiency (ratio)	(x_2)	0.0007	0.0002	0.0003	0.0004
Wage share (ratio)	(x_3)	-2.1186	-0.6612	-0.9413	-1.1100
Share of sales expenses (x_4) (ratio)		0.6991	0.2182	0.3106	0.3663
σ		0.6559			
Φ (β'X/ σ)			0.3121	0.4443	0.5239

Notice that in deriving the marginal coefficients, the multiplicative factor specific to each form of business organisation is indicated in the last line of Table 3. This factor is

the lowest for single proprietorship firms, the highest for limited companies with that for partnership firms lying in-between. In other words, compared to an average single proprietorship firm, the impact of every single explanatory variable is 42 per cent higher for an average partnership firm and as high as 68 per cent higher for an average limited company. We interpret this to mean that the form of business organisation reflecting access to finance and technology as well as scale advantage is clearly a very important factor governing export performance.

The sensitivity of firm level export performance turns out to be very high with a negative marginal coefficient with respect to the share of wages in total gross output. Thus, among the three forms of business organisation, an equal reduction in wage share produces the highest impact on the export performance of limited companies followed by that of partnership concerns and proprietary firms in that order. A reduction in wage share should not be narrowly interpreted in terms of a reduction in wage rate or employment or both. Rather, out discussion in section 2 brings out and further confirmed in section 3 that exporting units are more efficient users of (the economy-level relatively abundant factor) labour and pay *both* (skill-adjusted) higher wage *and* offer higher employment so long as both together make a more than proportionate contribution to overall productivity per unit of labour at the firm level. This in turn, can be attributed to the possible organisational flexibility offered by the modern small scale industrial units classified by the original value of plant and equipment below a certain ceiling level. This segment in a labour intensive industry marked by wide diversity in skill and machinery combinations, is characterised by reasonably free entry and organisational possibilities of getting around restrictive labour legislation that constrict labour market flexibility in the Indian organised manufacturing sector.

Next in quantitative magnitude but opposite in direction is the sensitivity of the firm level export performance to the share of sales expenses in gross output. This reflects the fact that in the buyer-driven consumer chain that is characteristic of the garment

industry, accessing branded merchandisers, trading companies or large retailers abroad requires higher sales expenses per unit of (physical) output in relation to unit value of output. The impact of an identical increase in the share of sales expenses on export performance goes up in moving from proprietorship to partnership firms to limited companies. Since access to finance and hence scale of operation goes up across forms of business organisation, the rising magnitude of the marginal coefficient is possibly reflective of scale economies in accessing international markets.

That technical efficiency matters for competitive advantage of firms is verified by the positive and statistically significant coefficient of this variable in the estimated equation (5.4). Table 3 brings out that the average impact of technical efficiency on export performance rises steadily across the three forms of business organisation. Positive impact (though smaller in magnitude) of technical efficiency on the share of exports in production means that there exists scope for firms to raise exports even in the short run with the given input combination and technology simply by reorganising themselves so as to reduce wastage and extracting more out of existing technology.

Similarly, the positive and statistically significant marginal coefficient of scale in the estimated equation (5.4) implies that *scale of operation matters even within the segment of small scale industrial units*. The impact of scale on the export performance is higher for limited companies than that for other two forms of business organisation. This result has important implications for the policy of reservation of garment industry for the exclusive production in the small scale sector which does not permit entry of large scale organised units.[30] Its importance is more so given the fact that limited companies contribute substantially to garment exports and these companies are larger in scale compared to the other two forms of business organisation.[31]

6. Summary and Concluding Observations

In this paper, we examined the firm specific factors that impart competitive advantage to firms and hence govern their export performance in the case of Garments and Apparel industry of Delhi using the unit level data for the year 1987-88.

Since most of the garment exports are of bulk and non-branded varieties, cost competitiveness is clearly critical for exports. We considered scale of operation, technical efficiency and the share of wages as the most important sources of cost competitiveness. In addition, we identified the form of business organisation and the share of sales expenses as other relevant factors. Form of business organisation determines a firm's access to finances which is important in a material intensive export-oriented industry being studied and hence its competitive advantage. Sales expenses indicate the firm's actual effort to establish and/or expand connections to international consumer driven chains for distribution.

