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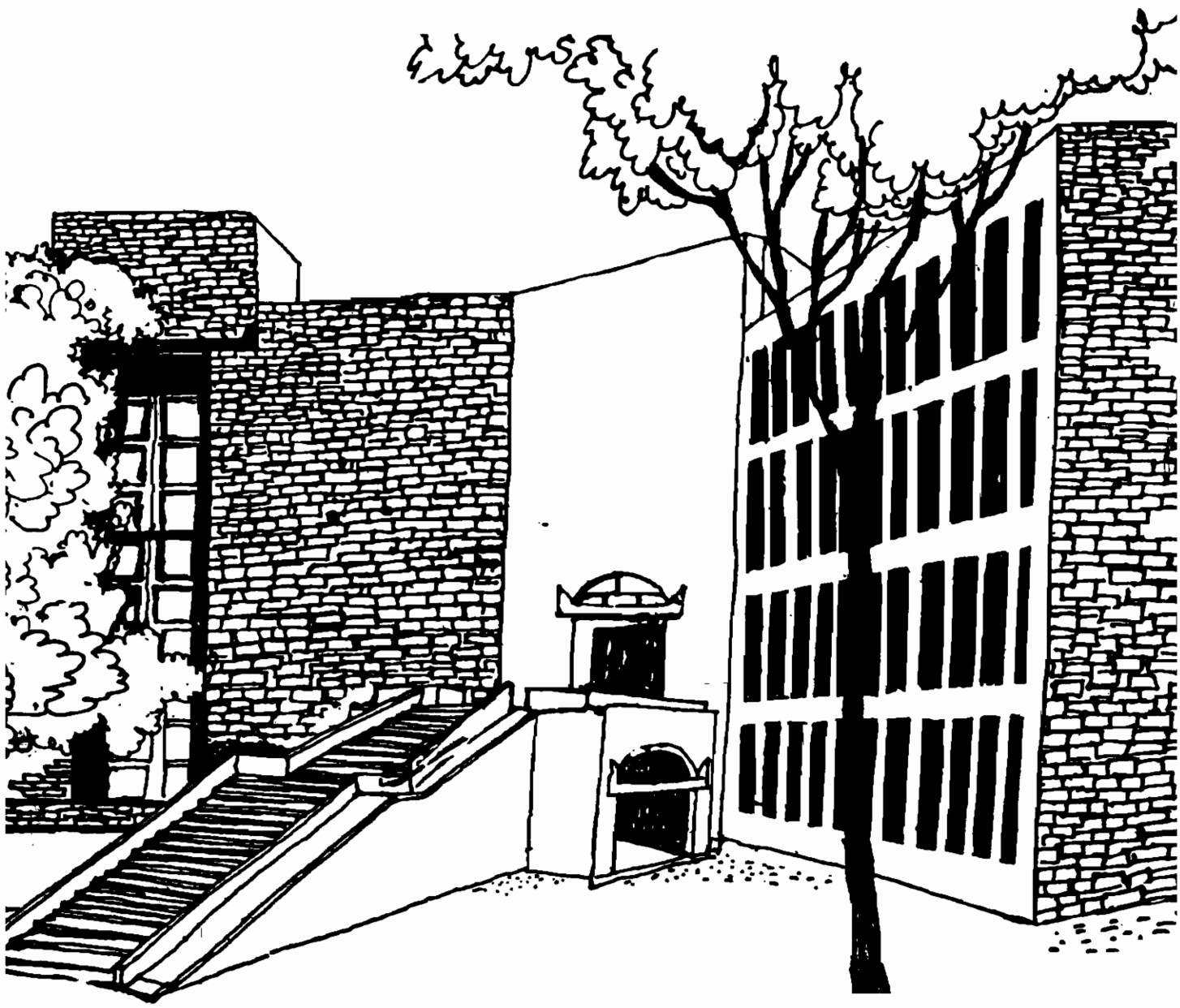

HOW DIFFERENT ARE MULTINATIONAL SUBSIDIARIES FROM LOCAL FIRMS IN A DEVELOPING ECONOMY: A STUDY OF INDIAN INDUSTRY

By

Murali Patibandla

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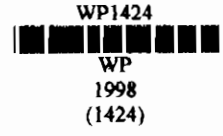

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INDIA

How Different are Multinational Subsidiaries from Local Firms in a Developing Economy: A study of Indian Industry

