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LIBERALISATION, MULTINATIONAL ENTERPRISES AND EXPORT PERFORMANCE : EVIDENCE FROM INDIAN MANUFACTURING

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Foreword

The process of global integration has intensified the technology-based competition in world markets during the 1990s. In this new environment, many developing countries are increasingly relying upon multinational enterprises (MNEs) for upgrading their international competitiveness and promoting their dynamic comparative advantage. This paper attempts to analyse the export-enhancing role of MNEs in the Indian manufacturing sector during the 1990s.

The analysis in the study for the 1990s provides a relatively weak support to the hypothesis that MNE affiliates perform distinctly better than their local counterparts in the export markets in a globalised economy. The analysis also indicates that MNE affiliates perform no better than their local counterparts even in high-tech industries. India appears to have failed in attracting efficiency-seeking FDI on a significant scale, particularly in high-tech industries. R&D and efficiency of manpower emerge as two significant determinants of international competitiveness in technology-based sectors (high and medium-high tech sectors).

Much more empirical analysis of the determinants of competitiveness is needed before we understand the complex forces at work. This study is a modest first step in this direction.

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Liberalisation, Multinational Enterprises and Export Performance: Evidence from Indian Manufacturing*

I Introduction

In the globalised world of the 1990s, multinational enterprises (MNEs) have assumed a major role in international trade. According to an estimate (see UNCTAD, 1999) two-thirds of total world trade was accounted for by MNEs in 1996; over a third was intra-MNE. Besides, foreign affiliates of MNEs are estimated to account for more than one-fifth of world exports and one-third of developing country exports. The process of increasing global integration, reinforced by the renaissance of the market economy, the emergence of new, generic and core-knowledge technologies as the vital competing resources and a growing tendency for techno-protectionism and strengthening of the international IPR [see e.g. Dunning and Narula 1997; Kumar 1998a, Dunning 1998] has intensified the technology-based competition in world markets during the 1990s. In this new environment MNEs have an edge over local firms owing to their access to proprietary assets, location-specific endowments of countries and regions in which they operate and their strategies to deploy and integrate these assets. The nature and character of foreign direct investment (FDI) has also undergone substantial changes with MNEs pursuing more globally integrated production and marketing strategies having greater trading prospects [Dunning 1994, 1998; Aggarwal 1997; Papanastassiou and Pearce 1999]. It is therefore expected that MNEs would play a key role in international trade, particularly in

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high-tech industries during this period. In recognition of the role of MNEs in world trade in the changing scenario, many developing countries are increasingly relying upon MNEs for upgrading their international competitiveness and promoting their dynamic comparative advantages (Dunning 1994, p. 26).

Though the impact of recent globalisation trends on the export enhancing role of MNEs, particularly in developing countries, has been discussed extensively in recent studies [Dunning 1994, 1998; UNCTAD 1999], empirical studies on this issue are scarce. Most existing studies on the relative export performance of MNEs relate to the highly restrictive regimes of the seventies and the eighties [see Jenkins 1991, Dunning 1993, Caves 1996, Kumar and Siddharthan 1997 for a survey on developing countries]. A recent cross-country analysis for 52 countries [UNCTAD 1999] suggested a positive relationship between FDI and manufactured exports; the relationship was stronger for developing than developed countries and in high- and low- tech industries than in medium-tech ones. Individual country-level studies are, however, scarce. Against that background, this paper analyses the Indian experience during the 1990s. It attempts to answer two questions. First, do MNE affiliates export more than the domestic firms in the open regime of the 1990s in Indian manufacturing? Second, do MNE affiliates have comparatively greater advantage in high-tech than in low- and medium-tech industries ? These questions are addressed in the paper through a firm-level analysis of the determinants of export intensity during the late 1990s.

Though a structural adjustment programme in India was initiated during the mid-1980s, a massive dose of liberalisation was administered in 1991. As a result, the average effective rate of protection which was as high as 126 per cent during 1984-90 came down to 86 per cent over 1991 (Das, forthcoming). The average nominal tariff rate in the manufacturing sector declined from 116.6 per cent in 1987-88 to 53 per cent by 1994-95 and the peak rate of tariff was lowered from 110 per cent to 65 per cent over the same period (Saleem, 1996). Mehta (1999) found that the import weighted average tariff rate (inclusive of basic, special and additional custom duties) declined from 102.3 per cent in 1993-94 to 38.12 per cent by 1998-99. There have been reductions in quantitative restrictions as well. On an average, the share of imports under Open General License (OGL) in the manufacturing sector was only 20 per cent in 1987; it increased to around 55 per cent by 1994-95 (Saleem 1996). By 1997-98 over 90 per cent of imports in the manufactured group were free from non-tariff barriers and less than 20 per cent items in this sector were under non-tariff barriers (Mehta 1999). Besides trade liberalisation, the 1990s also witnessed substantial relaxation in FDI policies. In the initial phase of liberalisation (1993-95) the inflows of FDI and foreign technologies increased tremendously (the ratio of FDI to gross domestic investment rose over fourfold during 1993-98). Manufactured exports also increased rapidly during the same period with their share in total exports rising from around 75 per cent in 1989-90 to around 81 per cent by 1999.

The structure of the paper is as follows. Section II sets out the theoretical framework of linkages between the policy regime, MNEs and exports. Section III

describes the model and the methodology; Section IV discusses the empirical results while Section V concludes the analysis.

