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Determinants of Export Performance: Case of Indian Manufacturing Firms

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Abstract:
This paper reports the findings from an analysis of the determinants of exports performance based on a sample of nearly 4500 Indian manufacturing firms for the period 2001-2011. The determinants of exports performance in Indian manufacturing firms are analysed econometrically using Tobit model, in particular, the role of financial variables, which has been largely overlooked by previous studies. The explanatory variables considered include firm size, leverage, and cash-flow by sales ratio, labour intensity, and profit by sales ratio, R&D by sales ratio, and foreign equity. The paper additionally examines how global crisis has affected the export performance of different types of Indian manufacturing firms distinguished on the basis of size and extent of leverage. The result show that high leveraged firms were more at risk and suffered more because of the crisis than low leveraged firms. It implies that firms with lower level of debt in their capital structure were better insulated from the damaging impact of the crisis on export intensity. Similarly, the recession affected small sized firms the most, followed by medium sized firms, with the large firms having relatively the highest immunity against the detrimental impact of crisis.

Keywords: Indian manufacturing firms, export intensity, leverage, global crisis

1. Introduction
India's susceptibility to international crises became evident when the financial crisis of 2008 had an impact on India's economic performance. The financial turmoil had a dampening effect on global demand which adversely affected India's manufacturing exports. The impact of this crisis on the export sector was evident as India's manufacturing exports which had previously grown at nearly 20 percent per year between 2002 and 2008 plummeted to new lows reaching to a negative growth rate of 6.5 percent in 2009-10 (see figure 1). This had a cascading effect on overall economic growth, as India's GDP growth rate fell from 9.3 percent in 2007-08 to 6.7 percent in 2008-09. The growth rate of manufacturing exports after showing signs of recovery in 2010-11 again fell drastically in 2011-12 and 2012-13. Even though India had previously experienced a negative growth in its manufacturing exports, such a prolonged period of decline had not been witnessed in over two decades.It is only in 2013-14 that the growth rate has started to display a positive trend.
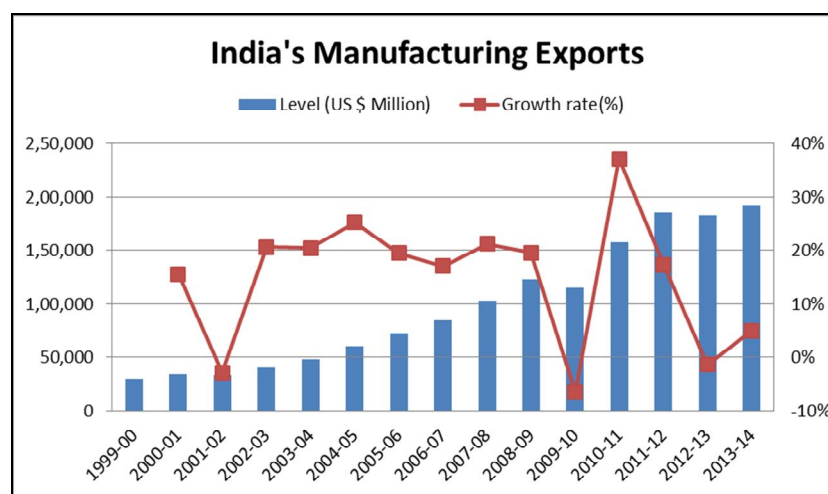

Figure 1: Level and Growth Rate of Indian Manufacturing Exports
Source: RBI's Handbook of Statistics on Indian Economy

Although, as apparent from the preceding discussion,the overall India's manufacturing export performance has been adversely hit because of the global slowdown, it is quite possible that all manufacturing firms may not have been impacted equally i.e. some

firms may have been impacted more than others. Hence, it is important to examine the export performance of different types of Indian manufacturing firms and the intensity of impact of the slowdown on them.

In the present study, by applying econometric model of export performance on firm level panel dataset of 4455 Indian manufacturing firms for a period of 11 years from 2001 to 2011, we make an attempt to identify which type of firm's export performance, differentiated on the basis of their size and the extent of leverage,have been affected more by the recession. Arguably, such firms are more vulnerable to changes in domestic as well as global economic factors.