Murali Patibandla
Indian Institute of Management, Ahmedabad-380015, India

Abstract:

The spill-overs associated with superior production and marketing practices of multinational (MNC) firms to local firms in a developing economy are germane only when MNC firms are significantly different from local firms in technological, organizational and marketing practices. The spill-overs and competition induced deliberate efforts of local firms should make the best practices common contributing to growth process, especially in developing countries such as India which have achieved a certain degree of industrialization and technological capabilities. This paper makes a conceptual distinction between exogenous and behavioural response variables that determine the differences among MNC and domestic firms. The empirical exercise tests for how different are MNCs from local firms in production efficiency, vertical integration, R&D behaviour, marketing , exporting and importing intensity for five Indian industries on the basis of firm level panel data. The explanation for the observed differences or lack of differences is drawn from the arguments of exogenous and behavioural response variables.

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Address for Correspondence: Murali Patibandla, Indian Institute of Management, Ahmedabad-380015, India. E-mail: muralip@iimahd.ernet.in; Phone: 91-79-407241; Fax: 91-79-6427869.

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1. Introduction

For a long time. most of foreign direct investment (FDI) flows have been among developed nations with similar income levels and factor endowment conditions. FDI flow among developed economies is basically a substitute for intra-industry trade. During the last ten years there has been a significant increase in the share of developing countries in FDI inflows. The share of developing countries in FDI inflows increased to 37 per cent ($ 87 billion) in 1994 from 18 per cent ($ 34 billion) in the period of 1987-91 (The World Investment Report. 1997, The U. N). As several developing countries achieve rapid increase in incomes. they become attractive markets for products of multinational firms (MNC). Secondly, these countries are also attractive for soursing production in certain industries for the global market because of low wage costs of unskilled and skilled manpower.

One of the major outcomes of the economic reforms initiated in the mid eighties in India has been the increasing presence of multinational firms in the Indian market (See Table.1). The literature on the issue of MNCs in developing economies shows that their ownership of proprietary. largely intangible value-creating assets such as technological knowledge, marketing. management and networks benefit developing economies through technology and marketing spill overs (Caves. 1988, Dunning. 1981).[1] The firm specific advantages of MNCs make them different from local firms at least in the beginning of their entry into developing countries. If the superior production and marketing practices of MNCs are copied by local firms by deliberate efforts and spill-overs, both MNCs and local firms should be similar in characteristics over a period of time. This. in turn, should lift the overall industries in developing economies to a higher trajectory. In other words. MNCs are a part of the dynamic growth process through open trade and investment policies and growth, in turn. makes best practices to be common across countries. The idea is that if MNCs come with practices that are superior to those of local firms. the overall benefits to the host economy will be important. In other words. more significant are the differences

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[1] As the market for intangible assets is imperfect in several ways, these are partially public goods which means knowledge developed by one firm can be applied at little cost by other firms.

Table 1
Industry wise Break up of Foreign Collaborations Approvals from 1991 to 1996

Name of Industry	Number of Approvals		Amount of FDI approved Rs.Milion	Per cent to total amount
	Technical	Financial		
Basic Industries	966	766	278326	32.2
Capital goods	1992	1399	86111	10
Intermediate industries	170	286	15043	1.76
Consumer Non-durable industries	904	1292	120629	13.9
Consumer durable industries	27	42	26468	0.5
Services	258	1467	336712	39
Total	4317	5252	86329	100

Source: Research Foundation, EPW

across MNCs and local firms higher should be the gains to developing economies that have undertaken the reforms to facilitate MNC investment, provided it does not lead to exit of domestic firms (Kokko, 1994).[2]

The recent reforms in India have eliminated the policy bias against MNCs. When the policy is neutral to domestic and foreign capital in production, MNCs will enter the Indian market because: 1) they have firm specific relative advantages compared local firms in specific industries, and (or) 2) even if they do not possess any dominant relative advantage but the growth in the domestic market is not matched by the domestic investment in certain industries. Furthermore, MNC investment can take place irrespective of distinct firm specific advantages of MNCs if location of production in India provides them with a cost advantage in production and consequently in the international markets in certain labour and skill intensive industries. In the latter case, MNCs do not have to look significantly different from local firms in total factor productivity and intangible assets but still contribute to growth process by reducing the capital constraint.