II Multinational Enterprise Affiliates, Exports and Policy Regime: Hypotheses

Theoretical literature suggests that liberal trade regimes attract export-oriented FDI. Bhagwati (1973), using the framework of the international trade theory, argued that exogenous FDI inflows are essentially to exploit local-cost conditions *a la* H-O model and are, therefore, attracted to industries where the country has comparative advantage. Tariff barriers distort this pattern and induce tariff-jumping FDI in import-substituting industries. Vernon (1979) in his product cycle theory (see also Krugman 1979) suggested that cost competitiveness concerns drive production abroad in the maturing stages of production. Foreign production, therefore, is to exploit the location-specific advantages to achieve cost- efficiency. Its objective is to service the host country market and export to other countries. Thus, export-oriented FDI takes place in maturing stages of production. High tariffs, however, offer a locational advantage for tariff-jumping, import-substituting FDI in the early stages of production. Thus protected regimes are likely to attract import-substituting FDI. Dunning (1993) argued that firms' ownership advantages and the host country's location-specific advantages interact with the internalisation advantages to determine the nature and consequences of FDI. Artificially high exchange rates, government regulations and protected economic environment within a restrictive trade regime induce FDI that is of market seeking variety. Open regimes that facilitate intra-firm trade, allow greater freedom to MNEs and are export-friendly may, on the other hand,

attract resource seeking, efficiency seeking and /or asset acquiring FDI, all of which have a significant impact on trade. The literature on exports and technology treats FDI as a mode of technology transfer. It argues that owing to easy access to proprietary technology of their parents, MNE affiliates are likely to be more competitive in international markets. Their export-competitiveness however, depends upon the kind of technology actually transferred by their parents. In a protective regime, MNEs may not be motivated to transfer new technologies to their affiliates owing to the absence of competition and government regulations regarding foreign equity ownership holdings and local content requirements on FDI [Balasubramanyam and Salisu 1991, Wang and Blomstrom 1992] . The *initial* technology advantages continue to provide these affiliates with an edge over the local firms [see also Papanastassiou and Pearce 1999]. Opening up of the economy spurs competition from importers, other foreign firms as well as new and modernising indigenous firms. To maintain their profitability in the face of mounting competition, parents update the technologies of their affiliates to strengthen their national and international competitiveness [Blomstrom et al.1994, Kokko 1992, Kokko and Blomstrom 1995 for empirical evidence]. Evidence from Latin American countries suggests that economic liberalisation during the 1990s has induced MNEs to upgrade their facilities set up in import-substituting regime by deepening technology and research activities [UNCTAD 1999].

While the arguments set out above describe the links between the export-promoting role of MNE affiliates and trade regime in a given economy, many recent studies [see e.g. Dunning 1994,1998; Kumar 1998b; Papanastassiou and Pearce 1999]

have focused on the impact of the recent process of globalisation on the export-role of MNEs. These studies argue that most MNEs tended to be of a 'stand alone' type or truncated miniature replica [TMR] of their parents reaping monopolistic profits in a protected economic environment. The process of globalisation has induced them to restructure their operations to avail economies of scale and scope by internalising the economies of specialisation through the integration of assets, production and marketing activities across countries to advance the core competencies in the global markets. They are locating different stages of production in different countries according to factor costs and capabilities and / or distributing similar production activities across affiliates in countries with similar capabilities to reap scale economies. These strategies have shifted the focus from market-seeking to efficiency-seeking export-oriented production.

The theoretical literature summarised above suggests that MNE affiliates are likely to be more outward oriented, and are associated with more competitive technology, better management techniques and better marketing skills in a globalised world. My first hypothesis therefore is : the export intensity of MNE affiliates is greater than that of local firms during the 1990s.

There are reasons to believe that MNEs play a greater export-role in high-tech than in low- and medium-tech industries. High-tech industries are characterised by rapidly changing and complex technologies. Such technologies, as the theory of internalisation [Magee 1977; Teece 1977; Mansfield and Romeo 1980; Davidson and Mcfetridge 1984; among many others] suggests, may not be transferred to unaffiliates in host countries through

markets due to high incidence of market failures such as inefficient pricing, the risk of leakage, information asymmetry and uncodifiability of knowledge in their transfers. Internal hierarchies are preferred to transfer such technologies. Therefore, MNE affiliation confers a distinct advantage on firms in these industries. On the contrary, relatively older and codifiable technologies prevailing in low- and medium-tech industries may be transferred through markets also. Besides, it is also argued that the importance of delivery and effective marketing increases with technological complexity of the products [UNCTAD 1995,1999]. Marketing-based advantages, therefore, provide a competitive edge to MNEs over local firms in high-tech industries. Evidence suggests [UNCTAD 1999] that despite their broad technology base, firms in the newly industrialising economies [NIEs] have begun using strategic alliances with leading MNEs for rapid entry into complex activities due to increasing competition. Finally, highly integrated production systems raise barriers-to-entry for developing countries into high-tech export markets. MNE affiliation provides close integration into global markets and networks. My second hypothesis, therefore, is: MNE affiliates have greater competitive advantages over local firms in high-tech industries than in low-and medium-tech industries.

III The Model

To test the above two hypotheses, I draw upon the existing studies that relate export performance of firms to technological capabilities, variable costs and the scale of operation. While adapting this framework to the present context, the following explanatory variables are identified.

Multinational Affiliation

The discussion above suggests that MNE affiliates have an edge over their local counterparts in international markets and are likely to enjoy a higher export intensity. However, many authors postulate a positive relationship between foreign equity stake and exports. They argue that MNEs prefer to control their export-oriented affiliates closely through high ownership stakes treating their marketing network as their proprietary asset [see UNCTAD 1999]. Besides, the empirical evidence suggests that more complex and advanced technologies are transferred to closely held affiliates [Behrman and Willander 1976, Teece 1977 among others]. In view of the theoretical literature, I postulate a positive effect not only of multinational affiliation (FS) but also of foreign equity stake (FE) on firms' export intensity.

