

Foreign Direct Investment and Export Performance of Pharmaceutical Firms in India: An Empirical Approach

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Abstract

This paper presents an empirical analysis of how foreign direct investment impact on the export performance of pharmaceutical firms in India. The hypothesis is examined using panel data analysis. The results show that foreign ownership has a negative impact on export performance. Unlike other industries, it is observed that in pharmaceutical industry foreign owned firms export less and focus more on domestic demand and host country specific advantages. Our findings provide rich source of information to policy makers, researchers and the management of both foreign and domestic owned firms.

Keywords: Foreign Direct Investment, Export performance, Pharmaceutical industry, Panel data, India

1. Introduction

There is a huge competition among the various countries of the world to get export oriented Foreign Direct Investment (FDI). This is essentially true among developing countries like India, China, Brazil and Russia. FDI may be considered as a means for developing countries to get capital inflows, access to foreign technology, management skills and marketing networks. It promotes export activities by providing access to global markets and facilitating export oriented production with an inflow of capital and access to modern technology. The main channel for multinational firm's expansion strategy is FDI. Thus, FDI encourages exports of host country economies by way of enhancing their domestic capital for exports, facilitating in transfer of technology and new products and services for exports, providing linkages with new and large global markets, and lastly, helps in training the host country workforce in improving their both technical and management capabilities. Hence, FDI is pursued as a tool for export promotion.

According to the theory of internationalization, it is argued that FDI is an alternative mode for exporting. A multinational corporation, as a first step, enters into foreign markets by exporting its product. Then, based on the outcome, it may set up its production facilities in the foreign market—via FDI—and start serving the local customers from these facilities. In this regard, 'product life cycle theory' proposed by Reymond Vernon (1966) is the first paper to discuss such patterns, then huge theoretical and empirical research followed. Lu and Beamish

(2001) found that exporting is the first step to enter into global markets which provides an opportunity for future international expansions. Further, Lutz and Talavera (2004) support the argument and proved that the firm exports are regarded as the sign of comparative advantage. Rob and Vettas (2003) found that given the demand uncertainty and irreversibility, firms both exports their products and undertake FDI. Interestingly, Aulakh et al. (2000) observed that multinational corporations build plants in those countries where they can produce goods and services for exports at lower costs. This intern helps in improving the exports through preferential access to markets in the multinational enterprise home country. In case of multinational enterprises from developing economies, Mathews (2006) found that unlike first wave of multinational enterprises, the second wave of multinational enterprises are to be required in pull factors that draw firms into global connections, rather than push factors which drove them as stand-alone players in the first wave. Thus, he observed that the rise of second-wave multinational enterprises from developing economies is less driven by cost factors per se, but more by search for international markets and technological improvements and innovations to compete efficiently in the global markets.

FDI and exports are like two sides of a coin of the globalization process which not only complementary to each other but also mutually supportive. In recent years, several papers have appeared linking export performance and FDI (Abdel-Malek, 1974; Sun, 2001; Mai, 2001; Rasiah, 2003; Zheng et. al., 2004). However, empirical findings are 'inconsistent and contradictory', particularly for developing economies for whom exports are the most important. In case of developing economies, it is argued that foreign owned firms play a main role in exports. They have an edge over domestic owned firms due to their access to key resources, location specific capabilities of countries and regions in which they operate, and their ability to organize and integrate these resources. Thus, given the monopolistic advantages of foreign owned firms and their desire to please the host government, they may demonstrate a higher export performance. On the other hand, it can be argued that given the regulatory restrictions and the presence of several more attractive production bases in other developing economies, it will be plausible to argue that foreign owned firms export performance would be lower. Thus, for a long, the role of FDI in promotion of exports of manufacturing sector has been a topic of interest for both policy makers and academicians. Further theoretical and empirical research would be valuable for a better understanding of the impact of FDI on export performance of firms. This paper attempts to work in this direction by using the pharmaceutical firm's data in emerging market setup.