One general observation about MNC investment behaviour is that they tend to be present more in knowledge intensive industries rather than physical capital intensive industries because intangible assets in knowledge intensive industries are more significant which provide them with a relative advantage over

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[2] In other words, if the relative advantages of MNCs are very dominant, they will eliminate domestic firms which means we can not talk of spill overs to local firms. In such a case, one of the benefits a developing country reaps is that if MNCs employ local workers, the training imparted to them can be seen as a technological gain. In case of India, local firms in most industries can be observed to be matured and in a position to compete with MNCs. A further gain to a developing economy is that entry of MNCs may create markets which are non-existent. For example, entry of Kellogs in the food processing industry generated market for break-fast cereals in India which, in turn, gave impetus to entry of small local firms into the market competitng on the basis of low price.

local firms (Dunning, 1981, Caves, 1988). The relative advantage of intangible assets could be in technology, brand names, international networks and distribution, and managerial practices, etc. This theory is applied to explain FDI flows among developed nations that are similar in factor endowments and income levels. In such a case, MNC investment is mainly to serve local markets by overcoming transport cost, import tariffs and to be in proximity with the consumers as a substitute for intra-industry trade. In case of developing economies, the explanatory factors could be a little more complex because both the factors of realizing proximity with local consumers and also differences in factor endowment conditions (wage costs) play a role in FDI inflows- both the intangible asset theory and also locational advantages arising out of factor endowment differences are relevant. In the Indian market (given the skewed income distribution), the sizeable middle class and higher income groups provide a sizeable local market for the income elastic (differentiated)goods of MNCs. Secondly, relatively lower wage rate of skilled and semi-skilled labour provides MNCs with a cost advantage in certain industries for competing in the international markets.[3]

This paper undertakes an empirical verification of the issue of how different are MNCs from local firms in production efficiency, R&D behaviour, marketing , exporting and importing intensity. In Section 2, a conceptual framework is brought out which differentiates among exogenously given firm specific factors and the behavioural variables that determine the differences between MNCs and local firms. Section 3 presents the empirical results. The empirical exercise is undertaken on the basis of firm level panel data for five Indian industries. Section 4 gives concluding remarks.

[3] But it is observed that except in a few industries such as electronics and textiles, in most industries labour costs make up only 5-10 per cent of total production costs in OECD countries which declined from 25 per cent in the 1970s (The World Investment Report, 1997, the U.N).

2. A Heuristic Framework

How MNCs differ from local firms can be seen from two inter-related ways- 1) the inherent features of MNCs arising out of their home and global multi-market operations which are exogenous to the host country operations and 2) given these inherent features and local market conditions, the behaviour of MNCs as a response to country specific conditions and local firms behaviour. In the first case, the variables are superior technology, managerial practices, knowledge capital like patents and brand names and marketing networks, etc., which MNCs bring into the host economy. In the latter case, we call the variables as behavioural response factors which are export intensity, import intensity, vertical integration, advertisement intensity and R&D intensity. A major component of behavioural outcomes is dynamic governed by competition among MNCs and between MNCs and local firms, and their response to changing domestic demand, product and factor market structural conditions, which are a part of the growth process of the host economy. An important part of the behaviour factors is governed by the host country's institutional conditions and the related cumulative learning of an MNC of the host country conditions.

A firm becomes a multinational when it has a firm specific advantage of possession of intangibles such as patents and brand name. The factors that determine a firm to set up subsidiaries in a foreign country instead of serving them by exports are in terms of trade-off between transport costs and tariff barriers and loss of economies of scale involved in multi-plant operations, and the need to be close to consumers, etc. This framework is used to explain FDI flows among developed countries with similar factor endowments and income levels (similarity of demand pattern), (Markusen,1995). In case of developing countries that differ in relative factor endowments and possess a sizeable home market for income elastic goods similar to consumption patterns of developed countries, MNCs investment could be motivated for serving local markets and also for exploiting relative factor endowment advantages of LDCs for their global

competitiveness in certain industries. In this context, the analysis of behavioural factors becomes germane and complex.

When the motive of MNCs is mostly serving the host country market, the competition that takes place between MNCs and local firms determines their relative export and import intensities, and R&D and marketing behaviour. For example, if local firms lose domestic market share to MNCs, given the limited size of local market, they increase technological efforts, advertising, exports and import content in order to compete with MNCs (Patibandla, 1997a).