Technology Imports

Technology imports is one of the most important sources of knowledge acquisition by enterprises in developing countries. Technology import may be disembodied in the form of blueprints or embodied in capital goods. While the disembodied technology imports involve arms' length purchase of technology [MT], embodied technologies are acquired through imports of capital goods [IMPK]. The two modes of technology imports are differentiated on the basis of the age, nature, complexity and packaging of technologies that are involved and hence, are likely to have differential impact on firms' export performance.

Local Research and Development Activity

Technology acquisition through external sources does not confer competitive advantages on all firms automatically and equally. Firm-specific technology absorption and development capabilities are crucial in determining performance-enhancing effects of technology acquisition and improving international competitiveness [see Lall 1992; Bell and Pavitt 1997; Mowery and Oxley 1997 for a detailed analysis]. These capabilities are reflected in research and development intensity [RDS] that is expected to affect their export performance positively.

Skills of labour force

Most studies in the evolutionary literature have emphasised learning as an important determinant of firms' competitiveness (see Mowery and Oxley 1997). In the process of learning, the most crucial input is the presence of skilled labour force. It is argued that acquisition of technology may be a key factor but it is the effective utilisation of technology that makes it valuable and there are two requirements for this. First, the firm must hire skilled persons and train them and two; the firms must organise to make use of employees' skills effectively (Lazonic 1993, Lall 1999). To capture the effect of the two, I used efficiency of labour force as a measure of SKILL. I expect a positive relationship between export performance and SKILL.

Imports of raw materials

Early studies on the cost competitiveness of Indian industry [see, World Bank 1984, CEI 1986 for engineering industries[1] and Doraiswamy 1992 for chemical industry] suggested that in the protected regime high tariff rates on inputs affected cost competitiveness of Indian products adversely. If that is the case, one may expect low tariffs and easy importability of raw materials and components to confer cost competitiveness on firms in the post-liberalisation period of the 1990s. Besides, firms using imported materials would also compete on the basis of superior quality of products, particularly in markets where consumers are more quality conscious [Lall 1986]. Thus, the import intensity of raw materials [IMRS] is postulated to affect firms' export performance positively.

Firm size

Theoretically, size [SIZE] is predicted to affect export performance of firms positively [see Bonaccorsi 1992 for a survey]. The new trade theory posits a positive impact of market size in view of economies of scale. It argues that the scale economy provides cost advantages in production, R&D and marketing efforts [Kumar and Siddharthan 1994]. The literature associated with export marketing, on the other hand, suggests that large firms have greater resources to gather information on markets in foreign countries and to cover uncertainties of a foreign market [Wakelin 1997]. It is, therefore, hypothesised that large firms are likely to be more export-oriented.

Industry-specific effects

[1] This study was commissioned by the Confederation of [Indian] Engineering Industry [CEI] and has been

Considering that the industries differ vastly in terms of the organisational structure, policy environment, technological characteristics and historical development, one may expect that industry-specific differences are significant. To take account of these differences, industry-specific effects are controlled in the empirical analysis. The model for inter-firm variations in export performance, therefore, is given by [1]:

EXP = [FE/FS, MT, IMPK, RDS,SKILL, IMRS, SIZE, D_1, - - -, D_n] [1]

Where EXP denotes the export intensity of a given firm and D_1, - - -, D_n are industry-specific dummies for n industries.

III.1 Data Base and Methodology for Empirical Testing

For the empirical testing of the above hypotheses, I have used the CAPITAL LINE database. This database provides financial statistics of firms listed on the stock exchange. For each company, the industrial activity accounting for at least half of its turnover is specified. The database includes firms engaged in both manufacturing and non-manufacturing activities. The empirical analysis here was to be confined to the manufacturing sector firms. Therefore, I extracted from the database manufacturing firms' data for five years i.e. from 1996 to 2000. This yielded 4211 observations for 970 firms. The firms were classified into 33 industries. Since the data span was five years , it was necessary to control year - to - year variations. To even out such variations, yearly averages were worked out. This provided us a panel data set of 970 firms classified across 33 industries. Firms, which had missing observations were eliminated from estimation. Firms that were producing primarily for the export markets (exporting more than 60 per

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cited by K.C.Khanna, ' Why Industry Stagnates', Times of India, 28 October, 1986.

cent of their sales in overseas markets) were also excluded from the sample. These firms, small in number (48), were located mainly in export processing zones, all producing for the export markets *irrespective of ownership*. In a sample where the average export intensity is 6-7 per cent, the inclusion of such firms could introduce sampling bias. After eliminating these firms, I was left with a panel data set of 916 firms across 33 industries. Since some firms did not export at all, a tobit model was fitted onto the data. To capture the unobserved industry-specific effects both fixed effect and random effect models were estimated. Since a fixed effects model cannot be estimated in a tobit framework, 33 industries were reclassified into 16 broad industries to capture industry-specific effects. Tobit model estimates were then obtained with dummy variables for these 16 industries. I term these estimates as fixed effect tobit models (FEM). However, tobit random effect models were estimated with all 33 industry groups (REM) using the STATA statistical package.

The empirical testing of the second hypothesis required classification of industries in different technology groups. For this, we used the revised classification provided by the OECD (see, Hatzichronoglou 1997). In this classification, four different technology-groups are identified. These are namely, high-tech, medium-high-tech, medium-low-tech and low-tech industries. Since my sample provided information on the main product of each firm, it was easy to classify firms and then industries according to this classification (see Appendix 1). Fixed and random effects tobit models were estimated for each industry group separately.

IV Empirical Results

The results based on fixed and random effects tobit models are presented in Table 1 and Table 2. While Table 1 presents results for the entire data set, Table 2 provides results for different industry groups. Two alternative measures of foreign affiliation are used in the estimation of tobit models.

