CHAPTER 8

SUMMARY AND CONCLUSIONS

8.1 GENERAL

The liberalisation process initiated in 1991 was primarily intended to improve competition by increasing the market contestability. One of the policies adopted was allowing unimpeded entry of foreign firms in different sectors. In the present study an attempt was made to empirically prove the role of FDI in building up technological competencies and spillover generation in Indian manufacturing industry after liberalisation. This chapter summarises the results of the analysis and provides policy implications of the study. The chapter is organised as follows: Section 8.2 presents the summary and major findings of the study. Some of the policy implications that may be drawn from the empirical analyses are discussed in Section 8.3. Finally, Section 8.4 states the major limitations of the study and further scope for research.

8.2 SUMMARY AND MAJOR FINDINGS

In recent times, with countries increasingly opening up their economies, there has been a growing flow of commodities, factors of production, management, technology and financial capital across national borders through which technological knowledge is spreading out. Such flow of knowledge and capital mainly take place through FDI. MNEs, the carriers of
FDI, are the important producers of advanced technology and as the literature points out, the most important reason for firms establishing overseas operation is to exploit this technological lead.

In this globalisation era, achieving technology capability is very important for international competitiveness and higher economic growth. A more liberalised economic scenario brings in more FDI that helps in building up strong technological capability among local firms through their interaction with technologically superior foreign firms. Increased technology capability can be achieved through learning by doing or exporting to knowledgeable buyers, in-house R&D, importing technology through embodied or disembodied sources, and/or through spillovers of technology. A liberalised policy regime, with increased FDI, accelerates such technology capability building. Liberalisation provides increased access to foreign technology and foreign knowledge stock.

Based on the above argument, three main hypotheses were tested in this study. The first hypothesis is that if MNEs possess such technological lead, then increased foreign ownership in a firm would result in increase in the firm's productivity. The productivity differences between subsidiaries of MNEs and their local competitors explain, to an extent, the importance of the role played by FDI in a developing country. Second, since MNEs are producers and carriers of advanced and sophisticated technologies, the technological effect on the productivity of MNE affiliates (also called as foreign-owned firms) through various factors such as learning by doing or exporting, in-house R&D, and technology imports should be higher than that of domestically owned firms. Third, The entry of foreign firms and their inherent advanced technologies are expected to reduce the inefficiencies existing among the domestically owned
firms in developing countries through 'spillovers', thereby making them more competitive. These spillovers are determined by the absorptive capacity of firms.

India has followed an import substitution strategy till 1991, which had virtually eliminated foreign competition for Indian industries. However, realising the importance of FDI through MNEs in improving productivity and overall economic growth, a number of policy decisions were undertaken in India during 1980s and early 1990s to attract more FDI along with other economic liberalisation policies. Foreign investment regulations have been liberalised considerably during the 1990s. This has resulted in increased inflow of FDI and technology transfer. However, there exists no empirical analysis that examines as how much these inflows have facilitated capital accumulation, technological progress and international competitiveness in Indian industrial sector. In this context, this study tried to fill the gap by characterising and measuring more precisely the effect of FDI on the technological capabilities and in turn the productivity of Indian firms after 1991 liberalisation.

Towards this end, a comprehensive survey of major literature, both theoretical and empirical, is presented in Chapter 2. The chapter summarises the determinants and impacts of FDI on the productivity and growth of firms, industries and countries, both at microeconomic and macroeconomic levels. The key determinants of FDI were analysed through the historical theoretical developments in this field of research. The survey of empirical literature highlighted the different approaches and their merits and shortcomings in analysing the role FDI played in economic growth, productivity improvement and spillover generation among firms, industries and nations. This chapter also
looked specifically at the various empirical studies in India and found that there is a dearth of comprehensive and systematic study about the role of FDI in technological capability building and productivity enhancing especially after liberalisation.

The role played by FDI in any industry in a country depends upon the policy framework in that country pertaining to that particular industry. Chapter 3 analysed the policy framework that existed in India related to FDI and manufacturing sector since independence. The general trends and patterns of FDI in India was also analysed. The liberalised policies of 1990s had helped in attracting large amount of FDI to India. The data shows that the actual inflow of FDI increased from a mere US$ 97 million in 1990-91 to around US$ 3904 million in 2001-02.

In Chapter 4, the methodology and data used for analysing various hypotheses were discussed. A brief theoretical background in measuring technology and productivity analysis methods was presented to get an idea about the existing methods of analysis. A general specification of estimation model was developed based on this theoretical and empirical background to analyse the impact of FDI on productivity performance and technological competence of firms. This was followed by a detailed discussion of the database used for the study, the method of construction of various variables used and their relative merits.

