Multinationals, Local Firms, and Economic Reforms in Indian Industry

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Abstract

This thesis seeks to understand multinational activity in Indian industry after the reforms of 1991.

Chapter 2 models two effects of inward FDI on local industry - linkage and competition effects. We develop a two-sector model with vertical product differentiation in the downstream sector and a monopolistically competitive upstream sector. We show that a domestic content requirement increases both linkage and competition effects, and can raise domestic welfare through growth of upstream industry, and increased consumer welfare. The stronger are linkage effects, and lower the income level, the greater are benefits from a DCR.

Chapter 3 presents descriptive statistics and stylized facts about multinationals in India. We consider sectoral destination, characteristics, and performance of MNCs. We find MNC investment is horizontal and that they are more profitable than domestic firms. A model of distribution dynamics is used to investigate persistence in profitability. Differences in performance are driven by persistence of profits of highly profitable MNCs.

In Chapter 4 we test for the effects of FDI reforms on firm performance. By constructing treatment and control groups and using pre and post reform data, we isolate the impact of reforms. We find that local firms' profitability has been reduced by the entry of new MNCs. However, pre-existing MNC profits have not been significantly affected by reforms. We find some evidence that MNCs are more efficient than local firms.

In Chapter 5, we analyze export behaviour of Indian firms. Decomposing exports shows that post-reform export growth has been driven by surviving firms. We model the decision of the firm to export, and find that there are substantial sunk costs to exporting. Firm characteristics - size, profitability and multinationality - are important determinants of exporting. We find evidence for spillovers from general exporting activity but not from MNC presence in the industry on exporting.

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Chapter 1

Introduction

In 1991, faced with a severe balance of payments crisis, India embarked on a historic set of reforms to free its economy from excessive state controls and bureaucratic regulations. After four decades of inward-looking policies which led to increasing protectionism and import substitution, India began liberalising its economy with a set of policies having wide-ranging implications.[1]

One of the critical components of these reforms was the liberalization of foreign direct investment rules. In a major policy shift that broke decades of ambivalence, if not outright hostility towards multinationals, India allowed majority foreign ownership in its industry. Subsequently, there was a large increase in FDI flows, as annual inflows increased from $200 million in 1991 to $3.2 billion in 1997. This generated considerable debate in industry, policy, and media circles as to the appropriateness of allowing multinationals (MNC) into industry.[2] The characteristics and impact of MNCs on Indian industry after liberalisation remains poorly understood and subject more to rhetoric than analysis. This thesis attempts to fill that lacuna by seeking to understand the nature of MNC activity in India, and it's impact on domestic industry. In so doing, it aims not only to contribute to an understanding of multinationals in Indian industry, but also to develop analytical tools and draw lessons which could be applied to similar reforms

[1] Consequently there was an improvement in almost all indicators of macroeconomic performance. See Acharya (2001) for a description of the macro reforms. For an interesting non-technical essay on the social and economic impact of the reforms, see Das (2000).

[2] The main opposition party at the time, the Bharatiya Janata Party (BJP), used phrases such as 'silicon chips yes, potato chips no' to signify its opposition to FDI in certain sectors, which then became buzzwords for the extensive debate on the issue in policy and media circles.

and multinational investment in other developing countries.

The importance of analyzing the impact of MNC entry cannot be overstated. The issue attracts significant public attention and arouses strong passions in developing countries. There is a large theoretical and empirical literature looking at the effects of MNCs in developing countries.[3] This thesis is an attempt to contribute to that literature by analysing a natural experiment of FDI entry, i.e., the FDI reforms in Indian industry starting from 1991.

This short introductory chapter is organized as follows. The next section puts the economic reforms into context by briefly describing the historical policy towards FDI followed by India. Details of the reforms starting from 1991 are left to be discussed in Chapter 4 below. To put the entry of MNCs into context, Section 3 discusses the theoretical literature for the evolution of MNCs. The next section describes the salient features of the thesis and the manner in which it is organized. Finally section 5 discusses the contributions of this thesis.

1.1 Indian Policy towards FDI

After independence in 1947, Indian economic policy attempted an industrial revolution through the agency of the state. This manifested itself in publicly owned, import substituting industrialization which was insulated from international competition. Domestic industry was accorded considerable protection in the form of high tariffs and quantitative restrictions on imports. In order to channel the country's scarce investible resources according to priorities determined by the state, an industrial approval system was put into place in the country that regulated all industrial investments beyond a certain minimum.[4]

We can distinguish four broad periods in Indian policy towards FDI. The first period of 1948-67 witnessed import protection and a generally ambivalent policy stance towards FDI. The second period of 1968-79 saw a hostile attitude to restrict the operations of MNCs. The third period of 1980-1991 was characterised by cautious deregulation and a gradual change from the hostile attitude of the previous decade. Finally, from 1991 onwards there was liberalisation, and relaxation of rules governing MNC entry.

[3] See Caves (1996) for a comprehensive survey. Selected surveys of this literature are presented in the chapters below.

[4] See Bhagwati and Desai (1970). This section also draws upon Kumar (1990).

In 1948 there was legislation introduced so as to regulate foreign capital in the 'national interest,' and ensure that majority ownership and effective control remained in Indian hands. A new Industrial Policy Resolution of April 1956 was passed which earmarked a number of important industries for future exploration by the public sector, thus reducing the scope of operation of private - local and foreign firms. However, the foreign exchange crises of 1957-58, led to a liberalisation in the government's attitude towards foreign capital. In a bid to attract foreign investment to finance the foreign exchange components of projects, a host of incentives and concessions were extended. Following this, in 1961, the government issued a list of industries where foreign investments were to be welcomed. These included industries earlier reserved for public sector - drugs, aluminium, heavy electrical equipment, fertilizers, synthetic rubber among others. The proportion of foreign held equity was to depend upon the sophistication of technology and requirement of foreign exchange. Local majority ownership, though welcome, was not to be insisted upon.

In 1968, following recommendations of the Mudaliar Committee on Foreign Collaborations (1966), a new agency called Foreign Investment Board (FIB) was created within the government to deal with all cases involving foreign investment or collaboration, except those in which total investment in share capital exceeded Rs. 20 million and where the proportion of foreign equity exceeded 40 percent. These latter cases were to be referred to the Cabinet Committee. In effect, this ruling restricted the level of foreign equity level to 40 percent. A new Patent Act was enacted in 1970 abolishing product patents in food, chemicals, and drugs, and reduced the life of process patents from 16 to 7 years. Foreign investment unaccompanied by technology was not favoured. Three illustrative lists of industries were issued which demarcated industries: a) where no foreign collaboration was considered necessary, b) where only technical collaboration could be permitted, and c) where foreign investment might be permitted.

The infamous, Foreign Exchange Regulation Act (FERA), came into force in 1973 which required all foreign companies operating in India to register under Indian corporate legislation with upto 40 percent foreign equity.

The 1980s witnessed cautious deregulation. The industrial licensing rules were liberalised, and exemptions from foreign equity restrictions under FERA was granted to 100 percent export-oriented units. Rules and procedures concerning payments of royalties and lump-sum technical

fees were relaxed and withholding taxes were reduced. The approvals for opening liaison offices by foreign companies in India were liberalised.

Finally, in June 1991, faced with a balance of payments crisis, the Indian government initiated a programme of macro-economic stabilization and structural adjustment supported by the IMF and World Bank. As part of this programme, a New Industrial Policy was announced which started the process of liberalisation, especially as it related to FDI.[5]

1.2 Theoretical Background on the MNC[6]

The multinational is defined in the theoretical literature as a firm which owns or controls income-generating assets in at least two countries (Dunning (1973)). The theory of the MNC is also a theory of FDI. The prevalent theory of the reasons for the existence of a MNC are built mainly on the contribution by Coase (1937), and the elaboration by Williamson (1975) of the transaction cost theory of the firm. According to this theory, there is a trade-off between the costs associated with transactions in the external market and the costs associated with transactions within the firm. The boundaries of the firm are chosen to find the best possible trade-off between these costs. The transaction cost approach to the theory of the MNC, also called internalization theory, stresses that the MNC is an institution created in order to reduce costs associated with international market transactions.

There are, however, other competing theories for the existence of the MNC. The early studies in the literature tended to emphasize barriers to entry in final product markets and the exploitation of monopolistic advantages by firms (Hymer (1960), Kindleberger (1969)). According to this view, the MNC arises to maximise monopoly power rather than in order to reduce transaction costs. Yet, this IO approach and the transaction cost approach are very much related. For instance, they both tend to focus on market failures associated with arm's length transactions in technological knowledge. Efficient pricing is not possible due to the public good nature of such assets, i.e., use of them in one location does not diminish the amount available in another location. Thus, if transacted in external markets, the assets would be underprovided.

[5]The details of the new policy are described in Chapter 4 below.

[6]**This section draws from Caves (1996) and Ekholm (1995)**

Hymer (1960) suggested that a firm's expansion abroad requires the possession of firm-specific advantages vis-à-vis local competitors. These advantages must outweigh the cost advantages that local firms are likely to have when operating in a familiar environment.

The IO approach and the internalization theory tend to reach quite different conclusions about the social welfare aspects of MNCs. According to the IO approach, the existence of MNCs can lead to increased degree of monopolization which results in social losses. The transaction cost approach, on the other hand, focuses on the MNC as an instrument for reducing transaction costs, thereby enhancing efficiency in the global economy.

Another strand in the literature that falls within the IO approach is analyses based on oligopolistic rivalry. Later versions of the product cycle model (Vernon 1971-74) belong to this tradition, as do studies by Knickerbocker (1973), Graham (1978, 1991), and Cantwell (1989). These approaches focus on the strategic interaction between firms in oligopolistic markets. This type of analysis generally implies that growth of foreign production by MNCs tends to be associated with an increased level of competition. This is one important difference between the analyses based on oligopolistic rivalry and most of the work in the Hymer-Kindleberger tradition, since the latter generally holds that the expansion of the MNC leads to a lower level of competition.

The OLI theory associated with Dunning, constitutes an attempt to synthesize elements from the IO approach and the internalization theory. The theoretical framework identifies three important factors influencing the firm's choice between different modes of supplying a certain market. First, the firm's possession of ownership advantages determines whether it has a competitive advantage relative to its competitors. This factor includes the firm-specific advantages stressed by the IO approach. Second, the foreign country's location advantages determine whether production of a certain good is more profitable abroad than at home. Location advantages are determined by comparative advantages and by barriers to trade, such as tariffs and transport costs. Third, internalization advantages determine whether a given ownership advantage will be exploited abroad through the establishment of a foreign subsidiary, through exports, or through some other arrangement, such as technology licensing. These advantages depend on the level of the transaction costs associated with different modes of supplying the foreign market.

Trade theorists have modeled some of the insights gained from the OLI framework. Two different approaches to the location of MNC production can be identified: the factor proportion approach and the proximity concentration approach. According to the factor proportion approach, the firm's decision to locate production abroad is driven by the desire to take advantage of cheaper factors of production. (Markusen 1984, Helpman & Krugman 1985, Helpman 1984). In these models, a firm will choose to locate production abroad when differences in factor proportions become sufficiently large, and the affiliates will serve consumers in the home country by re-exporting.

According to the proximity-concentration approach, on the other hand, there is a trade-off between the advantages of being located close to the customers and those of concentrating production in the home country. (Krugman 1983; Horstmann & Markusen 1992; Brainard 1993). Multinational production arises when proximity advantages dominate, which are likely to do when trade is costly and scale economies at corporate level are much greater than those at plant level. Whether transaction cost factors or factors related to market structures are more relevant when explaining the existence of actual MNCs is essentially an empirical issue.

1.3 Description of Thesis

This section provides a brief description of the rest of the thesis.

Chapter 2 models the impact of inward Foreign Direct Investment on local industry. Inward FDI in a developing country has essentially two important effects on local industry - a linkage effect on local suppliers, and a competition effect on local producers competing in the same industry. We develop a two sector model with the downstream sector containing vertically differentiated local and multinational firms competing in prices. The upstream sector has many firms and is modeled as monopolistically competitive of the Dixit-Stiglitz-Ethier type. An increased demand for inputs by downstream firms causes the upstream sector to expand as more firms enter the industry, and the price of inputs to fall. The chapter analyses the impact of a common policy tool - a domestic content requirement (DCR) - which stipulates the fraction of inputs that must be sourced locally by a multinational firm. We show that a DCR increases both linkage and competition effects, and can raise domestic welfare primarily through growth

of the upstream industry, and increased consumer welfare. The stronger are linkage effects, and the lower the income level, the greater are the benefits from a DCR. Thus, this chapter shows that the use of domestic content requirements can generate pecuniary externalities, which can increase benefits from FDI for a low-income developing country.

Chapter 3 presents descriptive statistics and stylized facts about MNCs in India. It describes the firm level panel data set we use for the empirical section of the thesis. First, we consider the sectoral destination of FDI approvals in Indian industry. We classify inward FDI qualitatively according to criteria related to technology, wages, orientation, market structure, and skills. Second, we investigate the characteristics of MNCs versus local firms in terms of size, export and import intensity, average costs of production, wages, spending on R&D and Advertising. Third, we analyze the performance of MNCs relative to local firms as measured by profitability. We consider aggregate returns on assets and profit margins, and then decompose changes in profitability to changes due to entering firms, exiters, or survivors. We then investigate persistence in profitability by employing a model of distribution dynamics, and using transition matrices and mobility indices. This allows us to compare the dynamics of profits between MNCs and local firms, as well as between high and low performers within these groups. We consider both absolute as well as relative persistence of profits to understand which firms are driving the differences in performance.

In Chapter 4 we formally test for the effects of FDI reforms on firm profitability. By constructing treatment and control groups for reformed and not reformed industries and by comparing data on these groups before and after reforms, we are able to control for all other factors affecting firm profitability. Employing a difference-in-difference estimation strategy to isolate the impact of reforms on profits, we test whether differences in profitability between local firms and MNCs can be explained by barriers to mobility or due to efficiency differences between the two groups of firms.

In Chapter 5, we analyze the export behaviour of Indian firms in the post-reform period. Given that there has been a significant rise in export intensity in manufacturing after the reforms, we decompose export growth into contributions due to surviving firms, new entrants, and exiters to understand the source of this growth. We model the decision of the firm to export, and estimate a dynamic binary choice model with unobserved heterogeneity. Following

the literature we use and compare different estimation strategies with probability of exporting as our dependent variable. Using firm level data on exports, we test whether there is evidence of sunk costs to exporting in Indian industry. We also test whether firm characteristics, most notably performance, is an indicator of exporting status. There is some debate in the literature on the direction of causality between export behaviour and firm performance. Here, we test whether more successful firms tend to export more. A key area of debate in the literature on multinationals is whether the presence of MNCs in the same industry encourages domestic firms to export more. We test whether there are any industry level spillovers from MNCs to local firms. Finally, we investigate evidence for spillovers from general exporting activity in the same industry.

1.4 Results & Contributions

The primary motivation for this thesis was to understand the nature of multinational activity in Indian industry after the reforms of 1991. We use theoretical and empirical methods to contribute to furthering that understanding. The theoretical section models product differentiation between the local and multinational firm and combines this with monopolistic competition in the upstream industry to provide a framework to model two primary effects on industry, a linkage effect and a competition effect. The framework is then used to analyse the effects of a domestic content requirement. The results show that a DCR can raise domestic welfare primarily through growth of the upstream industry, and increased consumer welfare. The stronger are linkage effects, and the lower the income level, the greater are the benefits from a DCR. This framework can be extended in several directions to address issues such as quality upgradation by local firms. The simulations remain at a preliminary stage and can be developed to provide deeper insights into issues such as costs of quality upgrading, efficiency differences between firms, and taste for quality in the population, and its impacts on the main effects of the model. Further, the model can be tested empirically for the importance of linkage and competition effects. Hence the framework can be usefully applied to address similar issues for other developing countries.

The empirical section of the thesis uses an Indian firm level panel data set to understand

multinational and local activity after the economic reforms. The descriptive statistics on the sectoral destination, characteristics and performance of firms after reforms provides a panoramic view of multinationals and local firms. We use distribution dynamics techniques from the growth literature to analyse the evolution of profits across the profit space among multinationals and local firms which enables us to understand issues of persistence and mobility, as well as to isolate groups of firms which are driving differences in performance. We find that foreign investors in India have favoured medium technology, high-wage, specialised supplier, scale intensive, differentiated goods, and skilled labour industries. We find some evidence that FDI in Indian has been of the horizontal type. Comparing the characteristics of MNCs versus local firms we find that they are larger in size, have similar export and import intensities as local firm, have lower average costs of production and pay higher wages, and spend more on R&D and Advertising. Comparing the performance of the two ownership groups reveals that on aggregate MNCs have consistently outperformed local firms over the sample period. The decomposition of profits shows us that changes in overall profits for local as well as MNCs are being driven by changes in average profitability for surviving firms. Even though the period has seen a lot of entry, the new firms are not having a large impact on aggregate profits. Analysis of the distribution dynamics of profits reveals that there is a lot of persistence in performance. Persistence is particularly strong in the top and bottom deciles, i.e., the highest and poorest performers tend to stay that way. The differences in aggregate profits between MNCs and local firms seem to be driven by the top performing MNCs earning persistently higher profits than the top performing local firms.

We then test for the impact of reforms on domestic and MNC firm performance. Our dataset allows us to treat the reforms of 1991 as a natural experiment for the entry of multinationals as we are able to distinguish between industries and years which were subject to reform, and those that were not. We find that local firms' profitability has been reduced by the competitive pressure applied by MNCs. However, pre-existing MNC profits have not been significantly affected by reforms. We find some evidence that MNCs are more efficient than local firms. Such a dataset and the differences-in-differences technique could be used to shed light on other variables of interest such as productivity, market structure, investment behaviour, and industry growth amongst others. Further work could also focus on testing the determinants of firm

performance in Indian industry.

Finally, we investigate export behaviour of Indian firms. We use a model and data which allows us to test for sunk costs in exporting, firm characteristics, and spillovers from MNCs as well as general exporting activity. This contributes to the literature by enhancing our understanding of firm export behaviour in India. We find that there are sunk costs to exporting in Indian industry, and that firm characteristics, most notably performance, are an important determinant of exporting activity. We find evidence of spillovers from general exporting activity but not from the presence of MNCs in the industry. These methods could also be usefully applied to answer similar questions for other developing country exporting behaviour. More research would be required to understand the determinants of the export intensity increase in India, and the contribution of trade reforms towards that purpose. Further work could also focus on understanding geographical spillovers from multinationals.

On the whole, we hope that this thesis makes a modest contribution to our understanding of multinational activity in India after the reforms of 1991, and also offers some ideas for future work.

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Chapter 2

FDI, Linkages and Local Content Requirements

2.1 Introduction

The large increase in multinational activity in developing countries in recent times, has also led to a renewed interest among researchers in modeling the effects on the recipient host country. The primary impact of inward FDI seems to be on the host country industry. In this chapter, we focus on two important effects of multinational (MNC) investment, namely linkages and competition effects.

When an MNC produces in a host country, it typically purchases some local inputs. The consequent increase in demand for local inputs facilitates the growth of the upstream supplier industry through *backward linkage* effects. The development of the upstream industry then leads to *forward linkage* effects as the cheaper and/or better quality inputs produced by the upstream firms are now available to the downstream local industry, which in turn expands.[1] These effects can be extremely large, and lead to the development of entire industries. There is case study evidence from East Asia that multinational investment led to phenomenal growth of the intermediate as well as the final goods industry.[2] Particularly striking is the development of the semi-conductor industry in Singapore, the sewing machine industry in Taiwan, and

[1] See Markusen & Venables (1999) for a recent documentation of linkage effects and cumulative causation.
[2] See Hobday (1995)

the electronics components industry in Malaysia. Given the importance of FDI in generating linkages, and the externalities inherent in them, there appears to be a potential role for welfare improving government policy.[3]

There is, however, another important effect of MNCs on host industry - a competitive pressure on local firms in the same industry. There is theoretical and empirical backing for the hypothesis that an increasing number of multinationals locate in developing countries to produce near end-consumers, rather than to take advantage of cheap factor costs.[4] We take this line of research as the starting point of our analysis. Once multinational production is aimed to serve the local market, rather than for exports, then competition with local firms becomes a critical consideration in the evaluation of host country welfare. Thus, apart from linkages generated, the *competition effects* of multinational activity become central to our analysis.

One policy tool which has been used by host governments to regulate multinationals is a Domestic Content Requirement (DCR), which essentially stipulates the minimum fraction of inputs that must be sourced from the host country by the multinational. Content requirements have been used in developing as well as industrialised countries typically targeting multinational downstream producers in oligopolistic industries. The objective is not only to increase output of domestic intermediates, but also to create a 'level playing field' for domestic downstream firms by forcing similar procurement conditions onto foreign firms. Examples of DCRs include restrictions on Japanese manufacturers in the EU (of products such as computer printers, copiers and video tape recorders) to source at least 40% of components from the EU. DCRs are even more extant in developing countries.[5] India requires multinational producers of passenger cars to use no more than 50 percent imported content by the third year of production, and no more than 30 percent imported content by the end of the fifth year.

Given the widespread use of content requirements, there has been little research devoted to analysing its effects on the host economy. Since Grossman (1981), a small theoretical literature has developed. Most of the early papers argue against content requirements on the grounds

[3]Rodriguez-Clare (1996), for example, has shown that backward and forward linkages are increasing with the amount of inputs sourced locally by multinationals.

[4]See Brainard (1997) for an exposition of the proximity-concentration hypothesis versus the factor-proportions hypothesis.

[5]See UNIDO (1986) for a description of the prevalence and extent of content requirements in developing countries.

that it has distortionary and anti-competitive effects on the host industry. The intermediate goods sector is usually modeled as a monopoly or an oligopoly.[6] This paper concentrates on an effect of a DCR which has hitherto been ignored by the literature, namely *linkage* effects. We will show that a content requirement, by increasing linkage effects can actually increase domestic welfare.

This chapter has two objectives. First, we develop a framework to analyse the effects of multinationals on developing country industry, especially the linkage and competition effects mentioned earlier. Second, we use this framework to understand the impact of a domestic content requirement on host economy welfare.

2.1.1 Main Ideas

Multinationals in developing countries are often distinguished by the superior quality of their products in comparison to local goods. The better quality normally comes from the MNC's world-wide access to sophisticated inputs, higher skilled workers, more R&D and so on. For example, the automobile multinational, General Motors, uses hundreds of international suppliers at globally competitive prices to meet its input requirements. GM demands not only electrical, chemical, and metallic inputs from its suppliers but also logistics, systems control, process development, and so on. By its very nature, and because it has access to high quality inputs abroad, a MNC normally tends to use a smaller fraction of domestic inputs per unit output than the local firm. When a content requirement is imposed, the multinational, in order to continue producing in the host economy, is compelled to source a larger fraction of its inputs domestically. Given that the local input industry in the host country is underdeveloped, greater usage of low-quality local inputs by the multinational means that it has to compromise on the quality of its final product. In effect, a domestic content requirement leads to quality downgrading by the multinational.[7] Quality downgrading by the multinational mainly affects three groups in the host economy: i) the local producers who are competing with the multinational

[6] See papers by Beghin & Summer (1992) and Krishna & Itoh (1988). This assumption on upstream market structure seems to be invalid. In industries where DCRs are commonly imposed, eg. automobile and capital goods industry, there are many local component suppliers.

[7] Over time, the quality of the local inputs may improve. This is another channel through which the linkage effect would work, and strengthens its case. See Matouschek (2000) on the above. The following analysis holds as long as there is some global supplier whose quality is superior than that of the local ones.

in product markets, ii) the upstream industry supplying the inputs, iii) the domestic consumers of the final good.

As the DCR fosters similar procurement policies for local and multinational firms, the MNC's product becomes relatively less differentiated in quality to the local firm, than before. Now the MNC provides more intense price and quality competition to the local firm. Second, the content requirement by forcing the MNC to source more inputs locally leads to greater backward linkages, hence development of the upstream industry. Third, consumers get a lower quality, but the intensification of competition leads to a lowering of prices. A further downward pressure on prices comes from the positive forward linkage: the development of the upstream industry leads to lower prices of inputs and thus to lower product prices. There is clearly a tension between these effects. In other words, a lower quality multinational leads to greater linkage effects, but also to greater competition effects. So, for host economy welfare, these opposing forces have to be taken on board to adequately appraise the effects of local content requirements.

We show that under loose assumptions on taste for quality and thereby income distribution among consumers, a DCR improves consumer welfare. We also show conditions under which even the local firms competing in the same industry as the MNC are better off - namely, when positive forward linkage effects dominate competition effects.

This chapter contributes to the literature on inward FDI in several ways. First, it incorporates quality differences in production of downstream goods in a two sector model to adequately capture the salient features of MNC investment. Second, it analyzes the effects of a common policy tool on FDI - domestic content requirements, and shows that it can be welfare improving for the host economy. Third, it models the effect of FDI on consumer welfare in the context of a two-sector model.

The rest of this chapter is organised as follows. Section 2 lays out the basic model for the analysis. Section 3 analyses the effects of domestic content requirements. Section 4 discusses the implications and applicability of the foregoing analysis. Section 5 concludes.

2.2 The Model

To model the effects mentioned above, we clearly need two sectors in the local economy - an upstream and a downstream sector. We also need a framework which differentiates quality between the local and the multinational good. Further, there must be strategic interaction between the local and multinational firms to capture competition effects. To capture linkage effects, we need dynamic interaction between downstream demand for inputs and upstream production. Here, we model the various effects by combining two different frameworks - the vertical product differentiation framework of Shaked & Sutton (1982), and the monopolistic competition framework of Dixit & Stiglitz (1977). With the help of this framework, we can also model consumer welfare. The critical dynamic link between the upstream and downstream sectors is that as downstream demand for inputs increases, more firms enter the upstream industry, which in turn reduces the input price index.[8] To focus on the effects of multinationals on the host country, we restrict our analysis to the local economy. This economy has two sectors - an upstream sector, and a downstream sector.

2.2.1 *Downstream Industry*

Following Brainard (1993), the multinational locates in the host economy to be close to final consumers. We focus on domestic sales of multinationals and do not consider multinational exports in the analysis. Multinational entry only occurs in the final-goods industry.

To capture the effects outlined in Section 1 above, we let the downstream sector consist of two firms, a local firm and a multinational. These two firms provide a single product which differs in quality. So, we have vertical product differentiation in this sector. The modeling of this sector follows Tirole (1988).

[8] This framework is largely based on Markusen & Venables (1999). One criticism of the approach is the lack of strategic interaction between upstream firms. For our purposes, the focus is on downstream competition effects where we have strategic interaction.

Demand:

Consumers either consume one unit of the good or none. If they consume the good, their preferences are given by:

$$U = \theta s - p \tag{2.1}$$

where

s: quality of the good

p: price of the good

θ is taste for quality and is uniformly distributed across the population of consumers between $\left\{\underline{\theta};\overline{\theta}\right\}$

where $\underline{\theta} \geq 0$ *and* $\overline{\theta} = \underline{\theta} + 1$

The parameter θ can be interpreted as the marginal rate of substitution between income and quality. High income consumers are willing to give up more income to consume a higher quality good, than low income consumers. Hence the taste for quality distribution can be simultaneously viewed as an income distribution.

Firm i produces a good of quality s_i

Throughout the following analysis we let the domestic firm be $i = 1$, and the multinational $i = 2$

We assume that:

$$\overline{\theta} \geq 2\underline{\theta}$$

This assumption says that the amount of consumer heterogeneity is sufficient for what follows.

Let the θ where the consumer is indifferent between goods 1, 2 be $\widetilde{\theta}$

Hence for the marginal consumer:

$$\widetilde{\theta} s_1 - p_1 = \widetilde{\theta} s_2 - p_2 \tag{2.2}$$

Therefore,

$$\widetilde{\theta} = \frac{p_2 - p_1}{s_2 - s_1} \tag{2.3}$$

Letting $\Delta s = s_2 - s_1$,

The demand for goods 1 and 2 is thus given by:

$$D_1(p_1;p_2) = \frac{p_2 - p_1}{\Delta s} - \underline{\theta} \tag{2.4}$$

and

$$D_2(p_1;p_2) = \overline{\theta} - \frac{p_2 - p_1}{\Delta s} \tag{2.5}$$

Supply:

Let unit marginal costs of production for downstream firms be given by:

$$c_1 = b_1\left[(1-\mu_1^d)r + \mu_1^d q\right] \tag{2.6}$$

and

$$c_2 = b_2\left[(1-\mu_2^d)r + \mu_2^d q\right] \tag{2.7}$$

where:

μ_i^d : Firm i's demand for domestically produced input as a fraction of total input requirement;

r: Price index for foreign input, which is exogenously given;

q: Price index for domestic input, which is endogenous,

$1-\mu_i^d$: Firm i's demand for foreign inputs as a fraction of total input requirement

b_i : Efficiency parameter - a lower b implies greater efficiency - *ceteris paribus.*

We assume that the foreign price index is greater than the domestic price index: $r > q$

This assumption seems reasonable due to the vertical product differentiation set-up. Since the inputs manufactured domestically are of lower quality, they must be cheaper than the foreign inputs. If this was not the case, i.e., the domestic input was of lower quality and more expensive, firms will avoid using any local inputs.