Table 1 : Determinants of inter-firm variations in export intensity: Tobit model analysis

	Fixed Effect				**Random Effect**			
Variable	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficie	z-Statistic
FS	0.0149 [c]	1.6480			.0141 [c]	1.655		
FE	-	-	0.0002	1.3276	-		.0003	1.294
SIZE	0.0119 [a]	5.3360	0.0120 [a]	5.3608	.0128 [a]	5.680	.0128 [a]	5.703
MT	-0.1083	-0.9347	-0.1072	-0.9269	-			
IMRS	0.2107 [a]	5.0802	0.2106 [a]	5.0671	.2059 [a]	4.985	.2059 [a]	4.979
SKIL	-0.0005	-0.5947	-0.0004	-0.5676	-		-	
RDS	0.9832 [c]	1.6534	0.9581 [c]	1.6122	.7958	1.530	.7742	1.595
IMPK	0.1342 [b]	2.3660	0.1304 [b]	2.2957	.1374 [b]	2.425	.1338 [b]	2.361
CONSTANT	-	-	-	-	-.0347	.0123	-.0344	-2.796
SCALE	0.1135	36.561	0.1135	36.558	-	-	-	-
L-likelihood	385.337	-	384.926	-	367.56		366.629	
NOB	916		916		916		916	

[a] significant at 1% , [s]ignificant at 5% and [s]ignificant at 10%

Table 1 shows that FS turned out to be significant at 10 per cent with a positive sign ; FE was insignificant in all equations. The results suggest that MNE affiliates performed better than local firms though there is no evidence of the positive relationship between foreign equity stake and export performance of firms in Indian manufacturing. Most studies directed at the pre-1990s period in India found MNEs to have either the same or an even lower export intensity than that of local firms. While Lall and Streeten [1977] and Subramaniam and Pillai [1979] found that the MNE affiliates performed more poorly than the local firms; Lall [1986],

Kumar [1990], Pant [1993], Kumar and Siddharthan [1994] showed that foreign controlled firms performed no better than the other firms. Jain [1998] in her analysis of selected industries found that the impact of foreign holding on firms' export performance was not significant in the early 1980s in any industry; in the late 1980s it improved in some of the industries. In view of the above studies, findings of the present study appear to be supporting my first hypothesis that liberalisation measures of the 1990s enhanced the export-role of MNE affiliates in the late 1990s. However, this inference may be drawn with two caveats (1) the relationship between FS and export intensity is not strong enough to suggest that India is attracting efficiency seeking FDI on a significant scale; (2) contrary to the expectations, firms with higher foreign equity stake are not more export oriented than those with smaller stake.

Table 2 :Industry group-wise determinants of export intensity

High Tech Industries								
	FIXED EFFECT				RANDOM EFFECT			
	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Stat	Coeffi	z-Statistic
FS	-0.006	-0.2709			.00298	.122		
FE			-0.0066	-0.2709			-8.2e06	-.015
IMPK	-0.4880	-1.3926	-0.4880	-1.3926				
MT	-0.1718	-0.3941	-0.1718	-0.3941	-.2559	-.603	-.2491	-.591
IMRS	0.4261[a]	4.9618	0.4261[a]	4.9618	.3999[a]	4.560	.3996[a]	4.558
RDS	0.8773	1.0107	0.8774	1.0107	.9876	1.122	.9761	1.110
SKIL	0.0080[a]	2.6405	0.0080[a]	2.6405	.0078[a]	2.537	.0077[a]	2.506
SIZE	0.0065	0.8808	0.0065	0.8808				
CONSTANT					-.0458	-1.441	-.0448	-1.403
SCALE:C(12)	0.1036	13.554	0.1036	13.554				
L-L	67.511		67.902		62.266		62.259	
NOB	111		111		111		111	
Medium-high -tech Industries								
	FIXED EFFECT				RANDOM EFFECT			
FS	0.0191[c]	1.7261			.01734[c]	1.686		
FE			0.0002	0.9404			.00018	.781
IMPK	0.1221	1.6855[c]	0.1184	1.5261	.1169	1.537	.1143	1.627
MT	-0.1007	-0.5132	-0.1004	-0.5106	-.1259	-.633	-.1249	-.626
IMRS	0.1310[b]	2.3883	0.1367[b]	2.4829	.1193[b]	2.144	.1253[b]	2.234
RDS	0.9550	1.6882[c]	0.8383	1.6053	.8538	1.217	.7881	1.138
SKIL	0.0010	0.6674	0.0010	0.6605	.0005	.312	.0004	.293
SIZE	0.0107[a]	3.5214	0.0109[a]	3.5708	.0091[a]	2.996	.0093[a]	3.067
CONSTANT					-.0157	-.923	-.0142	-.832
SCALE	0.1013	25.604	0.1015	25.599				
L-L	229.3824		228.34		226.159		225.209	
NOB	442		442		442		442	
Medium –Low –tech technology Industries								
	FIXED EFFECT				RANDOM EFFECT			
FS	-0.0059	-0.2682			-.0012	-.057		
FE			-6.72E-05	-0.1572			.00006	.145
IMPK	0.1197	1.0004	0.1203	1.0054	.1371	1.146	.1380	1.154
MT	-0.3847	-1.1870	-0.3863	-1.1895	-.3127	-.991	-.3146	-.993
IMRS	0.2211[a]	2.6534	0.2208[a]	2.6384	.2521[a]	3.087	.2508[a]	3.062
SKIL	9.51E-05	0.0730	0.0001	0.0797	.00097	.765	.0010	.787
SIZE	0.0145[a]	3.6483	0.0145[a]	3.6448	.02103[a]	4.830	.0210[a]	4.832
CONSTANT					-.07934	-3.611	-.0803	-3.621
SCALE	0.1067	17.373	0.1067	17.372				
LL	91.525		91.502		96.310		96.139	
NOB	216		216		216		216	
LOW TECH								
	FIXED EFFECT				RANDOM EFFECT			
FS	0.0585	1.5215			.05199	1.319		
FE			0.0014[c]	1.8680			.0013[c]	1.772
IMPK	0.4472[a]	4.4332	0.4440[a]	4.4231	.4494[a]	4.433	.3867[a]	2.805
MT	-0.1456	-0.5634	-0.1417	-0.5505	-.1496	-.571	-.2051	-.689
IMRS	0.1031	0.5433	0.0997	0.5277	.0828	.430	.1050	.542
RDS	-6.1319	-0.3173	-5.8810	-0.3055	-5.416	-.260	-4.865	-.412
SKIL								
SIZE	0.0139[c]	1.9108	0.0135[c]	1.8682	.01428[c]	1.927	.0131[c]	1.759
CONSTANT					-.0101	.0369	-.0087	-.233
SCALE	0.1779	14.482	0.1739	14.506				
L-L	7.921		8.5033		2.4136		2.521	
NOB	153		153		153		153	