The empirical analysis of this study used data compiled from the Prowess (an electronic database for Indian corporate firms) provided by CMIE. The data contains selected manufacturing firms that come under NIC-2 digit
classification from seven industry groups (chemical, food processing, machine and machine tools, metal and metal products, non-metallic minerals, textiles and transportation). The study used a balanced panel data of 1129 sample firms for the period between 1992 to 2000. This includes firms that were existing and in operation before the initial year of the study, 1992. The sample firms in each industry sector were grouped into two categories – domestic and foreign firms based on the criteria given by RBI. Based on this criteria, there are 874 (around 77 per cent) domestic firms and 225 (around 23 per cent) foreign firms.

Chapter 5 gives a descriptive analysis of data using tables and graphs to identify the trends in various technological indicators for two categories of firms – domestic and foreign – under various industry groups. The chapter investigates whether technological capabilities vary among domestic-owned and foreign-owned firms. For this purpose, the selected firms were grouped under various industry types and the technological performance of domestic and foreign firms were compared taking four technology indicators. These are R&D intensity, export intensity, capital goods imports intensity and technology imports intensity.

The association between foreign equity participation and firm-level productivity was analysed in Chapter 6 by estimating the log-linear form of production function for a cross section of the sample data. For this purpose, a variable representing the foreign equity share was introduced in the general specification of the model. The model was tested using OLS estimation method both with and without controlling for industry characteristics in order to understand the influence of industry characteristics on the impact of FDI on the productivity of firms.
In Chapter 7, the question of whether the presence of foreign firms are really productivity enhancing in Indian industries was analysed by comparing the impact of various technological factors on the productivity performance of foreign and domestic firms in different manufacturing industry groups. For this purpose, the impact of various technology variables on the productivity of these firms was tested. It was also attempted in this chapter to test whether the presence of foreign firms improves the productivity of domestic-owned firms through spillovers and how these spillovers are determined by the absorptive capacity of firms.

The major findings of the study are summarised as follows:

- The policy framework in India related to FDI has changed from a cautious welcome policy during 1948-67 to restrictive and regulated policy during 1968-1979. The 1980s were marked by partial liberalisation but still with many regulations to protect the domestic industry interests. It was since 1991 that a liberal investment climate, with an orientation towards globalisation of Indian economy, was created taking a host of policy reforms.

- The analysis showed that the trends in FDI inflows in India moved in tune with the nature of different policy regimes. The liberalisation policy of 1991, which opened up many sectors for foreign investment with special emphasis on infrastructure sector, has helped in attracting a large inflow of FDI to the country. However, the relative importance of manufacturing sector in attracting FDI has declined compared to the pre-liberalisation period. The analysis revealed that there was
tremendous competition among Indian States in attracting FDI, and more industrial friendly States that provide better incentives, infrastructure facilities and industrial climate had been more successful in attracting a major share of total FDI to the country.

- A descriptive analysis of sample data used in the study showed that domestic firms are twice in size that of foreign firms in terms of average output, net capital stock and employment. However, the analysis showed that these differences in size between domestic and foreign firms had declined over the period from 1992 to 2000.

- The output per capital of the domestic firms was lower than that of the foreign firms indicating under-utilisation of capital among domestic firms. However, the labour productivity for domestic firms was higher than that of foreign firms, which slightly increased during the 1990s. This increased labour productivity was due to a shift towards capital intensive production among the domestic firms.

- On an average, the R&D intensity of domestic firms was found to be only 76 per cent of the foreign firms after the liberalisation period, 1992-2000. In the case of technology import intensity of domestic firms, it was just above one-third of foreign firms during the study period (1992 - 2000).

- The descriptive analysis of sample data also showed that there had been substantial growth in the R&D intensity and export intensity of both domestic and foreign-owned manufacturing
firms in India during 1992-2000. While the R&D intensity of foreign-owned firms registered a growth of 23.48 per cent after the liberalisation, the growth rate in domestic-owned firms was 11.71 per cent. Regarding export intensity, domestic-owned firms registered a higher growth of 7.40 per cent compared to the 4.54 per cent growth for foreign-owned firms. However, technology import intensity has declined in both categories of firms indicating the declining trend of dependence on technology imports through licensing after liberalisation. The capital goods import intensity for domestic firms also registered a negative growth while there was a small positive growth for foreign firms.