If MNC investment is motivated for exploiting local factor endowments for global competitiveness, MNC subsidiaries do not have to possess any distinct advantage compared to local firms as they may not compete for local market in a major way. But even in this case, their distinction could be in terms of exploiting the local factor endowment conditions more efficiently by better organisational, technological and international marketing practices- for example, paying higher wage to skilled labour with wage compensation schemes, professionalism, orgainzational efficiency and quality control practices, etc. In other words, why should an MNC have higher exports than a domestic firm in those industries in which host country has a significant comparative advantage can be explained by MNC's intangible assets in international markets in terms of net works and distribution channels which provide them with a relative advantage in exploiting the comparative advantage more efficiently in comparison to local firms. In these industries, differences in export intensity across MNCs and domestic firms is not a behavioural outcome variable as exports may be the initial motivating factor for MNC investment (examples are India's garments and software industries, see Ghemawat and Patibandla, 1997).

To recapitulate, the exogenous factors that make MNCs distinct are the factors which MNCs accumulate through their home country and other foreign country operations and bring them into the host country. One straight forward variable refers to technology and its vintage that is superior to local firms which

helps them to realise higher total factor productivity compared to local firms.[4] In other words, MNCs have invested in R&D in the home country to generate new technologies and differentiated products that have been market tested and bring them to a developing economy that has a sizeable market for them. Under this, there is no reason for MNCs to invest in R&D in a host developing economy unless host economy's technological institutions and skill endowments cause reduction in R&D costs themselves. In most industries, developing country's technological institutions and skill endowments are observed to be inadequate for efficient R&D investment.[5]

In those industries in which MNCs subsidiaries compete with local firms for host country market, domestic firms respond by importing newer technologies and also undertaking R&D investment to reduce costs and improving product features as a part of the behavioural response. Consequently, domestic firms may exhibit higher R&D expenditure and also higher import intensity than MNC subsidiaries in a developing country. Import intensity of domestic firms increases as MNCs presence starts increasing and may remain high until domestic firms build up their own technological capabilities to compete with MNCs (examples could be India's television and automobile industries).

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[4] On the other hand, the cost structure of MNC affliates is expected to differ from that of their domestic counter parts in that there are significant fixed costs in production relocation. Furthermore, the decision on cost minimizing plant location and size is also affected by the market structure in the host country. The degree of monopolistic competition affects the extent to which the foreign investor can cover sunk cost. See De Mello Jr (1997).

[5] In a few industries such as a few product segments of pharmaceuticals and drugs and software, MNCs are setting up R&D centres in India as costs of doing R&D are observed to be lower because of availability of low wage skilled labour (and possibly to take advantage of India's rich endowment and deversity of biological conditions). For example, in the software industry, Novell Inc, has set up a major R&D centre in India recently.

MNCs subsidiaries tend to be highly import intensive especially in the beginning of their operations in a developing economy as they bring in technology and intermediate products from the parent operation. In due course, for reducing transport and tariff costs and because of possible cost advantages of producing locally, MNC subsidiaries start production of certain intermediates that involve less technological sophistication, locally. But at the same time, as a deliberate strategy of blocking technology spill-overs to local firms. MNCs subsidiaries do not produce certain intermediates in the host country and continue to import them from the parent firm. This can also be a part of undertaking transfer pricing and retaining demand for specific intermediate products for the parent firm.

Import intensity of MNC subsidiaries may vary with time as a response to domestic firm's behaviour. As mentioned before, at the initial stage of entry into a developing country MNC subsidiaries show high import intensity. As they localise production of certain components, import intensity declines. As a part of the competitive process, if domestic firms catch up technologically with MNC subsidiaries, MNCs import newer and more efficient technology from the parent firm which is the R&D centre for them (Kokko, 1994). This could be one of the ways MNC subsidiaries may keep up their technological edge and show a cyclical (an *u* shape) pattern in the import intensity. In other words, the initial lead MNCs have in R&D at home country may provide them with a continuous advantage in which case the technological differences between local firms and MNCs persist.