[a] significant at 1% , [b] significant at 5% and [c] significant at 10%

Industry group wise results do not lend support to the second hypothesis of the paper. Both FE and FS emerged insignificant for the high-tech industry group. The results could partly be explained by the Patent Regime followed in India since 1970. This regime abolished product patents and relaxed the terms of process patents. The absence of patent protection may have restricted the inflows of more advanced technologies in high-tech sectors, particularly drugs and pharmaceuticals. It could also be that much of FDI in this group is concentrated in EPZs. If that is so, it may not necessarily be conducive to building dynamic export capabilities in high-tech sectors. In general it is argued that FDI in EPZs is resource seeking and that its benefits in terms of technology diffusion and upgradation of competitiveness are at best limited (Balasubramanyam 1988). FS did emerge significant in medium high-tech industries. However the statistical significance at 10% is rather weak. Thus the impact of liberalisation on FDI-export link is not typical of a country with wide R&D base, availability of skilled labour force and industrial capabilities. The results suggest some gaps not only in introduction and implementation of liberalisation measures but also perhaps in the existing capabilities. In low-tech industries, FE (and not FS) turned up significant indicating that firms with higher foreign equity are likely to export more. The results are in conformity with those reported in UNCTAD [1999]. It is argued there that many MNEs are setting up wholly owned production facilities in low-tech industries (textiles, food processing) in low-wage countries. They set up more sophisticated facilities with higher quality products and export to other countries using their marketing networks [UNCTAD 1999]. Our results are in line with this explanation suggesting that India's competitive advantages still lie in low wages.

MT did not turn out to be significant in any equation. Theoretically, it is argued that

market transactions that transfer only standard and codified technologies may not confer competitive advantages on firms, particularly in high-tech industries. However, countries such as Japan and Korea acquired competitiveness on the basis of imported technologies even in high-tech industries in the early phase of their development. In the Indian context also, previous studies showed that licensing did confer competitive advantages on firms in engineering industries [Lall 1986, Kumar and Siddharthan 1994, Jain 1998]. However, with growing technology-based competition and relaxation of conditions for MNE entry the world over, this strategy appears to be getting less attractive in acquiring competitive advantages abroad. There may be cases of success but it appears that these cases may not be generalised. Evidence suggests that many East Asian countries liberalised their FDI regime in the late 1980s to facilitate the flow of advanced technologies [Hou and San 1993 for Taiwan and Westphal et al. 1985 for Korea].

IMPK emerged significant for all firms combined. However, a disaggregated analysis suggests that imports of capital goods provide distinct advantages in low-tech industries only where

IMPK emerged significant at one per cent. This could be because technologies in these industries are widely diffused and are mainly embodied in capital goods [Lall 1998].

IMRS came up significant at one per cent with positive sign for all firms pooled together and in each sub-sample except the low-tech industry group. It appears to be one of the most important determinants of firms' competitiveness. Lowering of tariff and non-tariff

barriers on raw materials and components facilitated imports of raw materials and components from the cheapest possible sources available that gave a distinct cost competitiveness to firms in India manufacturing. The results support the policy of lowering tariff and non-tariff barriers on raw materials, components and machinery strongly.

RDS turned positive and just missed significance at 10 per cent in the sample of all firms. It is generally feared that relaxation in the restrictions on technology transfers would enhance firms' dependence on foreign technologies reducing the role of domestic R&D [Subramanyam, 1991]. However, the findings here support the evolutionary school of thought, which maintains that building up technological capabilities through own R&D efforts are crucial in creating competitiveness. While MT does not appear to have contributed to international competitiveness, RDS had a positive effect. A disaggregated analysis, however, shows that R&D variable was significant only in medium-high tech industries. In others, it turned insignificant. The results are not illogical. It could be that in high-tech industries R&D efforts may not match the world standard and, in medium- and low-tech industries its levels are negligibly small. Besides, as Pavitt [1984] argued, the dependence of low-tech industries for machinery, components and raw materials on other sectors is very high. Thus, a small scale of their own R&D is not likely to give them much edge.

SKILL variable emerged insignificant in the sample for all firms (Table 2). In high-tech industry group, however, this variable turned out to be significant at one per cent with a positive sign. Our results indicate that skill creation is crucial for creating competitiveness in high-tech sectors. Porter (1999) finds one-to-one relationship between R&D workforce

and innovative capacity. Most existing studies on India did not find skill to exert significant influence on firms' competitiveness. However, these studies used either the share of highly paid employees in total wage bill (see Kumar 1990, Kumar and Siddharthan 1994 among many others) or average wage rates (see Lall and Mohammad 1983) as a measure of skill intensity. While these variables need not reflect skill intensity, the efficiency variable used in this paper reflects not only the skills of labour force but also the way the productive system uses it.