• An industry-wise analysis of sample data showed that the technological performances (as represented by various technological indicators like R&D intensity, export intensity, capital goods import intensity and technology import intensity) of both domestic and foreign firms in all the industries had almost similar trends and patterns. In almost all the industries the technological performance of foreign firms was either higher than or more or less similar to that of domestic firms except in chemical industry where domestic firms outperformed foreign firms in export intensity and capital goods import intensity. The performances with respect to different technological indicators for domestic and foreign firms showed that the technological capability building by these firms are more industry-specific.
• In all the industries, the technology import intensity for foreign firms was found to be higher than that for domestic firms, indicating that the dependence of foreign firms on imported technology is quite high. It should be noted that foreign equity participation is expected to bring newer technology. Therefore, technological performance with regard to imported technology was higher for foreign firms. Both categories of firms had an almost constant or slightly decreasing trend for this technological indicator in all the industries.

• The empirical evidence showed that there are large productivity gains associated with higher foreign equity participation in Indian manufacturing industry. The estimation results indicated that when a firm changes its foreign equity share from zero to 100 per cent, its output increases by 22.59 per cent. Moreover, once the industry-specific productivity differences are controlled, the magnitude of impact though reduces from 22.59 per cent to 17.32 per cent but still remains highly significant.

• It should be noted that with respect to age, there are two effects – one positive effect due to ‘learning by doing’ and another a negative effect since the plant and machinery gets older. The results showed that for domestic firms in food processing and for foreign firms in chemicals and non-metallic minerals industries the former effect was more prominent while for domestic firms in machine and machine tool industry and foreign firms in textile industry the latter effect was more dominant.
• Export intensity showed a positive and highly significant influence on the output of both domestic and foreign firms in machine and machine tools and transportation industries, suggesting that high export orientation of firms in these industries irrespective of their ownership improves the productivity of these firms. Domestic firms in metal and metal products and textile industries and foreign firms in non-metallic minerals industry also showed productivity improvement due to their export orientation. However, for the foreign firms in chemical industry the high export intensity showed a negative influence on their output.

• The high fluctuations in the case of R&D intensity and capital goods import intensity, for both domestic and foreign firms in almost all the industries, is due to their very nature itself. Firms do not invest large amounts in R&D every year. This is the case with capital goods imports. In the case of R&D, if the amount spent is very small, usually firms do not report it. However, as mentioned above, the general trend showed an increase in the R&D intensity of both categories of firms, while the capital goods imports intensity showed a decline among domestic firms but a slight improvement for foreign firms.

• Though the descriptive analysis showed substantial growth in R&D intensity during the study period, this variable did not have any significant impact on the productivity of either categories of firms (i.e. domestic or foreign) except for domestic firms in transportation industry and for foreign firms in food processing industry. This is because of the low R&D spending
by firms in Indian manufacturing industry, irrespective of their ownership. The R&D intensity of domestic firms was only 0.02 per cent in 1992, while it was only 0.01 for foreign firms during the same year. Though R&D intensity of both categories of firms increased considerably (23.48 per cent for foreign firms and 11.71 per cent for domestic firms) during the liberalisation period, it was still very meager (R&D intensity of domestic firms was only 0.08 per cent in the year 2000, while it was 0.10 per cent for foreign firms in the same year). Therefore, such low R&D intensity is always expected to have less significant impact on firm's productivity.

- R&D had a significant positive impact on the productivity of domestic firms in transportation industry. The R&D intensity was negatively significant for foreign firms in food processing industry suspecting that these firms could not properly utilise their R&D investments. In all other industries for both domestic and foreign firms the R&D intensity was found to be insignificant in influencing their output.

- In majority of industries, capital goods import had negative impact on productivity of domestic firms, while it had a positive impact on productivity of foreign firms. However, in most of these industries the impact was not very significant. The negative impact on productivity for domestic firms was significant only in food processing and textile industries. The influence of capital goods imports on productivity of foreign firms was significantly positive only in transportation industry.
• The econometric results indicated that firms, which do not have any major foreign collaboration, spent more on technology import through licensing and this had a significant impact on their productivity. This impact was more pronounced in more technology intensive industries like machine and machine tools, metal and metal products and transportation.

• All these findings showed that there is considerable heterogeneity in the impact of technological variables on the productivity of firms across industries. This leads to question about the extent to which satisfactory estimates of the determinants of technology progress obtained in other studies that take all firms together.

• The study found that, while spillovers from foreign firms' sales do not support any significant improvement in the productivity of domestic firms, the spillovers through capital and technology stocks negatively affect their productivity. This supports the argument in the literature that the competition effect due to the more efficient operations of foreign firms had a negative impact on the productivity of domestic firms. Such effects are suspected due to under-utilised capacity in many industry groups such as textiles, food processing, non-metallic minerals, etc.