Now,

$$\mu_j^d \qquad for \qquad j\epsilon 1,2$$

is the input-output co-efficient, i.e., the input of the local upstream industry required per unit total input requirement of the downstream industry.

To focus on the key variables, and to keep the system tractable, we use a simple linear relation between quality and inputs. Hence 'quality' technology is given by:

$$s_i = 1 + a(1 - \mu_i^d)$$

Thus, a larger fraction of the high quality foreign input in total inputs, improves quality.

Now, we are only concerned about the relative quality of the two goods rather than an absolute measure. Hence we make the simplifying assumption that the local firm only uses domestic inputs and has no access to foreign inputs:[9] $\mu_1^d = 1$

Hence, the local firms quality, $s_1 = 1$,

So the difference in quality between the multinational and local good is related to inputs via:

$$\Delta s = a(1 - \mu_2^d) \tag{2.8}$$

where: $0 < a < 1$

Here, a signifies the cost of quality upgrading. The higher is a, the lower proportion of foreign inputs are needed to produce a good of a given quality. Since foreign inputs are more

[9]The specification of the cost function is general enough to allow for the domestic firm to use foreign inputs. All the subsequent analysis and results are similar as long as the fraction of foreign inputs used by local firms is smaller than that used by multinationals.

expensive than local ones, a higher a implies lower costs of quality upgrading.

The 'quality' technology is such that it is only the foreign input that leads to differences in quality. A larger fraction of inputs sourced globally rather than within the developing country leads to a higher quality output. Since the multinational uses high-quality inputs from abroad, it produces a good of better quality than the local firm:

$$s_2 > s_1$$

Now, the local and multinational firm's optimisation problem is[10]

$$Max_{p_1} \qquad \pi_1 = (p_1 - c_1)D_1(p_1;p_2) \tag{2.9}$$

and

$$Max_{p_2} \qquad \pi_2 = (p_2 - c_2)D_2(p_1;p_2) - G \tag{2.10}$$

where

G: fixed cost for the multinational

The fixed cost for the multinational arises from the initial set-up costs of producing in the host country.

Finally, the total demand for inputs arises from adding the local and multinational's individual demand for domestic inputs

$$I = D_1 b_1 \mu_1^d + D_2 b_2 \mu_2^d \tag{2.11}$$

We make the following additional assumption:

$$\frac{2}{3}c_1 + \frac{1}{3}c_2 + \frac{1}{3}\left(\overline{\theta} - 2\underline{\theta}\right)\Delta s \leq \underline{\theta} s_1 \tag{2.12}$$

[10]Following Lahiri & Ono (1998), we assume that for the multinational, the alternative to producing in the host economy is to produce in another country. Without loss of generality, suppose the reservation profit for the MNC is $\overline{\pi} = 0$.

For the following analysis, we assume that $\pi_2 \geq 0$

This ensures that in price equilibrium, the market is 'covered', i.e., each consumer buys one of the two goods.[11]

2.2.2 *Upstream Industry*

The industry is imperfectly competitive and has many potential firms. Each firm is able to differentiate its product so that the output of the firms are imperfect substitutes. The industry is modeled as monopolistically competitive of the Dixit-Stiglitz-Ethier kind, with free entry. The main mechanism is the following - changes in demand change profits and the number of firms operating in the industry. This change in production changes the price of goods supplied (forward linkage) which feed back - and there is cumulative causation.

Demand

We construct a price index for intermediate goods defined over the varieties of products produced by different firms and taking the form:

$$q = \left[n z_i^{1-\gamma} \right]^{\frac{1}{1-\gamma}} \tag{2.13}$$

where

q: price index

n: number of firms in the industry

z_i: price of an individual upstream firm's product

γ: measure of product differentiation in the industry. A low γ represents a high degree of product differentiation.

Assume $\gamma > 1$

Hence, the price index is decreasing in the number of firms in the industry.

Demand for a single variety:[12]

[11] The assumption ensures that the price of the lower quality good in equilibrium (LHS), is less than or equal to the willingness to pay for that good. See Tirole (1988) and Shaked and Sutton (1982).

[12] By interpreting the price index as an expenditure function and then using Shephard's Lemma.

$$x_i = z_i^{-\gamma} I q^{\gamma} \tag{2.14}$$

where

I : Total Intermediate demand

From the above two equations, we have:

$$n z_i x_i = qI$$

Supply

Profits for each firm in the industry is given by:

$$\pi_i = z_i x_i - \beta_i (x_i + F_i) \tag{2.15}$$

where

$\beta_i F_i$: Fixed cost for each firm

β_i: Marginal cost of production

2.2.3 Equilibrium

For equilibrium, we use game theoretic solutions for the following sequence of events:

1) The multinational chooses the amount per unit output of the local input (μ_2^d). Effectively, this is a quality choice.

2) The upstream firms choose quantity to maximise profits, by taking into account the total demand for the input derived from the game the downstream firms will be playing.

3) The downstream firms compete in prices.

We solve the game backwards, using sub-game perfection.

Downstream industry

Given marginal costs of production (2.6) and (2.7), and demand for goods 1 and 2, (2.4) and (2.5), the MNC and local firm compete in prices.

Profit maximisation gives:

For firm 1:

$$Max_{p_1} \qquad \pi_1 = (p_1 - c_1)\ D_1\left(p_1;p_2\right)$$

FOC:

$$p_2 = \underline{\theta}\Delta s - c_1 + 2p_1 \tag{2.16}$$

where Δs is given by eqn (2.8);

and for firm 2:

$$Max_{p_2} \qquad \pi_2 = (p_2 - c_2)\ D_2\left(p_1;p_2\right)$$

FOC:

$$p_2 = (p_1 + c_2 + \overline{\theta}\Delta s)/2 \tag{2.17}$$

Upstream Industry

Firms in the industry are small, hence they take the price index as given. They choose quantity to maximise profits. Taking the first order condition of eqn (2.15) yields:

$$z_i\left(1 - \frac{1}{\gamma}\right) = \beta_i \tag{2.18}$$

Since we have monopolistic competition, profits for each firm are driven to 0

Hence $\pi = 0$ condition gives:

$$x_i = (\gamma - 1)\, F_i \tag{2.19}$$

Input Choice

Using the solutions to stages 3 and 2 above, we solve for stage 1. The MNC chooses the amount of local input per unit output taking into account the fact that this will affect both quality of his good as well as total intermediate input demand. The change in intermediate demand would have an effect on the upstream price index (q), which would in turn impact on the marginal costs of production for downstream firms as well as the final price of the good. Finally, consumer demand for both goods will also be affected by the input choice of the MNC, as the latter affects both price as well as quality of the final goods.

Hence, profit maximisation for the MNC gives:

$$Max_{\mu_2^d} \qquad \pi_2 = (p_2 - c_2)D_2\,(p_1;p_2) - G$$

FOC:

$$\frac{d\pi_2}{d\mu_2^d} = (\frac{dp_2}{d\mu_2^d} - \frac{dc_2}{d\mu_2^d})D_2 + (p_2 - c_2)\frac{dD_2}{d\mu_2^d} = 0 \tag{2.20}$$

The first term on the RHS in eqn (2.20) above shows the effect of input choice on price of final good and costs. Marginal costs are given by eqn (2.6) and (2.7) while the effect on price is seen by taking the partial derivatives with respect to input choice by using eqn (2.16) and (2.17). Finally, the second term on the RHS shows the effect of input choice on demand for the MNC good, where demand is given by eqn (2.5).

Combining the equations for the 3 stages gives us equilibrium.[13]

In equilibrium:

$$\mu_2^d = \widetilde{\mu_2^d}$$

$$p_1 = \frac{2}{3}c_1(\widetilde{\mu_2^d}) + \frac{1}{3}c_2(\widetilde{\mu_2^d}) + \frac{1}{3}\left(\overline{\theta} - 2\underline{\theta}\right)\Delta s(\widetilde{\mu_2^d}) \tag{2.21}$$

[13] See Appendix for details

$$p_2 = \frac{1}{3}c_1(\widetilde{\mu_2^d}) + \frac{2}{3}c_2(\widetilde{\mu_2^d}) + \frac{1}{3}\left(2\overline{\theta} - \underline{\theta}\right)\Delta s(\widetilde{\mu_2^d}) \tag{2.22}$$

Both firms make more profits when they are more differentiated, firm 1 gains from reducing its quality and firm 2 from increasing its quality. Hence firms try to relax price competition through product differentiation.[14]

2.3 Domestic Content Requirement

Suppose the host government stipulates the minimum fraction of inputs that must be sourced locally by the multinational. To have any impact, the stipulated fraction must be larger than the amount the multinational would otherwise choose in equilibrium

Let $\underline{\mu_2^d}$ be the domestic content requirement

This implies:

$$\underline{\mu_2^d} \geq \widetilde{\mu_2^d}$$

If the multinational continues to produce in the host economy, the new input-output coefficient μ_2^d of the multinational must not be less than be greater than $\underline{\mu_2^d}$.

Now, the relation between quality difference and inputs is given by:

$$\Delta s = a(1 - \mu_2^d)$$

The crucial assumption we make is that:

$$b_2\mu_2^d < b_1\mu_1^d \tag{2.23}$$

The amount of locally produced inputs used by the multinational per unit output, is less than that used by local firms. This may be due to the MNC being more efficient ($b_2 < b_1$)

[14] See Shaked & Sutton (1982), and particularly, Tirole (1988) for details. Note that if the quality of domestic firm is fairly low, it could end up facing no demand. This would prevent maximal differentiation. However, the assumption in eqn (2.12) avoids this scenario.

and/or because multinationals source their inputs differently $\left(\mu_2^d < \mu_1^d\right)$

Linkage Effect: In equilibrium, we have:[15]

$$\frac{dq}{d\Delta s} > 0 \tag{2.24}$$

Quality downgrading by the MNC means that it is substituting away from higher quality foreign inputs into lower quality local inputs. Thus, the demand for local inputs is rising, which increases the number of firms in the upstream industry and decreases the upstream price index. Thus, eqn (2.24) above captures the backward and forward linkage effects.

With a content requirement, we now have the following three-stage game:

1) The multinational firm chooses the amount per unit output of its local input, given the content regulations.

2) The upstream firms take into account the input demands of downstream firms, and choose quantity to maximise profits.

3) The downstream firms compete in prices.

We solve the game using sub-game perfection.

Stage 3) and 2) above are the same as analyzed in section 2. Using the solutions to those stages, we can solve for stage 1, taking output prices, and the upstream price index as given:

Proposition 1: The multinational uses exactly the stipulated level of domestic contents, i.e., $\mu_2^d = \underline{\mu_2^d}$ if:

i) The multinational continues to make non-negative profits in the host economy.

ii) It's profits are monotonically declining with domestic content requirements.

iii) There is sufficient consumer heterogeneity for both firms to exist with DCR.

Proof.

See Appendix

Essentially, this proposition says that if the profits of the multinational are falling with quality downgrading (due to the domestic content requirement), then it will not choose to downgrade quality any more than is essential. Hence, it will not use local inputs more than the required amount. Clearly, it can't choose inputs below $\underline{\mu_2^d}$. Thus, in equilibrium, the multi-

[15] See appendix for details

national will set $\mu_2^d = \underline{\mu_2^d}$. Condition ii) above states that the multinational must continue to make non-negative profits. If the domestic content requirement is such that the multinational makes negative profits, then it will obviously cease production. In all of the above analysis we are assuming without loss of generality that the outside option of the MNC is $\overline{\pi} = 0$

2.3.1 Price of Local Good

When a domestic content requirement is imposed, the multinational has to source more inputs locally. This leads to an increase in the demand for local inputs, which encourages entry into the monopolistically competitive upstream sector. The entry of new firms lowers the upstream price index q. The decrease in q reduces costs of both the local and multinational firm. However, the costs of the local firm fall by more as it uses more domestic inputs than its rival. This is the linkage effect.

The content requirement also leads to a second effect: a *competition effect.* As was pointed out earlier, the firms relax price competition through product differentiation. After a content requirement, however, the quality of the multinational good decreases. Further, the price of the multinational good will also fall. This is due to two reasons - (a) as the multinational substitutes cheaper local inputs for foreign inputs, his costs fall ($r > q$). (b) The increased demand for local inputs causes greater linkage effects making q fall. Hence the price of the multinational good falls. We now want to understand what happens to the price of the local good. Now, there is greater quality and price competition for the local firm. Both the competition and linkage effects should tend to reduce price of the local good. The price can only rise if perversely the content requirement leads to anti-competitive effects which are so great as to swamp the linkage effects.[16] Below we derive sufficient conditions under which price of the local good decreases with content requirements.

Lemma 1 *A sufficient condition for the price of the local good to decrease with content requirements is* $(\overline{\theta} - 2\underline{\theta}) \geq 0$ *, i.e., sufficiently heterogenous taste for quality among consumers so that both goods are purchased.*

[16] In this case, the profits of the local firm will unambiguously increase. However, for the remainder of the paper we concentrate on the more interesting case when local prices fall.

Proof. See Appendix

Hence, for the price of the local good to decrease, the taste for quality spectrum, or alternately, the income distribution should be sufficiently heterogenous so that both goods are purchased after the content requirement, i.e., $(\overline{\theta} - 2\underline{\theta}) > 0$.

2.3.2 Relative Price:

We have established above that with a content requirement, the price of the multinational good falls. We have also established conditions under which the price of the local good falls. What about the relative price? We would expect the multinational's price to decrease more because it is downgrading its quality and switching to cheaper inputs.

Lemma 2 *The price difference between the two firms' products is decreasing with a domestic content requirement.*

Proof. See appendix.

As a domestic content requirement is imposed, the multinational is forced to downgrade quality. If the taste for quality is low in the population, and linkages very strong, then the domestic firm can lower its price by more than its multinational rival.

2.3.3 Demand for Local Good:

We would expect demand for the local good to fall with a DCR due to increased competition. Here we derive conditions under which demand for the local good actually increases.

Lemma 3 *A domestic content requirement leads to an increase in demand for the local good, if*

a) Lemma 2 above holds, i.e., the price difference between the two firms decreases.

b) The decrease in the price difference between the two goods is less than the willingness to pay for quality of the marginal consumer. $\frac{dk}{d\Delta s} < \frac{k}{\Delta s} = \widetilde{\theta}$

Proof.

$$\frac{dD_1}{d\Delta s} = \frac{dk/d\Delta s}{\Delta s} - \frac{k}{(\Delta s)^2} < 0 \qquad if \qquad \frac{dk}{d\Delta s} < \frac{k}{\Delta s} = \widetilde{\theta}$$

The demand for the local good is increasing with quality downgrading by the multinational if the decrease in price difference between the two products is less than the willingness to pay for quality (or marginal rate of substitution between income and quality) of the marginal consumer. In other words, the equilibrium marginal consumer will switch to buying the local good with a DCR if the gain in utility from purchasing the higher quality MNC good is smaller than the loss in utility due to its higher price. Thus, the MNC price relative to the local good hasn't fallen enough to induce the marginal consumer from buying the MNC good.

2.3.4 Profits of Local Firm:

As discussed earlier, there are two effects of a content requirement on the local firm. A linkage effect, which tends to increase the profits of the local firm and a competition effect which tends to lower profits. The net effect will depend on the relative strengths of these two effects. Below we derive the interesting case when profits of the local firm will increase with a content requirement. Given our results above, this can happen only when the gains from the increased demand for the local good outweighs the losses associated with declining price-cost margins. We summarize these observations in the proposition below.

Proposition 2: *Profits of the local firm are increasing with domestic content requirements if :*

i) Lemma 3 above holds

ii) The linkage effect is stronger than the competition effect, i.e., $\frac{b_2}{a}(r-q) < \frac{dq}{d\Delta s}(b_2\underline{\mu_2^d} - b_1\mu_1^d)$

Proof.

In equilibrium, we have:

$$\frac{d\pi_1}{d\Delta s} = (\frac{dp_1}{d\Delta s} - \frac{dc_1}{d\Delta s})D_1 + (p_1 - c_1)\frac{dD_1}{d\Delta s}$$

In order for this expression to be negative, i.e., profits of local firm to increase with quality downgrading:

We want

$$\frac{dp_1}{d\Delta s} - \frac{dc_1}{d\Delta s} < 0 \quad and \quad \frac{dD_1}{d\Delta s} < 0$$

Lemma 3 gives us conditions under which $\frac{dD_1}{d\Delta s} < 0$

For the first expression to be negative, we have:

$$\frac{dp_1}{d\Delta s} - \frac{dc_1}{d\Delta s} = \frac{1}{3}\frac{dq}{d\Delta s}(b_2\underline{\mu_2^d} - b_1\mu_1^d) + \frac{1}{3}\frac{b_2}{a}(r-q) + \frac{1}{3}(\overline{\theta} - 2\underline{\theta}) < 0$$

From Lemma 1, $(\overline{\theta} - 2\underline{\theta}) > 0$

Rearranging,

$$\frac{b_2}{a}(r-q) < \frac{dq}{d\Delta s}(b_2\underline{\mu_2^d} - b_1\mu_1^d)$$

where the LHS gives the competition effect, i.e., fall in price of MNC good due to shifting from foreign to domestic inputs; and the RHS gives the linkage effect. ■

2.3.5 Consumer Welfare:

We can divide the consumers in the economy into 2 groups - those who buy the multinational good, and those who buy the local good. When a content requirement is imposed, the quality downgrading by the multinational has two effects on consumers. First, the linkage effect which reduces costs and therefore prices of the firms. Second, an intensification of price competition due to smaller differences in quality. Different groups in the population are affected differently. For the consumers who were buying the multinational good, the downgrading of quality leads to a loss in utility. However, the reduction in price increases utility. For the consumers buying the domestic good, both the linkage effect and the competition effect lead to reduction in prices which increases utility. So the consumers buying the local good are unambiguously better off with a content requirement. The net result on overall consumer surplus depends on the strength of the two effects, the taste for quality of the consumers, and the weight given to the different segments of the population. Below we show conditions under which a content requirement will improve consumer welfare.

Let equilibrium prices be given by p_1, p_2

Let:

U_1 be the utility of individuals consuming the local good,

U_2 be the utility of individuals who consume the multinational good.

These are given by:

$$U_1 = \theta s_1 - p_1$$

$$U_2 = \theta s_2 - p_2$$

The utility of the two subgroups in the population, are weighted by their individual proportions in the population to get the total consumer surplus:[17]

$$CS = \frac{\widetilde{\theta} - \underline{\theta}}{\overline{\theta} - \underline{\theta}} U_1 + \frac{\overline{\theta} - \widetilde{\theta}}{\overline{\theta} - \underline{\theta}} U_2 \tag{2.25}$$

Since the marginal consumer $\widetilde{\theta}$ is given by

$$\widetilde{\theta} = \frac{p_2 - p_1}{\Delta s}$$

Utility of the 2 subgroups are given by:

$$U_1 = \int_{\underline{\theta}}^{\widetilde{\theta}} (\theta s_1 - p_1)\, d\theta \tag{2.26}$$

$$U_2 = \int_{\widetilde{\theta}}^{\overline{\theta}} (\theta s_1 - p_1)\, d\theta \tag{2.27}$$

Thus, we can use equations (24), (25) and (26) to see how consumer surplus changes with

[17] Here the weights change with the content requirements as demand for the two goods change. Different weights on the two groups can generate different results than what we obtain. For example, a large weight given to the rich consumers buying the multinational good may cause consumer surplus to decrease as content requirements are imposed. The weights, of course, will be determined by political economy considerations.

a DCR:

Proposition 3: A sufficient condition for consumer surplus to be increasing with DCR is:

i) The maximum taste for quality among consumers, i.e. $\overline{\theta}$, is not too high

ii) Lemma 2 is satisfied, i.e., relative prices fall with a DCR , i.e., $\frac{dk}{d\Delta s} > 0$

Proof. See appendix.

The foregoing analysis suggests that consumer surplus with DCR is higher:

i) The lower is the maximum taste for quality of consumers

ii) The greater are linkage effects.

iii) The lower is the price difference between the two goods, i.e.e, the price of the multinational good falls more than the price of the local good. ($\frac{dk}{d\Delta s} > 0$).

iv) The larger the weight the policy-maker puts on the L group.

2.3.6 Simulations

In order to understand the mechanisms of the model and its predictions, we simulate the model.[18] Figure 2.1 shows the existence of linkage effects. As the fraction of domestically sourced inputs by the MNC increases, i.e., content requirement increases, the upstream price index falls, though at a declining rate. This demonstrates that linkage effects are larger initially. Figure 2.2 shows the effects of increasing the fraction of inputs sourced locally by the multinational on local firm profits. The initial increase in profits is due to cost savings through linkage effects outweighing the increase in competitive pressure from the multinational. Profits start falling as competition gets more intense as the multinational downgrades quality. Figure 2.3 displays effects on consumer surplus. The increase in DCRs leads to the MNC downgrading its quality. Consumers buying the high quality MNC good now face a loss in utility. Since competition effects are weak initially, effects on prices are not very strong and hence the loss in consumer surplus from lower quality exceeds the gain from lower prices. Once competition gets more intense, the price effect dominates and consumer surplus increases with the fraction of inputs sourced locally.

[18] See appendix for the parameter values used.

2.4 Discussion

The above analysis and the simulations show that there is a range of values for content requirements which increase host country welfare. A DCR has a differential impact on different groups in the population. The upstream supplier industry is unambiguously better off due to the increased demand for inputs. Since the upstream sector is monopolistically competitive, according to the model, the growth of the sector is essentially an increase in the number of firms. Hence, a DCR can encourage industrial growth.

The second group we consider are consumers. As Proposition 3 shows, if the taste for quality in the population in not too high, i.e., there are relatively few people who purchase the high quality MNC good, and if policy-makers assign equal weightage to all segments of the population, then a DCR improves consumer welfare. This result arises primarily due to the lowering of prices through the linkage effects, and an intensification of price competition.

For local producers competing in the same industry, a DCR can lead to an increase in profitability if the reduction in costs due to the linkage effects outweigh the fall in price-cost margins due to an intensification of price and quality competition.

Since a content requirement has a differential impact on different groups in the population, the overall host country welfare will depend on weights attached to the various groups. Hence, there is potential for conflict between the different groups. Local producers will likely oppose DCRs as it increases competitive pressures on them. Consumers with a high taste for quality will also oppose them as they suffer from quality downgrading by the MNC. Consumers of the local good will support DCRs as they gain from lower prices.

We now turn to discussing the effects of the main parameters of the model. From the above analysis, we find that host country welfare is increasing for a range of values of μ_2^d - the input output co-efficient of the multinational. A higher μ_2^d implies greater linkages. Clearly, the upstream industry expands due to the increase in demand. From the downstream industry local firm's perspective, greater linkages translates into lower price for domestic inputs. Since it buys all its inputs locally, its costs are reduced. So long as linkage effects dominate competition effects, the local firm's profits will increase. For domestic consumers, greater linkages means reduced prices of final goods, as costs of both firms are decreasing. Hence, consumer surplus is increasing for a range of values of μ_2^d.

The model also shows that the lower is $\overline{\theta}$, i.e., the highest taste for quality in the population, the greater are the benefits from domestic content requirements. If $\overline{\theta}$ is low, the willingness to pay for quality is not high in the population, and thus, the loss in welfare due to the MNC downgrading its product will be lower. Both consumer surplus and profits of the local firm are increasing with domestic content requirements, the lower is $\overline{\theta}$. Since taste for quality can be interpreted as income distribution, the implication is that the benefits from a DCR are greater, the lower is the purchasing power of the richest segment of the population.

Finally, the higher the cost of quality upgrading for the multinational (lower a), the higher the domestic welfare - if taste for quality is low in the population. For local producers - when cost of upgrading is high (a is low) a domestic content requirement means the MNC sources a large fraction of inputs domestically. If foreign prices are larger than domestic prices, the MNC's costs are falling, and thus, his prices are falling. This means more competition for the local firm, and lower profits. For consumers - the fall in prices of the MNC increases consumer surplus. The lower is a the higher is $\frac{dk}{d\Delta s}$, i.e., the decrease in the price difference in the two goods due to a DCR. The higher is $\frac{dk}{d\Delta s}$, the greater is the consumer surplus. This result has the interesting implication that a DCR will benefit those industries more where it is relatively expensive for the MNC to differentiate its good in quality.

In this chapter, we have focused on the host government imposing a content requirement on the MNC. In practice, one can also think of the MNC itself imposing this condition on itself by binding itself into contracts with domestic suppliers.[19] In so doing, the MNC is committing itself to buying a certain value or quantity of inputs from local upstream producers so as to encourage their development and to be able to reap the benefits of cheaper and/or better quality inputs through the development of the upstream industries. These contracts with suppliers would have similar consequences as the imposition of a DCR discussed above.

There is some evidence from India which supports the theoretical claims made in this chapter. As mentioned earlier, the Indian government requires that all multinational producers of passenger cars should source at least 50 percent of inputs locally. Since India did not receive any investment from car manufacturers prior to the 1991 reform, this restriction was inconsequential. The DCR has been significant since the entry of foreign car producers such as Daewoo,

[19] See Matouschek (2001)

Hyundai, and Ford in the 1990s. During 1991-97, the automotive components industry in India grew at a compound annual rate of 26.4 percent. These figures do not by themselves establish a causal link between DCRs and auto components industry growth. However, they do suggest that growth in the upstream stream industry was accelerating at the same time that DCRs were strictly being imposed in the downstream sector.

This chapter has argued for a domestic content requirement as a means to generate pecuniary externalities. One can also think of other policy instruments which could achieve this goal. One such instrument could be an investment subsidy to MNCs so as to induce them to source more inputs locally. The model sketched out in Section II above could be suitably amended to include this policy tool. The firms' profit maximisation would then be affected, which would then have implications for the optimal subsidy.

2.5 Conclusions

The growing literature on FDI views multinational activity as potentially beneficial for the host country due to several reasons, prominent among them are technology transfer, quality upgrading, and spillovers through the labour market. This chapter explores the benefits to the local economy through another channel - pecuniary externalities through linkages by combining vertical product differentiation models with two-sector linkage models. The chapter argues for a potential role for policy in increasing linkages by means of a Domestic Content Requirement. Stipulating minimum fractions to be sourced locally by a multinational encourages linkages and increases competition. As long as the taste for quality in the population is not too high, these effects can lead to increases in host country welfare and can be crucial in stimulating industrial growth in developing countries.

Several limitations to the analysis remain. First, the important process of quality upgrading is not explicitly modeled. This chapter has focused on quality downgrading by the MNC due to a DCR. An interesting extension of the model would be quality upgrading by the local firm due to the presence of the MNC. Second, the issue of multinational entry is not addressed. Third, we abstract away from trade considerations in the downstream sector. Fourth, since this is a partial equilibrium analysis, the claims on overall welfare are only tentative. Fifth, we do not

model political economy issues related to the potential conflict between consumers of the high quality MNC good, local downstream producers, and the rest of the population. Extending the model to resolve some of these issues are the objective of future research.

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Chapter 3

Characteristics of MNCs in Indian Industry

3.1 Introduction

India liberalised its FDI regime in 1991, and consequently saw a dramatic upsurge in FDI inflows. Annual inward FDI increased from 200 million in 1991 to $3.2 billion in 1997. As multinational presence has increased in Indian industry, there is a need to understand the nature of such activity. With this aim, this chapter presents a descriptive analysis of MNC activity in India. Later chapters use these characteristics of the data in more formal econometric analysis. In particular, later chapters analyze the effects of MNC entry on the performance of local firms, and the decision to export. Before undertaking such an analysis, we seek a detailed understanding of the nature of MNC activity.

This chapter concentrates on three sets of issues regarding multinational activity in Indian industry. First, the sectoral destination of MNC investment. Which industries have been recipients of FDI in the 1990s and what are their characteristics - in terms of importance of technology, market structure, orientation, skills and wages. The next set of issues concern the characteristics of MNCs relative to Indian firms. How do MNCs compare with local firms in terms of size, costs of production, wages, export and import orientation, amount spent on R&D and Advertising, and linkages generated with the domestic economy? The final set of issues deal with the performance of multinationals relative to local firms in the post-reform period in

terms of profitability. We seek to understand whether there is any persistence in profits, and the distribution dynamics of profitability.

There are some underlying themes which the analysis in this chapter seeks to address. We would like to ascertain whether FDI in India is of the horizontal or the vertical type.[1] Are MNCs coming into India to avail of cheap factor costs, or to take advantage of the market size and produce for the Indian market? A central theme is whether MNCs are consistently outperforming their local rivals, and if so to disaggregate performance within ownership groups to understand which firms are driving the performance differentials. In addressing the above issues, the objective of this chapter is to present some stylised facts about FDI in India during the reform period, some of which are explored in Chapters 4 and 5 below.