Firm size turned significant with a positive sign in all the equations. Most previous studies found smaller firms to be more export oriented in the restrictive regime [Lall and Kumar 1981, Patibandla 1995]. Kumar and Siddharthan [1994] found very large firms to be domestic market oriented. Two main arguments extended were as follows: (1) In the presence of capital market imperfections and sub-optimal contractual arrangements small firms faced higher costs in the domestic market. These firms tended to expand their markets by breaking into competitive world markets. (2) Large firms tended to be domestic market oriented due to high profits that they reap in protected domestic markets due to their monopolistic position. The present study, however, shows that increasing liberalisation of the economy, intensified competition and exchange rate correction favoured large firms in the world markets in the 1990s.

V Conclusion

This paper analysed the inter-firm determinants of export performance in Indian

manufacturing in the late 1990s. The objective was to test two hypotheses : first, in a liberalised regime, MNE affiliates perform distinctly better than local firms in the export markets and second, MNE affiliates have greater comparative advantages in high-tech than in low- and medium-tech industries. For the empirical analysis, export models with technology, cost and scale variables were estimated for a sample of firms drawn from Indian manufacturing. Tobit model estimations conducted on all the sample firms pooled together supported the first hypothesis. However, the evidence of the better performance of MNEs is not strong enough to suggest that India is attracting efficiency-seeking outward-oriented FDI. Even firms with higher foreign equity stakes have not performed distinctly better than others. The results also show that high-tech industries are not attracting efficiency seeking FDI as had been expected. In medium-high tech sectors their performance is somewhat better. However, even in this group the results are not robust. In low-tech industries, however, firms with high foreign stake are found to be performing better. Two important implications of the results are : one, it appears that the economy is not fully integrated with the global economy and that the existing industrial and technological capabilities need reorientation to attract efficiency seeking FDI; two, India's competitive advantages still lie in low-tech sectors. There have not been dynamic changes in the export structure even after liberalisation (see Lall 1999 also). The results also suggest that in technology based sectors own technological capabilities of firms are crucial determinants of export performance of firms. Finally, it was found that the export performance of firms was linked strongly with firm size and imports of raw materials and components in almost all technology groups.

In view of the findings of this paper, I would like to make a few policy remarks. The liberalisation of markets and technological changes taking place have changed the kind and determinants of trans-border activities engaged in by MNEs. MNEs are increasingly looking for physical and human infrastructures, which enable them to create and exploit their ownership specific core competencies. However, for such efficiency seeking FDI they prefer locations, which have well-developed R&D base, a good physical infrastructure, skilled labour and well-developed economic clusters. In the absence of such assets, developing countries may fail to attract such FDI. It is therefore crucial for the countries to upgrade the competitiveness of their own resources and capabilities. Governments may also need to revise their policies with respect to FDI regulations and intellectual property rights. The results also suggest that the lowering of tariff walls on the imports of capital goods and inputs have had desirable impact on firms' competitiveness. This policy may further be rationalised. Finally, it may be suggested that government should promote a strong nucleus of flagship indigenous firms in internationally oriented sectors' to compete in world markets.

References

Athukorala, P. et al. [1995] 'Multinational Firm and Export Performance of firms in Developing Countries : some Analytical Issues and New Empirical Evidence', *Journal of Development Economics*, vol. 46 , 109-122.

Aggarwal, Aradhna [1997] `Liberalisation, Internationalisation advantages and Foreign Direct Investment : The Indian Experience in the 1980s, *Transnational Corporations*, 6[3], 33-57.

----------[2000] 'De-regulation, Technology imports and Local R&D Efforts : An Analysis of the Indian Experience,' *Research Policy* [forthcoming]

Alam, G. [1985] `India's Technology Policy and its Influence on Technology Imports and Technology Development', *Economic and political Weekly* Vol. 20 [45,46,47] Special No. 2073-2080.

Amemiya [1973] `Regression Analysis When the Dependent Variable is Truncated Normal', *Econometrica*, 41 [1973], 997-1016.

Balasubramanyam, V.N. (1988) ' Export Processing Zones' in Greenway, D. (ed.) *Economic Development and International Trade* (London, Macmillan).

Balasubramanyam, V.N. and Salisu, M. (1991) `Export Promotion, Import Substitution and Direct Foreign Investment in Less Developed Countries' in A. Koekkoek and L. Mennes (eds.) *International Trade and Global Development* (London : Routledge)

Behrman, J. and H. Willander (1976) '*Transfer of Manufacturing Technology Within Multinational Enterprises'* Cambridge Mass Balling.

Bell M. and K. Pavitt [1997] `Technological Accumulation and Industrial Growth : Contrasts Between developed and Developing Countries', in D. Archibugi and Michie Jonathan [eds.] *Technology, Globalisation and Economic Performance*, Cambridge University Press, 83-137 [1997]

Bhagwati, J.N. (1973) ' The Theory of Immeserising Growth : Further Applications' in Micheal B. Connolly and A.K. Swoboda (eds.) International Trade and Money, Toronto, University of Toronto Press.

Blomstrom, M. A. Kokko and M. Zezan [1994] `Host Country Competition, Labour Skill and Technology Transfer by Multinationals' in *Weltwirtschaftliches Archiv*, 130 [1994], 521-533.

Bonaccorsi, A. [1992] ` On the Relationship Between Firm Size and Export Intensity', *Journal of International Business Studies*, 23 [4], 605-35

Caves R.E. [1996] Multinational Enterprise and Economic Analysis 2nd ed. Cambridge :

Cambridge University Press.

Chen C.,L. Chiang and Y. Zhang (1995)' The role of Foreign Direct Investment in China's Post 1978 Economic Development' *World Development* 23, 691-703.