The import behaviour of MNC subsidiaries has implications on the degree of vertical integration of their operations in host developing economies. If they keep parent firm as a major source for intermediate products, they will have low degree of vertical integration for the host country operations. The issue of whether they will have lower degree of vertical integration compared to local firms requires examination of domestic institutions that determine market transaction costs as against extent of economies of scale and organisational costs involved in integrated production (the internalisation theory, Williamson, 1985, Dunning, 1981) which may be different for (especially new entrant) MNCs and domestic firms. This requires analysis of trade-offs among a ray of factors that are different for MNC subsidiaries and domestic

firms. In the case of MNC subsidiaries, the trade-off is between extent of plant level economies of scale and wage costs and skill levels of local labour against transport and tariff costs of bringing in intermediates from parent firm and extent of profits to parent firm in transfer pricing.[6] If the latter factors are more dominant, MNC subsidiaries may show low vertical integration as they import intermediates from the parent firm. Furthermore, as mentioned before, MNCs may not want to produce certain technologically sophisticated intermediate goods locally in order to block spread of spill-overs to local firms and also because local skills available are not adequate or below standards.[7]

Domestic firms have to weigh trade-off between extent of plant level scale economies and organisational costs[8] associated with integrated production as against cost savings that can be realised through sub-contracting and associated market transaction costs. When several intermediate products can be produced more cost efficiently by local vendor firms because of economies of specialisation (for example, certain auto-components) , firms, in general, have to weigh the trade-off between production cost savings as against market transaction costs of dealing with local vendor firms. In this context, domestic firms who have more experience with domestic market institutions, might be in a better position to deal with high market transaction costs of domestic market than MNC firms (especially new MNC firms) and will have

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[6] The case of possible benefits of transfer pricing is based on the assumption that the parent firm produces the necessary intermediate products. On the other hand, MNC firms might be sourcing certain intermediate goods from different firms spread across different countries not necessarily from the parent firm in order to realize economies of specialization.

[7] Maruti Sujuki company in the Indian automobile industry can be an example for this. Sujuki company prefers to bring in gear boxes for the car from the parent company in Japan instead of producing it locally.

[8] The organizational costs associated with integrated production could be high for large firms in India because of the labour policies and trade unions. It is very difficult for large firms to replace inefficient workers once employed.

lower vertical integration. Apart from this, as mentioned earlier, domestic firms in order to compete with MNCs may increase imports of intermediate products which reflects in lower degree of vertical integration.

Even in the case of labour intensive industries, where MNCs might be present for undertaking exports, both domestic and MNCs may adopt high vertical integration in order to reduce transaction costs of dealing with Indian market institutions. For example, in the case of Garments industry in India which is one of the export oriented industries, large scale integrated plants that produce yarn, cloth and garments are set up in order to reduce high lead times and transaction costs associated with securing inputs and to avoid dealing with a large number of sub-contractor firms and to implement quality control in the recent years (Ghemawat and Patibandla, 1997). In this context, MNC subsidiaries that have a relative disadvantage in dealing with a host developing country's market institutions may show higher vertical integration. On the other hand, as MNCs gain cumulative experience in dealing with the host economy's market institutions, they may be able to lower the transaction costs in the Indian market by developing reliable vendors and distribution networks, etc. This helps them to adopt vertically separable operations if there are significant economies associated with them.

MNCs are generally observed have higher advertisement intensity and superior marketing practices as a part of generating brand name and consumer loyalty. Increasing presence of MNCs in the Indian market makes domestic firms to increase advertising intensity to compete with the brand names of MNCs. As local firms lose market share to MNCs, they increase promotional expenditure (Patibandla, 1997a).[9]

[9] One of the executives of a major domestic firm in the two wheeler industry mentioned that under the increased competition from new MNCs in the post-reform period, the marketing managers of the company visit the dealers almost every month whereas in the past (before the reforms) it used to be once in a year.

Consequently, MNCs and domestic firms may end up looking similar: a good example is the Indian television industry.

3. Empirical Analysis

The objective of the empirical exercise is to test for how MNC subsidiaries and domestic firms differ on the basis of different variables that capture the bevioural and exogenous factors. Most previous studies on the issue of MNCs in the Indian context are based on the analysis of cross-section series firm level data (for example see Panth, 1993, Kumar, 1990). This study takes firm level panel data that captures both cross-section and time series elements. The possible behavioural response factors will be captured by the time series element of the data. Secondly, the equations are estimated separately for each industry to capture industry specific factors explicitly. The qualitative dependent (dummy) variable is used to distinguish between domestic and MNC firms. As the dependent variable is qualitative, we use the Probit method of estimation (see Maddala, 1983). It tests for the probability of a firm being a domestic firm or a multinational firm as the values of independent variables change. It is similar to discriminant analysis in terms of distinguishing between firms on the basis a set of variables. For example, it tests for the research issue of does the probability of a firm being a MNC subsidiary increases significantly at higher the levels of total factor productivity?