The rest of this chapter is organised as follows. In the next section we describe the dataset which is used for the analysis in this chapter as well as the rest of the thesis. The following

a continuous monitoring of company announcements and a qualitative understanding of the group-wise behaviour of individual companies.

Prowess organises companies into economic activity groups. This is done under an economic activity classification system which classifies companies based on the share of the various product and service lines in the total income of the Company. A Company is classified under a product/service group if more than half of the Company's sales is derived from the products under such a group. If a company cannot be classified under any of the industry groups in such a manner, then the company is classified as a diversified company.

For each firm, we have data on various measures of profits, assets - fixed as well as total, sales - gross and net, total costs of production, exports, imports - broken down by raw materials, intermediate, and capital goods, breakdown of costs of production into wages, advertising, R&D, marketing and distribution among others. There is also data on gross and net value added and value of output.

We drop companies where industry or year is not specified or there are two observations for a particular year. In this way we drop 362 observations. We clean up the data by removing firms with negative sales or negative costs of production. We also remove very small firms (< 0.1 crore rupees of gross fixed assets) as a significant proportion of their ratios are highly volatile, and implausible outliers - firms with profits/losses or costs of production greater than 20 times net sales or assets. In this way we drop 1317 observations. We further delete 186 observations on industries with less than 4 firms, as we believe the firms constitute only a small part of the industry, and hence are not representative of the industry.

The limitation of the dataset is that since it is based primarily on listed companies, several private companies, unlisted multinationals, small and unregistered firms are missing from the dataset. Further, there are issues of industrial classification as mentioned above, as multi-product firms are allocated to individual industries based on the share of sales in different products. There are also issues of sample selection, as the sample is based on listed companies which are non-random. Large firms are likely to be overrepresented. Hence, our results in the more formal hypothesis testing will be affected by sample selection problems. We discuss the implications of these data issues in the interpretation of our results in the econometric analysis of later chapters.

3.3 Sectoral Destination of FDI

In the 1990s, FDI in India has grown from an extremely small base. In 1991, the total stock of FDI stood at less than 0.6 percent of GDP. By 1997, the stock of FDI had grown to about 2.5 percent of GDP. In terms of flows, FDI annual flows as a percent of manufacturing GDP has grown from less than 0.4 percent in 1991 to about 5 percent of manufacturing GDP in 1997. Further, aggregate FDI numbers in India have systematically been under-reporting the importance of FDI. It does not include reinvested earnings, which tends to comprise large portions of FDI in other emerging countries. Some recent corrections for this suggest that official aggregate FDI numbers might be under-reporting actual FDI by as much as 50 percent.

Given that there has been a large increase in FDI in the 1990s, a natural question that arises is which sectors have been the recipients of this FDI. The sectoral destination will enable us to distinguish the type of FDI that has been flowing into India from 1991-97. The primary source for this data is the Secretariat for Industrial Assistance Newsletter, Department of Industrial Policy & Promotion. Table 3.1 shows the sectoral distribution of FDI approvals from 1991-97. It also shows the stock of FDI in 1980 and 1990.

The government policy pursued until 1991 generally restricted FDI to technologically intensive branches of manufacturing industry. Hence 85 percent of FDI stock in 1990 was in manufacturing. In the 1990s however, the bulk of the inflows have been directed to non-manufacturing infrastructural sectors such as energy (29%) and telecommunication services (20%) as is evident from Table 3.1. The share of manufacturing has gone down to 37%. Among the manufacturing subsectors, FDI approvals in the 1990s are also more evenly distributed unlike the heavy concentration in relatively technology intensive sectors upto 1990. The infrastructural sectors which have commanded nearly half of total approved investments in the 1990s had not been open to FDI inflows before, and hence, could be attributed to the policy liberalisation.

To distinguish further the type of FDI inflows into India in the 1990s we match the sectorwise FDI approvals data from the SIA with a classification scheme used by the OECD Directorate of Science, Technology and Industry, Economic Analysis and Statistics Division. This classification groups manufacturing sectors according to different technologies, wages, orientation, market structure, and skills. Table 3.3 lists the classification scheme and the corresponding

percentage of FDI inflow into the sector.[3]

1) *Technology* - High and medium technology sectors have been the beneficiaries of two-thirds of all FDI approvals. Given the historical bias for orienting approvals towards high technology industries, there has been a significant increase in the importance of low technology industries, especially petroleum refineries and food, beverages and tobacco.

2) *Wages* - Only a quarter of FDI approvals are destined for low wage sectors. Given that India has a large surplus of cheap labour, the relatively lower approvals suggests that the type of FDI coming in may not be driven by cheap factor costs. High and medium wage industries such as chemicals, petroleum refineries, and telecom have been relatively favoured. It may also reflect the outcome of the policy choice of no automatic approval of FDI in industries such as Wood, Leather, and much of Textiles.

3) *Orientation* - Table 3.3 shows that specialised supplier and scale intensive industries have received over 80 percent of approvals. This is further evidence to suggest that resource and labour intensive industries, in which India is supposed to have a comparative advantage, have tended to be less favoured by incoming FDI.

4) *Market Structure* - In Indian industry MNCs have come into differentiated goods industries, both fragmented and segmented (about three-quarters of all approvals). This follows the pattern in other emerging countries where MNCs normally have a comparative advantage in differentiated goods industries, due to the importance of intangible assets in these industries. MNCs can take advantage of their intangible assets such as higher R&D spending, Advertising costs and other spending which differentiate their goods relative to local firms.

5) *Skills* - FDI approvals during the 1990s have tended to occur more in skilled sectors such as chemicals, and telecom, than unskilled industries. Given India's large ratio of unskilled to skilled workers, there has been no bias in favour of unskilled worker industries.

Although any classification scheme is ultimately arbitrary, the above does provide a useful categorisation of FDI approvals, and some qualitative evidence in favour of the hypothesis that FDI in India in the 1990s has been of the horizontal type as investors have favoured medium

[3]Since the classification scheme only covers manufacturing, whereas FDI approvals data is for all sectors, the numbers in table 3 represent the percentage of approvals for Manufacturing, Oil Refinery, and Telecommunications. It does not include the Power and Services sector which cumulatively contributed about 26% of all approvals.

technology, high-wage, specialised supplier, scale intensive, differentiated goods, and skilled labour industries which are industries in which developed source countries have a comparative advantage. For investments of the vertical type, we would have expected industries to be characterised by low wages, resource and/or labour intensive, and unskilled worker industries. Lack of FDI in resource and labour intensive industries where India might be thought to have a comparative advantage seems to suggest that foreign firms are choosing to serve the Indian market via local production rather than exports, and producing goods roughly similar to those produced for the home market.

Although the above information on sectoral destination provides a broad overview of the industries favoured by FDI in the 1990s, it must be borne in mind that the data above is for approvals only and not actual inflows. Given that the ratio of approvals to inflows has on average been about 20 percent (see Table 3.2), approvals data might not accurately reflect the actual investments taking place. Further, FDI in India has systematically been under-reported. It does not include reinvested earnings, which tends to comprise large portions of FDI in other emerging countries. Hence we turn to the Prowess database described above which is a sample of actual inflows in industry. There are several advantages to the dataset. First, it measures foreign ownership based on direct information on production activity rather than financial flows.[4] Second, we have data on actual activity of foreign firms rather than simply approvals. Third, we have information on activity of MNCs before and after the reforms.

From the data base we can also look at the share of MNCs in Assets and Sales in different sectors. Table 3.4 shows the incidence of MNCs in different sectors. There is wide variation in the presence of MNCs in different sectors. They are more prevalent in Leather Products, Chemicals, Mineral Products, Electrical and Non-electrical machinery and Transport Equipment. These are actual inflows and somewhat corroborates evidence from the approvals data from the SIA. However, this information also includes MNCs present before liberalisation. We discuss the subsectors in which FDI has entered in the 1990s in greater detail in Chapter 4 below.

[4]See Griffith (1999) on this.

3.4 Characteristics

This section describes the characteristics of MNCs in Indian industry relative to Indian firms. As Chapter 1 discusses, theory suggests that MNCs in developing countries have certain characteristics. Here we seek to determine whether these are borne out in the Indian context.

Using the firm-level database described above, we aggregate across all industries to get a composite picture of firm characteristics by ownership. Table 3.5 lists the aggregate cross-section characteristics.

3.4.1 Size

For ascertaining the relative size of firms, we employ two measures - Total Assets and Net Sales. Table 3.5 shows that multinationals in Indian manufacturing are larger both in terms of Total Assets and Net Sales than their local counterparts. They also have larger Fixed Assets than local firms. MNCs are almost twice as large as local firms in terms of Assets, and almost three times as large in terms of Sales. This finding seems to correspond well with the existing literature in which both theory and evidence point to MNCs being larger than local firms.

3.4.2 Export & Import Orientation

An important variable of interest in investigating the characteristics of multinationals is their propensity to export and import relative to local firms. Evidence from Table 3.5 suggests that multinationals both export and import more than local firms. This may be due to the larger relative size of foreign firms. Hence we normalise imports/exports by net sales. We find that the difference in openness between the two ownership groups disappears. A mean comparison test cannot reject the hypothesis that the export and import intensity of the MNCs and local firms are similar.

Figure 3.1a plots the export intensity of foreign and local firms over time. As the figure shows, there's been a clear increase in exports in the post-reform period for both groups of firms. This could be due to more export-oriented firms entering, surviving firms exporting more, a reallocation of market share towards more export oriented firms, or due to the exit of firms. Chapter 5 seeks to answer these questions by formally decomposing export intensity growth.

Looking at the evolution of import intensity (Figure 3.1b), we find that it has been rising for both ownership groups in the immediate aftermath of the reforms. However, for local firms, the ratio of imports to sales has been falling at the end of the sample period. Clearly, the extensive macro economic and trade policy reforms starting from 1991 seems to be the underlying reason for the increase in exports and imports for all firms. Towards the end of the sample period, even though absolute imports for local firms has grown, import intensity has declined as sales growth has been bigger. There may be some substitution of local for foreign inputs may be going on due to better availability of inputs locally. However, these are aggregate numbers and may be hiding significant variation within firms and industries which needs to be explored.

To understand the propensity of firms to export in different industries, we graphed export intensity by industry before reforms and after reforms. Figure 3.2 plots overall export intensities in 1990 and 1996. The figure seems to suggest that there have not been large changes in the distribution of export intensities across industries. In other words, although a few sectors such as software seem to have had a significant increase, rather than a move towards concentration of exporting activity within certain sectors, the entire distribution appears to have shifted upwards. We attempt to answer the evolution of these patterns in Chapter 5.

To investigate the importance of MNC presence for exporting activity, we ranked industries by MNC market share, and plotted the corresponding export intensities. Figure 3.3 shows that there is little correlation between MNC market share in industry and exporting activity in that industry. The co-efficient of correlation between the two variables turns out to be slightly negative. Chapter 5 picks up on this issue and seeks to test whether greater MNC presence in an industry increases the probability that a firm in the industry will export.

3.4.3 Costs of Production & Wages

Table 3.5 shows that MNCs have lower average costs than local firms. A means comparison test shows that MNC costs of production per unit sales is almost 10 percent lower than that of local firms. Figure 3.4 displays the evolution of average costs over time. MNCs have consistently performed better than local firms over the sample period. Thus, there is some indication that MNCs may be more efficient than local firms in terms of lower average costs. However, these are aggregate numbers with wide variation across firms and industries, which needs to be explored.

The data shows that MNCs pay higher total wages than local firms. Even as a proportion of costs of production, MNC wages are slightly higher. This corresponds well with the earlier finding that MNC presence has tended to be in medium to high wage industries rather than low wage ones. Evidence from other countries suggests that MNCs employ a larger share of skilled workers, thus leading to higher total wages. However, wages comprise less than 15 percent of the overall cost of production. This finding suggests that wages are not a primary component of costs in Indian manufacturing.

3.4.4 R&D and Advertising

Table 3.5 shows that as a proportion of sales, MNCs spend more on advertising as well as marketing & distribution than local firms. This squares well with the literature and the earlier finding that MNCs are present in industries with high barriers to entry and sell differentiated goods, which are both characterised by high advertising and marketing & distribution costs. The surprising finding is that they're spending less on R&D as a proportion of sales than their local counterparts.[5] This could be because they are concentrating their R&D activities at headquarters and not in the host economy.

3.4.5 Linkages

To get some measure of the linkages generated with the local economy, we consider the proportion of imported inputs as proportion of sales. Table 3.5 shows that MNCs and local firms have similar ratios of imported inputs to sales. We would expect MNCs to source a larger fraction of inputs from abroad, due to its very nature. It would have been useful to compare imported inputs to total inputs. However, the information on total inputs is unavailable. MNC imports may actually be hiding intra-firm transfers from the parent to the subsidiary, which could bias the ratio downwards for MNCs.[6]

[5] A comparison of means test showed that the difference between local firm spending on R&D and MNC spending on R&D as proportion of sales is significant.

[6] Over time, the evolution of imported inputs to sales for both firms follows a similar trend to the import intensity graph presented earlier, and is therefore not repeated

3.5 Performance

To compare MNC performance with that of local firms, we essentially look at 2 measures : i) the ratio of Profits before Tax to Gross Fixed Assets, i.e., Return on Assets, and ii) the ratio of Profits before Tax to Net Sales, i.e., Profit Margins. Both these measures of performance are standard in the literature.

A large part of the literature on inward FDI has tended to focus on productivity as a preferred measure of firm performance. Studies have tended to use plant-level information on output, labour, and capital to measure productivity. One limitation of our dataset is the lack of information on labour. This is due to the fact that in India, firms are not required to report on the number of employees for listing on the stock exchange.[7] Thus, our measure of performance reflects in part data limitations. However, it is of interest in itself to look at profitability as this would also capture the impact of intangible assets of the MNCs

Two other issues regarding profits need to be addressed. First, is the difference between accounting profits and economic profits. In general, these tend not to be the same, and hence claims on economic profits based on accounting profits are tenuous at best.[8] However, the problem is mitigated somewhat by considering a longer time horizon of profits. Our panel data set thus is useful for this purpose.

Second, is the issue of transfer pricing. If MNCs are engaging in transfer pricing, then any comparison between local and MNC firms will be meaningless due to measurement errors in reported profits. However, Indian average corporate tax rates during the period were higher than corporate tax rates in America which proxies for the rest of the world. Thus, there was an incentive for MNCs to under report profits. To the extent that we find MNCs have higher profits, without transfer pricing, these profits would have been even higher. Hence, one can think of MNC profits as reported as a lower bound on actual profitability.

To understand performance differences, we first consider aggregate profits. In the next subsection we decompose profits into surviving, exiting and entering firms in order to understand the key drivers of performance over time. The rest of the section deals with the important issue

[7] Further, stringent labour laws provide incentives for even registered firms to misreport the number of their permanent employees.

[8] See Fischer & McGovern (1983) on this.

of persistence in profits.

3.5.1 Aggregate Returns & Margins

Figure 3.5a plots a time-series of average MNC and Local firm returns on assets weighted by their asset share. We see that over the period 1989-97, MNCs have, on average, consistently outperformed local firms. Figure 3.5b shows the evolution of weighted profit margins. The evolution of both returns on assets and return on sales are remarkably similar. The figure adequately captures the Indian business cycle - the recession of 1991-92, the expansion in the following 4 years, and then the fall in profits starting from 1996-97. However, these are aggregate numbers and mask differences in firm profitability within each broad aggregation. We divided industries into those with a substantial presence of MNCs (greater than 20 percent of assets) and those without. However, the profitability differences between local and MNC firms in the two sets of industries remained. We explore the differences across industries in Chapter 4 below. The rest of the section deals with the decomposition and distribution dynamics of aggregate profits.

3.5.2 Decomposition of Profits

Given the above, we would like to determine the factors behind this profitability difference and changes over time. Is it the case that entering MNC firms are more profitable than locals or that surviving local firms are performing worse than surviving MNCs. To get a deeper understanding of the forces underlying aggregate profitability, we decompose profitability during the period 1989-1997. Aggregating across firms, overall profitability Π is defined as:

$$\Pi = \sum_j \frac{Z(j)}{Z} \Pi(j) \tag{3.1}$$

where $Z(j)$ is gross fixed assets of firm j, and Z is total fixed assets.

There are four potential contributors to changes in profitability. First, is it due to entering firms being more (or less) profitable. Second, have less profitable firms exited in the sample period, thereby raising overall profitability. Third, is it due to a reallocation of output to the most profitable firms. Fourth, can we explain the changes due to changes in the average

profitability of surviving firms.

We follow the decomposition procedure of Bailey, Hulten, Campbell (1992)[9] and decompose aggregate profitability into the contributions of entering firms(n), exiting firms (x), reallocation among surviving incumbents (s), and profitability changes for surviving incumbents. Denoting the set of firms of each type as ω_k, $k = n, x, s$:

$$\begin{aligned} \Pi' - \Pi &= \frac{Z'_n}{Z'}\left(\Pi'_n - \Pi'_s\right) - \frac{Z_x}{Z}\left(\Pi_x - \Pi_s\right) \\ &+ \sum_{j\in\omega_s}\left(\frac{Z'(j)}{Z'_s} - \frac{Z(j)}{Z_s}\right)\Pi'(j) + \sum \frac{Z(j)}{Z_s}\left(\Pi'(j) - \Pi(j)\right) \end{aligned} \tag{3.2}$$

The first term represents the profitability contribution from entrants whose profit levels differ on average from that of surviving incumbents. The second term represents the corresponding profit contribution from firm exit. The third is the contribution from reallocation across incumbent survivors. The fourth is the contribution of profitability changes within the incumbent survivors.

Table 3.6 shows the results from the profitability decomposition for all firms, MNCs, and local firms.[10] Observe that there are big differences in the contributions for profitability for MNCs compared to local firms. For local firms the largest contributor is profitability changes for survivors, which is negative. Reallocation amongst survivors is positive, while entry and exit are both negative. For MNCs, reallocation contribution is slightly larger than that of changes for survivors, but the former is negative, while the latter is positive. The entry contribution is small and negative. This suggests that surviving MNCs have gained in profitability, whereas new entering firms are contributing negatively. Reallocation amongst firms is such that it is not necessarily the most profitable which are getting bigger.

The decomposition exercise suggests four main results. First, aggregate profitability has come down from pre-reform to post-reform days, with the declines being driven by surviving local firms. Second, unlike their local counterparts, surviving MNCs have continued to make

[9]The authors cited here use the procedure for decomposing aggregate productivity growth for firms into its constituent elements.

[10]We perform the decomposition for the change between 1990-1996. This is representative of the profitability changes in the period.

higher profits. Third, even though a large number of firms have entered during the period, especially domestic firms, they are too small to have a large impact on aggregate profitability. Fourth, reallocation of assets across firms is not necessarily such that more profitable firms are getting relatively bigger.

3.5.3 Persistence

Having established that MNCs are more profitable than their local counterparts, we would like to investigate whether these profit advantages are persistent. We would like to understand the persistence of above or below normal profits across the profit space. There is a large literature on persistence of company profits.[11] The normal methodology is to regress profits on lagged profitability, with the co-efficient on the lag term giving a measure of persistence. The intercept can be interpreted as a measure of long-run profits. Mueller (1986) goes a step further and calculates intercepts for all firms, thereby getting a measure of long-run profits for each firm.

Here we use transition matrices and mobility indices to investigate the persistence in profits. These techniques have not been used before in studying persistence, and are ideal for exploring profit dynamics and mobility of firms across the profit space.

Transition Matrices & Mobility Indices

To understand the dynamics of profits we employ a model of distribution dynamics that has been widely used in the cross-country growth literature (Quah, (1993), (1996a), (1996b)). Here we closely follow Redding (1999) who uses it to model a country's specialisation dynamics.

Conceptually, an ownership group's pattern of profitability at a point in time, π_{it}, is characterised by the cumulative distribution function of π_{it} across firms, $F_{ot}(\pi)$. Corresponding to $F_{ot}(\pi)$, we may define a probability measure, ϕ_{ot},

$$\phi_{ot}() = F_{ot}(\pi)$$

where ϕ_{ot} is the probability density function for profits across firms i in ownership group

[11] See especially, Mueller (1990) and the chapters contained therein.

o at time t. The dynamics of an ownership group's pattern of profitability corresponds to the evolution of the entire cross-section distribution of π over time. Following Quah (1993) and Redding (1999), the evolution of the cross-section distribution is modelled using a stochastic difference equation,

$$\phi_{ot} = M_o^*(\phi_{o(t-1),}u_t)$$

where M_o^* is an operator mapping disturbances (u_t), and probability measures, into probability measures. Assuming that the mapping operator is time invariant and absorbing the disturbance into the operator definition, we have

$$\begin{aligned}\phi_{ot} &= M_o^*(\phi_{o(t-1),}u_t) = M_o^*(M_o^*(\phi_{o(t-2)})) \\ &= M_o^*(M_o^*(M_o^*...(M_o^*(\phi_{o(t-\tau)})))) = M_o^{*\tau}\phi_{ot}\end{aligned}$$

If we break up the possible values of π into a number of discrete cells $k \in \{1,...,K\}$, M_o^* becomes a matrix of transition probabilities,

$$\phi_{ot+1} = M_o^*\phi_{ot} \qquad M_o^* \equiv \begin{bmatrix} m_{11} & m_{12} & .... & m_{1K} \\ m_{21} & m_{22} & .... & m_{2K} \\ : & : & \ddots & : \\ m_{K1} & m_{K2} & ... & m_{KK} \end{bmatrix}$$

where ϕ_{ot} is now a $K \times 1$ vector

Hence, the above matrix essentially breaks up the profit space to enable us to look at persistence of profits at different profit levels. We can compare firms' mobility within profit intervals in the transition matrices by using a mobility index. A common index is Shorrock's Mobility Index:[12]

$$Shorrock's\ Index\ = \frac{n - tr(n)}{n-1} \tag{3.3}$$

[12]See Shorrocks (1978) and Quah (1996b)

where $tr(n)$ is the trace of the matrix

and n is the no. of columns(rows) of the matrix.

A higher value for the index implies greater mobility across the profit space.

Here we employ two measures to discretize the profit space. The first measure chooses end-points of cells by breaking profit levels into equal intervals. This gives us a measure of overall distribution of firms across the profit space, and we name it as 'levels persistence'. The second measure chooses end-points of cells to assign an equal number of firms to each interval.[13] This measure gives us relative persistence of firms within the profit space, and we call it 'rank persistence.'

Levels Persistence Table 3.7 reports transition probabilities and Shorrock's Mobility Index for Local and MNC firms between year t and $t+1$. We calculate an individual firm's deviation from normal profits by subtracting the industry-year average from the firm's returns. This return is then assigned to one of 7 intervals with range $[-0.3, 0.5]$ and two intervals for all values above and below that range - to make a total of 9 intervals. Each entry $p_{i,j}$ in the matrix signifies the probability of a firm being in the jth interval, given that it was in the ith interval in the previous period. The sum of the probabilities in each row is 1 (100 in our case for ease of illustration). We divide the sample into local and MNC firms and calculate the transition probability matrix for each group, pooling across the entire sample. Persistence is measured by the probabilities in the leading diagonal of the matrix.

Table 3.7 shows that persistence probabilities along the leading diagonal are higher for MNC than for local firms. By comparing the positive and negative segments of the matrix, we find that it is the positive above normal profits which are more persistent for MNCs than the negative ones. The Mobility Index also suggests that MNC above normal profits are 'less mobile' between profit intervals than local firms. (A higher index value implies greater mobility across the profit space).

Figure 3.6 is a surface plot of the transition matrix. The figure reveals the triple peaked structure of profit persistence. If firm deviations from industry-year average profits is close to

[13] Quah (1996b) develops a software package in order to do this. Here, we code it as deciles of firms to get a similar result.

zero, then they continue to tend towards the industry average in the following year. If firms are earning considerably higher or lower profits compared to the average, then the probability that they will continue to do so in the following time period is close to 0.4 for local firms, and 0.5 for MNCs.[14] Figure 3.6c plots the evolution of Shorrock's Mobility Index for MNCs and Local firms. We find that mobility for MNCs has been lower than that for local firms in each year, except 1996.

We can test whether the transition matrices of the MNC and the local firm are similar. We employ a test based on Anderson and Goodman (1957). Our null hypothesis is that the Data Generating Process for the local firm transition matrix is equal to that of the null, which we assume to be the MNC transition matrix. Thus, $f_{ij} = l_{ij}$ with f_{ij} being the null, i.e., the transition probability of the MNC; and l_{ij} is the probability of transition of the local firm.

Then, the transition probabilities for each state k have an asymptotic distribution χ^2

$$\sum_{i=1}^{N} \theta^k \frac{(l_{ij} - f_{ij})^2}{f_{ij}} \sim \chi^2(N-1)$$

$$and\ \theta^k \equiv \sum_{t=0}^{T-1} n^k(t)$$

where $n^k(t)$ denotes the number of firms in cell n at time t.

This test statistic holds for each state $k = 1, ..., N$

Since the transition probabilities are independently distributed across states, we may sum over states, and the resulting test statistic is asymptotically distributed as a $\chi^2(N(N-1))$

We find that we overwhelmingly reject the hypothesis that the transition probabilities of local firms is equal to that of the null at the 1 percent level.

Thus, the transition matrix helps us in identifying three empirical regularities regarding persistence of profits. First, persistence of profits is not uniform among firms with differing 'levels' of profits. In particular, we find that there is a lot of persistence around zero profits, and at the tails of the profit distribution. Second, the persistence of profits for MNCs is greater than

[14]To test for robustness, we calculated transition matrices for each year during the period 1990-97. The matrices and the accompanying surface plots showed that our findings on overall persistence are remarkably similar across years.

that for local firms as evidenced from the lower mobility in the transition matrices, Shorrock's Index, as well as the Andersen-Goodman test. Third, MNC above normal profits seem to persist more than local above normal profits as evidenced from the higher peak at the positive tail of the distribution. To understand these empirical regularities further, we investigate rank persistence.

Rank Persistence One caveat for the peaks at the two tails of the profit distribution is that this might simply be due to the manner in which we've discretised the profit space, and chosen the arbitrary profit intervals. We are perhaps lumping together firms with very large differences in profits in one interval. Hence, even though firms may be earning substantially higher profits, and these profits may be falling over time, but since the tail intervals are open-ended, they are not capturing this movement. Hence, instead of breaking up the profit space into discrete intervals, we assigned the firms into deciles according to their performance in a particular year. For example, if a firm's profitability in a given year was in the highest 10 percentile of all firms, then it was placed in decile 10. Table 3.8a is a transition matrix analogous to table 3.7 above, except that here we compare the *relative* persistence of firms. In the top panel, the number in the first row and column shows the probability that an MNC which was in the 1st decile in one year, stayed there in the next year. The second column of the same row shows the probability of moving to the 2nd decile given that the firm was in the 1st decile the previous year, and so on. Table 3.8b shows the associated numbers of firms transiting from one decile to another.

The table again confirms two earlier observations. First that persistence is higher in the top and bottom deciles than in the middle deciles. Hence, high performers and poor performers tend to stay that way. Second, that MNC high performers are more persistent than local high performers. Figures 3.7a and 3.7b confirm this observation, as the peaks in the tails of the distribution are quite high. Note that the hump in the middle in the overall transition surface plot disappears. This is because there are a large number of firms earning close to zero profits, hence the range of profits that a firm needs to have to be in a particular decile is smaller. Thus, a small change in its profits moves it out of that particular decile and into another one, causing lower persistence in the intermediate deciles.[15] To investigate this further, table 3.8c shows the

[15] We performed the same exercise using quintiles, and the results were very similar.

summary statistics of the persistence in deciles. Column 1 shows the end-points of the deciles. Column 2 shows the median returns in the deciles. We plotted this column and the resultant figure 3.8c shows that the gap in median returns among local and MNCs are in the high deciles - namely from 7 onwards. Column 3 shows the annual median change in firm's profits in a given decile. Again we observe that there has been significantly higher changes in the 8th and 10th decile for MNCs relative to local firms. Finally, column 4 displays the inter-quartile range. Here we notice how the ranges are high at the tails of the distribution and low at the middle. This confirms the earlier observation that for firms earning close to zero profits, a small absolute change in profits moves them into another decile. Hence there is less persistence in the middle deciles.

To summarise, we considered both the absolute persistence of profits across the profit space as well as the relative persistence of profits. The related transition matrices and surface graphs showed that

a) There is significant persistence in profits of firms.

b) Persistence of profits is not uniform among firms with differing 'levels' of profits. In particular, we find that there is a lot of persistence around zero profits, and at the tails of the profit distribution.

c) The persistence of profits for MNCs is greater at the positive tail of the distribution than the negative one. Thus, MNC above normal profits seem to persist more than MNC below normal profits.

d) MNC above normal profits seem to persist more than local above normal profits.

e) The highest decile and lowest decile of performers tend to stay that way.

f) The profits of the highest MNC performers are more persistent than the profits of the highest local performers.