India was regulated and restricted for FDI until 1990. The new economic policy introduced by Government of India (GOI) in July 1991 include the removal of industrial licensing policy, removal of restrictions on FDI, abolishing of the Monopolies and Restrictive Trade Practices (MRTP) Act and opening up of reserved sectors for foreign investment. Thus, since 1991, the Indian economy has transformed from a closed economy to an open economy. Initially, GOI allowed FDI up to 51% through an automatic route, Reserve Bank of India (RBI) and foreign technology agreements in all bulk drugs and formulations barring only a few items. Subsequently, in the second-generation economic reforms introduced in 1998, FDI was allowed up to 100 percent in many sectors including Drugs and Pharmaceuticals. The main objective of such liberalization of FDI regime is to attract multinational corporations to invest in India. Majority of these policies and procedures, which were liberalized across sectors or activities that require approval from the Foreign Investment Promotion Board (FIPB), are given automatic approval by the RBI. Overall, the FDI inflows have grown notably over a period of 15 years that is from Rs 409 crores in the year 1991-92 to Rs.24,613 crores in 2005-06. (see Figure I). However, post Asian crisis of 1997-98, they have decreased markedly and increased thereafter. Similarly, FDI inflows have decreased in fiscal year 2003-04 and increased thereafter.

With the introduction of new economic reforms, the inflow of FDI across industries has gradually increased over a period of time. Table 1 ranks the sectors based on inflow of FDI, where the Drugs and Pharmaceutical industry occupies the eighth position and accounts for 3.2 percent of total inflows of FDI during 1991 to 2006 (see Table 1). Though, the FDI flows to manufacturing sector in India has increased in the last few years, foreign investors have not yet recognized India as the most important manufacturing destination for labour-intensive exports as compared to its counter parts like China, Vietnam and other Asian countries. Among the various industries, the drugs and pharmaceutical industry has an important place in the Indian economy because of its positive technological spillovers to other sectors of the economy. Unlike other industries, one can examine all the components of FDI in pharmaceutical industry like capital flows, access to international markets, technology transfer and change in management. One of the objectives for further liberalizing FDI policies in India in general and allowing 100 percent FDI in pharmaceutical industry in particular is to attract more of an export-seeking FDI.

In India, the pharmaceutical industry is one of the emerging industries with enormous opportunities for both the domestic and multinational companies. Due to the changes in the international patent laws, now the focus is on India for contract research, joint ventures and alliances. Among over 23,000 Indian pharmaceutical units, organized sector

covers only 250 units and rest of the units are in the unorganized sector. The present study made an analysis based on the firms in the organized sector. The industry is characterized as a high growth industry (Chadha, 2006). To promote the sector, GOI had abolished product Patents Act 1970 and limited the patent term to recognize only process patents for pharmaceuticals. Being India is a member of the WTO and party to the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPs), it introduced product patents from January 1, 2005 through the passage of the Patents (Third Amendment) Act in March 2005 (Linton and Corrado, 2007). In response to this, in India, some of the multinational pharmaceutical companies are focusing on increasing the quantity and quality of FDI in the areas of pharmaceutical R&D and manufacturing. However, in the short run, product patents in India may be less harmful. But, in future, it may be sever because of many off-patented therapeutic equivalents are accessible to the Indian consumer and only around 3 percent of the drugs marketed in India are patented (Panchal, 2005).

In this paper, an attempt is made to examine the impact of FDI on export performance of pharmaceutical firms in India. A panel or longitudinal data analysis is employed using the firm level data for a period of 8 years from 1998 to 2005 to reflect the effects of second generation economic reforms in India. In the present study, the terms like FDI and multinational enterprise (MNEs) are interchangeably used to refer the foreign ownership proportion of a firm. Our findings show that foreign ownership has a negative impact on the export performance of foreign owned firms in pharmaceutical industry in India. The main contribution of this paper is examining how FDI impacts the export performance of firms operating in one particular manufacturing industry in an emerging economy setup with firm level data.

The paper is organized as follows. Section two presents a review of literature pertaining to the impact of FDI on export performance and the choice of variables. Section three indicates the research methodology including data collection and model specification, and list of variables. Section four presents results and discussion. Section five concludes by pointing to a future research direction.