Das (forthcoming) 'Some Aspects of Productivity, Growth and Trade in Indian Industries. Ph.D. Dissertation, University of Delhi, Delhi

Davidson W.H. and D.G. Mcfetridge [1984] ' International Technology Transactions and the Theory of Firms' *Journal of Industrial Economics*, 32, 253-64

Doraiswamy, L.K. [1992] `Technology Development and Transfer in India : The Agony and the Ecstasy', *Indian Chemical Industry-Emerging Scenario*, Indian Chemical Manufacture Association [ICMA], 1992.

Dosi, G. [1988] `Sources, Procedures and Micro Economic Effects of Innovation'. *Journal of Economic Literature*, 26, 1120-71.

Dosi G., K. Pavitt and L. Soete [1990] *The economics of Technical Change and International Trade*. London : Harvester Wheatsheaf

Dunning, J.H. [1993] *Multinational Enterprises and the Global Economy, Reading_* : Addison-Wesley

------1994] 'Re-evaluating the Benefits of Foreign Direct Investment' *Transnational*

Corporations 3, February 23-52.

-----[1998] ' Changing Geography of Foreign Direct Investment : Explanations and Implications in Nagesh Kumar et al. *Globalisation, Foreign Direct Investment and Technology transfers: Impacts on and Prospects for Developing Countries*, London and New York : Routledge.

----------and Narula 1997 'Developing Countries Versus Multinationals in a Globalising World : The Dangers of Falling Behind' in P. Buckley and Pervez Gauri [eds.] *Multinational Enterprises and Emerging Markets : Managing Increasing Interdependence*, Dryden Press, 1997.

Fritsch, W. and F. Gustavo (1991) 'Foreign Direct Investment in Brazil: Its Impact on Industrial Restructuring' OECD, 1991

Hatzichronoglou, T. (1997) ' Revision of The High-Technology Sector and Product Classification' STI Working Paper OECD/GD(97)216, OECD Paris.

Hou, C. and G. San [1993] ' National System Supporting Technical Advance in Industry : The case of Taiwan' in R.R. Nelson [eds.] *National Innovation Systems : A Comparative Analysis*,

New York, Oxford University Press.

Jain, Aradhna [1998] ' MNEs, Technology and Industrial Structure : Indian Experience in the 1990', *Ph.D. Dissertation*, Delhi School of economics, Delhi University [unpublished]

Jenkins, R.O.[1991] ' The Impact of Foreign Investment on Less Developing Countries : Cross section Analysis Versus Industry Studies', in P.J. Buckley and J. Clegg [eds.] *Multinational enterprises in Less developed Countries*, Basingstoke : Macmillan.

Krugman, P. [[1985] `A Technology Gap Model of International Trade' in K. Jungfelt and D. Hague [eds.] *Structural Adjustment in Development of Open Economies*. Proceedings of the Conference of the International Economics Associations held at Yxtaholm, Sweden, London, The Macmillan Press Ltd

Kokko, A. [1992] ' *Foreign Direct investment and Host Country Characteristics and Spillovers'* Stockholm, Economic Research Institute, Stockholm, School of Economics.

Kokko, A. and M. Blomstrom [1995] 'Policies to Encourage Inflows of Technology Through Foreign multinationals' *World Developme*nt 23 [3], 459-468.

Konrad, N. and D. Wahl [1985] ' Scientific and Technology Potential in Developing Countries as National and International factors, *Economic Quarterly* 20, 3, 3-18.

Kumar, N [1990*] Multinational Enterprises in India : Industrial Distribution, Characteristics and Performance*. London and New York Routledge

--------[1994] 'Determinants of Export Orientation of Foreign Production by US Multinationals : An Inter-Country Analysis' *Journal of International Business studies* 25[1], 141-56.

----------[1998a] 'Technology Generation and Technology Transfer in the World Economy: Recent Trends and Implications for Developing Countries', in Nagesh Kumar et al. *Globalisation, Foreign Direct Investment and Technology transfers: Impacts on and Prospects for Developing Countries*, London and New York : Routledge

------[1998b] ' Multinational Enterprises, Regional Economic integration and Export Platform Production in the Hoist Countries : An Empirical Analysis for the US and Japanese Corporations', *Welwirtschaftliches Archiv*, 134[3] : 450-3.

----------and N.S. Siddharthan [1994] `Technology, Firm Size and Export Behaviour in Developing Countries: The Case of Indian Enterprises', *Journal of Development Studies*,31[2], 289-309.

Kumar and N.S. Siddharthan [1997] *Technology, Market Structure and Internationalisation : Issues and Policies for Developing Countries*. UNU INTECH Studies in New Technology and

Development, published in association with Routledge London and New York.

Lall S. [1985] ' *Multinationals, Technology and Exports'*, London

--------- [1986]`Technological Development and Export Performance in LDCs: Leading Engineering and Chemical Firms in India,' *Weltwirtschaftliches Archiv,* 122, 80-91

--------[1987] *Learning to Industrialise : The Acquisition of Technological Capability by India* London : Macmillan Press

---------[1992] `Technological Capabilities and Industrialisation' *World Development*, Vol. 20, No.2, pp 165-186.

--------[1998] Exports of Manufactures by Developing Countries : Emerging Patterns of Trade and Location' *Oxford Review of Economic Policy* 14,2, 54-73.

-------[1999] 'India's Manufactured Exports : Comparative Structure and Prospects' World Development Vol. 27 (10),1769-1786.

---------- and R. Kumar [1981] ' Firm-Level Export Performance in an Inward Looking Economy: The Indian Engineering Industry', *World Development,* 9[5], 453-463.

---------- and S. Mohammad [1983] ' Multinational in Indian Big Business: Industrial Characteristics of Foreign Investment in a Heavily Regulated Economy' *Journal of Development Economics*, 13, 143-57.

----------and P. Streeten [1977] *Private Investments, Transnationals and Developing Countries,* London, Macmillan.