2. Earlier Studies on Export Performance of Indian Manufacturing Firms

Empirical studies on determinants of export performance have been undertaken both at the macro level as well as micro level. Macro level studies focus mainly on issues like global economic conditions, exchange rate, tariffs and Regional Trade Agreements. Microlevel studies, on the other hand, provide insight into the factors that determine the export competiveness of firms in international markets and other aspects relating to their export performance.

Firm export performance is regarded as one of the key indicators of the success of a firm's export operations, and as such, it has been an extensively studied phenomenon. Numerous empiricalstudies have been conducted for gaining a better understanding of the firm level factors and behaviours (e.g., export strategy) that make exporting a successful venture. A perusal of the literature available on the firm level variables having influence on export performance shows absence of comprehensive and detailed studies on the subject. Taken together, different studies have examined the effect a number of variables on export performance. Thus, although no single comprehensive study is available on the topic in the literature,different studies can help identify several firm level determinants of exports.

The available firm-level empirical studies on India, for instance, of Lall and Kumar (1981), Kumar and Siddharthan (1994), Patibandla (1995), Goldar and Banga (1999), Dholakia and Kapur (1999), Bhavani and Tendulkar (2000), Aggarwal (2002), Raut (2003), Hassan and Raturi (2003) and others, have analysed the effects of factors, such as firm's age, firm size, R&D expenditure, technology import intensity, import intensity, capital intensity, extent of product differentiation and labour productivity on its export performance.

The findings suggest that firm size exerts a significant positive influence on exportsof Indian firms (Lall and Kumar, 1981;Goldar and Banga, 1999; and Dholakia and Kapur, 1999). Similarly, Research and Development (R&D) expenditureis found to have a significant positive influence on the export performance in a study by Kumar and Siddharthan (1993) for Indian firms. However, Lall and Kumar (1981) and Lall (1986) report a negative influence of R&D expenditure in the Indian engineering and chemical firms on their export behaviour. The studies by Dholakia and Kapur (1999), and Goldarand Banga (1999) for Indian firms found a positive relationship between technology importsand export performance. The role played by import intensity in determining the export performance of firms is, however, debateable. Pant (1993), Export-Import Bank of India (1996), and Dholakia and Kapur (1999) find a positive influence, but Siddharthan (1989) and Patibandla (1992) find a negative relationship between import intensity and firm level export performance in India. Capital intensitythat gives competitive advantage to a firm through the production of technologically superior or better quality products, however, gives a negative relationship with export performance for Indian firms (Pant, 1993; Siddharthan, 1989; and Kumar and Siddharthan, 1993). Other variables found to have a significant positive influence on the export performance of firms include Advertisement Expenditureundertaken by a firm, Firm Level Growth, Product Quality, Product Diversification, FirmLevel Diversification, Foreign Ownership, Government Policies(Patibandla, 1988), and Skills(Kumar and Siddharthan, 1993).

Thus, the current state of the econometricliterature on determinants of Indian firms' export performance could be summarised as (i) methodologically fragmented since there are a variety of analytical and methodological approaches, (ii) conceptually diverse, because a large number of determinants have been identified as having direct or indirect influence on the firm's export performance, and (iii) inconclusive, since the studies have produced inconsistent or conflicting results in respect of the impact of different determinants on export performance.

However, it is important to note that very few studies have included financial variablesas adeterminant ofthe exports performance of Indian manufacturing firms.Thus, the main focus the present paper is to make an attempt towards filling this gap in literature and focuses on some of these financial variables. In the wake of Global Financial Crisis, 2008, the paper further examines which type of firms' export performance are more affected by this recession based on their size and leverage.

The rest of the paper is organized as follows. Section 3describes the study methodology and data sources. Section 4 is dedicated towards presentation of empirical results and discussion of the key findings of the study, and in section 5 we summarize the findings of the study and make some concluding remarks.

3. Methodology

The success of any firm depends on the effective utilization of funds procured. The principal sources of finance of a firm are owners' equity and the borrowed money (debt). The decision on the composition of funds, otherwise known as 'capital structure', is an essential decision. Leverage is a metric that indicates the relationship between debt and equity.