Thus, there is evidence to suggest that there is a group of MNCs which are persistently earning high profits, which are driving the difference in profitability between the two groups.

3.6 Conclusions

The conclusions that can be drawn from the above analysis are the following. Using sectoral inflow data, we find some evidence that MNC activity in India is mostly of the horizontal type. This is based on three pieces of information. First, the type of industries in which they locate are primarily high-tech, high wage, scale-intensive and differentiated goods industries. Second, the share of wages in total costs of production are lower than 15 percent. Third, the sales of MNCs are concentrated in the domestic market, with fewer than 10 percent of sales going for exports.

Comparing the characteristics of MNCs versus local firms we find that they are larger in size, have similar export and import intensities as local firm, have lower average costs of production and pay higher wages, spend more on R&D and Advertising, and have similar proportions of imported inputs to sales. Considering the performance of the two ownership groups reveals that on aggregate MNCs have consistently outperformed local firms over the sample period.

The decomposition of profits shows us that changes in overall profits for local as well as MNCs are being driven by changes in average profitability for surviving firms. Even though the period has seen a lot of entry, the new firms are not having a large impact on aggregate profits. The interesting result is that whereas surviving local firms are getting less profitable, surviving MNCs on average are becoming more profitable. This could be due to efficiency differences or mobility barriers. This issue is explored in greater depth in Chapter 4 below.

According to the Schumpeterian concept of competition, firms earning above normal profits cause entry and then through the forces of competition and imitation see their profits erode. Successful firms are those which are continually innovating, whereas unsuccessful firms exit. There is thus a reversion towards the mean. We investigated the dynamics of profits in Indian industry. We found that there is a lot of persistence in profitability. There are a lot of firms earning close to zero profits at any given time. However, we find that persistence is particularly strong in the top and bottom deciles, i.e., the highest and poorest performers tend to stay that way. There are differences between MNC and local firm profits. The differences in aggregate profits between MNCs and local firms seem to be driven by the top performing MNCs earning persistently higher profits than the top performing local firms.

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Chapter 4

FDI Reforms and Local Firm Performance

4.1 Introduction

When the motivating force for FDI is proximity to final customers, then competition with local firms becomes a key issue. There is a large theoretical and empirical literature which looks at the effects of multinational entry on domestic competition. This chapter adds to that literature by providing new evidence from India on the impact of multinational entry on domestic firm performance.

One of the reasons why countries encourage inward foreign direct investment is that such activity fosters greater competition and therefore improves allocative efficiency in hitherto protected markets. The reasoning is that since MNCs tend to populate industries where barriers to entry are high, they may pare down monopolistic distortions and raise productivity of the host country's resources by improving their allocation. In an economy such as India, with a history of state domination and stifling regulation of industry, such increases in competitive pressures can have substantial benefits.

The outcome of multinational entry on domestic industry performance is by no means clear-cut. There are at least five possible outcomes. First, if MNCs are more efficient than their rivals, the outcome would be a reduction in profit margins of domestic firms. Second, the MNCs coming in perform a different array of activities than local firms, claim moderate market

shares and settle into a sort of market equilibrium without impacting local profit margins. Third, the MNC themselves drive out local firms, and then start reaping monopoly profits by restricting entry. Fourth, the multinational has a positive effect on market concentration, then all firms would be making greater profits. Fifth, if the MNC, lacking familiarity with local conditions is driven out of the industry without affecting local firm performance.

This chapter attempts to isolate the impact of multinational entry on domestic firm performance in India by looking at the effects of the 1991 liberalisation of the FDI regime. Our results suggest that liberalising the FDI climate did indeed foster greater competition, as measured by declining local firm profit margins. This result is reassuring as it suggests that increased access by MNCs did enable greater competition thus leading to improvements in allocative efficiency.

4.1.1 Firm versus Industry View

Apart from the impact of MNC entry, a robust finding across several previous studies is that multinationals in India have earned persistently higher profit margins than their local counterparts.[1] Our analysis in Chapter 3 above suggests that MNCs consistently outperform local firms in Indian industry in the time period under consideration. We seek to investigate the sources of these differences in performance. The conventional market structure-conduct-performance paradigm relates profitability to the degree of seller concentration and the height of entry barriers. However, entry barriers are industry specific and expected to protect all firms in the industry in proportion to their sales. Thus, the structure-conduct-performance framework does not help in explaining systematic intra-industry differences in profitability.

The 'firm' versus 'industry' debate in the IO literature to the sources of firm profitability suggest that there could be two competing hypotheses explaining the superior performance of MNCs in India. According to the 'firm view,' superior ability or entrepreneurship is the source of inter-firm differences in profitability.[2] Hence, MNCs are more profitable due to greater efficiency than local firms. This could be due to MNCs possessing rent-yielding intangible assets as discussed in Chapter 1. These productivity differences would then allow pre-existing MNCs to continue deriving rents even with new entry into the industry.

[1] See Kumar (1990)

[2] As first expostulated by Bain (1956) and developed by Demsetz (1973).

Alternatively, the 'industry view' states that inter-group differences in profitability can be explained in terms of strategic heterogeneity of firms. In particular, there are mobility barriers within an industry to the erosive forces of imitation, competition, and expropriation which allow some firms to earn persistently higher profits.[3] According to this view, MNCs in India are not necessarily more efficient but form a strategic group within an industry which is protected by mobility barriers leading to higher profits.

The concept of strategic groups is based on the observation that there are alternative ways of doing business in an industry and that the strategy of firms in any particular industry differs in terms of the mode of competitive rivalry, degree of vertical integration, geographical extent of markets served, nature of distribution channels employed, breadth of product line etc. An industry is therefore composed of groups of firms, and firms in a group are similar to each other in terms of competitive strategy. One implication of this concept is that entry barriers are partly specific to the strategic groups and partly to the industry. The entry barriers not only impede fresh entry to the industry but also more importantly, restrict inter-strategic group mobility of existing firms. Hence these mobility barriers may be the source of persistent advantage and might explain the higher profit margins enjoyed by MNCs in the industry. The strategic differences between firms could be reflections of their tangible and intangible assets (Porter 1979) or alternative business strategies. For MNCs the intangible assets could be brand goodwill, proprietary technology, captive access to the parent's research laboratories, reservoirs of organisational and managerial skills, and information networks. This might affect the structure of markets and domestic rivalry. Alternative business strategies include predatory pricing, the use of 'deep pocket' advantages to promote non-price competition, the provision of intra-group services at below marginal cost, a willingness by the parent company to accept below normal profits and dividends from its affiliates, the manipulation of cross-border intra-group prices, and so on.

In this chapter, we distinguish between the firm view and industry view, by allowing new MNC entry. If the industry has mobility barriers with strategic groups of firms, then the existing MNCs would face renewed competition from the new firms and barriers would be reduced leading to lower profits. If the old firms continue to make high profits then there is

[3]See Caves and Porter (1977), and Ghemawat (1991) for an exposition of the 'industry view'.

evidence against the existence of such mobility barriers.

We find that the effect of liberalising the FDI regime has not had a significant impact on the existing MNC margins. Combining this result with the findings in Chapter 3 above suggest that our findings are not inconsistent with the hypothesis that efficiency differences are the source of higher MNC profitability.

As discussed in Chapter 1, India liberalized its foreign investment regime in 1991, as part of a larger macro-economic reform and structural adjustment program after being faced with a severe balance of payments crisis. In that sense, the timing for reform was exogenous. The need for foreign exchange to counter large scale losses in external reserves was the precipitating factors for changes in the FDI regime rather than any particular stage in the evolution of the selected industries. Hence, they provide an ideal experiment in which multinationals enter a previously protected domestic industry.

In keeping with the experimental design, we can identify a set of industries in which FDI was encouraged. These form our treatment group. On the other extreme we use a set of industries where FDI was particularly discouraged. Firms in these industries were subject to compulsory industrial licensing due to strategic, national, and environmental reasons. These industries form our control group as they experienced little effects of the changes to the FDI regime. By exploiting the differences between these two groups of industries we can attempt to identify the impact of the easing of FDI entry restrictions.

We use a firm-level panel data set which includes observations before and after reforms to get around some of the identification issues. By exploiting differences within an industry before and after the reforms, we can better estimate the impact of FDI. We also provide evidence on whether different firms are affected differently by certain kinds of reforms.

In this study, we use firm profitability as a measure of firm performance. A large body of recent empirical work has used productivity as the variable of choice in measuring the impact of FDI competition. Our measure is in large part dictated by data limitations. Employment data at the firm-level in India is notoriously difficult to find. Hence measures of productivity would at best be indirect. Second, as a measure of firm performance, profitability would adequately capture any competitive pressure arising from the entry of multinationals.

The rest of this chapter is organised as follows. Section 2 discusses the reasons why there

may be differential impacts on MNCs and local firms. The next section provides the institutional details of India's industrial reforms. Section 4 lays out a simple model of profitability. The following section explains the empirical methodology used. Section 6 presents the basic results. The next section discusses these results. Finally, section 8 concludes.

4.2 Related Literature

MNCs have certain properties that make them distinct from other local competitors. Given the differences between these two groups of firms mentioned above, it is worth repeating here the theoretical consequences of these differences. The proprietary asset hypothesis about the basis for MNCs seems to suggest that they will compete in an industry in ways that use their proprietary assets to best advantage. Further, the MNC's diversification allows it to undertake riskier activities than firms with fewer options for spreading their risks, and therefore might earn higher average profits. To the extent that MNCs tend to be larger than their local counterparts and are more geographically or industrially diversified they should be better able to take advantage of any economies of size and scope.

MNCs are generally more successful at protecting themselves against the adverse effects of environmental volatility and market failure. They do so by adapting their products and processes to customer requirements, price changes and technical developments, and by reducing their exposure to both technological obsolescence and reductions and fluctuations in demand. Further, because of their industrial and geographical spread, they have more flexibility than uninational or non-diversified firms in the sourcing of their inputs, in the relocation of their investments, and in the markets they choose to serve.They also attempt to counteract exchange risk by appropriate locational or intra-firm pricing policies.[4] Evidence from the response of MNC affiliates to the economic recession in Columbia in 1980 suggests that in the following four years they displayed a speedier and more pronounced recovery pattern then their indigenous competitors (Atyas and Dutz, 1993). The authors ascribe this fact to the lower agency costs and less stringent liquidity constraints incurred by the foreign affiliates.

As a general proposition, one might expect that affiliates of MNCs will engage in more

[4]See Dunning (1993)

non-price competition than indigenous firms in the same industry. This is partly because the types and range of products of the parent company are likely to be different from those of firms in the host country, and partly because one of the main ownership advantages of MNCs is their possession of assets which encourage product differentiation and diversification.

A MNC new to a national market likely proves a disturbing competitive force. Any entrant is likely to disturb an industry with few sellers, but the MNC, lacking familiarity with local customs, is less likely to fall in with any prevailing pattern of co-operation. This prediction has been documented by the complaints of national rivals (Behrman (1970) provides examples). Domestic competitors' reactions will include attempts to emulate or offset the proprietary assets brought by the foreign investor. On the other hand, as the subsidiary ages and "goes native," its competitive manners improve as its market conduct becomes less distinguishable from that of domestically controlled enterprises.

Although the fact that MNCs possess proprietary advantages relative to local firms might suggest that they could be both more profitable and productive, there is no a priori reason why this should be the case. Dunning (1993) provides five reasons why one cannot predict the relative profitability of MNCs. First, foreign firms may be faced with certain competitive disadvantages vis a vis local firms in penetrating the latter's markets. The second factor has to do with purposes of FDI. Dunning lists five types of FDI: resource based, market based, rationalised specialisation of products or processes, trade and distribution, and miscellaneous. Not all types of FDI will automatically lead to higher efficiency relative to local firms in the host country. The efficiency may be of secondary concern to MNCs that wish to safeguard their supplies of raw materials or intermediate products or acquire superior technologies or capabilities to advance their global strategic goals. Thus it is not necessary for MNCs to earn higher average rates of return than local firms. Third, although MNCs may be more efficient as suppliers of intermediate products, they are not necessarily better at adding value to these products than domestic firms. They may fail. Fourth, MNCs may use their ownership advantages to exploit a monopolistic position rather than to improve efficiency. An increase in productivity or profitability may accrue entirely to the investing company via means of transfer pricing, and will not be reflected in the performance of subsidiaries. Finally, MNCs may be satisfied by earning profits from an FDI project that are equal to its opportunity costs.

4.3 Industrial Reforms

Ever since the late 1960s, Indian industry has been protected with a complex web of rules and regulations in the drive for nationalisation of 'strategic industries,' and import-substitution policies. The era is infamously referred to as the 'licence-permit raj' signifying the numerous licences and permits needed to operate industry. Multinationals, although having a presence in India since colonial times,[5] were actively discouraged in this era. In 1991, faced with a severe balance of payments crisis the Indian government underwent a host of reforms to liberalise trade and industry. Prominent among these were the relaxation of rules governing foreign direct investment. As against the previous policy of considering all foreign investment on a case by case basis and that too within a normal ceiling of 40% of total equity investment, the new policy provided for automatic approval of FDI up to 51% of equity in a specified list of 35 high priority, capital intensive, hi-technology industries. The caveat was that the foreign equity covers the foreign exchange involved in importing capital goods, and outflows on account of dividend payments are balanced by export earnings over a period of 7 years from the commencement of production.

Foreign technology agreements were also liberalised for the 35 industries with firms left free to negotiate the terms of technology transfer without the need for government approval. Further, investment above 51% equity was also permitted on the basis of case by case approvals given by a specifically constituted Foreign Investment Promotion Board (FIPB) charged with expeditious processing of government approvals. The infamous Foreign Exchange Regulation Act (FERA) was amended to remove a number of constraints earlier applicable to firms with foreign equity operating in India and also to make it easier for Indian businesses to operate abroad.

India signed the Multilateral Investment Guarantee Agency (MIGA) Convention and became a member of MIGA along with many other developing countries interested in promotion of foreign investment.

The prohibition against the use of foreign brand name or trademark in goods sold in the

[5]British multinationals were the most common during the era, with firms such as Burroughs-Welcome - (incorporated in 1912), ITC Ltd. - India's 3rd largest company in 1997 started as Imperial Tobacco Company (1910), and Glaxo India (1924) operating as wholly-owned subsidiaries.

domestic market was withdrawn. All industrial licensing was abolished, except for certain industries related to security and strategic concerns and concerns related to safety and overriding environmental issues.

On a cumulative basis, FDI approvals between April 1991 and September 1998 were of the order of $54,268 million whereas actual FDI during the same period was $11,806 million. Therefore, actual FDI as a proportion of FDI approved was only 21.7%. Yet, the amount was a quantum jump from the pre-liberalisation era.

The reforms in FDI approval were further augmented by changes in laws pertaining to industrial licencing. Under this notification, industrial undertakings were exempted from the operation of Sections 10, 11, 11(a) and 13 of the Industries (Development and Regulation) Act of 1951. Section 10 refers to the requirement of registration of existing industrial units. Section 11 refers to the requirement of licensing of new industrial undertakings. Section 11(a) deals with licences for the production of new articles. Section 13 refers, inter alia to the requirement of licensing for effecting substantial expansion.

The industrial policy had three schedules. Schedule I had a list of industries reserved for the public sector. Schedule II listed industries which were subject to compulsory licencing. Schedule III which was the articles reserved for the small scale/ancillary sector.

Given the above changes in industrial policy legislation, we can identify a set of industries - which are the high-priority industries where FDI was allowed through the automatic route. We can also identify a group of industries where FDI was discouraged, and which were subject to compulsory industrial licencing due to strategic, environmental, and national concerns. These two groups would then form the basis of our comparisons.

4.4 Modeling Profitability

The literature on modeling profitability is substantial. Given that our primary focus is on testing the effects of reforms, we require a fairly simple estimatable model of the determinants of profitability rather than rigorous structural estimation. Here we follow the modeling structure of Machin and Van Reenen (1993) for its simplicity and ease in estimation.

We assume that industries are not purely competitive, nor are all firms in long-run equi-

librium. Rather, an industry can be earning excess profits on account of barriers to entry of new firms. The industry includes firms of varying efficiency, their individual rates of profit accordingly distributed about the industry mean.

Ever since Cowling and Waterson (1976), a substantial amount of empirical work on the determinants of profitability have been based on versions of a homogeneous product oligopoly model. In this model the profit margin for a profit-maximising firm i is given as:

$$\left(\frac{\pi}{S}\right)_i = m_i\left(1+\lambda_i\right)/\varepsilon \tag{4.1}$$

where S is firm sales, m_i is market share, λ_i is the conjectural variation term and ε is the industry price elasticity of demand.

The critical component in formulating estimatable models is the treatment of the unobserved variable λ_i. Clarke and Davies (1982) suggest that if firm i has a share m_i , then the magnitude of the other firms' output responses will be given by the ratio of their summed market shares to i's share. Accordingly they model the conjecture term as $\lambda_i = \alpha_i\left(1-m_i\right)/m_i$

If we substitute this expression for λ_i in (4.1) we get:

$$\left(\frac{\pi}{s}\right)_i = \left[\alpha_i + \left(1-\alpha_i\right)m_i\right]/\varepsilon = \left[(1-m_i)\alpha_i + m_i\right]/\varepsilon \tag{4.2}$$

Profit margins here are a weighted average of $1/\varepsilon$ and m_i/ε which are the margins under monopoly/perfect collusion and Cournot respectively. Here $\alpha_i = 1$ implies total collusion while $\alpha_i = 0$ suggests Cournot behaviour. This formulation, as pointed out by Kwoka and Ravenscraft (1986) is empirically useful as the α_i term only enters in an interactive fashion with $(1-m_i)$.

In the above formulation, λ is decreasing in m_i so that larger firms have smaller conjectures. Clearly, this may not hold in practice. To allow for this possibility, we follow Machin & Van Reenen and use the more general formulation $\lambda_i = \alpha_{1i}\left(1-m_i\right)/m_i + \alpha_{2i}\left(1/m_i\right)$

Here there are two components shaping conjectures: the first is the Clarke-Davies strategy of matching output according to market share distributions and the second has conjectures shaped by own market share[6]. This generates:

[6]Schmalensee (1987) has also generalised the conjecture term as $\lambda_i = \lambda + \gamma(m_i - 1/N)$ where N is the number of firms in the industry

$$\left(\frac{\pi}{s}\right)_i = [(1-m_i)\alpha_{1i} + \alpha_{2i} + m_i]/\varepsilon \qquad (4.3)$$

which simplifies to (4.2) if $\alpha_{2i} = 0$

To translate to an estimatable formulation we need to make a number of steps. First, we need to empirically model the α coefficients in equations (4.2) and (4.3). In existing empirical work based on the Clarke-Davies approach, α has been assumed to be a linear function of industrial concentration. Here, we use a more general approach in which the α parameters are treated as a time-varying function of industrial variables such as concentration and import intensity, and previous profitability. This formulation of α recognises that the gains from collusion are likely to be influenced by market structure and dynamic behaviour.

Secondly, traditional studies have been plagued by problems of omitted variable bias. For instance, there are a number of unobservable determinants of profits whose exclusion may seriously bias estimated coefficients. By using panel data we can control for time-invariant unobservables via fixed effects. The firm specific fixed effect, γ_i captures effects such as management style and corporate culture.

Defining the α parameters in (4.3) as

$\alpha_{kit} = X'_{jt}\Phi_{k1} + \Phi_2 (\pi/s)_{it-1}$ $(k = 1, 2)$

where X_{jt} denotes the industrial variables of interest, equation (4.3) can be rewritten as:

$$(\pi/s)_{it} = \gamma_i + \theta_1 (\pi/s)_{it-1} + \theta_2 m_{it} + X'_{jt}\theta_3 + ((1-m_{it})X'_{jt})\theta_4 + \theta_5(1-m_{it})(\pi/s)_{it-1} + v_t + u_{it} \qquad (4.4)$$

where u_{it} is an i.i.d. error term and v_t contains time-specific effects.

We can rewrite equation(4.4) above as:

$$(\pi/s)_{it} = \gamma_i + \delta_1 (\pi/s)_{it-1} + \delta_2 m_{it} + X'_{jt}\delta_3 + (m_{it}X'_{jt})\delta_4 + \delta_5 m_{it}(\pi/s)_{it-1} + v_t + u_{it} \qquad (4.5)$$

where the δ parameters are simple functions of θ parameters. This formulation is adopted as it is a standard model incorporating interactions between market share and other variables

in the model.

Equation (4.5) is a fairly general model of profit determination and has the desirable property of nesting a number of popular models in the existing literature. For instance, it can be compared to the conventional linear static models specified in the structure-performance literature by testing the restriction $[\delta_1, \delta_4, \delta_5] = 0$.

A slightly weaker restriction $[\delta_4, \delta_5] = 0$ simplifies the model to a standard linear model with a partial adjustment mechanism for margins.

The estimation strategy for equation (4.5) is discussed next.

4.5 Empirical Methodology

We implement a difference-in difference estimation technique to ascertain the effects of industrial reforms on profitability. By analogy with the experimental terminology, we refer to those industries which have been subject to reform legislation as *treatment* industries and to firms in those industries as *treatment firms.* Similarly, we refer to industries which have not been liberalised as *control industries*, and firms within them as *control firms.* In the first level of differences, one can in theory subtract the value of the outcome variable of interest, in our case profitability, after the reforms from its value before the reforms. Since we can do this for both control and treatment, we get two sets of differences: $\Delta^T \pi$ for the treatment group and $\Delta^c \pi$ for the control group. By itself, $\Delta^T \pi$, could be a misleading estimator of the laws' impact since other changes contemporaneous with the laws affect this estimate. To deal with this, we introduce a second level of differences. If contemporaneous shocks affect treatment and control groups in roughly similar ways, then those shocks should also be contained in $\Delta^c \pi$. One can therefore subtract $\Delta^c \pi$ from the first difference $\Delta^T \pi$ to estimate the effect of the law.

The difference-in-difference model can be specified as:

$$\pi_{ijt} = \gamma_i + \nu_t + \beta * treatment_j * post_t + \sum \phi \Omega_{ijt} + \eta_{ijt} \tag{4.6}$$

where i indexes firms, j indexes industry, and t indexes time.

The dependent variable is our indicator of the effects of FDI reforms on firm performance, i.e., profitability. The right hand side variables include a firm fixed effect γ_i, a year fixed effect

ν_t, a series of control variables Ω_{ijt}, that vary over firms, industry, and time. Note that Ω_{ijt} includes the lagged dependent variable and the other explanatory variables in 4.5 above. The $treatment_j$ is a dummy variable for an industry which has been subject to industrial reforms. The $post_t$ is a dummy for the period after reforms.

This methodology fully controls for fixed differences between the treated and non-treated firms via the firm fixed effects. The year dummies control for aggregate fluctuations. The estimate of the effect of FDI reforms is β, the coefficient on the interaction term: change in outcomes after the reforms specific to firms in industries which have been subject to the new legislation.

The difference-in-difference model makes the counterfactual assumption that the treatment firms would show similar rates of profitability as the control firms if there were no reforms. While this assumption is not directly testable, we can test whether the treatment firms and the control firms showed similar characteristics in the pre-reform period. If we do find that they were indeed similar, it would suggest that our counterfactual assumption would be correct. As table 4.2 shows, the treatment and control group did have similar profit margins in the pre-reform period.

4.5.1 Estimating Profitability

The primary issue in estimating profitability (equation 4.6), is the lagged dependent variable which causes problems in getting consistent estimates by the usual panel data techniques. Specifically, since profit margins are a function of the firm fixed effect γ_i, lagged profits are also a function of γ_i. Therefore, a right hand regressor is correlated with the error term rendering the OLS estimator biased and inconsistent. For the fixed effects estimator, the Within transformation wipes out the γ_i, but does not solve the problem of correlation between the regressor and the error term.[7] The same problem occurs with the random effects GLS estimator.[8]

[7] To see this, note that the Within transformation means that the lagged dependent variable becomes - $(\pi/S)_{i,t-1} - \overline{(\pi/S)}_{i.-1}$ where $\overline{(\pi/S)}_{i.-1} = \sum_{t=2}^{T}(\pi/S)_{i,t-1}/(T-1)$. But it will still be correlated with $u_{it} - \overline{u}_{i.}$ because $(\pi/S)_{i,t-1}$ is correlated with $\overline{u}_{i.}$ by construction. (The latter average contains u_{it-1} which is correlated with $(\pi/S)_{i,t-1}$)

See Nickell (1981) for the derivation of this asymptotic bias

[8] See Baltagi (1995) for details

An alternative transformation that wipes out the individual effects, yet does not create the above problem, is the first difference (FD) transformation. Anderson and Hsiao (1981) suggest a methodology based on first differencing. They suggest using the dependent variable lagged two periods as an instrument for the first difference term of the dependent variable on the right hand side. These instruments will not be correlated with the first difference error term as long as the η_{ijt} themselves are not serially correlated. This method leads to consistent but not necessarily efficient estimates of the parameters in the model because it does not take into account the differenced structure of the residual disturbances.

A more efficient procedure to estimate dynamic panel data models is the Arellano and Bond procedure. The advantage of this procedure relates to its efficient utilisation of available instruments. The procedure obtains additional instruments by utilising the orthogonality conditions that exist between lagged values of the dependent variable and the disturbances. Thus, more instruments can be used as the panel progresses yielding efficiency gains relative to other estimation methods.[9] Hence, we use the Arellano-Bond technique in what follows.

For comparison purposes we also present estimates for the OLS, and fixed effects estimators.

4.5.2 Data

We use the Prowess database described in Chapter 3 above. There is balance sheet information on firms for the period 1989-1997. Hence, this covers the reform period which began in 1991. The data allows us to distinguish between multinationals and local firms. It also has information on profitability, sales, size, and imports.

The firms are grouped under 127 industries at the 3 to 4 digit level on the Indian classification scheme called Indian Trade Classification (Harmonised System), based on the major activity of the firm. Firms which don't have any one major activity are classified as 'Diversified'.

The list of industries which were allowed automatic approval for upto 51% foreign equity is taken from Annex III of para 39 of the Handbook of Industrial Policy and Statistics, 1991-92. These high priority industries are then individually matched with the Prowess database to give us the 'treatment' sample of industries in which FDI was encouraged. The industries are listed in table 4.1 (Treatment and Treatment2).

[9] See Arellano and Bond (1991) for details.

The 'control' sample of industries is found by referring to the Industries Development and Regulation Act of 1951. This act lists industries which are reserved and not open to foreign direct investment for a) reasons of public interest; b) activities reserved for the small-scale sector; and c) polluting and strategic industries which require compulsory licensing. By matching this list with the database, we can extract 13 industries in which FDI was discouraged, and this forms our 'control' group. We clean up the data by removing implausible outliers.

The measure of profitability we use is return on sales (profit margins) which is our dependent variable. Our measure for concentration is the C-4 ratio - the sum of the market shares of the largest four firms in the industry. Using alternative measures such as the Herfindahl index didn't alter the results. We computed market share for each firm by using the ratio of its total sales to the industry's total sales for the given year.[10]

4.6 Basic Results

Table 4.3 presents results of estimating equation (4.5). Columns (1) and (2) present results from using the Arellano and Bond estimation technique outlined above. The variable $reforms1$ is our first measure of industrial reforms. It takes a value of 1 if the firm belongs to a treatment industry, i.e., subject to liberalisation as discussed above.

We see that the co-efficient of the reforms dummy is negative and significant at the 1% level. The rest of the explanatory variables all have the expected sign and are significant. Thus, like much of the persistence of profits literature (Mueller (1990)), the dominant influence is lagged profitability which is very significant. A higher market share implies larger profitability, and concentration in the industry is positive and significant even after controlling for market share.[11]

Given that the sample period was characterised by significant trade reforms, which could have had an impact on firm profit margins, we need to control for the effect of trade policy. To capture the impact of trade reforms we include the import intensity of the industry as a right

[10]Since each firm is classified in an industry based on its major activity, it is likely that some of its sales are in other industries. The market share of a firm would be overstated only if a larger fraction of its sales are in other industries compared to its rivals in its major activity industry. The classification of firms with large fractions of sales in different industries as 'diversified,' reduces this problem.

[11]Other variables prominent in the literature, such as R&D intensity, Capital Turnover ratio, Log of Initial Sales, Asset Growth in industry were also used as explanatory variables as part of X'_{jt}. These were not significant in any estimation, and hence are not reported here.

hand side variable. We find that it is insignificant in all specifications.

To investigate the sensitivity of our results to our groupings of 'treatment' and 'control' industries, we constructed alternative 'treatment' groups. We consider industries as treatment industries if they fulfil three criteria - i) they are on the list of high-priority industries; ii) there is some MNC presence in the industry in the industry; iii) there is at least one foreign firm which has entered the industry in the post-reform period. This criteria ensures that our treatment group has industries which are not only open to FDI but have also actually seen some inflow occurring. We label this group as 'treatment2' and a list of these can be found in table 4.1. The dummy associated with this treatment group is called $reforms2$.