Lazonic, W. (1993) 'Learning and the Dynamics of International Competitive Advantage' in R. Thomson (eds.) Learning and Technological Change, St. Martin's Press, 172-200

Mansfield E. and A. Romeo [1980] ' Technology Transfer to Overseas Subsidiaries by US Based Firms' *Quarterly Journal of Economics*, 95 [December] 737-50

Magee S.P. [1977] ' Information and Multinational Corporations : An Appropriability Theory of Direct Foreign Investment' in Bhagwati [eds.] *The New International Economic order,* Cambridge, MA MIT Press, 317-340.

Mehta, R. (1999) 'Tariff and Non-tariff Barriers of Indian Economy : A Profile', *monograph,* Research and Information Systems for Developing Countries, New Delhi.

Mowery, D.C. and J.E. Oxley [1997] `Inward Technology Transfer and Competitiveness : The Role of National Innovation System', in D. Archibuigi and Michie Jonathan [eds.] *Technology, Globalisation and Economic Performance* Cambridge University press, 1997.

Nunez, W.P. (1990) ' Foreign Direct Investment and Industrial Development in Mexico' OECD 1990

Pant, M. [1993],`Export Performance, Transnational Corporations and the Manufacturing Sector: A Case Study of India' *The Indian Economic Review,* 28[1], 41-54.

Papanastassiou, M. and R. Pearce [1999] '*Multinationals, Technology and National Competitiveness'* Edward Elgar

Patibandla, M. [1995] ' Firm Size and Export Behaviour : An Indian Case Study' *Journal of Development Studies,* 31[6], 868-882.

Pavitt, K.[1984] `Sectoral Patterns of Technical Change : Towards a Taxonomy and a Theory', *Research Policy*, 13, 343-373.

Porter , M.E. (1999) 'Innovative Capacity and Prosperity : The Next Competitiveness Challenge', *The Global Competitiveness Report 1999.*

Saleem, H.N. (1996)'India: Tariff Policy Reform and Impact on Protection 1987-88 to 1994-95, *monograph*, National Institute of Public Finance and Policy, New Delhi.

Subramanyam ,K.K.(1991) 'Technological Capability under Economic Liberalism : Experience of Indian Industry in Eighties', *Economic and Political Weekly*, August 31, M87-89.

Subramanyam, K.K. and P. Pillai [1979] *Multinationals and Indian Exports,* New Delhi : Allied.

Teece D.J. [1977] ' Technology Transfer by Multinational firms - The Resource Cost of Transferring Technological Know-how' *Economic Journal* 87, June 242-61.

UNCTAD 1995 *World Investment Report* 1995 UNCTAD

UNCTAD 1999 *World Investment Report* 1999 UNCTAD

Urata, S. [1999] 'Intra firm Technology Transfer by Japanese Multinationals in Asia' in D.J. Encarnation [eds.] *Japanese Multinationals in Asia: Regional Operations in Comparative Perspective,* Oxford University Press.

Wakelin, K. [1997] *Trade and Innovation: Theory and Evidence,* Edgar Publishing Inc. 1997.

Wang, Y.J. and M. Blomstrom [1992] ` Foreign Investment and Technology Transfer- A Simple *Model' European Economic Review,* 36 [1], 137-155.

Westphal, L.E., L. Kim and C.J. Dahlman [1985] ' Reflection on the Republic of Korea's

Acquisition of Technological Capabilities' in N. Rosenberg and C. Frischtak [eds.] *International Technology Transfers : Concepts, Measures and Comparisons*, New York, Praetor.

World Bank [1984] ' India: Non -electrical Industrial Machinery Manufacturing - A Subsector Study, *Report no. 5095-IN*, 2 August 1984.

Appendix 1

Industry-group	Industry		R&D intensity	Export Intensity		
				ALL FIRMS	MNE	DOM
All Firms		Mean	0.000897	0.070225	0.071	0.063
		Std. Dev.	0.006450	0.111684	0.102	0.099
		Observations	916	916	234	682
Hi-tech	Pharmaceuticals,	Mean	0.002436	0.072413	0.064	0.076
	Telecommunication, Computer	Std. Dev.	0.011688	0.109059	0.081	0.118
	Photocopying machines	Observations	111	111	31	80
Med-high	Sc. Instruments,	Mean	0.001245	0.057791	0.069	0.052
	Other engineering& Chemical	Std. Dev.	0.007179	0.087558	0.099	0.0810
	Industries	Observations	442	442	141	301
Med-low	Rubber & Plastic products	Mean	Neg.	0.059793	0.051	0.058
	Metal & Metal products	Std. Dev.	-	0.094289	0.065	0.091
	Non metallic minerals	Observations	215	215	30	185
Low-tech	Paper, Textiles, Food	Mean	Neg.	0.109313	0.110	0.089
	Beverages, Tobacco, wood	Std. Dev.	-	0.158578	0.147	0.132
		Observations	153	153	32	116

Variables:

Dependent Variable

Export intensity [EXP] : Total export as a proportion of firms' sales.

Independent Variables

Foreign Affiliation: Two alternative variables are used to proxy foreign affiliation in the present analysis. These are,

FS : =1 if foreign equity >25 per cent and
=0 otherwise;

FE: The share of foreign firms in total equity holding.

Intensity of market transactions of technology [MT]: technical fee and royalties paid abroad as a proportion of firms' sales.

Intensity of imports of capital goods [IMPK] : imports of capital goods as a proportion of firms' sales.

R&D intensity [RDS]: Expenditures incurred on in-house R&D labs and equipments as a proportion of firms' sales.

Skill intensity [SKILL] : Value added per unit of wage bill.

Intensity of imports of raw materials and components [IMRS] : Imports of components and raw materials as a ratio of firms' sales ,

SIZE: Log of total sales of firm i.