2. Review of Literature and Variables

Most of the existing studies on the relationship between FDI and exports fall under the domain of the macroeconomics mainly in the areas of international trade and investment and the microeconomics specially in the areas of the firm and industrial behavior in the globalization process. The literature observed that multinational enterprises are likely to be more outward oriented. They are provided with more competitive technology, efficient management techniques and marketing skills in a globalised world (Aggarwal, 2002). Firm-level studies in Malaysia and Thailand found that foreign ownership participation had transformed the local environment in facilitating the manufacturing exports in technological industries (Rasiah, 2003). On the contrary, Abdel-Malek (1974) found that there was no significant difference in export performance between foreign and Canadian owned firms. In the case of Vietnam, Mai (2001) found that FDI facilitated in making use of the countries comparative advantage in terms of cheap labour and rich natural resources in producing export products. The empirical results on export performance indicate that, on average, the exports of foreign owned firms are much higher than comparable domestic firms (Willmore, 1986; Zhang and Song, 2000; Thangavelu and David, 2003). Very few studies have found that the effect of FDI on the export performance of firms in emerging markets is positive (Willmore, 1992; Filatotchev et al., 2001). Aggarwal (2002) found that such positive effect of FDI on export performance is present in high technology industries, but not in other industries. Greenaway and Kneller (2007) provided a critical review on firm heterogeneity, exporting and FDI.

In Indian context, very few studies, have analyzed the impact of FDI on export performance. In India, Lall and Mohammad (1983) found that FDI in large businesses were positively associated with export propensities. Aggarwal (2002), with firm level data, found relatively weak support for the hypothesis that the export performance of multinational corporation was greater than that of domestic companies, and that multinational corporation had a greater competitive advantage over domestic companies in high-tech industries than in low and medium-tech industries. At macro level, Sharma (2003) found that FDI has statistically no significant impact on India's export performance. Banga (2003) examined the hypothesis that FDI has not played any significant role in export-promotion across the various industries in India. He found that FDI has to some extent result in to diversification of the nation's exports. Further, regarding the impact of source-country of FDI, Banga (2003) found that US FDI has a positive and statistically significant effect on export performance of industries in the non-traditional export sectors, while Japanese based FDI has no significant impact. Siddharthan and Nollen (2004) examined that the export performance of multinational enterprises was determined differently from that of domestic companies in high-technology industries, and found that, in case of the Indian information-technology industry, the export performance of multinational enterprises were greater when they had higher FDI that brought more implied knowledge transfer and complementary of FDI advantages.

From the above, it is observed that there are mixed results on the impact of FDI on export performance of firms. Lall and Mohammad (1983) recommended the need for testing a model which would effectively consider all the factors that may affect inter-industry variations in FDI and export performance. Some of the studies (Kumar and Siddharthan, 1994; Sun, 2001; Zheng, et. al., 2004) also suggested that additional investigations at the firm level or industry-specific studies will throw further light on the extent to which FDI affects export performance. In India, second generation economic reforms were introduced in 1998, which introduced further liberal FDI policies. Due to the differences in regulatory environment, the FDI policies and procedures across various industries, there is a need to examine the impact of FDI on firms operating in one particular industry. Siddharthan and Nollen (2004) suggested that future studies of exporting need to be analyzed specific to one particular industry. The results and analysis provided in the past may not reflect the current export competitiveness of firms in a changed regulatory environment. Thus, empirical studies which examine the impact of FDI on a particular industry are limited. In this study, an attempt is made to examine the impact of FDI and the export performance of firms operating in pharmaceutical industry in India. In analyzing the determinants of inter-firm differences in export behavior, the present study considers the standard determinants which are explained below.