Being a financial variable, leverage has largely been overlooked by previous econometric literature on Indian manufacturing firm-level export performance. In an attempt towards filling this gap, a major focus of the present study is to examine how leverage, along with other important financial and real variables, affectsmanufacturing firms' export performance. For this purpose, the model explaining export intensity has been specified as:

$$XI_{it} = \alpha + \beta_1 SIZE_{it} + \beta_2 LEV_{it} + \beta_3 CFS_{it} + \beta_4 LBR_{it} + \beta_5 PRS_{it} + \beta_6 RDS_{it} + \beta_6 FEC_{it} + \gamma_{it} REC_{it} + \gamma_{it} TREND_{it} + \varepsilon_{it}$$

where,

 XI= Export Intensity (export to total sales ratio);

SIZE =Size of the firm (logarithm of total sales);

LEV=Leverage of the firm (debt by total assets ratio)

CFS= Cash flows by sales ratio

LBR= Labour Intensity (employee cost by total capital employed)

PRS=Profit before taxes by total sales

RDS=R&D expenditure by total sales

FEQ=Share of foreign equity in total equity (in %)

REC= Recession Dummy (takes value 1 from the year 2009 onwards, 0 otherwise)

TREND=Trend (time in years)

 = Error term

Subscripts '*i*' and and '*t*' has been added to each variable in the equation above to represent the *i*'th firm in the *t*'th year.

Using firm level panel data of 4455 Indian manufacturing firms for 11 years from 2001-2011, theabove model has been estimated using the Tobit methodology since our dependent variable, viz. export intensity is zero in a sizeable proportion of observations. The tobit model has been applied in a number of previous studies (see, for example, Srinivasan and Archana, 2011). The OLS (ordinary least squares) method insuch cases leads to biased and inconsistent estimates (Cheng, 1992). The Tobit model takes care of this problem. In the Tobit approach, we have the option of estimating the coefficients through either the 'fixed effects model' or the 'random effects model'. According to Mundalak (1978), if we want to draw inference with respect to firm specific, time-specific, and both firm and time specific effects, we should use the random effects model. On the other hand, if one is looking for inferences conditional on the effects existingin the sample, the fixed effects model is ideal. Since we are interested in the present exercise to draw inferences for the population of firms based on an examination of our sampled cross-section of 4455 firms for 11 years, it is appropriate to view firm-specific constant terms as randomly distributed across different cross-sectional units.

The model estimation has been carried out atthree levels to suit the main objectives of the study:

- by taking all the firms together;
- by dividing the firms based on size i.e. small, medium and large firms; and
- by dividing the firms based on the extent of leverage in their capital structure i.e. low leveraged and high leveraged firms.

It is important to point out that while estimating, some observations have been dropped because the dependent and independent variables take extreme values. For each of the variables, these cases of extreme values have been identified using the 1st and the 99th percentile.

4. Empirical Results

Table 1 provides the estimates of the exports equation described above for all the 4455 Indian manufacturing firms included in the sample for the period 2001-2011 using both the simple Tobit model as well as Tobit random effects model.

Explanatory Variable	Tobit Model Coefficients	Random-Effects Tobit Model, Coefficients
Size	0.117** (9.24)	0.244** (15.13)
Size Squared	-0.007** (-6.47)	-0.019** (-13.57)
Cash flows/Sales	-0.056 (-1.15)	-0.006 (-0.15)
Leverage	-0.051** (-2.75)	0.006 (0.31)
Labour Intensity	-0.229** (-4.39)	0.004 (0.07)
Profit/Sales	0.007 (0.25)	0.061** (2.80)
R&D/Sales	0.066** (9.82)	0.058** (10.42)
Foreign Equity	-0.0004* (-2.06)	-0.0001 (-0.62)
Recession dummy	-0.193** (-11.49)	-0.175** (-15.38)
Trend	0.079** (25.43)	0.072** (33.29)
Constant	-158.062 (-25.48)	-145.892 (-33.42)
LR chi2(10)	1764.09 (p=0.000)	
Wald chi2(10)		1821.56 (p=0.000)
N	4455	

Table 1: Estimation Results of the Export Equation,
Model Explaining Exportsof India's Manufacturing Firms
Notes: Figures in the parentheses are the t-ratios. '' denotes coefficient significant*
*at the 5% level of significance. '**'denotes coefficient significant at the 1% level*
of significance.