First, we studied the empirical relevance of the above mentioned factors in terms of their differences across exporting and non-exporting units and across forms of business organisation and found them important. This led to the specification of the export function in terms of scale of operation, technical efficiency, wages share, share of sales expenses with intercept dummies for each of the three forms of business organisation. It has been estimated as a Censored Regression (Tobit) Model. All the parameter estimates of the export function have been found to be statistically significant with expected signs.

The marginal impact of every single variable on firm-level export performance was found to be the highest for limited companies, lower for partnership firms and the lowest for proprietary concerns. The form of business organisation was thus found to be critical in explaining inter-firm export performance. Given the form of business organisation, marginal coefficient of wage share is the highest in magnitude followed by

that of share of sales expenses. We interpret this to mean that firm level efforts in efficiently utilising the abundant factor of labour and in accessing international distribution chains play a significant role in translating the economy-level potential comparative advantage into firm level competitive advantage.

Results indicate that garment exports can be increased by permitting large scale firms in the production of garments as they are in a better position to reap economies of scale in bulk purchase of materials, raise finances and capable of spending on marketing and sales. Larger size also enables firms to reorganise themselves better in using the existing technology efficiently. There is no need to worry about the employment implications of the rise in size as our results also show that not only do larger firms make proportionately greater contribution to employment but also pay higher (skill adjusted) wages. However, one can expect a quantum jump in exports only if the existing labour legislation is amended so as to enable large scale organised firms to use labour productively and flexibly - the major source of international competitiveness. Expansion in scale of operation would also facilitate the graduation of atleast, some of the existing firms from the unbranded mass-produced low unit value products into branded high-unit value products.

Our results show that while the existing organisation of industry characterised by exclusive production in a large number of small scale units makes it possible to get around the constricting effects of existing labour legislation in India, scale of operation directly as well as indirectly through other variables such as forms of business organisation exerts a strong positive impact on export performance. Since healthy export expansion is critical to the viability of balance of payments of a globalising economy like India, our findings strongly suggest two major changes in government policy for this purpose, namely, abolition of reservation of products in small scale units and appropriate amendments in labour legislation to introduce labour market flexibility. In a labour intensive industry operating in competitive export markets, it is important to permit

individual units to find optimal size with respect to competitive advantage rather than subjecting those units (as the Indian policy makers have done) to irrational constraints on the scale of operation.

While discrete jumps in technological innovations in products and processes are indeed essential to sustain and expand exports in the long run, incremental improvements in technical and organisational efficiency (i.e. movement nearer to the frontier) and in labour usage as well as in sales efforts can contribute positively to exports in the short run. Government can provide enabling environment and firms should concentrate first on these short run factors while focusing on long term improvements in competitive advantage.

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APPENDIX

Table 1: Readymade Garment Exports of India 1981-82 to 1994-95

Rs. Crores

Years	Garment Exports	Total Exports	Share of (%) (2) in (3)
(1)	(2)	(3)	(4)
1981-82	669.80	7798	8.59
1982-83	629.30	8788	7.14
1983-84	734.60	9738	7.54
1984-85	948.30	11705	8.10
1985-86	1096.10	10847	10.10
1986-87	1503.00	12417	12.10
1987-88	1999.50	15611	12.81
1988-89	2278.10	20148	11.31
1989-90	3472.20	27681	12.54
1990-91	4639.64	32555	14.25
1991-92	6282.35	44042	14.26
1992-93	8840.75	53688	16.47
1993-94	11648.06	69752	16.70
1994-95	13921.62	82609	16.85

Source: Textile Commissioner. *Compendium of Textile Statistics*. 1995

Table 2: Distribution of Indian Exports of Readymade Garments by Destination 1987-88 to 1994-95