Column (2) shows that $reforms2$ is negative and significant, indicating that among the treatment industries, if we consider those that have seen some multinational entry, there is a negative effect of reforms on profitability.

For comparison purposes we also present results from the OLS and Fixed Effects estimations in columns (3) and (4).[12] Given the problems discussed earlier that these estimations suffer from, we nevertheless find the reform dummy - $reforms2$ - significant in both regressions.

We test for identification by employing the Sargan test. The null hypothesis is that the parameters of the model are identified. We employed several different specifications to avoid overidentification. The specifications reported in Tables 4.3 and 4.4 pass the Sargan test, and hence the parameters are identified.

Since we have a differenced lagged dependent variable in the Arellano-Bond estimation, we need to check for second-order serial correlation in the error terms.. Our preferred models in Tables 4.3 and 4.4 cannot reject the null of no serial correlation in the error terms.

4.6.1 Multinationality

The results reported above were for all firms in the control and treatment groups. This aggregation glosses over the difference in profitability within different groups of firms. The reforms may have affected the profits of different ownership groups separately. As mentioned earlier, India had a substantial presence of multinationals in colonial times, and even after the stringent

[12] We also estimated equation (4.6) using the Anderson and Hsiao technique mentioned in the empirical section. Due to the efficiency loss in this technique, however, we did not find any explanatory variables significant. Hence we do not report the results.

controls on new entry, they continued to operate in industry. The existing multinationals in the industry could have been either more efficient to counter the threat of new entry or able to deal with the new competition to be unaffected by it.[13] Hence, we split the sample into local firms and multinationals. The results are presented in Table 4.4.

Column (1) & (2) show the results for the sample containing local firms. We find that both the reform dummies are negative and significant at the 1% level. When we consider only multinationals - as in column (3) & (4), we find that the reforms dummy becomes positive and insignificant. Hence, the reforms do not seem to have affected the profitability of existing MNCs in the industry.

4.7 Discussion

If foreign investment has any special virtue for increasing allocative efficiency, the profit rates of domestic firms should be inversely related (ceteris paribus) to the competitive pressure supplied by foreign firms. The above results suggest that the FDI reforms did indeed reduce profit margins for local firms in the industries which were subject to the reform. However, we do not find any evidence that encouraging new multinationals has reduced the profits of the pre-existing set of multinationals. Hence, there is some evidence that the multinationals and local firms have differed in their response to reforms.

The legislations, by allowing FDI through the automatic route, lowered the entry costs for multinationals. Given that these were allowed only in high-technology and capital intensive industries, they were in industries with high levels of concentration. The entry of multinationals increased competition, which reduced profits. There is thus, some evidence to suggest that inefficient local firms were earning above normal profits in the previous regime due to protection afforded by barriers to entry, in the form of restrictions on entry of multinationals. For the pre-existing group of multinationals, the reforms did not affect their profitability. They were more efficient than the local firms and could withstand the increased competition from new entry.

[13]Note that MNC profits could be overstated due to transfer pricing issues. However, Indian corporate taxes during the period were higher than average US corporate taxes (using the US as a proxy for global taxes). Hence, if anything, MNCs had a reason to understate their domestic profits.

These findings confirm the results from the analysis on persistence of profits in Chapter 3 above. We found that differences in profitability between local and MNCs were being driven by differences between the top performing firms in these groups. Specifically, a group of high-performing MNCs who existed in the pre-1991 era were persistently outperforming their counterparts. The 'firm' versus 'industry' hypothesis could claim these to be either due to efficiency differences or due to strategic mobility barriers between these two groups. The results presented above are not inconsistent with the hypothesis that it is efficiency differences which are driving the wide disparity in performance.

Two pieces of information are quite relevant - a) Indian industry was booming during this time; b) MNC market share was not too high. This seems to suggest that even though there was a reduction in profit margins, the multinationals themselves were not in a monopolistic position in these industries.

By considering alternative groups of treatment industries we tested whether our results were sensitive to the group of treatment industries. If we consider the narrower group of industries that actually saw some MNC entry, our basic results are reinforced. However, any construction of industries based on ex post realisations (such as actual MNC entry) makes the treatment group endogenous and hence not entirely credible. Yet, we present the results for illustration.

Beginning in 1991, there was simultaneous reforms on a number of fronts in Indian industry. In this chapter we make claims on the effects of the liberalisation of FDI rules. However, there was a concurrent delicencing of many industries which were hitherto governed by strict rules and licencing requirements. Our treatment and control groups are unable to distinguish between these two reforms, as the control group is constructed on the basis that those industries still required licencing. To investigate this further, we split the industries according to licencing requirements. That is, into a control group - requiring compulsory licencing, and all other industries - where licencing was abolished. For this larger sample, the reforms dummy was insignificant, thereby suggesting that the actual impact for the subset of delicenced industries we include as treatment was coming from the FDI reforms. There may or may not have been an additional impact on profit margins coming from delicencing for these industries.

There is an issue of sample selection bias as the industries open to FDI were all high technology and capital intensity. This would be an issue if there are inherent characteristics of

these industries which make them more or less profitable than others. There is also the problem of endogeneity of MNC entry as they would likely enter industries whose profitability is expected to increase. These problems are mitigated by the inclusion of firm fixed effects, which would also capture the industry fixed component, as well as the fact that we see profitability evolving in different ways for different firms in the industry.

All of the above empirical tests are based on accounting profits rather than economic profits. As Fischer and McGovern (1991) have pointed out, these are different concepts which are similar only by chance. To the extent that our results suffer from these measurement errors, our hypothesis is restricted to only accounting profit margins, rather than any claims on economic profit margins.

We have also imposed a functional form on the profit function based on a very simple homogeneous model. More structural estimation would utilise a functional form based on a more rigorous model of profitability and competition. Moving to a more involved model based on product differentiation remains the objective of future research.

Another limitation of the study is that our measures of market share and concentration are only approximations to the actual market shares of firms. To the extent that our data set does not include small firms which are not publicly listed - our market shares may be too high. Hence, the larger domestic firms, i.e., those which are listed may be affected differentially from smaller ones - which may be operating in niche markets without being affected by MNCs.

4.8 Conclusions

This chapter aimed to test a limited hypothesis. Does the entry of multinationals lead to an increase, decrease, or no change in profitability of local firms. Evidence from the Indian FDI reforms of 1991 suggests that legislation to allow easier entry for multinationals in Indian industry has contributed to increased allocative efficiency as measured by the fall in profit margins of local firms. This result is reassuring for the large literature on MNC entry which seems to predict similar conclusions. Existing multinationals have not been affected by the increased competition. This finding is not inconsistent with the 'firm' view which states that differences in performances are due to efficiency differences between multinationals and local

firms in Indian industry.

There are several possible extensions to the analysis presented in this chapter. First, future research could try to explain the dynamic mechanisms through which profitability of local firms were affected and foreign firms not affected by new multinational entry. Second, what was the impact of MNC entry on market structure. Third, what was the impact on productivity of local and multinational firms of new MNC entry. These and other related issues would require further research.

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Chapter 5

Export Behavior of Indian Firms

5.1 Introduction

One of the key motivations for the Indian economic reforms starting from 1991 was to improve the export performance of Indian firms. As trade and industry have been progressively liberalised, there has been a boom in exports. Total exports of goods and factor services went up from about 401 billion rupees in 1991 to about 1271 billion rupees in 1997 in absolute terms.[1] Hence, any attempt at analysing and assessing economic performance in the post-reform phase must seek to understand the factors which drive exporting behaviour of Indian firms. In this chapter, we provide empirical evidence on the export decision by Indian manufacturing firms. In a dynamic framework, we consider the impact of sunk costs, individual firm characteristics, and spillovers from multinationals and other exporting activity during a period of extraordinary export growth.

Chapter 3 above discussed some empirical regularities on export behaviour during the period. First, there has been a large increase in export intensity for all manufacturing in the post-reform period (Figure 5.1). Second, a preliminary look at the data seems to suggest that rather than changes in the concentration of exporting activity among sectors, the distribution of export shares across sectors appears to have shifted up during the period (Figure 3.2). In this chapter we seek to explain these preliminary patterns by modeling the decision of the firm

[1] As a percent of GDP, exports went up from 5.8 to 8.9 percent over the same period. See International Finance Statistics, IMF (various years)

to export. We test whether there are large sunk costs to exporting in Indian industry. We also test whether firm characteristics, most notably performance, is an indicator of exporting status. There is some debate in the literature on the direction of causality between export behaviour and firm performance. Here, we test whether more successful firms tend to export more. A key area of debate in the literature on multinationals is whether the presence of MNCs in the same industry encourages domestic firms to export more. We test whether there are any industry level spillovers from MNCs to local firms.

5.1.1 Related Literature & Context of Present Study

There have been a number of recent papers which explore the microeconomic aspects of exporting success. Bernard and Jensen in a series of papers examine export success at the plant level using data on US manufacturing plants. Bernard & Jensen (1998) show that US exporters have faster sales and employment growth than non-exporters in the same industry but do not have faster productivity growth. They also find that there are large ex-ante advantages in terms of both growth rates and levels for future exporters. Clerides, Lach and Tybout (1996) test for the importance of "learning-by-exporting" on plant productivity in Columbia, Mexico, and Morocco. They find that exporting does not lower average variable cost relative to non-exporters. They also find some evidence that low cost firms are more likely to enter. Bernard and Wagner (1997) study the relationship between firm success and exporting in German plants and also find that larger firms, and firms with higher productivity, are more likely to become exporters ex-ante but they do not outperform non-exporters after entry.

The literature on exporting and firm performance has also considered the role of entry costs in the export decision. Roberts and Tybout (1997) develop a dynamic model of the export decision by a profit-maximising firm and test for the presence and magnitude of sunk costs using a sample of Colombian plants. They find that sunk costs are large and are a significant source of export persistence. In their sample, prior exporting experience can increase the probability of exporting by as much as 60 percentage points. They find that unobserved heterogeneity across plants plays a significant role in the probability that a firm exports. They also find that larger, older plants that are part of a multi-plant firm are more likely to export. Bernard & Jensen (2001) employ a linear probability framework with plant fixed effects and also find substantial

sunk costs in export entry. Export experience in the previous year increases the probability of exporting by 40%, although the entry advantage depreciates very quickly. This chapter extends the sunk costs and exporting behaviour literature by providing fresh evidence on the role of entry costs in the export decision of firms. Our results are largely consistent with the findings of Roberts & Tybout and Bernard & Jensen (2001).

In a static framework, Aitken, Hanson, and Harrison (1997) examine the role of geographic and sectoral spillovers on exporting by plants in Mexico. They find that the presence of multinational exporters in the same industry and state increases the probability of exporting by Mexican firms. They, however, do not find evidence of spillovers from general exporting activity. This chapter considers both spillovers from the concentration of MNCs in the industry, as well as those from general exporting activity in the same industry. In contrast to Aitken et al, we find evidence of spillovers from exporting activity in the same industry, but do not find any spillovers from MNCs. Our results are however based on spillovers from being in the same industry rather than the geographical spillovers that Aitken et al focus on.

The recent work on the export behaviour of firms has emphasized the heterogeneity of firm characteristics. Comparing plants at a point in time, Bernard and Jensen (1995, 1997) document large, significant differences between exporters and non-exporters among US manufacturing plants. Exporters have more workers, proportionally more white collar workers, higher wages, higher productivity, greater capital intensity, higher technology intensity, and are more likely to be part of a multi-plant firm. However, these substantial cross-section differences between exporters and non-exporters cannot tell us about the direction of causality, i.e., do good firms become exporters or do exporters become good firms. Roberts and Tybout (1997) include some plant characteristics in their work and find that plant size, plant age, and the structure of ownership are positively related to the propensity to export. Aitken, Hanson, and Harrison (1997) report evidence that plant size, wages, and especially foreign ownership are positively related to the decision to export. This chapter uses a firm-level data set to explore the relationship between firm characteristics and exporting. We consider the effect of firm performance, firm size, multinationality, age, and capital intensity on the probability to export.

This chapter contributes to the literature in several ways. First, the literature has thus far used plant level data for testing hypotheses even though the firm is the natural unit of analysis,

particularly for hypotheses related to firm characteristics such as performance and age. By using a firm-level data we are able to test these hypotheses directly, and thereby improve upon the existing literature.[2] Second, we provide fresh evidence on the role of entry costs, firm heterogeneity, and industry-level spillovers from exporters and multinationals in the export decision of firms. Finally, we are able to isolate the factors which drive exporting behaviour in India, and thereby explain the export behaviour of firms in the post reform period.

Our main results can be summarised as follows. The increase in export intensity in Indian manufacturing has largely been driven by surviving firms become more export intensive. We find evidence of large sunk costs in exporting. Having exported the previous year increases the likelihood of exporting by about 36%. Past firm success increases the probability of exporting, as does multinationality. Controlling for all other factors, younger firms tend to export more than their older counterparts. Finally, we find evidence of spillovers from general exporting activity in the same industry but not from the exporting activity of multinationals.

The rest of the paper is structured as follows. In the next section, we decompose the growth in export intensity to understand what is driving this growth. In Section 3 we present a simple model of the export decision. In Section 4 we present the data and descriptive statistics. Section 5 deals with the empirical methodology to be used. Section 6 presents our results, and the following section discusses these results. Finally, section 8 concludes.

5.2 Decomposing Export Growth

To understand what has happened to exports in Indian industry, we look at the evolution of export intensity in the period 1989-1997. Aggregating across firms, overall export intensity X is defined as:

$$X = \sum_j \frac{Z(j)}{Z} X(j) \tag{5.1}$$

where $Z(j)$ is sales of firm j, and Z is total sales. Figure 5.1 plots the evolution of export intensity over the sample period and clearly shows that there has been a trend break in the

[2]To the extent that some plants in a multi-plant firm serve only the domestic market, whereas others are entirely export oriented, our aggregation to the firm level will not be able to distinguish them.

post reform period. Whereas firms in Indian industry were exporting about 6% of their net sales in 1991, that number has doubled to 12% of sales by 1997. This pattern is quite robust across industries.

We would like to decompose this export-intensity to get a better understanding of the reasons for this increase. There are four potential contributors to the increase in export-intensity. First, is it due to entering firms being more export intensive. Second, is it the case that less export-intensive firms have exited in the sample period, thereby raising overall intensity. Third, is it due to a reallocation of output to the most export-intensive firms. Fourth, can we explain the increase due to an increase in the average export-intensity of surviving firms.

We follow the decomposition procedure of Bailey, Hulten, Campbell (1992)[3] and decompose aggregate export intensity growth into the contributions of entering firms (n), exiting firms (x), reallocation among surviving incumbents (s), and export intensity gains for surviving incumbents. Denoting the set of firms of each type as ω_k, $k = n, x, s$:

$$\begin{aligned} X' - X &= \frac{Z'_n}{Z'}\left(X'_n - X'_s\right) - \frac{Z_x}{Z}\left(X_x - X_s\right) \\ &+ \sum_{j\in\omega_s}\left(\frac{Z'(j)}{Z'_s} - \frac{Z(j)}{Z_s}\right)X'(j) + \sum\frac{Z(j)}{Z_s}\left(X'(j) - X(j)\right) \end{aligned} \tag{5.2}$$

The first term represents the export intensity contribution from entrants whose intensity levels differ on average from that of surviving incumbents. The second term represents the corresponding export contribution from firm exit. The third is the contribution from reallocation across incumbent survivors. The fourth is the contribution of export intensity changes within the incumbent survivors.

Table 5.1 shows the results from the export intensity decomposition.[4] Observe that most of the change has come from the last row - export intensity changes within incumbent survivors. Hence, in the period 1989-1997, the increase in export intensity in Indian industry is largely driven by incumbent firms getting more export intensive. We discuss this finding in Section 7

[3]The authors cited here use the procedure for decomposing aggregate productivity growth for firms into its constituent elements.

[4]We perform the decomposition for the change between 1990-1996. This is representative of the export intensity changes in the period. Using different years produced almost identical results.

below.

5.3 The Model

The theoretical literature on the decision to export is developed in papers by Dixit (1989), Baldwin (1988), Baldwin and Krugman (1989), and Krugman (1989). Here, we follow Roberts and Tybout (1997) and especially Bernard and Jensen (2001) in modelling the decision to export by the rational, profit maximising firm as analogous to the decision to market a new product.

The firm considers expected profits today and in the future from the decision to enter the foreign market net of any fixed costs. If the firm enters the foreign market, we assume that it can always produce at the profit-maximizing level of exports, q_{it}^*. Thus, in the one period case with no entry costs, the firm receives profits:

$$\pi_{it}(\Omega_t, \Phi_{it}) = p_t q_{it}^* - c_{it}(\Omega_t, \Phi_{it}|q_{it}^*) \tag{5.3}$$

where p_t is the price of goods sold abroad and $c_{it}(.)$ is the variable cost of producing quantity q_{it}^*. Exogenous factors affecting profitability, such as exchange rates, are denoted as Ω_t, while firm-specific factors are denoted by Φ_{it}. Firm characteristics that might increase the probability of exporting include size, profitability, capital intensity, ownership structure.

The export status of firm i in period t is given by Y_{it}, where

$$\begin{aligned} Y_{it} &= 1 \text{ if } \pi_{it} \geq 0 \\ Y_{it} &= 0 \text{ if } \pi_{it} < 0 \end{aligned}$$

This single period model can be extended to multiple periods. When there are no entry costs, the expected profits of the firm in multiple periods is given by:

$$\Pi_{it}(\Omega_t, \Phi_{it}) = E_t \left(\sum_{s=t}^{\infty} \delta^{s-t} \left[p_s q_{is}^* - c_{is}(\Omega_s, \Phi_{is}|q_{is}^*) \right] \right) \tag{5.4}$$

As long as the cost function does not depend on the level of output in a previous period, the solution of this multi-period problem is identical to the single period case. If there is any

effect of production today on costs tomorrow, then export status of the firm today will play a role in the decision to export tomorrow.

$$c_{it} = c_{it}(\Omega_t, \Phi_{it}, q^*_{it}|q^*_{it-1}) \; and \; \frac{\partial c_{it}(.)}{\partial q^*_{it-1}} \neq 0$$

This might occur if there is learning by doing in production of the export good. The value function for the problem is given by:

$$V_{it}(.) = \max_{\{q^*_{it}\}} (\pi_{it} * Y_{it} + \delta E_t [V_{it+1}(.)|q^*_{it}])$$

and a firm will choose to export in period t, i.e. $Y_{it} = 1$ if

$$\pi_{it} + \delta E_t [V_{it+1}(.)|q^*_{it}] > \delta E_t [V_{it+1}(.)|q^*_{it} = 0]$$

Entering foreign markets, however, have entry costs. These costs could be acquiring information about the foreign market, obtaining credit, establishing a distribution system, meeting foreign government regulations. Here we assume that these entry costs recur in full if the firm exits the export market for any amount of time.

Profits for the firm in single period maximisation problem with entry costs are given by:

$$\widetilde{\pi}_{it}(\Omega_t, \Phi_{it}, Y_{it-1}) = p_t q^*_{it} - c_{it}(\Omega_t, \Phi_{it}, q^*_{it}|q^*_{it-1}) - N(1 - Y_{it-1}) \tag{5.5}$$

where N is the entry cost for the firm. The firm does not have to pay the entry cost if it exported in the previous period, i.e., if $Y_{it-1} = 1$. Firms will export if expected profits net of entry costs are positive: $Y_{it-1} = 1$ if $\widetilde{\pi}_{it} > 0$

This formulation of entry costs as sunk costs yields an option value to waiting and thus increases the region where the firm chooses not to act. The firm chooses a sequence of output levels, $\{q^*_{is}\}_{s=t}^{\infty}$, that maximizes current and discounted future profits,

$$\Pi_{it} = E_t \left(\sum_{s=t}^{\infty} \delta^{s-t} [\widetilde{\pi}_{is} * Y_{is}] \right) \tag{5.6}$$

where period-by-period profits are given by equation (5.5) above, and are constrained to be

non-negative since the firm always has the option not to export. This is equivalent to the firm choosing whether to export in each period since we allow the firm to always pick the within period profit maximising quantity. The value function is the same as before with the addition of potential entry costs in the within period profits,

$$V_{it}(.) = \max_{\{q_{it}^*\}} (\widetilde{\pi}_{it} * [q_{it}^* > 0] + \delta E_t [V_{it+1}(.) | q_{it}^*])$$

A firm will choose to export in period t, i.e. $q_{it}^* > 0$, if

$$p_t q_{it}^* + \delta(E_t [V_{it+1}(.) | q_{it}^* > 0] - E_t [V_{it+1}(.) | q_{it}^* = 0]) > c_{it} + N_{it}(1 - Y_{it-1}) \tag{5.7}$$

The difference in the multi-period models with and without entry costs comes through the added intertemporal link between exporting today and exporting tomorrow embodied in the cost of entry. However, without a structural model of the production function, and cost function, we will be unable to identify intertemporal spillovers due to learning and those due to sunk costs.

Now, we may estimate the export decision in two ways. First, we could develop a structural representation of the participation condition by making specific assumptions about the form of the cost function. Alternatively, we could forgo identification of structural parameters and approximate the export decision as a reduced form expression in exogenous firm and market characteristics that are observable in period t. The advantage of the first approach is that, in principle, it allows identification of the parameters of the cost function and provides a complete description of the dynamic process. Its main disadvantage is that very restrictive parameterisations are required to make structural estimation feasible.[5] Because of this difficulty, we employ a non-structural model in testing hypotheses about the role of firm characteristics, spillovers, sunk costs, and period of entry in the decision to export by the firm.

Before discussing our empirical methodology we turn to describing the data.

[5] See R&T (1997) for more on the above.

5.4 Data and Descriptives

We use the Indian firm-level dataset described in chapter 3 . We have information on total amount of exports, net sales, profits, gross fixed assets, ownership, and year of incorporation for each of the manufacturing firms. Table 5.2 shows the representativeness of the sample. The total number of firms in the sample increased from 1989-1995 before falling, due to exit, in the last two sample years 1996-97. The percentage of firms exporting is a little over a half of all firms. This percentage is perhaps greater than the percentage of exporting firms in the entire economy, because the sample comprises mostly publicly listed firms which tend to be larger, and more open than unlisted firms. Further, all unregistered firms are not included in the sample. Somewhat surprisingly, given the economic reforms, the percentage of firms exporting does not change much over the sample period. There is a gradual increase from 51.5% to 55% in the first 8 years and then a jump to 58% in 1997. Among multinationals, the percentage which export is greater at around 70%. Moreover, there has been a pronounced increase in the percentage of MNCs exporting from 62% at the start of the period to 76% at the end.

Table 5.2 also shows the incidence of long run export persistence in Indian industry. The last row shows the percentage of firms that exported in 1989 and continue to export in later years. We find that almost three-fourths of firms that exported in 1989 continue to export in 1997. These numbers are remarkably similar to those obtained by Bernard & Jensen (2001) for US plants. They find that 78% of plants that exported in 1984 continue to do so 8 years later.

Table 5.3 lists firm characteristics of exporters and non-exporters. We pick two years 1990 and 1996 as representative of the pre-reform and post-reform period. The table shows that both in terms of sales and fixed assets, exporters are much bigger than their non-exporting counterparts. In fact, in terms of sales, exporters are almost five times as large as non-exporters.

With these preliminary patterns in the data in mind, we turn to the more formal analysis.

5.5 Empirical Methodology

From the multi-period model with entry costs, we find that a firm exports if current and expected revenues are greater than costs,[6]

$$Y_{it} = \begin{Bmatrix} 1 \; if \; \widehat{\pi}_{it} > c_{it} + N(1 - Y_{it-1}) \\ 0 \qquad\qquad otherwise \end{Bmatrix}$$

where

$$\widehat{\pi}_{it} \equiv p_t q_{it}^* + \delta(E_t \left[V_{it+1}(.) \left| q_{it}^* > 0\right.\right] - E_t \left[V_{it+1}(.) \left| q_{it}^* = 0\right.\right])$$

We aim to identify and quantify factors that increase the probability of exporting. We estimate these effects using a binary choice non-structural approach of the form

$$Y_{it} = \begin{Bmatrix} 1 \; if \; \beta\Phi_{it-1} + \gamma\Omega_{it-1} - N(1 - Y_{it-1}) + \varepsilon_{it} > 0 \\ 0 \qquad\qquad\qquad\qquad otherwise \end{Bmatrix} \tag{5.8}$$

5.5.1 Sunk Costs

The most difficult issue in the estimation of equation (5.8) above is the identification of the parameter on the lagged endogenous variable. There are unobserved firm characteristics, such as managerial ability or corporate strategy which affect the decision to export by the firm. Since these characteristics are highly serially correlated and unobserved, they will induce persistence in export behaviour. This will cause us to overestimate entry costs. This means that the error term, ε_{it}, can be thought of as comprising two components, a permanent firm-specific component, μ_i, and a transitory component, η_{it}, which captures other, exogenous shocks.

For the dynamic binary choice model with unobserved heterogeneity, there are several potential estimation strategies. Roberts & Tybout (1997) use a random effects probit specification in their analysis of sunk costs and entry. To use a random effects model, the required assumption is that firm effects be uncorrelated with the explanatory variables. This assumption is likely to be violated in our export decision model as firm characteristics such as size, profitability, and

[6] Here we assume that fixed costs of entering the export market, such as fufilling export requirements, foreign government regulations, installing distribution channels etc, are the same for all firms.

ownership are correlated with unobserved firm effects such as managerial expertise.

An alternative strategy is to use the fixed effects model. The Within transformation wipes out time invariant firm effects, but the lagged dependent variable is still correlated with the error term. The coefficient on the lagged dependent variable will be biased and inconsistent, unless the number of time periods is very large.[7]

A transformation that wipes out the individual effects, yet does not create the above problem, is the first difference (FD) transformation.[8] This instrumental variable (IV) estimation method leads to consistent but not necessarily efficient estimates of the parameters in the model because it does not make use of all the available moment conditions.[9] A more efficient procedure to estimate dynamic panel data models is the Arellano and Bond procedure which is a GMM estimator. The procedure obtains additional instruments by utilising the orthogonality conditions that exist between lagged values of the dependent variable and the disturbances. Thus, more instruments can be used as the panel progresses yielding efficiency gains relative to other estimation methods.[10] Here we use the Arellano and Bond procedure.[11]

The equation to be estimated is:

$$Y_{it} = \beta\Phi_{it-1} + \gamma\Omega_{it-1} + \theta Y_{it-1} + \varepsilon_{it} \tag{5.9}$$

First we estimate eqn (5.9) in levels without firm effects. This enables us to observe the effects of time-invariant firm attributes on export probabilities. The levels estimation also gives an upper bound on the importance of sunk costs. Now, firms that change from exporting to non-exporting and vice versa may undergo contemporaneous changes in size, performance, and capital intensity. Hence we lag all firm characteristics and exogenous variables one year to

[7] See Nickell (1981), and Ridder and Wansbeek (1990) for a derivation of this asymptotic bias. Kiviet (1995) also shows that for the typical panel where N is large and T is fixed, the Within estimator is biased and inconsistent.

[8] Anderson and Hsiao (1981) suggest first differencing the model to get rid of the individual firm effects and then using $\Delta y_{i,t-2} = (y_{i,t-2} - y_{i,t-3})$ as an instrument for $\Delta y_{i,t-1} = (y_{i,t-1} - y_{i,t-2})$. These instruments will not be correlated with $\Delta\eta_{it} = \eta_{it} - \eta_{it-1}$, as long as the η_{it} themselves are not serially correlated.

[9] See Baltagi (1995) for a discussion of the above. Also see Ahn and Schmidt (1993). The IV estimation method also does not take into account the differenced structure on the residual disturbances $\Delta\mu_{it}$. Arellano (1989) finds that the differences rather than the levels have very large variances over a range of parameter values.

[10] See Arellano and Bond (1991) for details.

[11] We also applied the FD-IV estimation strategy which was used by Bernard and Jensen (2001). The results were very similar to the Arellano and Bond method, and hence are not reported here.

alleviate simultaneity problems.

We then consider the role of firm fixed effects:

$$Y_{it} = \beta\Phi_{it-1} + \gamma\Omega_{it-1} + \theta Y_{it-1} + \mu_i + \eta_{it} \tag{5.10}$$

We estimate eqn (5.10) in levels with fixed effects. As discussed earlier, the estimates are biased downwards and inconsistent but give us a lower bound for the importance of the lagged endogenous variable.

Finally, we estimate (5.10) in differences with instrumental variables using the Arellano-Bond method.

$$\Delta Y_{it} = \beta\Delta\Phi_{it-1} + \gamma\Delta\Omega_{it-1} + \theta\Delta Y_{it-1} + \Delta\eta_{it} \tag{5.11}$$

This formulation also allows us to control for persistent shocks. If shocks are highly persistent, they can overcome the effects of large entry costs. Unmodelled persistence in the error structure would be picked up by the lagged endogenous variable and thus incorrectly interpreted as high entry costs. The first-differences specification should help alleviate this problem as well, although there is a loss in efficiency if the shocks are purely transitory.