2.1 Exports Performance (EXPORT)

This is measured as the exports to sales ratio. FDI provides various benefits to the host country firm. It is believed that with the inflow of FDI, the firm's exposure to exports is assumed to exert pressures on the firm to attain a superior export performance. It is argued that, due to easy access to the proprietary technology of their parents, multinational firms are likely to be more competitive in export performance. Thus, multinational enterprises can be powerful agents of export growth. They are generally world leaders in innovation and product differentiation, have direct access to the world's largest markets, as well as the managerial, entrepreneurial and financial resources to seek and commercially exploit viable international markets. Firms that have been relatively high exporters are also likely to be more progressive and risk oriented, with relatively better performance patterns. In this study, Export to Sales ratio is introduced as a dependent variable. It is hypothesized as

Hypothesis: Foreign direct investment has a positive impact on export performance of pharmaceutical firms in India

2.2 FDI Ownership (FDI)

As compared to domestic owned firms, foreign owned firms are found to be better placed to explore export markets, in light of their captive access to information and marketing networks for their parent enterprises. Thus, foreign owned firms are expected to do better than domestic owned firms in terms of export performance. However, most of them in India were set up primarily to explore the domestic or local markets in response to the import substitution programme. Few of the studies presented a positive relationship between foreign ownership and export performance (Lall and Mohammed, 1983; Willmore, 1992; Filatotchev et al., 2001). They observed that multinational enterprises prefer to control their export-oriented affiliates through high FDI, treating their marketing network as their proprietary asset. Kumar (1990) found, across various industries, that there is no significant difference between the export performance of foreign and domestic owned firms. Similarly, Banga (2003) examined the impact of FDI on exports performance with respect to the source-country of FDI and his empirical results found that US FDI has a positive and significant effect as compared to Japanese FDI. Sun (2001) investigate the regional effect of FDI on export performance in three macro-regions of china and consider provincial FDI inflows as a measure of FDI variable. In the present study, foreign direct investment proportion in total capital of a firm is considered as independent variable because the study focuses on firm level analysis where we are examining the impact of FDI ownership on export performance of a unit of firm (Buch and Lipponer, 2006). Hence, it will be interesting to see the impact of FDI on export performance of firms.

2.3 Other Variables

In addition to above dependent and independent variables, various other control variables are considered to examine how FDI impact the export performance of pharmaceutical firms in an emerging economy like India. The detailed description of all other variables is presented in Table 2. All the variables are selected based on extant review of literature. They represent firm specific characteristics which influence the export performance. Some of the prominent variables are described here. Siddharthan and Nollen (2004) found that technology imports have a negative impact on exports due to the substitution relationship among the two variables. Literature on industrial organization and the new trade theory propose a positive relationship between firm size and exports. In case of multinational corporations, firm size provides some advantages to them like access to technical expertise, best management practices, information, risk bearing and to brand name which helps for higher exports. Thus, firm size is proposed to have a positive impact on export performance. Basant and Fikkert (1996) observed that FDI flows to labour intensive industries will stimulate high exports due to its comparative advantages to those industries. The

relationship between age as a control variable and export performance is ambiguous. It is argued that older firms are expected to enjoy greater experimental and tacit knowledge, which helps in improving their export performance. On the contrary, new firms are expected to export more because they use relatively modern technology which increases productivity and product quality and operate in new economic environment. Table 3 presents the proposed nature of relationship of all the independent and control variables with dependent variable.

3. Research Methodology

3.1 Data Collection

The firm level data for the present study is obtained from the Department of Statistical Analysis and Computer Services, Company Finance Division, RBI. To maintain confidentiality, the data set was released without company identifiers. The sample consists of 103 pharmaceutical firms. The data is collected for a period of 8 years from 1997-98 to 2004-05. The sample selection criterion generated 824 observations. The existing data set has provided only sixty three percent of data density, and a unique technique for handling missing data, namely imputation models was applied to retrieve the remaining thirty seven percent data beyond the existing data.