The coefficient of size variable in our specification for both models is positive and statistically significant consistent with the theoretical expectations, indicating that the larger is the size of the firm, the higher will be its export intensity. This is so because the larger firms are better equipped than the smaller ones to bear the costs and risks of entering foreign markets and also to take advantage of scale economies of manufacturing, marketing and finance. Hence, it is expected that the larger firms would be more inclined to export.

On the contrary, size squared variable is found to have a significant negative coefficient implying that after a certain stage the further increase in size has in fact a detrimental impact on firms' exports intensity.

Cash flows-by-sales variable has an insignificant coefficient. So, no strong effect of cashflow in export performances is indicated by the data. Leverage variable has a significant negative coefficient in the Tobit model specification. The result suggests that a high debt in the capital structure of firms is a sign of financial constraints on the firms' decision to export. High leverage is expected to impede firms' ability to access further external funds, and consequently it is likely to prevent them from financing externally the fixed entry cost of exports. Creditor would be unwilling to put their money at risk, trusting a high leveraged firm that want to enter into export activity, due to the presence of information asymmetry about foreign market. The lower capacity to pay for the fixed entry cost of exports will in turn hamper the export intensity of such firms. The empirical results obtained in the study are by and large in line with these expectations. Indeed, in the results of the Tobit model, high leverage is found to have significant negative relationship with firms' exports intensity. However, the results of the random effects Tobit model suggested a negligible impact of leverage on firms' export intensity.

The estimated coefficient of the labour intensity variable is found to be significantly negative. It means that more labour intensive manufacturing firms have lower export intensity, which is a surprising result given that India is a labour abundant country and hence should comparative advantage in labour intensive industries. Our result is at variance with the findings of Srinivasan and Archana (2011) who find the exporting firms to be more (labour) productive and profitable in the labour intensive industries of the Indian manufacturing sector. One probable reason for our finding could be that it is not only the quantity of labour but also the skill of labour that is important, and even if there is abundance of labour in the country, it is quality or high skilled labour which Indian manufacturing sector lacks. Another reason could be that Indian manufacturing firms lack adequate capital to supplement the abundant labour giving rise to diminishing returns and hence lower export intensity. The random effects Tobit model conversely suggested an insignificant impact of labour intensity on firms' export performance.

Profit by sales variable is positive and significant in the case of random effects Tobit model implying that more profitable firms are more export intensive. In other words, firms with higher profitability are better equipped to absorb the costs and risks

associated with exports. The ratio nevertheless is found to be statistically insignificant in terms of its effect on exports in the case of the Tobit model.

R&D expenditure by sales ratio is found to be highly significant in the case of both the simple Tobit model and the random effects Tobit model. It means firms' investing heavily on R&D activities to develop more technologically superior products would be more export intensive in order to recover the cost by achieving higher level of sales in foreign markets, as also being more competitive in international markets thanks to the technological advantage.

The impact of presence of foreign equity in the firms' total equity is found to have negative influence on exports intensity of firms suggesting foreign investors discourage the concerned host country firms to export. It is however, important to note that although the estimated coefficient was found to be significant in case of Tobit model, but its absolute value is quite low implying its low impact on the export performance of firms.

Coming to recession dummy variable, the estimated coefficients are found to be significantly negative. These results show that global slowdown had a major impact on the Indian manufacturing firms, drastically hitting their export performance in general.

The trend variable has been included in the model to capture the influence of factors other than those variables directly included. The coefficient of the trend variable is found to be highly positive and statistically significant. It may be inferred that the some of the variables not included in the model had a favourable impact on the export intensity of the Indian manufacturing firms, making export intensity to improve over the years.