3.1. Data

The time period is 1988-89 to 1995-96 which is quite justified as the liberalisation of entry of MNCs were initiated in the mid 80s. The sample of firms is drawn from five industries: motor cycles (M) and television sets (TV), light Commercial Vehicles (LCV), electronics process control equipment (EPC), and diesel engines industries (DSL). Firms with foreign equity above 40 per cent are treated as MNC

subsidiaries.[10] The data sources are the publications of the Confederation of Indian Industry and the Centre for Monitoring Indian Economy on the Indian corporate sector.

3.2. Variables

D Dummy variable that takes a value of 'one' for MNC firms and 'zero' for domestic firms.

TE Relative technical efficiency of production (total factor productivity). See the Appendix for the explanation.

VI Degree of vertical integration, (Value-added/ Value of output)

$0 < VI \leq 1$

ES Export intensity, (Exports/Total Sales)

IM Import intensity (Imports of intermediate goods, raw materials and capital goods/ value of output)

RD Research and development intensity (research and development expenditure/value-added)

Ad (Promotional expenditure/Sales); promotional expenditure includes advertisement, marketing and distribution expenditure by firms.

3.3. The Results

We estimate the equation in two different stages to avoid simultaneity bias: for example, relative technical efficiency of firms (TE) depends on R&D intensity, and import intensity is one of the important variables in explaining degree of vertical integration. Therefore, we avoid introducing the variables that have high correlation in the same equation.

[10] But the equity levels for several firms in this period increased as the policy liberalised the controls on equity in stages. In several industries (such as Software industry) and infrastructure 100 per cent foreign owned subsidiaries are permitted. In other industries, foreign equity is allowed at 87 per cent equity.

Table 2 presents the Probit estimates that differentiate between MNCs and domestic firms on the basis of relative technical efficiency and degree of vertical integration. The estimates of TE variable is positive in three cases and is statistically significant only in the case of electronic process control industry. This implies that only for this industry one can say that MNCs are significantly more efficient in production compared to local firms. Contrary to presumptions, in the case of light commercial vehicles and television industries, domestic firms appear to be more efficient in production than MNCs. In the LCV industry out of the three MNC firms in the sample two are new entrants. The new entrant MNCs appears to have had difficulty in competing with the dominant incumbent domestic firms such as Tata engineering and locomotives Ltd (TELCO). Consequently, they have to operate at sub-optimal scales.[11] Apart from this, in response to new entry, TELCO has enhanced upon deliberate technological efforts (by investing in R&D) for improving efficiency. [12] In other words, in industries such as LCVs, domestic firms are technologically quite matured and are in a position to compete with MNCs effectively.

Except in the case of television and diesel engines industries, in others MNCs have higher vertical integration. This supports our argument of the previous section, that MNCs (especially the new entrants) which do not possess cumulative knowledge of dealing with domestic market institutions, may tend to operate with higher vertical integration. A part of the reason for lower vertical integration of MNCs in television and diesel engines industries, could be that the MNCs depend upon imports of intermediate goods and raw materials considerably.

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[11] The older MNCs who have been operating in India for a long time under the highly protected market (the pre-reform period), may not be significantly different from domestic frims

[12] As reported in the press, TELCO has invested about Rs.1, 700 million in research and development to design and develop an indigenous small car which is supposed to be marked in 1998.

Table 2. Probit Estimations

Industry/ Independent variables	M	LCV	TV	EPC	DISL
Constant	-19	-7.35	9.8	-5.0	4.9
	(2.8)*	(3.0)*	(3.0)*	(2.7)*	(1.88)**
TE	1.5	-2.58	-3.4	5.5	0.22
	(0.45)	(1.67)**	(1.97)**	(2.89)*	(0.17)
VI	28	11	-12	2.8	-6.3
	(2.96)*	(3.5)*	(3.19)*	(1.19)	(2.0)*
Log Likelihood	-9.97	-23.6	-18.8	-12.2	-20.6
N	51	49	52	30	34