Among the various methods of handling missing data, we use one of the multiple imputation models like EMis for preparing our panel data setup (King et. al., 2001). It is observed that about fifty percent more information than is currently possible for the model estimation would be available if the expected maximization importance sampling algorithm (EMis) is used for handling missing data. Further, the data is analyzed all the panel data set using a Tobit fixed effects model. For analysis, the results were combined as suggested by King et al. (2001). The model estimator accounts for heteroscedasticity and a first-order serial correlation in the regression residuals. The econometrics model procedure uses Within-OLS to obtain first-step consistent estimates. The serial correlation coefficient is then estimated from the first step residuals. The regression is further transformed to eliminate serial correlation, and is re estimated by fixed effects, applying White's procedure to obtain heteroskedasticity-robust standard errors. A standard specification test for panel data regressions like Durbin-Watson test is employed to test for the presence of first-order serial correlation. For the purpose of panel data analysis, 'EViews' statistical package is used.

3.2 Model Specification

Most of the existing studies attempting to examine how FDI impacts the export performance of firms through Export to Sales Ratio is used a linear specification, and estimated the equation using ordinary least squares. In this process, these studies depend upon the standard assumptions of an absence of serial correlation and heteroscedasticity. In this study, we applied panel data analysis to measure the impact across the firms and over a period of time in pharmaceutical industry. It estimates the following Tobit fixed effect model with 'firm' and 'year' effects to analyze the determinants of Export performance.

$$Y_{it}(\text{EXPORT}) = \alpha + \mu_i + \lambda_t + \beta X_{it} + \varepsilon_{it} \quad (1)$$

Where $i = 1, 2, \dots, n$ (number of firms) and $t = 1, 2, \dots, t$ (number of years). Here, Y_{it} is the dependent variable, X is the vector of explanatory variables, β is the vector of regression coefficients, ε_{it} is the disturbance term, μ_i represents the firm effect and λ_t represents the year effect.

The detailed econometric model for the dependent variable Export performance using the above equation is as follows.

$$\begin{aligned} (\text{EXPORT})_{it} = & \alpha + \mu_i + \lambda_t + \beta_1 (\text{FDI})_{it} + \beta_2 (\text{TECHIMP})_{it} + \beta_3 (\text{CAPIMP})_{it} + \beta_4 (\text{MATIMP})_{it} + \beta_5 (\text{CAPOUT})_{it} \\ & + \beta_6 (\text{SIZE})_{it} + \beta_7 (\text{R\&D})_{it} + \beta_8 (\text{SKILLS})_{it} + \beta_9 (\text{ADV})_{it} + \beta_{10} (\text{PROFIT})_{it} + \beta_{11} (\text{TAX})_{it} \\ & + \beta_{12} (\text{LABOUR})_{it} + \beta_{13} (\text{AGE})_{it} + \varepsilon_{it} \end{aligned}$$

4. Results and Analysis

Table 4 presents descriptive statistics for all the variables as mentioned in the study and assists in the interpretation of the panel data regression results. The average export performance over the entire sample was 27.84 percent of sales revenue. Table 5 indicates correlation matrix among all the variables used in this study. As per Table 5, the SIZE variable is highly correlated with R&D expenditure (where $r=0.84$). The CAPOUT and PROFIT variables are highly negatively correlated ($r=-0.76$). On the other hand, FDI ownership has no correlation with the import of raw material ratio ($r=00$). The SIZE and AGE variables are negatively correlated (see $r=-0.02$). Though Table 5 suggests the existence of collinearity among the few independent variables, sensitivity tests reveal that the essential results are not sensitive to the exclusion of such independent variables.

The results based on the fixed-effects estimates of the coefficients of Equation 1 are presented in Table 6. The hypothesis is not proved. The empirical results suggest that foreign ownership has a negative impact on the export

performance of pharmaceutical firms. The empirical evidence is statistically significant at a 5 percent confidence interval level. It implies from further analysis that foreign owned pharmaceutical firms focus more on domestic markets than exports sales.

In the past, most of the studies during pre-1990s period in India found that foreign owned firms have either the same or even lower in export performance than that of domestic firms (Lall and Streeten, 1977; Subramanian and Pillai, 1979). Aradhana Jain (1998) in her unpublished thesis analyzed selected industries and found that the impact of foreign holdings on the export performance of firms was not significant in the early 1980s in any industry. But, in the late 1980s it is improved in some industries. Sharma (2003) empirically proved that foreign investment has no significant impact on overall exports in India. Overall, some of the studies like Lall, 1986; Kumar, 1990; Pant, 1993; and Kumar and Siddharthan, 1994; found that foreign owned firms have not performed better than domestic owned firms. The results of the present study support the findings of some of the previous studies on impact of FDI on export performance in India.