5.5.2 Spillovers

There is a large body of anecdotal evidence which suggests that the presence of export-oriented MNCs can lead to spillovers whereby local firms start exporting more. One much documented case is that of the development of garment exporters in Bangladesh. The entry of one Korean garment exporter in Bangladesh lead to the establishment of hundreds of exporting enterprises, all owned by local entrepreneurs. Aitken, Hanson, and Harrison (1997) find evidence of localised spillovers from the export activity of multinationals in Mexico.

In this chapter we test two versions of the export-spillover hypothesis. We test whether the presence of multinationals in the same industry generates spillovers, i.e., whether MNCs act as export catalysts; and whether all export activity in the same industry generates spillovers. The potential for spillovers from MNCs derives from the fact that MNCs have a multi-market presence. They have a greater access than local firms to international market information,

distribution channels, and international marketing skills. Thus, MNCs can be a conduit for information about foreign markets, and can provide channels through which domestic firms can distribute and market their goods. We use various measures to test for MNC spillovers. First, we test whether a large MNC market share in the industry increases the likelihood of exporting. Second, we consider the export share of MNCs in total exports of the industry as an indicator of MNC presence in exporting activity. Third, we create a dummy for those industries which have actually had MNC entry in the 1990s. This indicator captures those industries where recent multinational activity has taken place and see if this activity has had an impact on the probability to export. Fourth, we look at the sheer number of MNCs in the industry that export.

We also test whether the concentration of general exporting activity in the industry can increase the probability that firms will export. This could come about through demonstration effects within the industry of the informational, distributional, and marketing channels of exporters in the industry. The variables we consider to capture spillovers from overall exporting activity are - a) the export intensity of the industry, and b) the number of exporters in the industry.

5.5.3 Firm Characteristics

We seek to understand what firm characteristics are important in explaining export behaviour. We test several hypotheses related to firm characteristics and the export decision. First, we consider those firm attributes that are related to past success. We follow Bernard & Jensen (1998) who show that good firms become exporters. The measures of firm success we use are firm size and firm profitability. Larger firms are naturally those which have been successful in the past and hence grown in size. Larger firms may also have lower average, or marginal, costs providing a separate mechanism for size to increase the likelihood of exporting. Further, our firm level data allows us to use profitability as a direct measure of past success, and thus adds to the existing literature. We use two measures of profitability, profits over assets, and profits over sales.

Since the direction of causality between firm characteristics and export behaviour is uncertain, we lag all firm characteristics one period to alleviate simultaneity problems.

There is a large body of research on the role of multinationals in trade. MNCs are generally considered as likely to be more open than local firms due to their presence in multiple countries and hence easier access to and knowledge about, foreign markets. In our data, we consistently find MNCs, on average, and over all time periods are more likely to export than local firms. Hence we include a dummy for multinationality.

Finally, we consider the role of age in exporting behaviour. The relation between age and exporting behaviour is not unambiguous. Older firms may have gathered more information, and developed the appropriate distribution and marketing channels to make the cost of entry into foreign markets lower. This would indicate that older firms are more likely to export. However, younger firms might be more flexible in their export behaviour and can more easily move into export markets. Hence, we attempt to distinguish between these alternate hypotheses linking a firm's age to exporting behaviour. To determine whether being born in the post-reform phase makes a firm more open we also use a dummy for a firm that is born after 1991 to indicate a firm born in the post-reform era.

5.6 Basic Results

Tables 5.4, 5.5, 5.6 and 5.7 shows the results from our basic estimation equations. The dependent variable in tables 5.4, 5.6 and 5.7 is Y and is a binary variable which takes on a value of 1 if the firm exports and 0 otherwise. In table 5.5, the dependent variable is export intensity as measured by the ratio of exports over sales. Table 5.4 shows the results from the levels - OLS estimation without any firm effects. This specification is especially useful in determining the effects of time-invariant firm characteristics on exporting behaviour. The first row shows that the lagged dependent variable is highly significant in all specifications. The levels regression co-efficient of 0.76 is probably an overestimation for the reasons discussed in section 5. We also find that the co-efficient on having exported two years ago is significant in all three specifications.

Turning to the firm characteristics, we find that the sales variable has a positive and significant co-efficient and so do both the profitability measures - profits over assets and profit margins over sales. This indicates that more successful firms tend to be exporters. Also, as

predicted in the descriptives section, multinationality increases the likelihood that the firm will export.

The next set of variables test the spillovers hypothesis. We find that all the variables testing for spillovers from MNCs are insignificant. The MNC market share in the industry as well as the number of MNC exporters are both insignificant. The MNC export share in the industry is negative and significant at the 5% level in specification (1), but insignificant when we control for industry effects.

On the other hand, all the variables testing for general spillovers from exporting in the same industry are significant. The export intensity in the industry variable is positive and significant suggesting that the larger the concentration of exports in an industry, the more likely it is that a firm in the industry will export. The number of exporters in the industry variable is also positive and significant.

The variable testing for age effects is whether a firm is born in the 1990s. We find that this variable is positive and significant at the 5% level. The reforms dummy is also highly significant and suggests that even after controlling for other determinants of export behaviour, there is an impetus to exporting in the reforms period.

Finally, the year dummies capture all the time specific effects that reflect macro-level changes in export conditions such as exchange rates, credit-market conditions, trade-policy conditions and all other year specific effects that are common to all firms.

To understand the effects of firm characteristics and spillovers we used export information on firms by using export intensity as a dependent variable rather than the simple binary choice variable. The results are shown in table 5.5. Our basic results discussed above are little changed. Export intensity in the previous year explains almost 50% of export intensity in the given year. Firm characteristics such as sales and profitability are positive and significant as expected. Once we control for the degree of export orientedness, multinationality becomes insignificant. This seems to suggest that although multinational firms are more likely to export, they do not seem to export a larger proportion of their sales than local firms. Export intensity in the industry is significant while multinational export share is not. When we control for export intensity two years ago, most of the variables become insignificant. This can be explained by the fact that the export intensity variable lagged two periods will absorb any variation caused by the industry

level variables. Hence, the industry level variables become insignificant.

Table 5.6 reports the results of the fixed effects and Arellano and Bond regression. The lagged dependent variable is highly significant in both the estimations. The fixed effects coefficient of 0.23 is biased downwards - for all the reasons discussed earlier. The Arellano-Bond estimate of 0.34 is our likely estimate of the effect of sunk costs on exporting. Thus, having exported the year before increases the likelihood of exporting by 34%.

Firm characteristics are not significant in any of the specifications as controlling for firm fixed effects absorbs much of their effects. This suggests that the identification was coming from cross-section variance rather than variation over time. Again, none of the MNC spillover variables are significant. We find that the export intensity in the industry is significant in the fixed effects regression but not in the Arellano-Bond specification. This can be explained by thinking of export intensity in the industry being a level effect and which is no longer significant in the differences specification. The age and the reforms dummy are highly significant in the FD-IV version confirming our earlier results from the OLS estimation. Note that the fixed effects regression drops all the time invariant variables such as multinationality, age, and reforms dummy.

Finally, Table 5.7 presents comparisons of the alternate strategies - Random Effects Probit analysis with the A-B estimation. We see that the lagged dependent variable in the probit specification is unusually large and for the reasons discussed in section 5 above cannot be adequately interpreted. All the rest of the variables have the expected sign and significance as the OLS regressions. Note that the MNC spillover variables are all insignificant.

5.7 Discussion

As mentioned in previous chapters, the period covered by the data witnessed significant macro, industrial as well as trade reforms in the Indian economy. The exchange rate was devalued starting from 1991 and the system transformed in less than two years from a discretionary basket pegged system to a market-determined, unified exchange rate. The heavy anti-export bias in the trade and payments regime was also reduced substantially by a phased reduction in the exceptionally high customs tariffs and a phased elimination of quantitative restrictions on

imports. Ideally, we would like to have data on the differential tariff changes by industry, to consider the impact of these on firm exporting behaviour. Since we have year dummies in all the specifications, we are able to control, to some extent, for macroeconomic factors affecting the economy as well as the overall annual changes in trade policy.

The result that there are large sunk costs to exporting squares well with the finding of the decomposition of export growth in section 2 above. Since there are sunk costs to exporting, surviving firms have been better able to take advantage of trade reforms and the general improvement in exporting conditions. The result that better performers tend to export more, also reconciles with the notion that survivors are more likely to be better performers than firms that exit. Hence, they have driven the increase in exporting activity.

The result that there are lack of positive spillovers from MNCs ties in well with the earlier finding (Chapter 3), that most of MNC activity is of the horizontal type, and aimed for the domestic market. Since the MNCs are not focusing on exports, the demonstration effects for local firms in the same industry are correspondingly small. Hence, local firms do not show any increased propensity to export simply due to larger MNC presence in their industry. Second, as we showed in Chapter 4 above, MNC presence has had a negative impact on domestic firm performance. This would affect exporting activity of local firms due to the direct effect of poorer performance on exports, as well as due to a negative market share effect. The spillovers from general exporting activity can be attributed to the demonstration effects mentioned above on other domestic firms in the same industry.

There are several caveats to these results. First, there could be sample selection problems as the data doesn't contain small, unregistered firms. This would be a problem for our main results only if the number of exporters and the export intensity amongst these firms differed significantly from both the larger sample as well as from earlier time periods. In particular, there may be new small export-oriented firms entering, which are more likely to export than older firms which are not captured by the data. However, the results from the export decomposition are so stark so as to render that claim as untenable. Second, we do not test for geographical spillovers which constrains the comparability of our results with earlier work on spillovers.

5.8 Conclusions

Even though Indian industrial exports still account for less than 1% of total world exports, the last decade has seen a substantial increase in exporting activity leading to a near doubling of the exports to GDP ratio. This chapter has tried to analyse the microeconomics of the export performance of Indian firms. We find that most of the increase in export intensity in the reform period has been driven by existing firms becoming more export-oriented. This finding is contrary to the notion that the opening up of industry through reforms led to large scale entry of more export-oriented firms who then drove the overall export performance.

Using a dynamic framework and the empirical estimation methodology of Bernard & Jensen (2001), we investigate the determinants of export behaviour in Indian industry. We find that there are substantial sunk costs to exporting. The results show that exporting the previous year increases the likelihood of exporting by 36%. These figures almost mimic those of Bernard & Jensen and are somewhat less than that of 60% found by Roberts & Tybout.

Firm characteristics play an important role in determining export behaviour. Past success increases the likelihood of exporting. Thus, we find that larger, and more profitable firms are more likely to export. Further, multinationality provides an impetus to exporting. These results are consistent with the literature on firm performance and exporting behaviour.

We test for industry-level spillovers from other exporters as well as multinationals and MNC exporters. We find that the presence of other exporters in the industry increases the likelihood that a firm will export. However, there is no evidence to suggest that MNCs act as export catalysts. These findings are contrary to those of Aitken et al (1997) who find positive geographical spillovers from MNCs but not from general exporting activity. The results are also at odds with Bernard & Jensen who also fail to find evidence of industry level spillovers from exporting activity. This suggests that there may be a dichotomy between geographical and industry level spillovers and therefore more research is needed.

Finally, we test for the role of age in exporting behaviour, and find that younger firms tend to export more than older firms. This contradicts the evidence from Columbia reported by Roberts & Tybout, and could perhaps be explained by the fact that younger Indian firms have lower costs of switching in and out of the export market than older firms.

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Appendix A

Equilibrium:

From upstream industry demand and price index (equations (2.11)& (2.13))

$$nz_i x_i = qI$$

From FOC for upstream firms (eqn(2.18))

$$z_i(1 - \frac{1}{\gamma}) = \beta_i$$

From the $\pi = 0$ condition:

$$x_i = (\gamma - 1) F_i$$

We choose units for output such that:

$$F_i = 1/(\gamma - 1)$$

Thus, equilibrium firm scale:

$$x_i^* = 1$$

Setting $z_i = 1$:

$$q^{-\gamma} = I$$

From equation (2.11) :

$$q^{-\gamma} = D_1 b_1 \mu_1 + D_2 b_2 \mu_2 \tag{A.7}$$

Substituting in the Demand functions:

$$q^{-\gamma} = \left(\frac{p_2 - p_1}{\Delta s} - \underline{\theta}\right) b_1 + \left(\overline{\theta} - \frac{p_2 - p_1}{\Delta s}\right) b_2 \mu_2 \tag{A.8}$$

Substituting in eqns (2.16), (2.17) for prices:

$$q^{-\gamma} = \left(\frac{1}{3\Delta s}(c_2 - c_1) + \frac{1}{3}(\overline{\theta} + \underline{\theta}) - \underline{\theta}\Delta s\right) b_1 + \left(\overline{\theta}\Delta s - \frac{1}{3\Delta s}(c_2 - c_1) - \frac{\Delta s}{3}(\overline{\theta} + \underline{\theta})\right) b_2 \mu_2 \tag{A.9}$$

Now,

$$c_2 - c_1 = b_2 \mu_2^d (q - r) + b_2 r - b_1 q$$

and,

$$\Delta s = a(1 - \mu_2^d)$$

Thus, in terms of exogenous parameters, we have an equation relating q and μ_2^d :

$$q^{-\gamma} = \left\{ \frac{1}{3a(1-\mu_2^d)} \left(b_2 \mu_2^d [q - r] + b_2 r - b_1 q \right) + \frac{1}{3}(\overline{\theta} + \underline{\theta}) - \underline{\theta} a (1 - \mu_2^d) \right\} b_1 +$$
$$\left\{ \overline{\theta} a (1 - \mu_2^d) - \frac{1}{3a(1-\mu_2^d)} \left[b_2 \mu_2^d (q - r) + b_2 r - b_1 q \right] - \frac{a(1-\mu_2^d)}{3}(\overline{\theta} + \underline{\theta}) \right\} b_2 \mu_2$$

The second equation relating q and μ_2^d is given by FOC of MNC making a quality choice (eqn(2.20))

$$\frac{d\pi_2}{d\mu_2^d} = \left(\frac{dp_2}{d\mu_2^d} - \frac{dc_2}{d\mu_2^d}\right) D_2 + (p_2 - c_2) \frac{dD_2}{d\mu_2^d} = 0 \tag{A.10}$$

These 2 equations can be solved simultaneously to get equilibrium q^* and $\widetilde{\mu_2^d}$

Suppressing the relation between $c_1, c_2, \Delta s$ and equilibrium q^* and $\widetilde{\mu_2^d}$, we can write equilibrium demands and profits for downstream firms as:

$$
\begin{aligned}
D_1^* &= \frac{1}{3\Delta s}(c_2 - c_1) + \frac{1}{3}(\overline{\theta} - 2\underline{\theta}) \\
D_2^* &= \frac{1}{3}(2\overline{\theta} - \underline{\theta}) - \frac{1}{3\Delta s}(c_2 - c_1)
\end{aligned}
$$

$$
\begin{aligned}
\pi_1^* &= \frac{1}{9\Delta s}(c_2 - c_1)^2 + \frac{2}{9}(c_2 - c_1)(\overline{\theta} - 2\underline{\theta}) + \frac{1}{9}(\overline{\theta} - 2\underline{\theta})^2 \Delta s \\
\pi_2^* &= \frac{1}{9\Delta s}(c_1 - c_2)^2 + \frac{2}{9}(c_1 - c_2)(2\overline{\theta} - \underline{\theta}) + \frac{1}{9}(2\overline{\theta} - \underline{\theta})^2 \Delta s
\end{aligned}
$$

Appendix B

Linkage Effect:

From equilibrium - the following relation holds betwen q and Δs :

$$q^{-\gamma} = \left\{ \frac{1}{3\Delta s} \left(b_2 \mu_2^d [q - r] + b_2 r - b_1 q \right) + \frac{1}{3}(\overline{\theta} + \underline{\theta}) - \underline{\theta} \Delta s \right\} b_1 + \left\{ \overline{\theta} \Delta s - \frac{1}{3\Delta s} \left[b_2 \mu_2^d (q - r) + b_2 r - b_1 q \right] - \frac{\Delta s}{3}(\overline{\theta} + \underline{\theta}) \right\} b_2 \mu_2$$

Taking total differentials, we can show:

$$\frac{dq}{d\Delta s} > 0$$

B.1 Proof of Proposition 1:

$$Max_{\mu_2^d} \qquad \pi_2 = (p_2 - c_2) D_2 (p_1; p_2) - G$$

$$s.t. \qquad \mu_2^d \geq \underline{\mu_2^d}$$

The Lagrangian is:

$$L = (p_2 - c_2) D_2 (p_1; p_2) - G + \lambda(\mu_2^d - \underline{\mu_2^d})$$

FOC:

$$\frac{dL}{d\mu_2^d} = (\frac{dp_2}{d\mu_2^d} - \frac{dc_2}{d\mu_2^d})D_2 + (p_2 - c_2)\frac{dD_2}{d\mu_2^d} + \lambda = 0$$

Constraint on the multiplier:

$$\lambda \geq 0$$

Complementary Slackness:

$$\lambda(\mu_2^d - \underline{\mu_2^d}) = 0$$

Now,

$$\frac{dD_2}{d\mu_2^d} = -a\frac{dD_2}{d\Delta s} \quad ; \quad \frac{dp_2}{d\mu_2^d} = -a\frac{dp_2}{d\Delta s} \quad ; \quad \frac{dc_2}{d\mu_2^d} = -a\frac{dc_2}{d\Delta s}$$

From complementary slackness:

$$If \quad \lambda > 0 \quad then \quad \mu_2^d = \underline{\mu_2^d}$$

From FOC:

$$\lambda = a(\frac{dp_2}{d\Delta s} - \frac{dc_2}{d\Delta s})D_2 + a(p_2 - c_2)\frac{dD_2}{d\Delta s}$$

For $\lambda > 0$: from FOC, we want

$$\frac{dp_2}{d\Delta s} > \frac{dc_2}{d\Delta s} \quad and \quad \frac{dD_2}{d\Delta s} > 0$$

$$\frac{dp_2}{d\Delta s} > \frac{dc_2}{d\Delta s} \quad if \quad \frac{1}{3}\left(2\overline{\theta} - \underline{\theta}\right) + \frac{dq}{d\Delta s}(b_1\mu_1^d - b_2\mu_2^d) > \frac{b_2}{a}(r - q)$$

$$and \quad \frac{dD_2}{d\Delta s} > 0 \quad if \quad \frac{b_2}{a}(r-q) > \frac{dq}{d\Delta s}(b_1\mu_1^d - b_2\mu_2^d)$$

So combining the above two inequalities, condition for $\lambda > 0$ is:

$$\frac{1}{3}\left(2\overline{\theta} - \underline{\theta}\right) > \frac{b_2}{a}(r-q) - \frac{dq}{d\Delta s}(b_1\mu_1^d - b_2\mu_2^d) > 0$$

B.2 Proof of Lemma 1:

From equilibrium equations (2.16) and (2.17), we have:

$$\frac{dp_1}{d\Delta s} = \frac{1}{3}\frac{dq}{d\Delta s}(b_2\underline{\mu_2^d} + 2b_1\mu_1^d) + \frac{1}{3}(\overline{\theta} - 2\underline{\theta}) + \frac{1}{3}\frac{b_2}{a}(r-q)$$

where the first term on the RHS is the linkage effect, and the last term is the cost decrease of the multinational when it buys local instead of foreign inputs.

But,

$$\frac{dq}{d\Delta s}(b_2\underline{\mu_2^d} + 2b_1\mu_1^d) > 0$$

And by assumption:

$$\frac{b_2}{a}(r-q) > 0$$

Hence,

$$\frac{dp_1}{d\Delta s} > 0 \quad if \quad (\overline{\theta} - 2\underline{\theta}) > 0$$

■

B.3 Proof of Lemma 2:

$$\text{Let,} \quad k = p_2 - p_1$$

Hence,

$$k = \frac{1}{3}(c_2 - c_1) + \frac{\Delta s}{3}(\overline{\theta} + \underline{\theta})$$

$$\frac{dk}{d\Delta s} = \frac{1}{3}\frac{dq}{d\Delta s}(b_2\underline{\mu_2^d} - b_1\mu_1^d) + \frac{1}{3}\frac{b_2}{a}(r-q) + \frac{1}{3}(\overline{\theta} + \underline{\theta})$$

$$\frac{dk}{d\Delta s} > 0 \quad if \quad \frac{dq}{d\Delta s}(b_2\underline{\mu_2^d} - b_1\mu_1^d) + \frac{b_2}{a}(r-q) + (\overline{\theta} + \underline{\theta}) > 0$$

$$Now, \quad \frac{dq}{d\Delta s}(b_2\underline{\mu_2^d} - b_1\mu_1^d) > 0 \quad \textit{shown above and by assumption}$$

$$\frac{b_2}{a}(r-q) > 0 \quad \textit{by assumption}$$

$$(\overline{\theta} + \underline{\theta}) > 0 \quad \textit{by assumption}$$

B.4 Proof of Proposition 3:

From the utilities of the 2 sub-groups in the population:

$$U_1 = \left(\frac{\widetilde{\theta}^2}{2} - \frac{\underline{\theta}^2}{2}\right)s_1 - p_1\left(\widetilde{\theta} - \underline{\theta}\right) \quad and \quad U_2 = \left(\frac{\overline{\theta}^2}{2} - \frac{\widetilde{\theta}^2}{2}\right)s_2 - p_2\left(\overline{\theta} - \widetilde{\theta}\right)$$

Thus, we can show that CS changes with a DCR in the following way:

$$\frac{dCS}{d\Delta s} = \frac{dk}{d\Delta s}\left(\widetilde{\theta} - \overline{\theta}\right) - \frac{1}{2}\left(\frac{k}{\Delta s}\right)^2 - \frac{dp_1}{d\Delta s} + \frac{\overline{\theta}^2}{2}$$

$$\frac{dCS}{d\Delta s} < 0 \quad if \quad \left| \frac{dk}{d\Delta s}\left(\tilde{\theta} - \overline{\theta}\right) - \frac{1}{2}\left(\frac{k}{\Delta s}\right)^2 - \frac{dp_1}{d\Delta s} \right| > \frac{\overline{\theta}^2}{2}$$

B.5 Simulations:

The following parameter values were used for the simulations:

$a = 0.5$

$\overline{\theta} = 2$

$\underline{\theta} = 1$

$r = 1.2$

$b_1 = b_2 = 2$

$\beta = 1$

$F = 1$

$\gamma = 2$

$x = 1$

Figure 2.1: Linkage Effects - Input Price Index

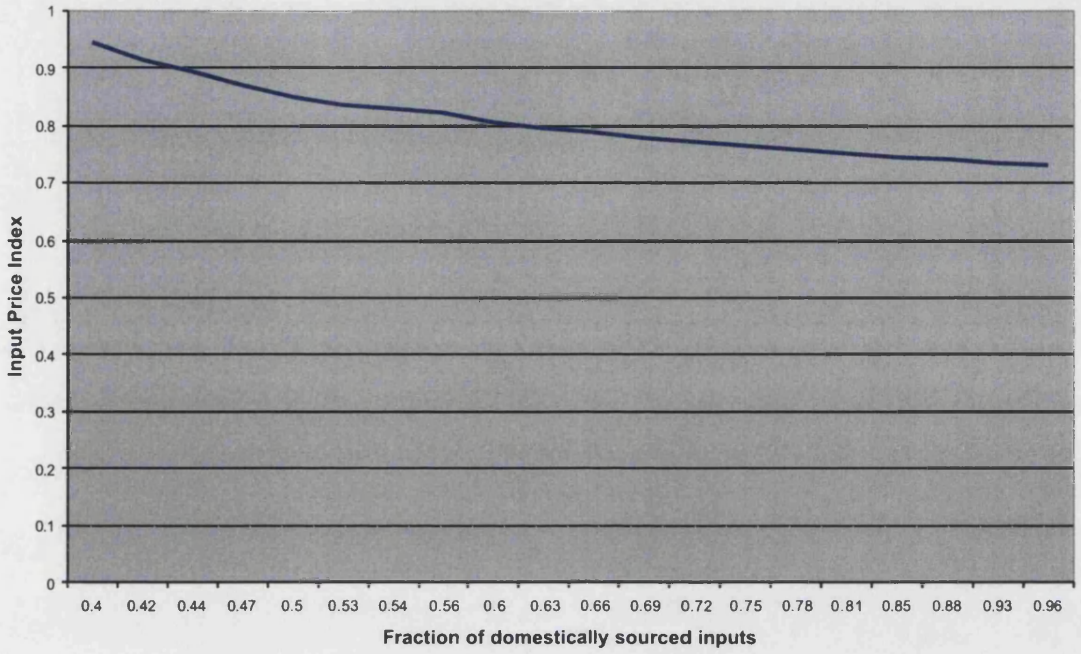


Figure 2.2: Local Firm Profits

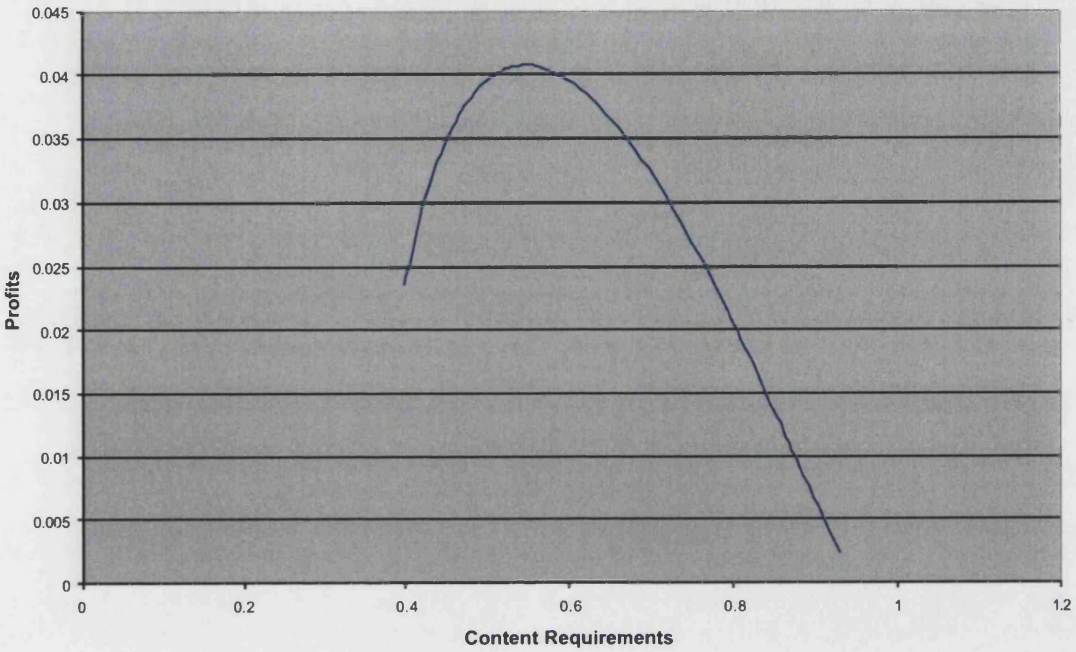


Figure 2.3: Consumer Surplus & Content Requirements

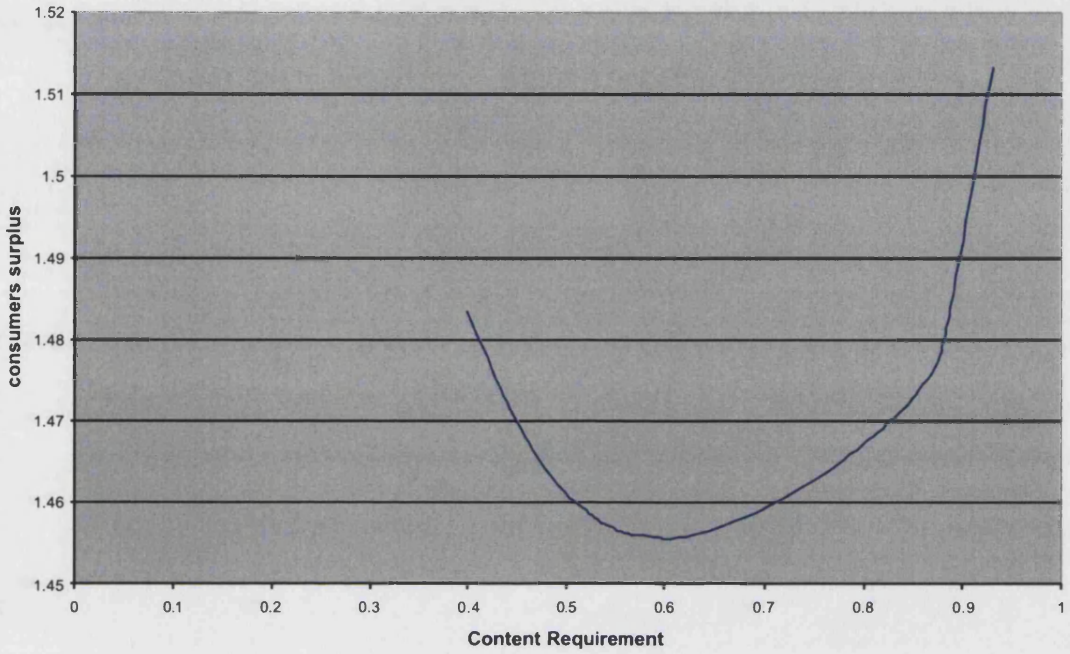


Table 3.1: Sectoral Distribution of FDI Stock in India, 1980-97

Industry Group	FDI Stock - March 1980		FDI Stock - March 1990		Approvals 1991-97	
	Value (Million rupees)	%	Value (Million rupees)	%	Value (Million rupees)	%
I. Plantations & Horticulture	**385**	**4.1**	**2,560**	**9.5**	**4,901**	**0.33**
II. Mining	**78**	**0.8**	**80**	**0.3**	**15,576**	**1.06**
III. Petroleum & Power	**368**	**3.9**	**30**	**0.1**	**423,905**	**28.91**
IV. Manufacturing	**8,116**	**86.9**	**22,980**	**84.9**	**545,135**	**37.18**
Food & Beverages	391	4.2	1,620	6	75,748	5.17
Textiles	320	3.4	920	3.4	23,700	1.62
Machinery & Machine Tools	710	7.6	3,540	13.1	32,830	2.24
Transport Equipment	515	5.5	2,820	10.4	71,082	4.84
Metal & Metal Products	1,187	12.7	1,410	5.2	73,225	6.00
Electrical & electronics	975	10.4	2,950	10.9	79,702	5.44
Chemicals & allied products	3,018	32.3	7,690	28.4	100,759	6.88
Misc. manufacturing	1,000	10.7	2,030	7.5	88,089	6.01
V. Services	**385**	**4.1**	**1,400**	**5.2**	**459,086**	**31.30**
Telecommunications	n.a.	n.a.	n.a.	n.a.	296,271	20.21
Finance & Banking	n.a.	n.a.	n.a.	n.a.	63,012	4.30
Hotels & Tourism	n.a.	n.a.	n.a.	n.a.	29,720	2.03
Air and sea transport	n.a.	n.a.	n.a.	n.a.	19,954	1.36
Consultancy	n.a.	n.a.	n.a.	n.a.	10,068	0.69
Other services	n.a.	n.a.	n.a.	n.a.	40,061	2.73
Total	**9,332**	**100.0**	**27,050**	**100**	**1,466,218**	**100**
Source: SIA Newsletter, Dept. of Industrial Policy & Promotion, December, 1997						