Figures in the parantheses are *t* values. * significant 0.01; ** significant at 0.05 levels

If we observe the results in Table 3, in three cases the estimate associated with RD variable has negative sign and is statistically significant only in the case of LCV industry. As mentioned earlier, in the LCV industry, domestic firms such as TELCO have increased R&D efforts significantly as a response to entry of new MNCs. Apart of the reason for statistical insignificance of the estimate for motor cycle industry is that the sample consists of domestic firms with contrasting behavioural response in the post reform period. The data shows that one of the domestic firms (Bajaj Auto Ltd) increased R&D investment significantly in the recent years while the other domestic firm (Rajdoot Ltd) lost out market share significantly to new entrant MNCs and does not invest in R&D in any significant manner. We could not introduce RD variable in the case of television industry, as firms do not report any research and development expenditure in this industry. A major source of technological efficiency in this industry could be imports of intermediates and capital goods. As the results for the coefficient of *IM* variable shows that only in television industry domestic firms have higher import intensity than MNCs. This result makes sense as in the television industry, one way domestic firms have been able to compete with new entrant MNCs is by increasing import intensity of intermediates (for example picture tubes) and also by increasing promotional (advertising) expenditure significantly (Patibandla, 1997a). It is not surprising that the estimated coefficient associated with the promotional expenditure variable (AD) for this industry is not statistically significant because both domestic firms and MNCs look similar in the advertising behaviour in a consumer goods industry such as television sets. In all other industries, MNCs have higher promotional expenditure than domestic firms. As far as exports are concerned, only in the electronics process control industry, MNCs show significantly higher export intensity than local firms. In the electronics industry, wage costs matter because of labour intensity of production. The Indian industry has a comparative advantage in lower wage costs which MNCs appear to take advantage more effectively possibly because of their relative advantage of intangibles associated with export markets. In other industries such motor cycles, the primary objective of MNCs could be serving the large and growing domestic market which shows in their lower export intensity.

Table 3. Probit Estimations

Industry/ Independent variables	M	LCV	TV	EPC	DISL
Constant	-3.5	-	0.15	-8.1	-3.5
	(1.98)*		(0.22)	(2.3)*	(1.95)**
RD	-30.9	-42	-	-64	15
	(1.22)	(2.8)*		(0.86)	(0.36)
IM	36	0.7	-8.79	19	49
	(2.5)*	(0.32)	(2.25)*	(2.3)*	(2.3)*
ES	-24	-4.8	-4.5	61	-23
	(1.6)**	(0.77)	(0.8)	(2.5)*	(1.7)**
AD	69	35	7.2	48	-138
	(2.24)*	(2.5)*	(0.46)	(1.26)	(1.97)**
Log Likelihood	-11	-18	-23	-5.4	-3.6

Figures in the parantheses are *t* values. * significant 0.01; ** significant at 0.05 levels

4. Conclusion

The policy reforms in India have given impetus to entry of MNC firms in several industries. It is generally argued that MNCs bring in later vintage technologies, superior organisational and marketing practices. The spill-overs associated with the superior practices are supposed to benefit local firms and industries and contribute to growth in developing country. Apart from the spill-overs, deliberate technological, organizational and marketing efforts of local firms induced by increased competition should shift industries in a developing country to a higher trajectory. In other words, more distinct MNCs are in technology and other practices, more beneficial should it be to developing economies for the dynamic growth process.

This paper has made a conceptual distinction between exogenously given firm specific differences between MNCs and domestic firms and behavioural response factors that capture the response mechanism of domestic firms as a result of competition from MNCs. For example, MNC firms not investing in R&D in developing countries can be treated as an exogenous factor because they bringing in superior technology from their parent firm which is generally the R&D centre. In order to compete with MNCs, domestic firms may increase investment in R&D as a part of the behavioural response mechanism. This paper has undertaken empirical examination of the issues on the basis of the firm level panel data drawn from five Indian industries for the period of 1988-89 to 1995-96. The Probit estimates show how MNC and domestic firms differ significantly on basis of a set of independent variables that capture the exogenous and behavioural aspects.

In several Indian industries, domestic firms are quite matured technologically and are in a position to compete with MNCs. The results show a higher technical efficiency in production for domestic firms in the light commercial vehicle industry. Apart from this, in industries such as light commercial vehicles and motor cycles, some of the major domestic players responded quite efficiently to entry of MNCs by investing in research and development and improving upon production efficiency. Furthermore, the

domestic firms cumulative experience in dealing with local markets and institutions provides them with an edge to compete with new MNCs effectively.