Figures given are percentage shares

Country	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1987-91*	1991-95*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Australia	1.19	1.48	1.40	1.05	1.15	1.28	1.32	1.29	1.25	1.28
Benelux	4.47	4.67	4.47	4.78	4.31	4.99	5.14	4.88	4.62	4.89
Canada	2.71	2.86	2.88	2.77	3.04	2.72	2.90	3.05	2.81	2.93
Denmark	0.96	0.85	1.05	1.01	0.89	0.82	0.83	1.21	0.99	0.97
France	6.92	6.74	6.76	6.67	6.87	6.95	6.62	6.66	0.75	66.74
Germany	14.18	13.73	15.25	15.93	13.93	13.32	12.69	12.53	15.05	13.01
Italy	6.33	4.15	3.52	3.31	4.00	5.16	4.22	5.12	4.01	4.70
Japan	2.22	2.66	3.22	3.15	4.44	3.56	3.23	3.35	2.93	3.53
Switzerland	2.41	2.40	2.66	2.87	2.92	3.15	3.05	2.38	2.65	2.82
Sweden	1.40	0.90	1.40	1.66	1.91	1.88	2.47	2.90	1.41	2.33
U.K.	10.96	9.70	11.80	11.64	10.09	11.57	10.04	9.50	11.22	10.20
U.S.A.	31.93	32.62	21.40	24.39	26.16	27.42	24.99	28.24	26.29	26.81
U.S.S.R (CIS)	8.66	9.97	8.34	7.62	4.68	2.42	5.57	4.22	8.42	4.29
U.A.E.	0.56	1.24	3.07	3.90	4.80	4.33	4.57	2.99	2.64	4.01
Others	5.04	6.05	12.80	9.25	10.81	10.42	12.19	11.89	8.98	11.49
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source is the same as given in Table 1. * gives the average of the all those years.

Table 3: Revealed Compared Advantage Indices for Indian Garment Exports 1978 to 1992

Years (1)	SMOG (2)	SWOG (3)	RMOG (4)	RWOG (5)
1978	0.72	2.30	1.52	4.85
1979	0.38	3.27	0.87	7.53
1980	0.40	3.49	1.00	8.62
1981	0.33	4.80	0.88	13.00
1982	0.26	3.20	0.66	8.00
1983	0.45	4.88	0.98	10.69
1984	0.52	4.48	1.13	9.75
1985	0.62	5.35	1.41	12.16
1986	0.51	4.37	1.20	10.14
1987	0.51	4.12	1.08	8.74
1988	0.57	3.88	1.15	7.82
1989	0.58	4.06	1.01	7.16
1990	0.44	3.43	0.85	6.60
1991	0.47	3.40	0.92	6.60
1992	0.40	3.56	0.72	6.37
ROG	0.896	0.987	-1.149	-1.078

Notes:

SMOG = %age share of India's exports in world exports of Mens Outer Garments
SWOG = %age share of India's exports in world exports of Women Outer Garments
RMOG = Revealed Comparative Advantage Index for Men Outer Garments
RWOG = Revealed Comparative Advantage Index for Women Outer Garments
ROG = Exponential Growth Rate per annum.

Source: UN: *International Trade Statistics Year Book.* Various Issues.

Table 4: Mean Values for the Scale of Operation and Structural Ratios by the Form of Business Organisation and Exporting Category