Table 3.2: FDI in India - Approvals vs Actual Inflows (US $million)

	1991	1992	1993	1994	1995	1996	1997
Approvals	325	1781	3559	4332	11245	11142	15752
Actual Inflow	155	233	574	959	2100	2340	3330
Realisation Rate	48%	13%	16%	22%	19%	21%	21%
Source: Economic Survey, 1999							

Table 3.3: Classification of Industrial Groups and FDI Approvals (%) - 1991-97

Technology	FDI %		Wages	FDI %
High Technology			**High Wage**	
Drugs & Medicines (pharmaceuticals)	0.7		Chemicals excluding drugs	9.5
Office & Computing equipment	0.7		Drugs & Medicines (pharmaceuticals)	0.7
Electrical machinery (excl. comm. Equipment)	8.3		Petroleum refineries & products	12.5
Radio, TV, and communication equipment	31.0		Office & Computing equipment	0.7
Aircraft	0.0		Motor vehicles	4.4
Professional Goods	0.4		Aircraft	0.0
Total	**41.2**		TOTAL	**27.9**
Medium Technology			**Medium Wage**	
Chemicals excluding drugs	9.5		Paper, paper products & printing	2.2
Rubber & Plastic Products	0.5		Rubber & Plastic Products	0.5
Non-ferrous metals	0.8		Non-metallic mineral products	1.3
Non-electrical machinery	3.4		Iron & Steel	5.6
Other transport equipment	5.1		Non-ferrous metals	0.8
Motor vehicles	4.4		Fabricated metal products	1.2
Other manufacturing	1.5		Non-electrical machinery	3.4
Total	**25.4**		Radio, TV, and communication equipment	31.0
Low Technology			Shipbuilding & Repairing	0.0
Food, beverages & Tobacco	7.9		Professional Goods	0.4
Textiles, apparel & leather	2.7		TOTAL	**46.4**
Wood products & printing	0.0		**Low Wage**	
Paper, paper products & printing	2.2		Food, beverages & Tobacco	7.9
Petroleum refineries & products	12.5		Textiles, apparel & leather	2.7
Non-metallic mineral products	1.3		Wood products & printing	0.0
Iron & Steel	5.6		Electrical machinery (excl. comm. Equip.)	8.3
Fabricated metal products	1.2		Other transport equipment	5.1
Shipbuilding & Repairing	0.0		Other manufacturing	1.5
Total	**33.5**		TOTAL	**25.6**

Table 3.3 cont: Classification of Industrial Groups and FDI Approvals (%) - 1991-97

Orientation	FDI %		Market Structure	FDI %
Resource Intensive			**Homogeneous fragmented**	
Food, beverages & Tobacco	7.9		Textiles, apparel & leather	2.7
Wood products & printing	0.0		Wood products & printing	0.0
Petroleum refineries & products	12.5		Non-metallic mineral products	1.3
Non-metallic mineral products	1.3		Other manufacturing	1.5
Non-ferrous metals	0.8		TOTAL	**5.5**
TOTAL	**22.5**		**Homogeneous segmented**	
Labour Intensive			Paper, paper products & printing	2.2
Textiles, apparel & leather	2.7		Petroleum refineries & products	12.5
Fabricated metal products	1.2		Rubber & Plastic Products	0.5
Other manufacturing	1.5		Iron & Steel	5.6
TOTAL	**5.4**		Non-ferrous metals	0.8
Scale Intensive			Shipbuilding & Repairing	0.0
Paper, paper products & printing	2.2		TOTAL	**21.7**
Chemicals excluding drugs	9.5		**Differentiated fragmented**	
Rubber & Plastic Products	0.5		Fabricated metal products	1.2
Iron & Steel	5.6		Non-electrical machinery	3.4
Other transport equipment	5.1		Office & Computing equipment	0.7
Motor vehicles	4.4		Electrical machinery (excl. comm. Equip.)	8.3
Shipbuilding & Repairing	0.0		Radio, TV, and communication equipment	31.0
TOTAL	**38.3**		Professional Goods	0.4
Specialised Supplier			TOTAL	**45.1**
Non-electrical machinery	3.4		**Differentiated segmented**	
Electrical machinery (excl. comm. Equip.)	8.3		Food, beverages & Tobacco	7.9
Radio, TV, and communication equipment	31.0		Chemicals excluding drugs	9.5
TOTAL	**42.7**		Drugs & Medicines (pharmaceuticals)	0.7
Science Based			Motor vehicles	4.4
Drugs & Medicines (pharmaceuticals)	0.7		Aircraft	0.0
Office & Computing equipment	0.7		Other transport equipment	5.1
Aircraft	0.0		TOTAL	**27.7**
Professional Goods	0.4			
TOTAL	**1.9**			

Table 3.3 cont: Classification of Industrial Groups and FDI Approvals (%) - 1991-97

Skills	FDI %
Skilled	
Food, beverages & Tobacco	7.9
Paper, paper products & printing	2.2
Chemicals excluding drugs	9.5
Drugs & Medicines (pharmaceuticals)	0.7
Petroleum refineries & products	12.5
Fabricated metal products	1.2
Office & Computing equipment	0.7
Radio, TV, and communication equipment	31.0
Aircraft	0.0
Professional Goods	0.4
TOTAL	**66.3**
Unskilled	
Textiles, apparel & leather	2.7
Wood products & printing	0.0
Non-metallic mineral products	1.3
Rubber & Plastic Products	0.5
Iron & Steel	5.6
Non-ferrous metals	0.8
Shipbuilding & Repairing	0.0
Non-electrical machinery	3.4
Electrical machinery (excl. comm. Equipment)	8.3
Motor vehicles	4.4
Other transport equipment	5.1
Other manufacturing	1.5
TOTAL	**33.7**

Table 3.4: MNC Sectoral Share of Sales

SECTOR	MNC Total Asset share	MNC GFA share	MNC Sales share
Food, Beverages, Tobacco	13.9	21.4	29.7
Leather Products	30.3	38.5	52.1
Textiles	2.2	7.2	5
Wood Products	0	0	0
Pulp & Paper Products	20.5	10.7	9.9
Chemicals	29.4	11.2	24.1
Plastics & Rubber	4.1	9.7	10.2
Mineral Products	40.3	35.2	47.2
Non-metallic mineral products	3.1	4.7	5.7
Base metals	2.3	7.6	5.5
Non-electrical machinery	23.3	25.2	24.5
Electrical machinery	24.1	19.4	23.5
Electronics	8.6	15.3	18.1
Transport Equipment	12.4	24.3	23.9
Diversified	3.2	5.8	16.4
Electricity	1.7	4.9	2.5
Source: PROWESS			

Table 3.5: Summary Statistics – MNCs and Local Firms

	MNC			LOCAL	
Variables	Mean	Std. Dev.		Mean	Std.Dev
Total Assets	148.4	347.7		89.9	419.7
Net Sales	173.5	453.3		67.0	236.6
Gross Fixed Assets	95.7	256.4		57.9	307.3
Total Exports	17.6	59.9		6.9	28.6
Total Imports	24.8	94.1		8.9	56.4
Exports/Sales	0.09	0.18		0.11	0.27
Imports/Sales	0.15	0.31		0.14	0.71
Cost of Production/Sales	0.76	0.25		0.86	0.51
Wages	13.29	24.60		4.97	21.46
Wages/Costs of Production	0.14	0.19		0.12	0.16
Advertising/Sales	0.010	0.021		0.005	0.019
R&D/Sales	0.001	0.010		0.023	1.600
Marketing&Distribution/Sales	0.050	0.271		0.035	0.197
Imported inputs/Sales	0.10	0.29		0.12	0.70
No. of Observations	1560			22668	

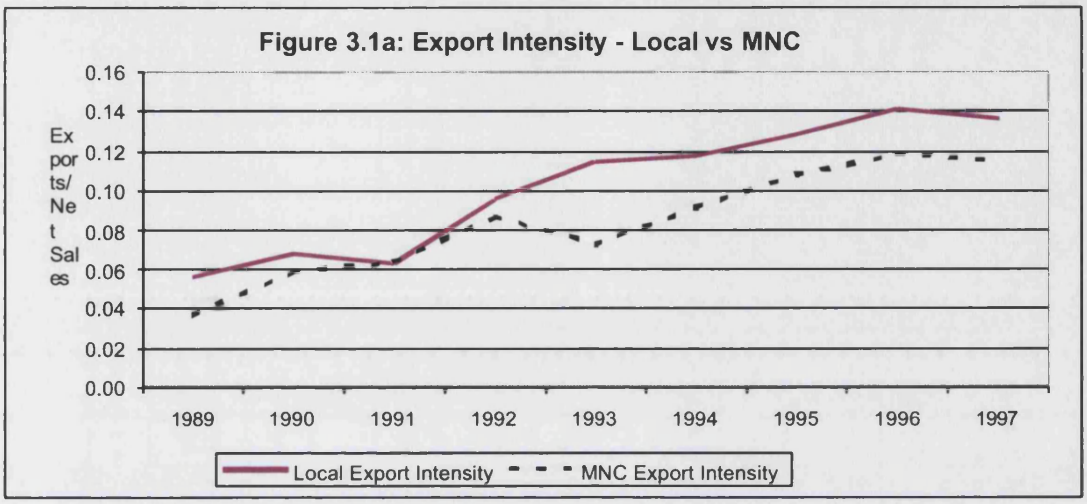


Figure 3.1a: Export Intensity - Local vs MNC
Exports/ Net Sales
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
1989
1990
1991
1992
1993
1994
1995
1996
1997
Local Export Intensity
MNC Export Intensity

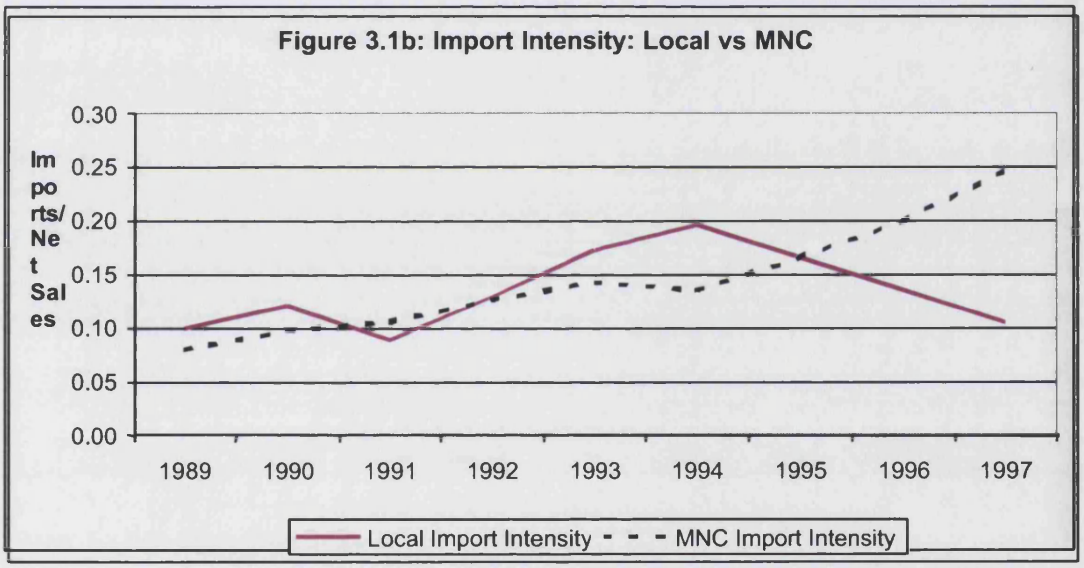


Figure 3.1b: Import Intensity: Local vs MNC
Imports/ Net Sales
0.30
0.25
0.20
0.15
0.10
0.05
0.00
1989
1990
1991
1992
1993
1994
1995
1996
1997
Local Import Intensity
MNC Import Intensity

Figure 3.2: Export Intensity by Industry: 1996 versus 1990

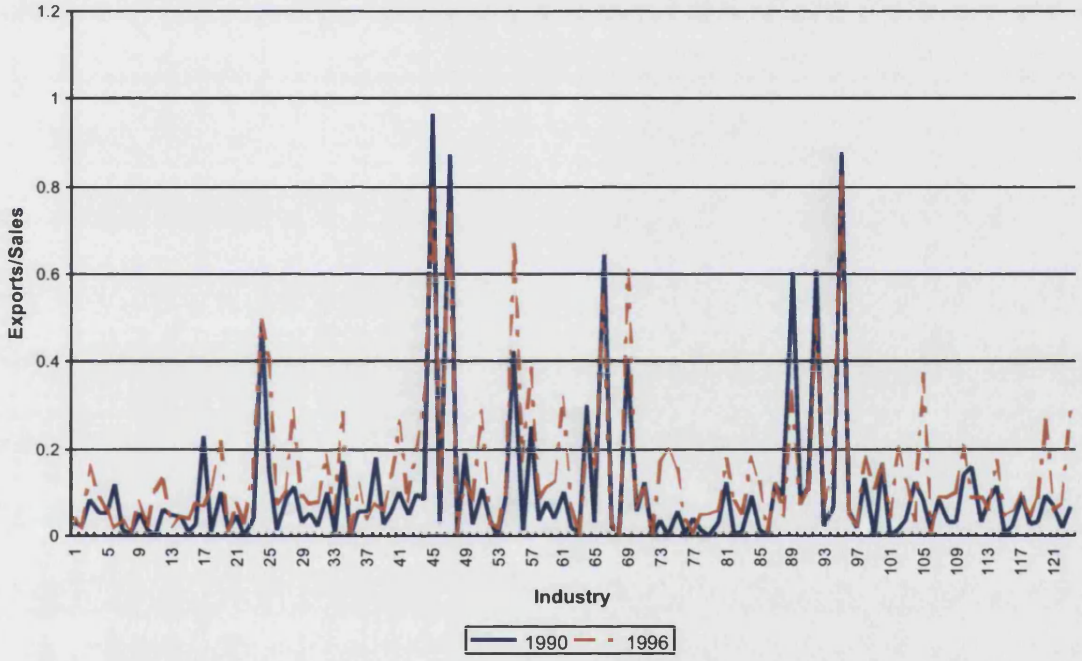


Figure 3.3: MNC Presence & Export Intensity in Industry

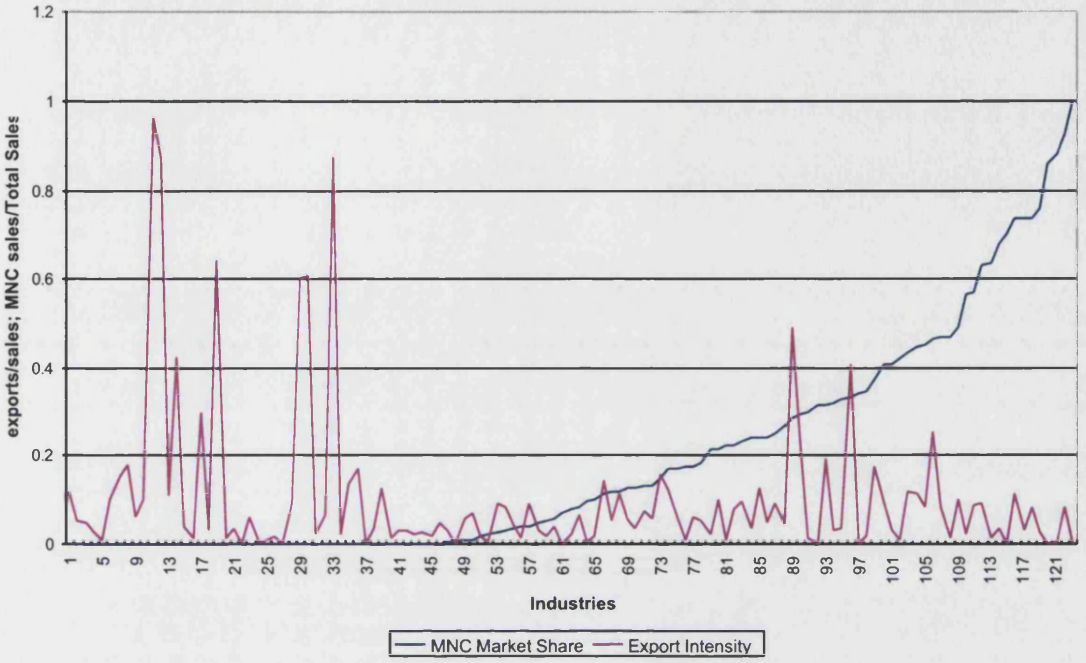
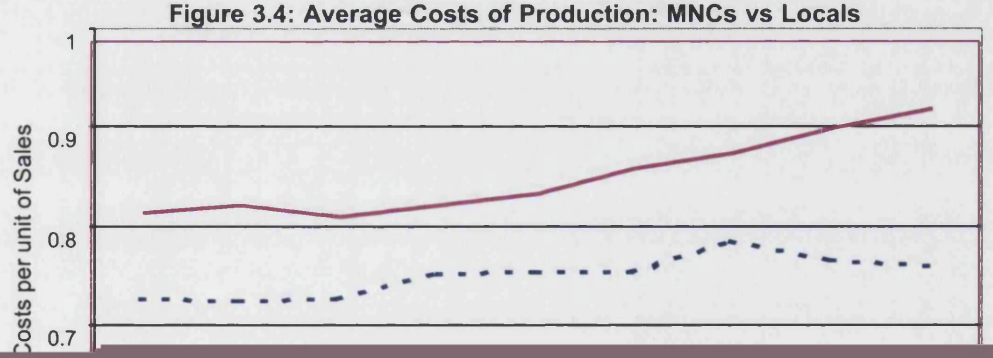


Figure 3.4: Average Costs of Production: MNCs vs Locals



1991 1992 1993 1994 1995 1996 1997

1989 1990

COP/Sales Local COP/Sales

MNC

Figure 3.5a: Returns on Assets (wtd): MNCs vs Locals

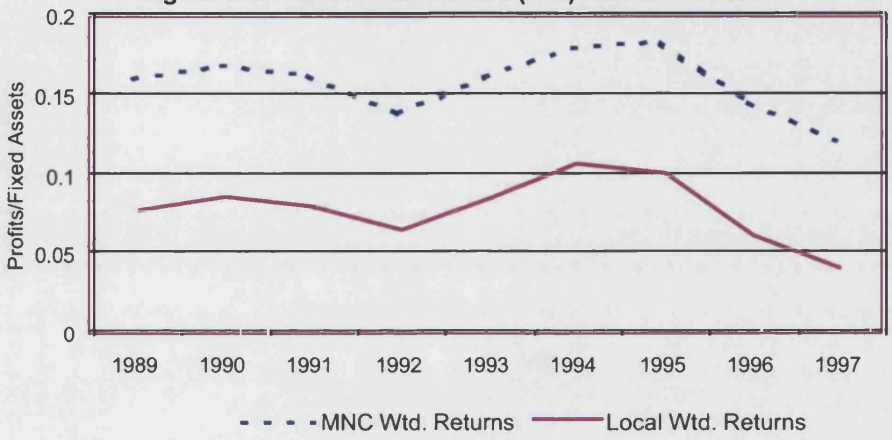


Figure 3.5b: Profit Margins (wtd): MNCs vs Locals

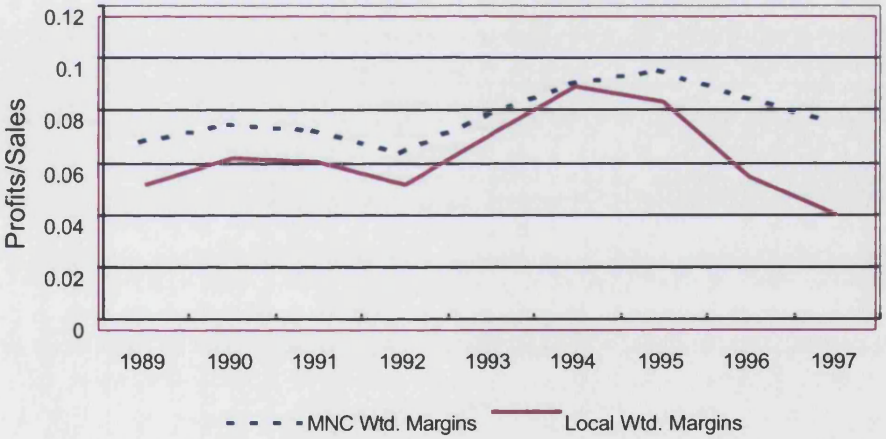


Table 3.6: Decomposition of Change in Profitability: Locals vs MNCs – 1990-1996

	Total	MNC	Local
Total Change in Profitability	-0.02615	-0.024	-0.02563
out of which:			
Contribution of Entering Firms	-0.00884	-0.014	-0.00432
Contribution of Exiting Firms	-0.00223	0.00001	-0.00179
Reallocation amongst Surviving Firms	0.007108	-0.0397	0.01372
Profitability changes for Survivors	-0.02309	0.0301	-0.03075

Decomposition based on Bailey, Hulten, and Campbell (1992)

Table 3.7: Transition Matrices: Levels Persistence 1990-97

MNC Profits (t+1)

MNC Profits (t)	< -0.3	[-0.3 to -0.2]	[-0.2 to -0.1]	[-0.1 to 0]	[0 to 0.1]	[0.1 to 0.2]	[0.2 to 0.3]	[0.3 to 0.5]	> 0.5	Total
< -0.3	**49.3**	15.5	12.7	7.0	5.6	2.8	2.8	2.8	1.4	100
[-0.3 to -0.2]	12.9	**28.6**	32.9	10.0	7.1	7.1	0.0	0.0	1.4	100
[-0.2 to -0.1]	6.0	12.7	**38.1**	28.4	9.0	3.0	1.5	0.0	1.5	100
[-0.1 to 0]	1.6	3.5	11.9	**50.5**	25.4	4.1	1.3	0.9	0.9	100
[0 to 0.1]	1.2	0.6	2.9	21.6	**51.5**	15.5	3.8	2.1	0.9	100
[0.1 to 0.2]	3.4	1.4	2.1	13.7	28.8	**30.1**	11.0	6.9	2.7	100
[0.2 to 0.3]	1.4	0.0	1.4	2.7	11.0	19.2	**28.8**	28.8	6.9	100
[0.3 to 0.5]	0.8	0.8	0.0	0.8	2.5	6.7	14.2	**50.0**	24.2	100
> 0.5	0.0	0.0	0.8	2.2	3.0	0.8	4.5	17.2	**71.6**	100
Total	4.8	4.5	9.7	22.1	23.8	10.2	5.8	8.9	10.2	100

SHORROCK's INDEX **0.627**

Local Profits (t+1)

Local Profits(t)	< -0.3	[-0.3 to -0.2]	[-0.2 to -0.1]	[-0.1 to 0]	[0 to 0.1]	[0.1 to 0.2]	[0.2 to 0.3]	[0.3 to 0.5]	> 0.5	Total
< -0.3	**56.4**	15.4	11.0	7.9	3.8	1.7	1.2	0.6	2.1	100
[-0.3 to -0.2]	18.7	**29.8**	31.8	11.3	3.7	1.6	1.4	0.7	1.0	100
[-0.2 to -0.1]	7.1	11.1	**37.1**	32.5	8.5	2.1	0.6	0.6	0.5	100
[-0.1 to 0]	2.9	2.7	13.4	**53.2**	22.5	3.7	0.8	0.5	0.4	100
[0 to 0.1]	1.1	1.3	4.0	26.4	**50.2**	12.7	2.7	1.2	0.4	100
[0.1 to 0.2]	1.4	0.7	2.1	11.4	34.8	**31.0**	10.5	6.4	1.7	100
[0.2 to 0.3]	1.7	0.4	2.9	7.0	18.6	26.5	**22.4**	16.1	4.5	100
[0.3 to 0.5]	0.9	1.0	1.6	5.7	13.1	17.9	18.8	**28.4**	12.7	100
> 0.5	3.3	1.0	1.6	3.1	7.8	5.7	7.8	17.4	**52.4**	100
Total	6.5	5.1	12.5	29.7	25.8	9.9	4.1	3.6	3.0	100