Except in the case of television sets industry, MNC firms show lower vertical integration than domestic firms- a part of the explanation is that they bring in intermediates from the parent company which might be because of the need to produce sophisticated intermediates at the parent company and also because of deliberate strategies towards transfer pricing. Secondly, as domestic firms have an edge in dealing with domestic institutions (and the associated transaction costs), they could make use of subcontracting activity (vendor development) more efficiently than MNCs.

In essence, in the case of developing economies such as India which had a considerably long period of industrialisation experience, domestic firms are matured enough to compete with MNCs. In this context, entry of MNCs is all the more beneficial as the technology spill-overs and the competition induced behaviour could make the best practices common across local and MNC firms contributing to the growth process. Furthermore, a large and growing market makes MNC investment more long term based as the principal motive of FDI flows is to serve the local market rather than using local production for international supply by taking advantage of low wage costs. [13]

[13] If MNC investment is motivated mainly for taking advantage of lower wage costs, MNCs move away once wages start increasing as a result of growth: a good example is garment and electronic goods. But India's large and growing domestic market (unlike in small countries like Malaysia) provides an incentive for MNCs not shift locations even if wage costs go up.

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Appendix

Measurement of Production Efficiency

Firm level efficiency indices are measured on the basis of Farrell's (1957) production frontier approach. Recent developments in the efficiency frontiers literature show the derivation of plant-specific time-variant technical efficiency indices by using panel data. The production function defines the maximum possible output a firm can realise for a given level of inputs employed, given the technology level. Farrell's method shows relative technical efficiency as the extent of deviation of output realized by a firm (for a given level of inputs employed) from the best practice in an industry.

The panel data techniques of measuring efficiency overcome several well known shortcomings of the estimates based on cross-sectional data (see Pitt and Lee, 1981). The panel data captures cross-sectional information of firms in an industry and also repeated observations over time for a given firm. This, in turn, overcomes the shortcomings of strong distributional assumptions about composed error terms. Furthermore, this method does not impose the assumption that technical efficiency is independent of factor inputs.

By taking Cobb-Douglas functional form, we can represent the technology as follows;

$$Y_{it} = \alpha + \beta \; X_{it} + v_{it} - u_i \qquad (1)$$

where Y_{it} is the observed output, X_{it} is a vector of K inputs: i index firm $(i=1....N)$; t index tim $(1....t)$. α and β are the unknown parameters to be estimated. v_{it} represents random errors. u_i $(u_i \geq 0)$ represents technical inefficiency with one-sided distribution which means that output must lie on or below the frontier.

The random error v_{it} is assumed to be identically and independently distributed across firms and time with identical zero mean and constant variance. It is also assumed to be un-correlated with factor inputs. The other error component, u_i, is assumed to be independently and identically distributed across plants with mean μ and variance σ_u^2.

We can rewrite the above equation (1) as

$$Y_{it} = (\alpha - ui) + \beta X_{it} + v_{it} \qquad (2)$$

Cornwell et all (1990) introduce a parametric function of time into the production function to replace the coefficient of plant-specific technical efficiency. The functional form is

$$Yit = Xit\,\beta + \alpha it + vit \qquad (3)$$

where

$\alpha_{it} = w'_{it}\,0_i$, $w' = (1, t, t^2)$, $0_i = (0_{i1}, 0_{i2}, 0_{i3})$

and other variables are as defined before.

The model allows the rate of productivity to vary over time and firms. The production function can be estimated by OLS, which is referred to as the `within estimator' in the literature (Krishna and Sahota, 1991). The residuals of the estimated function are used in deriving the efficiency indices. OLS estimation of the production function can be justified in terms of the Zellner-Kmenta-Dreze proposition that under the assumption of maximization of expected profits, the explanatory variables and the disturbance term are un-correlated. However, α'it is not consistent as T goes to infinity if factor inputs are correlated with firm and time specific effects. Under these conditions, the consistent estimators of α'it , as time goes to infinity, can be derived by estimating equation (3) using OLS directly (see Liu, 1993). The production function is estimated by the two input Cobb-Douglas functional form with value-added as output, and L and K as inputs.