In this context, findings of the present study in Indian pharmaceutical industry appear to support some of the previous studies observations on the relationship between foreign ownership and export performance. The present study shows that foreign ownership has a negative impact on export performance of pharmaceutical firms in India. Based on this, it is not enough to suggest that India is attracting export-oriented FDI inflows on a significant scale, particularly in the pharmaceutical industry. Thus, the findings of the empirical analysis should be viewed with caution; they do show that foreign owned firms focus more on domestic markets and host country specific advantages like opportunities for R&D, innovation and lower cost of manufacturing than on export markets. Due to the cost-effective process innovations and reverse-engineering of brand name drugs, Indian firms have emerged as competitive suppliers in the global market for a large number of generic drugs. Smith (2005) found that opening up of Indian economy since 1991 has significantly increased the global competitiveness of Indian pharmaceutical industry, where domestic firms have been forced to compete alongside foreign owned or multinational firms in the domestic market. In India, multinational corporations focus more on domestic demand and host country specific advantages. On one hand, they make an investment to carryout research and development activities and the other hand, they try to grab the share of domestic market. Thus, the Indian market becomes more crowded and highly fragmented, domestic firms are increasingly pressured to look elsewhere to expand their revenues. Due to these reasons, it is observed that majority of the domestic firms have taken specific steps to boost exports and major portion of their revenues come from exports. Before generalization of these results, future research studies can be carried out to examine the impact of FDI on the export performance of other industries, and the results can be compared for making strategic decisions and directing towards policy formulation. This is recommended due to variations in the nature of businesses, regulatory environment, FDI policies and procedures across the various industries in India.

As per Table 6, the control variables exhibit an interesting effect on export performance, and deserve some mention and discussion. As advocated by trade theory, the results indicate that the variable CAPOUT ratio is found to have a negative and statistically significant impact on the export performance of firms. As proposed, TECHIMP has a negative impact on the export performance of firms due to the existence of a substitution relationship between FDI and technology imports. Interestingly, as discussed, larger firms being market leaders have a disincentive to export if profitability in the domestic market is high and their higher domestic market share has not yet matured. In this study, the SIZE variable is found to have no impact on the export performance. ADV variable is found to have a negative impact on export performance of pharmaceutical firms in India. It implies that in case of international markets, advertisement does not contribute to an increase in exports; instead, there are other factors like the quality of the product and skills of the labour force which contribute to export sales.

As expected and observed in Table 5, SKILLS and R&D indicate a positive and statistically significant impact on the export performance of firms. Our results support the argument that skill creation is the most important requirement for creating competitiveness in knowledge based sectors like the pharmaceutical industry. In this regard, Porter (1999) found a one-to-one relationship between the R&D workforce and the innovative capacity. As proposed, MATIMP has a positive impact on exports due to low tariffs and easy importability of raw materials which makes firms cost competitive. Belying expectations, TAX has a negative and statistically significant impact on export performance. This could be due to a reduction in tax benefits for exporting firms. One of the determinants of FDI is the availability of low labour cost which in turn provides competitive advantage to firms. Hence, high labour cost is expected to have negative impact. The results found that LABOUR has a significant negative impact on exports. As discussed, AGE variable is found to have a positive impact on export performance of firms.