SHORROCK's INDEX **0.674**

Figure 3.6a: Profitability Transitions - Local Firms

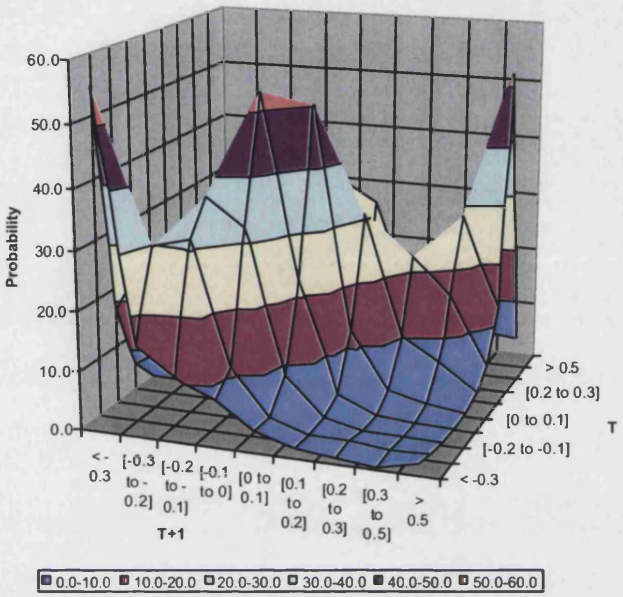


Figure 3.6b: Profitability Transitions: MNCs

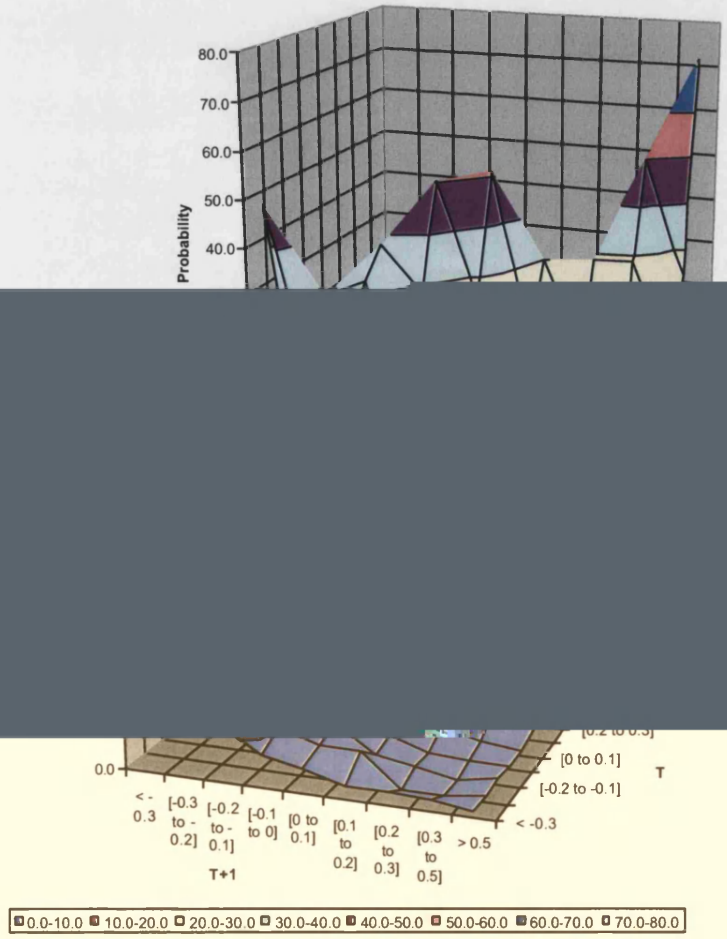


Figure 3.6c: Shorrock's Mobility Index - Local & MNCs 1990-97

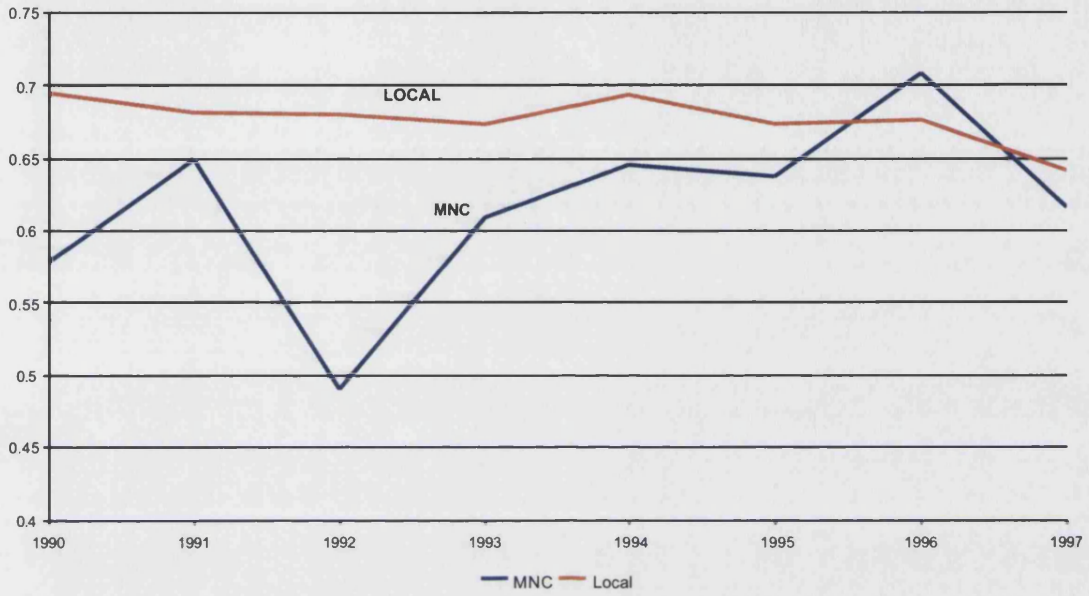


Table 3.8a (panel 1): MNCs – Persistence in Deciles

Deciles	1	2	3	4	5	6	7	8	9	10	Total
1	**50**	18.6	6.4	8.6	2.9	4.3	5.0	0.7	2.9	0.7	100
2	18.9	**28.8**	28.0	7.6	9.9	4.6	1.5	0	0	0.76	100
3	5.0	20.1	**33.1**	20.1	12.2	2.2	4.3	1.4	0.0	1.4	100
4	7.6	9.0	17.4	**31.9**	15.3	10.4	4.2	3.5	0.7	0.0	100
5	3.6	2.9	6.5	20.9	**33.1**	20.1	8.6	2.9	0.7	0.7	100
6	2.7	2.7	4.1	8.1	17.6	**33.1**	21.0	8.8	1.4	0.7	100
7	2.8	0.7	2.8	2.8	9.7	22.2	**25.7**	24.3	4.9	4.2	100
8	2.1	1.4	1.4	3.5	2.8	4.9	23.9	**38.0**	19.7	2.1	100
9	0.7	1.4	2.1	0.0	0.0	0.0	6.3	16.0	**56.3**	17.4	100
10	0.7	0.7	0.0	0.0	1.5	0.0	0.7	5.8	15.3	**75.2**	100
Total	9.3	8.5	10.0	10.4	10.5	10.4	10.3	10.3	10.3	10.2	100

Table 3.8a (panel 2): Locals – Persistence in Deciles

Deciles	1	2	3	4	5	6	7	8	9	10	Total
1	**52.4**	17.7	8.6	5.0	3.2	2.7	2.7	2.4	2.5	3.0	100
2	14.7	**31.5**	25.2	10.6	6.4	3.8	3.2	2.0	1.7	1.0	100
3	9.8	13.9	**24.1**	25.1	11.0	6.6	3.9	3.4	1.6	0.7	100
4	6.4	7.9	14.0	**24.5**	20.2	12.5	6.2	4.9	2.6	1.0	100
5	5.5	5.5	9.1	15.6	**22.0**	21.0	12.8	5.3	2.3	1.0	100
6	2.7	3.2	5.4	10.4	18.8	**22.2**	19.6	10.9	5.3	1.5	100
7	3.2	2.3	4.0	6.0	12.4	17.7	**24.4**	19.2	8.4	2.5	100
8	2.3	1.8	1.9	4.2	7.7	11.4	17.4	**27.6**	20.2	5.6	100
9	1.7	1.1	1.4	2.3	3.4	5.8	10.5	18.7	**37.8**	17.4	100
10	2.2	0.6	0.7	1.3	2.0	2.2	3.4	7.2	17.7	**62.7**	100
Total	9.8	8.5	9.3	10.4	10.7	10.6	10.5	10.3	10.2	9.8	100

Figure 3.7a: Persistence by Decile: MNCs

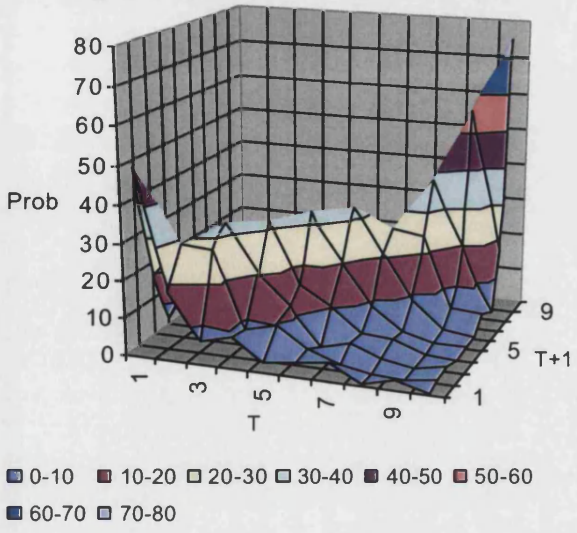


Figure 3.7b: Persistence by Deciles: Locals

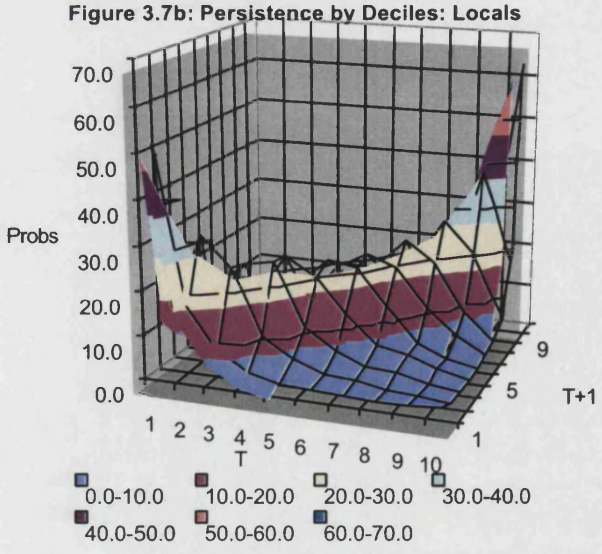


Table 3.8b (panel 1): Local Firms – Persistence in Deciles – No. of Firms

Deciles	1	2	3	4	5	6	7	8	9	10	Total
1	***868***	*293*	*142*	*82*	*53*	*44*	*44*	*39*	*42*	*50*	1657
2	*265*	***569***	*455*	*191*	*116*	*68*	*57*	*36*	*30*	*18*	1805
3	*163*	*231*	***400***	*417*	*182*	*110*	*64*	*56*	*27*	*12*	1662
4	*112*	*137*	*244*	***427***	*352*	*218*	*108*	*85*	*46*	*17*	1746
5	*97*	*98*	*162*	*278*	***391***	*374*	*228*	*94*	*41*	*18*	1781
6	*49*	*57*	*96*	*185*	*336*	***396***	*350*	*195*	*95*	*27*	1786
7	*56*	*41*	*70*	*107*	*219*	*313*	***432***	*340*	*149*	*45*	1772
8	*41*	*32*	*35*	*75*	*139*	*206*	*315*	***500***	*365*	*101*	1809
9	*30*	*20*	*25*	*41*	*61*	*105*	*190*	*338*	***684***	*315*	1809
10	*40*	*11*	*12*	*23*	*36*	*40*	*61*	*130*	*317*	***1126***	1796
Total	1721	1489	1641	1826	1885	1874	1849	1813	1796	1729	17623

Table 3.8b (panel 2): MNCs – Persistence in Deciles – No. of Firms

Deciles	1	2	3	4	5	6	7	8	9	10	Total
1	***70***	*26*	*9*	*12*	*4*	*6*	*7*	*1*	*4*	*1*	140
2	*25*	***38***	*37*	*10*	*13*	*6*	*2*	*0*	*0*	*1*	132
3	*7*	*28*	***46***	*28*	*17*	*3*	*6*	*2*	*0*	*2*	139
4	*11*	*13*	*25*	***46***	*22*	*15*	*6*	*5*	*1*	*0*	144
5	*5*	*4*	*9*	*29*	***46***	*28*	*12*	*4*	*1*	*1*	139
6	*4*	*4*	*6*	*12*	*26*	***49***	*31*	*13*	*2*	*1*	148
7	*4*	*1*	*4*	*4*	*14*	*32*	***37***	*35*	*7*	*6*	144
8	*3*	*2*	*2*	*5*	*4*	*7*	*34*	***54***	*28*	*3*	142
9	*1*	*2*	*3*	*0*	*0*	*0*	*9*	*23*	***81***	*25*	144
10	*1*	*1*	*0*	*0*	*2*	*0*	*1*	*8*	*21*	***103***	137
Total	131	119	141	146	148	146	145	145	145	143	1409

Table 3.8c : Persistence in Deciles – Summary Statistics

Decile	Maximum Return	Median Return	Median Change	Inter-Quartile Range	Number of Firms
MNCs					
1	-0.09	-0.27	-0.09	0.30	131
2	-0.03	-0.08	-0.01	0.10	119
3	-0.01	-0.04	0.00	0.06	141
4	0.04	0.00	0.01	0.09	146
5	0.10	0.04	0.01	0.08	148
6	0.17	0.09	0.02	0.08	146
7	0.29	0.17	0.03	0.16	145
8	0.46	0.30	0.06	0.21	145
9	0.81	0.49	0.03	0.19	145
10	12.95	0.99	0.14	0.52	143
LOCALS					
1	-0.131	-0.292	-0.120	0.266	1,721
2	-0.076	-0.109	-0.022	0.104	1,489
3	-0.034	-0.071	-0.003	0.067	1,641
4	-0.022	-0.042	0.003	0.071	1,826
5	-0.002	-0.016	-0.002	0.072	1,885
6	0.031	0.012	0.006	0.076	1,874
7	0.074	0.045	0.012	0.090	1,849
8	0.141	0.093	0.016	0.111	1,813
9	0.313	0.180	0.028	0.153	1,796
10	15.148	0.449	0.080	0.313	1,729

Figure 3.7c: Profitability by Deciles: MNCs and Local Firms - 1989-97

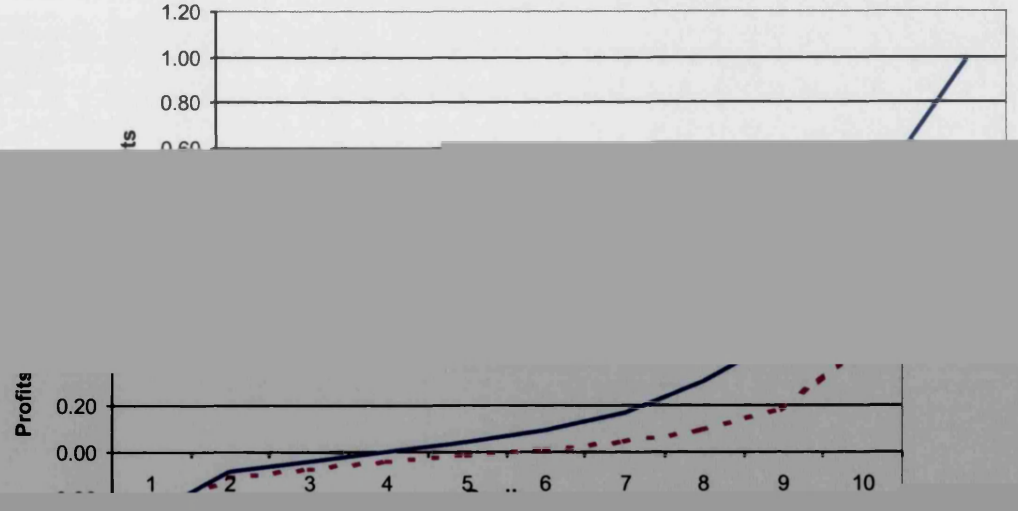


Table 4.1: Industry Groups & MNC Presence

	Avg. No. of MNCs	MNC mkt sh-1989-91	MNC mkt sh - 1992-97
Treatment			
Automobile ancillaries	4	18.7%	17.6%
Castings & forgings	2.24	7.7%	5.4%
Electronic components	2.48	12.9%	6.2%
Electronic equipments	3.3	15.6%	13.5%
Electronic tubes	0	-	-
Ferro alloys	0.84	4.4%	14.0%
Glass & glassware	1.86	14.7%	9.7%
Industrial machinery(excl.chem&text.)	5.8	38.1%	31.6%
Inorganic chemicals	1	6.2%	5.4%
Machine tools	3.95	39.1%	35.7%
Motors & generators	2	19.4%	25.7%
Nitrogenous fertilisers	0	-	-
Pig iron	0.85	-	17.5%
Plastic resins	0.28	-	51.2%
Plastic sheets	1	43.8%	28.7%
Plastic tubes & pipes	0	-	-
Prime movers	1.52	57.8%	46.2%
Soyabean products	0	-	-
Sponge iron	1	80.8%	79.0%
Tyres & tubes	2.9	19.0%	16.7%
Control			
Bakery & milling products	0	-	-
Beer	3.1	27.1%	15.6%
Clocks & watches	0	-	-
Jute products	0	-	-
Minerals	1.9	46.7%	39.7%
Oil cakes & animal feed	0.61	-	1.4%
Paper	1.91	10.0%	8.3%
Poultry & meat products	0	-	-
Silk textiles	0	-	-
Sugar	0	-	-
Textile machinery	2.8	14.7%	7.9%
Vanaspati	0	-	-
Wood	0	-	-
Treatment2			
Computer hardware	3.2	24.0%	11.6%

Computer software	6.2	19.3%	14.5%
Cosmetics & toiletries	5.55	63.3%	61.7%
Electronic equipments	3.32	15.6%	13.5%
Footwear	1.57	76.7%	57.2%
Lubricants, etc.	3.14	65.1%	75.3%
Misc. electrical machinery	1.54	21.3%	31.7%
Plastic packaging goods	0.63	0.0%	0.2%
Plastic resins	0.28	0.0%	51.2%
Pumps & compressors	5.53	45.1%	43.7%
Readymade garments	0.73	0.0%	0.7%
Refractories	0.68	0.0%	6.5%
Woollen textiles	1.62	3.5%	24.6%

Table 4.2: Comparing Average Profits

Industry Group	Period	Average Profit Margins	Observations
Treatment	*Before Reforms (1989-91)*	4.31%	760
	After Reforms (1992-97)	-9.77%	3006
Control	*Before Reforms*	3.69%	440
	After Reforms	-3.83%	1685

Table 4.3: Determinants of Firm Profitability

	Arel-Bond (FD-IV)		OLS	FE
	[1]	[2]	[3]	[4]
Lagged Profits	0.174**	0.171**	0.194**	-0.101**
	0.037	0.037	0.016	0.021
Reforms1	-0.038**			
	0.015			
Reforms2		-0.106**	-0.035**	-0.078**
		0.033	0.012	0.021
Market Share	6.1**	6.01**	1.13**	4.678**
	1.93	1.895	0.483	1.219
Concentration	0.807**	0.776**	-0.149**	0.332
	0.326	0.325	0.053	0.222
Import Intensity	0.326		-0.316*	-0.115
	0.387		0.127	0.284
Mkt Sh*Conc	-5.127**	-5.081	-1.066	-4.21**
	2.053	2.047	0.590	1.307
Mkt Sh*Profit Lag	-8.88**	-8.785	-0.450	1.767
	1.488	1.485	0.792	1.018
Mkt Sh*Imports	-0.345			0.851
	1.966			1.269
Year Dummies	Yes	Yes	Yes	Yes
Sample Size	4625	3577	4726	4726
Wald chi2	80.26 (14)	86.19 (12)		
R-squared			0.06	0.03
F-Statistic			21.52	8.43

Dep. Var. is Profits/Sales; ** Significant at 1% level; * Significant at 5% level; Std errors below co-effs
Reforms1 is dummy which is 1 if firm in treatment group of industries and post-reform years
Reforms2 is dummy which is 1 if firm in treatment group & post-reform years & MNC entry in industry
Mkt Sh: Market Share; Conc: Industry Concentration; Imports: Industry Import Intensity

Table 4.4: Reforms and Multinationality

	Local Firms		MNC	
	Arel.-Bond (FD-IV)		Arel-Bond (FD-IV)	
	[1]	[2]	[3]	[4]
Lagged Profits	0.173**	0.17**	0.68**	0.67**
	0.039	0.038	0.208	0.206
Reforms1	-0.04**		-0.015	
	0.015		0.034	
Reforms2		-0.122**		0.017
		0.036		0.109
Market Share	6.06**	5.99**	9.1*	9.08*
	2.02	2.02	3.76	3.75
Concentration	0.84*	0.816*	1.45*	1.44*
	0.343	0.342	0.595	0.59
Mkt Sh*Conc	-5.16*	-5.12*	-7.53*	-7.53*
	2.180	2.180	3.77	3.76
Mkt Sh*Profit Lag	-8.86**	-8.77**	-24.03**	-23.8**
	1.548	1.546	6.64	6.59
Year Dummies	Yes	Yes	Yes	Yes
Sample Size	3359	3359	1405	1405
Wald chi2	74.85 (12)	82.16 (12)	24.79 (12)	24.87(12)

Dep. Var. is Profits/Sales; ** Significant at 1% level; * Significant at 5% level; Std errors below co-effs
Sample for regressions [1] and [2] are pre-1991 local firms
Sample for regressions [3] and [4] are pre-1991 MNCs
Reforms1 is dummy which is 1 if firm in treatment group of industries and post-reform years
Reforms2 is dummy which is 1 if firm in treatment group & post-reform years & MNC entry in industry
Mkt Sh: Market Share; Conc: Industry Concentration; Imports: Industry Import Intensity

Table 4.5: List of MNCs Entering Reform Industries

Industry	Company	Entry Year
(Treatment 2 Group)		
Computer hardware	*Hinditron Informatics Ltd.*	1991
	Redington (India) Ltd.	1993
Computer software	*B F L Software Ltd.*	1992
	Polaris Software Lab Ltd.	1993
	Silverline Industries Ltd.	1992
Cosmetics & toiletries	*Lever India Exports Ltd.*	1993
Electronic equipments	*M I L Controls Ltd.*	1994
Footwear	*Stiefel Und Schuh India Ltd.*	1994
Lubricants, etc.	*E L F Lubricants (India) Ltd.*	1993
	Gulf Oil India Ltd. [Erstwhile]	1993
Misc. electrical machinery	*S A B Wabco India Ltd.*	1991
Plastic packaging goods	*Ras Propack Lamipack Ltd.*	1993
Plastic resins	*Ciba Speciality Chemicals (India) Ltd.*	1997
Pumps & compressors	*Beacon Process Pumps Ltd.*	1991
Readymade garments	*G I V O Ltd.*	1993
Refractories	*Vesuvius India Ltd.*	1991
Woollen textiles	*Fabworth (India) Ltd.*	1992

Table 5.1: Decomposition of Growth in Aggregate Export Intensity: 1990-96

Total Change in Export Intensity (X' - X)	0.0490
out of which:	
Contribution of Entering Firms	0.0098
Contribution of Exiting Firms	0.00014
Reallocation amongst Surviving Firms	0.0074
Export Intensity Gains for Survivors	0.0309

Decomposition based on Bailey, Hulten, and Campbell (1992)

Figure 5.1: Export Intensity - All Manufacturing 1989-1997

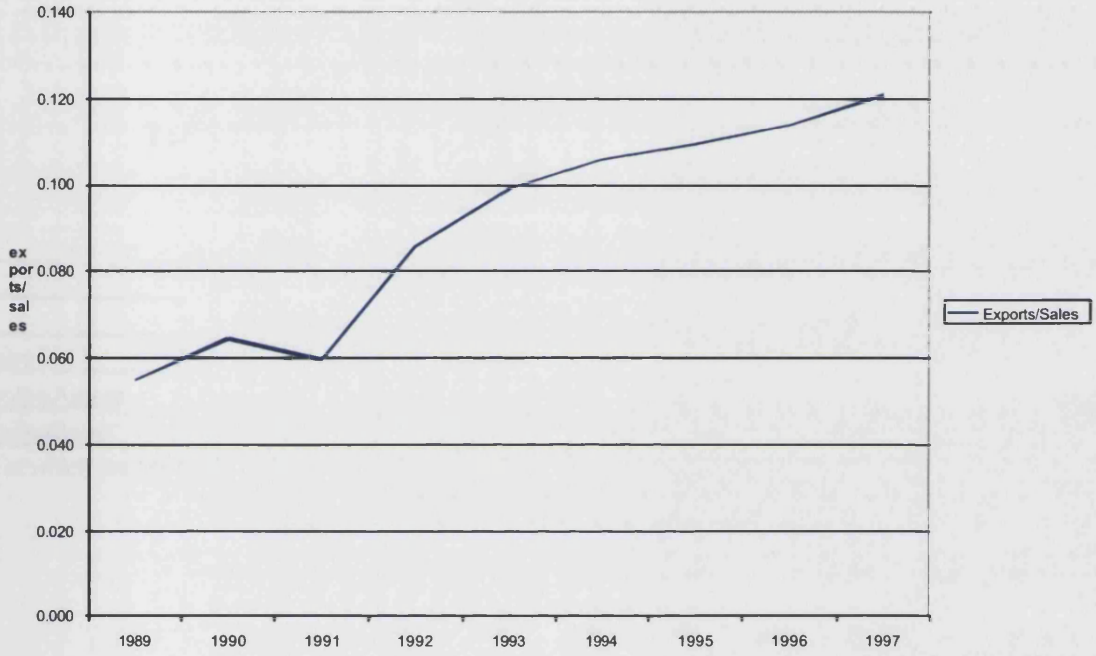


Table 5.2: Sample Characteristics

	1989	1990	1991	1992	1993	1994	1995	1996	1997
Total # of firms	1253	1621	1854	2241	2903	3657	4004	3801	3054
# of Firms Exporting	689	868	955	1210	1554	1784	1885	2091	2138
# of Firms Not Exporting	564	753	899	1031	1270	1349	1710	1772	1866
% of Firms Exporting	51.5	51.5	53.4	53.5	53.5	54.0	55.0	55.0	58.4
% of MNCs Exporting	62.3	63.1	67.9	68.8	70.9	72.8	74.6	75.3	76.1
Continuing Exporters from 1989	689	639	620	592	579	563	561	534	497
% of Continuing Exporters		92.7	90.0	85.9	84.0	81.7	81.4	77.5	72.1

Table 5.3: Characteristics of Exporters & Non-Exporters

	1990				1996	
	Exporters	*Non-Exp.*			*Exporters*	*Non-Exp*
Sales	93.3	25.25			138.3	29.0
Profits/Assets	0.178	0.117			0.08	-0.006
Profits/Sales	0.05	-0.01			-0.05	-0.24
% of which are MNCs	12.2	8.2			7.9	3.2

Table 5.4: Firm Characteristics and the Decision to Export

	OLS (1)	OLS (2)	OLS (3)
Exported Last Year	0.757**	0.755**	0.737**
	0.005	0.005	0.005
Last Exported 2 years ago	0.18**	0.177**	0.17**
	0.01	0.01	0.02
Sales	$6.57*10^{-6}$**	$5*10^{-5}$**	$7*10^{-5}$**
	$9.76*10^{-5}$	$9*10^{-6}$	$1*10^{-5}$
Profitability	0.008*	0.026**	0.02**
	0.004	0.006	0.005
MNC	0.07**	0.058**	0.06**
	0.008	0.009	0.009
MNC mkt share in industry		-0.03	
		0.019	
New MNCs in Industry	-0.005	0.003	
	0.006	0.008	
Export Intensity in Industry	0.14**		0.09
	0.02		0.08
MNC Export-Share in Industry	-0.025*		0.03
	0.013		0.02
No. of Exporters in Industry		0.0003*	
		0.0001	
No. of MNC Exporters		-0.0003	
		0.0008	
Born after 1990	0.014	0.018*	0.01*
	0.009	0.008	0.008
Reforms Dummy	0.069**		
	0.01		
Year Dummies	Yes	Yes	Yes
Industry Dummies	No	No	Yes

Binary Dependent Variable - Y = probability of firm exporting
** Significant at 1% level; * Significant at 5% level.
Standard Errors below Co-efficients

Table 5.5: Firm Characteristics and Export Intensity

	OLS (1)	OLS (2)	OLS (3)
Export Intensity Last Year	0.456**	0.755**	0.5**
	0.005	0.008	0.004
Export Intensity 2 years ago		0.14**	
		0.008	
Sales	.01**	0.025	.01**
	0.005	0.030	0.005
Profitability	0.025**	0.01**	0.02**
	0.002	0.002	0.005
MNC	-0.0007	-.0003	
	0.004	0.003	
MNC mkt share in industry		-0.03	0.007
		0.019	0.02
Export Intensity in Industry	0.24**	-0.04	
	0.04	0.03	
MNC Export-Share in Industry	0.009	-0.005	0.03
	0.01	0.009	0.02
No. of Exporters in Industry			0.006**
			0.001
Born after 1990	0.014**	0.004	
	0.004	0.004	
Year Dummies	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes

Dependent Variable = export intensity of firm (exports/sales)
** Significant at 1% level; * Significant at 5% level.
Standard Errors below Co-efficients

Table 5.6: Fixed Effects and First Difference-IV Model of Export Participation

	FE (1)	FE (2)	A-B (3)
Exported Last Year	0.23**	0.22**	0.359**
	0.01	0.01	0.005
Last Exported 2 years ago	-0.004	-0.01	
	0.02	0.01	
Sales	-0.009	-0.01	-0.002
	0.018	0.02	-0.029
Profitability	-0.0008	0.008	-0.0017
	0.005	0.009	0.006
MNC mkt share in industry	0.084		0.02
	0.06		0.03
New MNCs in Industry			0.005
			0.01
Export Intensity in Industry	0.2**		0.02
	0.08		0.05
MNC Export-Share in Industry	0.004		-0.007
	0.03		0.016
No. of Exporters in Industry		0.0005	
		0.0003	
No. of MNC Exporters		-0.008	
		0.005	
Born after 1990			0.037**
			0.01
Year Dummies	Yes	Yes	Yes

Binary Dependent Variable - Y = probability of firm exporting

** Significant at 1% level; * Significant at 5% level.

Standard Errors below Co-efficients

FE: Fixed Effects Model; A-B: Arellano Bond Model

Table 5.7: Comparing Random Effects-Probit and First Differences Estimation

		Probit		A-B
Exported Last Year		2.4**		0.359**
		0.03		0.005
Last Exported 2 years ago		0.607**		
		0.07		
Sales		0.002**		-0.002
		0.0002		-0.03
Profitability		0.12**		-0.0017
		0.03		0.006
MNC		0.37**		
		0.05		
MNC mkt share in industry		0.05		
		0.11		
New MNCs in Industry				0.005
				0.01