As already discussed, one of the objectives of the present study is to find out whether the global meltdown has impacted all manufacturing firms equally or some had been impacted more than the others due to their certain specific characteristics like size and magnitude of leverage. Table 2 presents the results of an analysis that helps in making a comparison across firms of different size. Firms have been divided into three size classes according to gross sales. The results of the model for firms divided on the basis of size using Tobit model specification are presented in Table 2.

Size is found to have significantly positive effect on exports intensity only in case of small firms while the coefficient is positive as expected but not statistically significant for medium as well as large sized firms. Furthermore, cash flows to sales ratio was found insignificant for all the three kinds of firms similar to the result obtained for all the firms taken together.

Some interesting results are found for leverage. Leverage has a substantial negative impact on exports intensity for small firms, but has insignificant impact on medium sized firms, while having a significant positive impact for large sized firms. Hence, the result suggests that as the firm size increases, the effect of leverage on the firms' exports intensity, changes radically from negative to positive.

Labour intensity is found to be insignificant for small firms while being significantly negative in the case of medium and large sized firms. It implies that it is among medium and large firms where greater labour intensive is associated with lower export performance than their counterparts among small firms.

The profit by sales ratio nevertheless is found to be insignificant in case of small, medium as well as large firms. Thus, it can be inferred that the extent of profit margin by sales does not have a substantial impact on the export intensity of firms irrespective of the size of firm. Likewise, foreign equity too has no significant impact.

R&D expenditure by sales ratio is found to be highly significant in the case of medium and large sized firms only. It implies the expenditure incurred on R&D results in considerable increase in firms' export intensity only in case of medium and large firms while not being fruitful for small firms.

Furthermore, quite remarkable results are obtained for the recession dummy. The coefficient estimates suggest that extent of damage on firms' exports performance caused by the recent financial crisis decreases with size. In other words, the recession affected small sized firms the most, followed by medium sized firms, with the large firms having relatively the highest immunity towards its detrimental impact. It implies that large firms are better equipped to face such grave changes in the global economic conditions. And, finally the trend variable which captures the impact of certain excluded variables is found to be highly positive for all sized firms.

Explanatory Variable	Tobit Model		
	Small Firms	Medium Firms	Large Firms
	Coefficient	Coefficient	Coefficient
Size	0.111**	0.027	0.011
	(3.94)	(1.54)	(1.94)
Cash flows/Sales	0.135	-0.152	-0.074
	(0.91)	(-1.56)	(-1.10)
Leverage	-0.435**	-0.018	0.116**
	(-4.89)	(-0.49)	(3.94)
Labour Intensity	0.311	-0.220*	-0.283**
	(1.31)	(-2.04)	(-4.91)
Profit/Sales	-0.002	0.021	0.099
	(-0.04)	(0.26)	(1.76)
R&D/Sales	-0.014	0.084**	0.066**
	(-0.37)	(5.64)	(10.08)
Foreign Equity	-0.0008	-0.0001	0.00007
	(-0.67)	(-0.33)	(0.33)

Recession dummy	-0.437**	-0.272**	-0.129**
	(-5.16)	(-8.06)	(-7.02)
Trend	0.202**	0.117**	0.046**
	(9.24)	(17.01)	(14.43)
Constant	-406.036	-234.762	-92.290
	(-9.25)	(-17.02)	(-14.44)
LR chi2(9)	333.83	717.65	488.00
	(p=0.000)	(p=0.000)	(p=0.000)
N	1485	1485	1485

Table 2: Estimates of the Export Equation, by size class
Notes: Figures in the parentheses are the t-ratios. '∗' denotes coefficient significant at the 5% level of significance. '∗∗'denotes coefficient significant at the 1% level of significance.

The next division of firms has been made on the basis of degree of leverage and the estimation results of the same using Tobit model has been reported in Table 3. The results show that while size and R&D expenditure has a major positive impact, cash flow, profit margin and foreign equity had no significant impact on firms' exports intensity irrespective of the magnitude of leverage in the capital structure.

Leverage and labour intensity are found to be significant negative impact only in the case of high leveraged firms while having a negligible effect on export intensity in the case of low leveraged firms.