5. Conclusions

The present study examines the impact of FDI on export performance of pharmaceutical firms in India. The objective of the study is to test the hypothesis that FDI has a positive impact on export performance of firms. For the

empirical analysis, firm level data for 103 firms for a period of 8 years from 1998 to 2005 is drawn from the pharmaceutical industry in India. A novel and robust method of handling missing data is applied which makes us available thirty seven percent more data for analysis than is otherwise possible. The hypothesis is tested using pooled cross sectional time series analysis. The results show that FDI has a significant negative impact on export performance of firms. The results of the study provide useful insights for reviewing the current policies and take necessary actions. Unlike other industries, it is observed that in pharmaceutical industry foreign owned firms export less and focus more on domestic demand and host country specific advantages. It is observed that opening up of India economy has substantially increased the global competitiveness of Indian pharmaceutical industry, where Indian market provides scope for potential growth on demand side. The domestic firms are increasingly pressured to take specific measures to operate in domestic markets and boost exports. Given the changing FDI regulations across the countries and sectors, the main contribution of the present study is to examine the impact of FDI on export performance of firms operating in one particular manufacturing industry in an emerging economy with firm level data. The present study provides rich source of information to policy makers, researchers and the top management of pharmaceutical firms. It also confirms the findings of earlier research studies. Before generalizing the above results, it would be useful to replicate the similar methodology across various industries due to varying regulatory environment like FDI caps and policies.

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Table 1. Sectors attracting highest FDI inflows in India

(US \$ in illions)

No.	Sector	Cumulative Inflows	Percentage
(August 1991 – March 2006)			
1	Electrical Equipment	5,496	17.49
2	Telecommunications	3,372	10.58
3	Transportation Industry	3,178	9.82
4	Services Sector	3,091	9.45
5	Fuels (Power + Oil Refinery)	2,581	8.10
6	Chemicals	2,143	6.33
7	Food Processing	1,179	3.47
8	Drugs & Pharmaceuticals	1,007	3.18
9	Cement and Gypsum	747	2.38
10	Metallurgical industries	655	2.08

Source: Department of Industrial Policy & Promotion, Ministry of Commerce & Industry, Government of India

Table 2. Description of Variables

Variables		Description
Dependent Variable		
EXPORT	Export performance	Export performance is measured as export sales divided by sales
Independent Variables		
FDI	FDI ownership	Foreign direct investment proportion in total capital
TECHIMP	Technology import	Ratio of total technology payments abroad, royalties and license fees to sales
CAPIMP	Imports of capital goods	Ratio of import of capital goods to sales
MATIMP	Imports of raw materials	Ratio of import of raw materials and components to sales
CAPOUT	Capital output ratio	Ratio of fixed assets to sales revenue
SIZE	Firm size	Sales revenue
R&D	Research & Development expenses	Ratio of research and development expenditure to sales revenue
SKILLS	Skills of labour force	Ratio of proportion of high income employees to total wage bill
ADV	Advertising & promotion	Ratio of advertisement expenditure to sales revenue ratio
PROFIT	Operating profit	Ratio of operating profit to sales revenue
TAX	Tax provision	Ratio of tax provision to sales revenue
LABOUR	Total labour	Ratio of total salaries and wages to sales revenue
AGE	Age	Number of years for which the firm is in operation

Table 3. Proposed nature of relationship of Independent variables with Dependent variable

Independent Variables		Export Intensity
FDI	FDI ownership	+/-
TECHIMP	Technology import	-
CAPIMP	Imports of capital goods	+
MATIMP	Imports of raw materials	+
CAPOUT	Capital output ratio	-
SIZE	Firm size	+
R&D	Research & Development expenses	+
SKILLS	Skills of labour force	+
ADV	Advertising & promotion	+
PROFIT	Operating profit	+
TAX	Tax provision	+
LABOUR	Total labour	-
AGE	Age	+/-

Table 4. Pooled Sample Descriptive Statistics*

Variables	Mean	Stand. dev.	Minimum	Maximum
EXPORT	27.84	25.56	0.00	95.20
FDI	6.22	15.78	0.00	92.00
TECHIMP	10.90	15.18	0.00	335.38
CAPIMP	1.08	3.01	0.00	68.70
MATIMP	10.56	9.86	0.00	63.30
CAPOUT	65.53	175.03	0.80	2397.16
SIZE [†]	12969.30	17436.90	1.60	53140.30
R&D	2.34	2.67	0.00	21.18
SKILLS	7.41	7.93	0.00	73.91
ADV	2.99	3.28	0.00	23.31
PROFIT	3.82	58.46	-1227.77	98.17
TAX	3.23	11.15	0.00	240.00
LABOUR	10.50	6.44	0.31	52.33
AGE	30.65	21.04	0.00	99.00

* Data for the 103 firms for 8 years in the sample

† indicates data in millions of Indian rupees.