Category	Units	Scale of Operation		Capital Intensity		Labour Productivity		WR	SE	Factor Shares		
		PRD÷U	L÷U	TK÷L	FK÷L	VA÷L	PRD÷L			SW	SM	SSE
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Proprietorship:												
Exporting units	57	8653	31	45.859	39.613	116.370	291.480	11.290	54	0.08	0.59	0.25
		(1.32)	(1.27)	(0.94)	(0.97)	(1.20)	(0.89)	(0.85)		(1.07)	(0.32)	(1.74)
Non-Exporting units	121	1199	12	20.927	17..969	17.778	61.117	6.181	46	0.25	0.53	0.07
		(3.10)	(2.28)	(0.83)	(0.83)	(1.04)	(1.18)	(1.24)		(2.41)	(0.63)	(1.64)
Partnership:												
Exporting Units	66	17508	61	48.112	32.818	117.090	341.050	12.061	75	0.07	0.64	0.13
		(1.31)	(0.95)	(0.98)	(0.99)	(1.53)	(1.27)	(0.85)		(1.33)	(0.26)	(0.84)
Non-Exporting Units	79	2546	18	22.744	18.952	28.998	109.301	6.421	25	0.13	0.65	0.08
		(2.31)	(1.23)	(0.92)	(0.91)	(1.03)	(0.82)	(0.54)		(1.21)	(0.34)	(1.56)
Limited Companies:												
Exporting Units	64	22101	76	57.233	44.898	111.570	350.580	12.240	95	0.07	0.64	0.11
		(1.66)	(1.04)	(080)	(0.72)	(1.80)	(1.57)	(0.67)		(1.11)	(0.23)	(0.75)
Non-Exporting Units	6	11256	46	45.031	39.896	65.429	219.090	10.272	5	0.07	0.66	0.13
		(1.25)	(0.48)	(0.64)	(0.64)	(0.93)	(0.84)	(0.57)		(0.69)	(0.27)	(0.15)
All Units	395	8565	35	35.63	28.43	67.36	201.94	9.001		0.13	0.60	0.11
		(2.26)	(1.48)	(1.09)	(1.00)	(1..93)	(1.63)	(9.29)		(2.55)	(0.40)	(1.80)

Source: DCSSI. *Second Census of Small Scale Industrial Units*, 1992.

Notes: PRD = Value of Production (Rs. 000), U = Number of units, L= Number of employees, TK = Total capital (Rs. 000), FK = Fixed capital (Rs. 000), VA = Value added (Rs. 000), WR = Wage rate per person per annum (Rs. 000), SE = Share of employment of exporting group in the employment of the category of business form of organisation, SW = Share of wages (Ratio of wage bill to value of production), SM = Share of materials (Ratio of value of materials consumed to value of production), SSE = Share of sales expenses (Ratio of sales and other expenses to value of production).

Figures in parentheses are coefficients of variation.

Figures in parentheses are coefficients of variation.

Table 5: Parameter Estimates of Different Specifications of Stochastic Production Frontier Model

Specification	α_0	α_k	α_l	α_e	γ_{kk}	γ_{kl}	γ_{ke}	γ_{ll}	γ_{le}	γ_{ee}	n
Common Cobb Douglas	-2.0939	0.5629	0.8357	0.0950							395
	(9.010)	(10.978)	(9.877)	(2.109)							
Common Translog	2.0679	-0.2499	1.9186	1.0549	0.0835	0.0056	-0.1364	-0.1402	-0.1147	0.0760	395
	(2.743)	(-0.841)	(4.234)	(4.226)	(1.934)	(0.051)	(-2.613)	(-1.176)	(-1.215)	(2.167)	
Separate Translog for Proprietorship	1.7521	-0.4084	2.1105	1.1407	0.1576	-0.2045	-0.1299	0.0210	-0.0378	-0.0145	178
	(1.167)	(-0.689)	(2.067)	(2.020)	(1.846)	(-0.820)	(-1.113)	(0.071)	(-0.145)	(-0.142)	
Partnership	6.8002	-0.5583	0.0107	0.4720	0.0320	0.2452	-0.0258	-0.0825	-0.1941	0.1067	145
	(3.497)	(-1.036)	(0.011)	(1.122)	(0.510)	(1.521)	(-0.323)	(-0.404)	(-1.224)	(2.403)	
Limited companies	10.2440	-2.7034	2.2258	1.3116	0.2316	0.1427	-0.2207	-0.3234	-0.0827	0.1019	70
	(1.784)	(-1.487)	(1.603)	(1.621)	(1.392)	(0.500)	(-1.825)	(-1.971)	(-0.967)	(2.399)	

Notes: 1. Cobb - Douglas frontier: $\ln Y = \alpha_0 + \alpha_k \ln K + \alpha_l \ln L + \alpha_e \ln E + \varepsilon$

2. Translog frontier is specified in the text as (3.4) in section 3.

3. figures in parentheses are t-ratios.