Our main interest in this exercise is to examine the impact of recession on different firms varying on the basis of leverage. We find that the export intensity of high leveraged firms suffered more because of the crisis than low leveraged firms. Hence, it can be inferred that firms with lower level of debt in their capital structure were better insulated from the damaging impact of the crisis on the export intensity than firms with higher levels of debt. This is quite a thought-provoking result, suggesting that high leveraged firms are more at risk to any unpredictable global economic changes and should reduce the level of debt in their capital structure if they want to be better equipped to face a crisis of such nature in the future.

Explanatory Variable	Tobit Model	
	Low Leveraged Firms	High Leveraged Firms
	Coefficient	Coefficient
Size	0.023**	0.057**
	(6.77)	(10.56)
Cash flows/Sales	-0.062	-0.118
	(-1.01)	(-1.54)
Leverage	0.023	-0.119**
	(0.37)	(-3.73)
Labour Intensity	-0.079	-0.262*
	(-1.41)	(-2.22)
Profit/Sales	0.047	0.045
	(1.50)	(0.93)
R&D/Sales	0.062**	0.090**
	(8.62)	(6.33)
Foreign Equity	-0.0003	0.0008
	(-1.34)	(1.75)
Recession dummy	-0.166**	-0.228**
	(-8.34)	(-7.80)
Trend	0.066**	0.094**
	(18.09)	(17.60)
Constant	-133.508	-188.294
	(-18.10)	(-17.62)
LR chi2(9)	821.34	924.04
	(p=0.000)	(p=0.000)
N	2228	2227

Table3: Estimates of the Export Equation, by extent of leverage
Notes: Figures in the parentheses are the t-ratios. '∗' denotes coefficient significant at the 5% level of significance.
'∗∗'denotes coefficient significant at the 1% level of significance

5. Conclusion and Summary
Although financial factors are expected to be important determinants of the export performance of heterogeneous Indian manufacturing firms, these have been largely ignored by previous empirical studies. The main objective of this paper was to fill

this gap and empirically investigate the role of some important financial variables in determining the export intensity of these firms. In the wake of Global Financial Crisis, 2008, the paper further examined which type of firms' export performance are more affected by this recession based on their size and leverage. Using firm level panel data of 4455 Indian manufacturing firms for 11 years from 2001-2011, an export function was estimated using the Tobit model as well as random-effects Tobit model. The model estimation was undertaken at three levels to serve the main purpose of the study: (1) by taking all the firms together; (2) by dividing the firms based on size i.e. small, medium and large firms; and (3) by dividing the firms based on the extent of leverage in their capital structure i.e. low leveraged and high leveraged firms.

Results on the relationship between export intensity and other variables are mostly in line with our expectations. The estimates showed that size has a significant positive impact while size square had a negative impact on firms' export intensity. Cash flows, profit margin and presence of foreign equity have only a marginal effect on firms' exports intensity. An interesting finding was that labour intensity had a substantial negative impact on exports intensity. It implies employing capital intensive techniques of production results in attainment of higher export intensity. R&D expenditure implying the production of more technologically sophisticated products resulted in higher export intensity especially in the case of medium and large sized firms.

Leverage had a detrimental impact on exports intensity. An additional important finding was that high leveraged firms were more at risk and suffered more because of the crisis than low leveraged firms. It implies that firms with lower level of debt in their capital structure were better insulated from the damaging impact of the crisis on the export intensity than firms with higher levels of debt. Similarly, the recession affected small sized firms the most, followed by medium sized firms, with the large firms having relatively the highest immunity towards its detrimental impact. It indicates that large firms are better equipped to face such grave changes in the global economic conditions.

Thus, to summarize, we feel that the Indian manufacturing firms should achieve growth in size, invest more in R&D activities, employ capital intensive techniques of production and reduce the magnitude of leverage in their capital structure to achieve higher export intensity. This would not only help them in improving their foreign exchange earning capabilities but also their competitive advantage further. The results of this study have important implications for the current situation of the Indian economy facing burgeoning trade and current account deficits to be better prepared to face any forthcoming financial crisis.

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