Table 5. Correlation Matrix

	FDI	TECHIMP	CAPIMP	MATIMP	CAPOUT	SIZE	R&D	SKILLS	ADV	PROFIT	TAX	LABOUR	AGE
FDI	1.00	-0.01	-0.06	0.00	-0.06	-0.25	-0.23	-0.11	-0.09	0.05	0.04	0.10	0.20
TECHIMP		1.00	0.11	0.47	-0.08	0.16	0.17	0.05	0.01	0.09	-0.01	-0.16	-0.08
CAPIMP			1.00	0.24	-0.01	0.20	0.18	0.09	0.05	0.07	0.01	-0.08	-0.05
MATIMP				1.00	-0.11	0.40	0.39	-0.02	0.12	0.16	0.08	-0.25	-0.08
CAPOUT					1.00	-0.13	-0.14	0.09	-0.12	-0.76	0.28	0.05	-0.15
SIZE						1.00	0.84	0.02	0.42	0.20	0.08	-0.25	-0.02
R&D							1.00	0.12	0.40	0.20	0.07	-0.20	-0.02
SKILLS								1.00	-0.06	0.02	0.03	-0.27	-0.20
ADV									1.00	0.14	0.03	-0.04	0.10
PROFIT										1.00	-0.04	-0.08	0.09
TAX											1.00	0.08	0.02
LABOUR												1.00	0.20
AGE													1.00

Table 6. Results of Fixed-Effects Regression Analysis

Variables	EXPORTS			
	Coefficient	Std. Error	t-Statistic	Probability
FDI	-0.0931	0.0125	-12.7140	0.0003
TECHIMP	-0.0016	0.0053	-0.1582	0.3303
CAPIMP	0.2144	0.2798	0.5222	0.3186
MATIMP	0.4851	0.0999	6.1612	0.0822
CAPOUT	-0.0018	0.0010	-3.8930	0.0371
SIZE	0.0000	0.0000	3.4200	0.0826
R&D	0.2502	0.0828	9.7999	0.0819
SKILLS	0.0342	0.0172	5.9319	0.0305
ADV	-0.1057	0.0327	-14.8021	0.0006
PROFIT	-0.0022	0.0030	-23.3784	0.1279
TAX	-0.0331	0.0105	-31.4354	0.0057
LABOUR	-0.0941	0.0171	-9.9161	0.0148
AGE	0.0683	0.0215	1.9702	0.0040
R ²		0.98		
Adjusted R ²		0.98		
Number of observations		824*		

• 103 firms over a period of 8 years

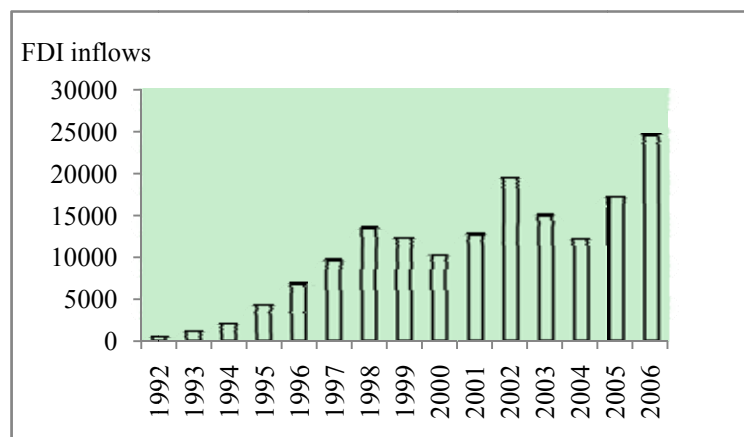


Figure 1. Foreign Direct Investment inflows during 1992 to 2006 (Rupees in crores)

Source: Department of Industrial Policy & Promotion, Ministry of Commerce & Industry, Government of India