• The negative spillovers also support the argument that the economy is still under transition period from a controlled regime to a more open economy, where increased competition from foreign firms has a crowding out effect on the output of
domestic firms at least in the short-run (i.e., the transition period).

- Another important finding from the study is that the negative technology spillovers are due to lack of technology absorptive capacity (low R&D) among domestic firms.

8.3 POLICY IMPLICATIONS

The finding of the study that higher foreign ownership had a positive and significant influence in increasing firm-level productivity, has certain policy implications. The descriptive analysis also showed superior performance of foreign firms for most of the technology indicators. This directs to policy suggestions with respect to attracting FDI by relaxing the foreign equity cap. The findings of the study indicates that the policy to be pursued is not allowing joint ventures with a minority share holding for foreign firms. This is because such minority holdings would not involve much technology transfer and spillovers that generate productivity gains. The differential responses between domestic and foreign firms in their productivity performances with respect to various technology indicators need to be taken into account while designing the appropriate policy.

The study also found that the technological and productivity impact of FDI is more industry specific and in more technology intensive sectors foreign firms perform well compared to the domestic firms. Therefore, in India policies related to FDI might be more industry-specific. Though, the reform policies initiated in India in 1991 has welcomed foreign investments and technical collaborations and removed most of the regulations related to
industrial investment, the results of econometric analysis showed that Indian economy is still under the transition period from a highly regulated regime to a consciously liberated regime. The transition from a restrictive regime to a liberalised regime takes some time. The too much cautious approach towards FDI policy prolongs this transition period.

From the policy perspective, the negative spillovers from foreign affiliates have important implications. This gives doubts to the perception that incentives to attract FDI will bring more technological improvement and competitiveness among Indian manufacturing industry. Kathuria (2002) points out that the negative spillovers are mainly due to under-utilisation of capacity prompted by high fixed investment during the liberalisation period, which was not supported by an equivalent demand growth. The study also showed that in most of the industry groups excess capacity exist.

The study suggests that, public policies that encourage R&D activities among firms will enhance the capability of these firms in absorbing technology spillovers from foreign firms. That is for an open policy to be effective, the increased technology transfer due to liberalisation should be backed with investment on R&D and other technological efforts. Technology policy is an important aspect that may have important impacts on the spillover benefits and technological capability building among the domestic firms. Consideration of country's comparative advantages in R&D skills and other inputs, with concentration to strengthen the national technological capability, is essential while framing policies to attract more FDI.
Above all, policies that encourage an industrial environment with improved infrastructure, supportive administration and with more amicable bureaucratic system, would be conducive to generate higher productivity growth in Indian manufacturing industry.

8.4 LIMITATIONS OF THE STUDY AND SCOPE FOR FURTHER RESEARCH

Technology transfer and diffusion can take place through labour movements. Domestic workers may absorb the productivity advantages of foreign firms through training and learning-by-doing. These advantages might eventually spillover to domestic firms through labour mobility. Basically, this study does not look into the possible channels through which spillovers take place.

The study also assumed that wage-rates are the same for both domestic and foreign firms. This is seldom true. The foreign-owned firms, usually pay higher wages and salaries than the domestic-owned firms. This aspect could not be examined due to the unavailability of information about the wage rate differentials among foreign and domestic-owned firms. The study ignores other potential gains from FDI, such as increased employment and inflow of capital.

The study used a balanced panel data due to missing information for certain firms in certain years in the Prowess database. A balanced panel data though has many advantages but it excludes new entrants from the sample that have an important impact on the contestability of respective industry.
Therefore, there is scope for further research to analyse the technological competitiveness of firms by incorporating the new entrants.

The study also assumed that the foreign equity share of firms have not changed considerably since 1992 and therefore, considers firms with more than 25 per cent foreign equity share in the year 2000 as foreign firms throughout the study period. However, this may not true with all firms. This is one of the major limitations of the database used in the study. There is further scope for research to analyse productivity changes due to variations in foreign equity participation using foreign equity shares of firms for different years.

The technological and productivity impact of FDI on local firms can also be tested considering the forward or backward linkages they create (i.e., the intra-industry spillovers). A very good example is the automobile industry in India, where foreign automobile firms largely depends on the local auto-component suppliers. This interaction (backward-linkage) has helped the Indian auto-component firms to improve their technologies and to become global suppliers of automobile ancillaries. Thus there exist ample scope for further research.