Table 6: Test Statistics for Choosing between Cobb - Douglas and Translog Frontier Specifications

Nature of Restrictions on the parameters
of Translog frontier as specified in (4.4): $\gamma_{kk} = \gamma_{kl} = \gamma_{ke} = \gamma_{ll} = \gamma_{le} = \gamma_{ee} = 0$
Number of Restrictions(r) = 6
Restricted (Cobb - Douglas) Residual Sum of Squares (RSS) = 400.92
Unrestricted (Translog) Residual Sum of Squares (URSS) = 348.87
Number of Observations (n) = 395
Number of Parameters (k) = 10
Degrees of Freedom (df) = n - k = 395 - 10 = 385
F-statistic = $F_{6,385}$ = [(400.92 - 348.87) / 6] / [348.87 / 385]
= 9.574 > 2.80 (critical value)

Table 7: Test Statistics for Stability of the Coefficients of the Translog Frontier

Nature of Restrictions for the stability of common Translog frontier as specified in (4.4): $\alpha_0^1 = \alpha_0^2 = \alpha_0^3$, $\alpha_k^1 = \alpha_k^2 = \alpha_k^3$, $\alpha_l^1 = \alpha_l^2 = \alpha_l^3$, $\alpha_e^1 = \alpha_e^2 = \alpha_e^3$

$\gamma_{kk}^1 = \gamma_{kk}^2 = \gamma_{kk}^3$, $\gamma_{kl}^1 = \gamma_{kl}^2 = \gamma_{kl}^3$, $\gamma_{ke}^1 = \gamma_{ke}^2 = \gamma_{ke}^3$

$\gamma_{ll}^1 = \gamma_{ll}^2 = \gamma_{ll}^3$, $\gamma_{le}^1 = \gamma_{le}^2 = \gamma_{le}^3$, $\gamma_{ee}^1 = \gamma_{ee}^2 = \gamma_{ee}^3$

Superscripts 1, 2 and 3 refer to Translog frontiers for proprietorship, partnership and limited companies respectively.

Number of Independent Restrictions(r) = 2 (k+1) = 20

Restricted (Common Translog) Residual Sum of Squares (RSS) = 348.87

Unrestricted(SeparateTranslog)Residual Sum of Squares (URSS)= 316.90

Number of Observations (n) = 395

Number of Parameters (k) = 10

Degrees of Freedom (df) = n-3k-3 = 395 - 30 = 365

F-statistic = $F_{r, n-k}$ = [(RSS - URSS) / r] / [URSS / (n-k)]

$F_{20, 365}$ = [(348.87 - 316.90) / 6] / [316.90 / 365]

= 1.841 > 1.57 (critical value at 5% level of significance)

Null hypothesis of common Translog stochastic frontier is rejected.

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Notes

[1] See Table 1, col. 4 in the appendix.
[2] Chatterjee and Mohan (1993).
[3] Report on the Second All-India Census of Small Scale Industrial Units, p. 119.
[4] Bhagawati (1988).
[5] Initially non-tariff trade barriers like quotas were taken to hinder the exports of developing countries which led to the second export pessimism of these countries. See Bhagwati *op.* cit., and Panoutsopoulos *op. cit.*, p.44. Later studies showed that this was not true. See Bhagawati *op. cit.*, pp. 42 & 43.
[6] Panoutsopoulos *op. cit.*, p. 30 gives some references in this regard.
[7] See Table 2 in the appendix.
[8] Product diversification is possible because quotas allotted to India for some products like bed linen, towels and other made-ups remained unutilised. See *Foreign Trade Review*. October, 1991.
[9] Khanna (1991), pp. 77-78. Ramaswamy and Gereffi (1998) observe that specialisation in terms of products has been practised by the garment exporting countries.
[10] For instance Chatterjee and Mohan, op. cit., show that US increased its base level quotas for India by 17 per cent in 1987 and again by another 18 per cent in 1988.
[11] In fact it was one of the most influential studies that led to the first export pessimism of less developed nations as Nurkse expected external demand to go down over time because of variety of factors.
[12] Panoutsopoulos (1992), Tables 2.3 to 2.6, pp.18-22.
[13] For a convenient survey of literature, see Warr (1994).
[14] RCA index is measured as the ratio of the share of the given product exports in a country's manufacturing exports to the share of the product in world manufacturing exports. (Yeats (1990)). RCA indices for the two products namely, women outer garments and men outer garments are presented in Table 3 in the appendix.
[15] Khanna *op. cit.*, pp. 77 - 78.
[16] The production of Ready-made Garments has been reserved for small scale units officially defined in terms of the ceiling limit on the original value of investment in plant and machinery which has been revised upwards over time. This was opened for large scale undertakings through a notification dated July 29, 1993 subject to an investment in plant and machinery not exceeding Rs. 30 millions and an export obligation of 50% of its production. (Economic Survey 1993-94, p. 93). However, with the recent hike in the ceiling limit on the original value of investment in plant and machinery to Rs. 30 millions to define small scale units, all the firms in the industry come under the (redefined) catergory of small scale units.
[17] Forsund *et. al.* (1980) and for the latest review on the subject see Fried, *et. al.* (1993). Estimation procedures for the frontier and efficiency indices are given in section 4.
[18] Kilby (1962) and Leibenstein (1966) discuss how these factors affect the efficiency of firms in detail.
[19] Liability of a single proprietor or partners is unlimited in the sense that it extends beyond the business assets and also covers privately owned and business unrelated property which can be attached for paying the debtors in case of bankruptcy. Similarly, if one member of partnership leaves, or dies, the identity of partnership and hence business is automatically dissolved. If the business is to be continued a new entity must be formed. Same is the case with the proprietorship firms.
[20] de Alessi (1988) and Carr and Mathewson (1988).
[21] Ramaswamy and Gereffi (1998).
[22] Its importance in the case of Indian exports had been stressed long ago by Manmohan Singh (1964), p. 25.
[23] The numbers in parentheses immediately following the industry names in this section are National Industrial Classification (NIC), 1973 code numbers for the respective industries.
[24] At two-digit level, Hosiery and Garments (26) industry had 808 units in Delhi which contributed 16 per cent of the total industrial production of Delhi in 1987-88 and occupied second position next to Electrical Machinery, Parts and Apparatus. Of 808 Hosiery and Garment units in Delhi, 207 units exported output worth Rs. 2813.2 million and accounted for nearly 73 per cent of exports by all small scale industrial units in Delhi during 1987-88. Ready-made garments (264104005) tops the list of 2075 products that were being

manufactured by the small industrial units during the year 1987-88, accounting for 13.7 per cent of the total industrial production in the union territory. *Report on the Second Census of Small Scale Industrial Units for Delhi*, pp. 34,85 and 105.

[25] It is one of the three widely used statistical distributions. The other two distributions are: the Gamma and the Half-Normal. In the absence of any *a prior* reasons to select one particular distribution, we have arbitrarily selected the Exponential distribution.

[26] Parameter estimates of the alternative specifications of frontiers are given in Table 5 in the appendix.

[27] For interested readers, the details of the two steps are provided in Appendix Table 6 and 7.

[28] For the Tobit model we mainly depend on Greene (1993), ch. 22 , pp. 691-700.

[29] Limit can be from below or above or both.

[30] Production reservation does not permit the existing small scale industrial units to grow even when it is warranted by considerations of efficiency improvements. Together with other concessions made available only to the small scale industrial units, they generate incentives and vested interest in remaining small and inefficient. See Tendulkar and Bhavani (1997) for the critique of the government policy for the small scale industry.

[31] Carr and Mathewson, *op. cit*,. show that limited companies are usually associated with larger size.

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