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Transnational Corporations, Local Adaptation and Inter-Firm Linkages in Developing Countries: Some Contrasts with Local Enterprises in India.

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ABSTRACT: The issue how transnational corporations (TNC) affiliates adapt locally within emerging markets while sustaining their global competitive advantage has been debated and discussed in international business literature. Even so, the actual response of TNC-affiliates to this contradiction has not been systematically explored. Using a rich dataset of over 300 companies in India, we examine if the ability of TNC-affiliates to adapt and strike linkages in host countries is in any way different to those of their local counterparts. Our results show that TNC-affiliates and local enterprises (LE) behave differently across a majority of dimensions predicted. But whereas this difference is robust for mature industries like chemicals, the same cannot be claimed for high technology global industries like electronics and transport equipment. This suggests that the behavioural differences between the two groups of firms may be strongly influenced by market structural variables impinging upon the industries in which they compete. The results have implications for TNC-affiliates striving to streamline their strategy with pressures in their task environment and also for nation-states as to how to best devise policy mechanisms to assist the same.

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1. Introduction

The issue how transnational corporations (TNCs) adapt and forge linkages in developing countries while sustaining their global competitive advantage has been redeemed as an important question in the new global economy. Indeed, the 2001 edition of UNCTAD's World Investment Report's has been exclusively devoted to this topic.[1] On one side there is a growing belief that TNCs increase world welfare by serving as a channel through which host countries obtain resources, skills and technology that reside overseas. Thus enlightened, developing countries have begun welcoming foreign direct investment (FDI). On the other side, there is still a residuum of unease about negative effects of FDI, should TNCs fail to modify their business models to suit local needs. A surfeit of instances where TNCs have entered developing country markets with their 'imperialist mindsets' with little modification of their business models have been reported in recent management literature.[2] However, systematic appraisal on adaptation has been sparse while much of the evidence on linkages has so far been inconclusive (see Lall and Streeten, 1977, Lall, 1978, 1993, 1996 for a review). Few researchers have attempted to go beyond qualitative case study evidence in recent times.

In this paper we shed new light on whether the behaviour of TNC-affiliates is in any way different to those of their local counterparts insofar as how they adapt to, and form linkages in India. Using a rich dataset of over 300 companies, we test for differences between TNC-affiliates and local enterprises (LEs) which may arise as a result of their respective strategic group affiliations. According to the strategic group hypothesis (see Caves, 1982) TNC-affiliates and local enterprises could differ in their deployment of strategy because of their respective group affiliations which in turn, could affect their relative disposition to adapt and strike linkages. This is the starting premise of our paper.

Briefly, our results show that TNC-affiliates and LEs do behave differently in how they adapt and forge linkages in the host environment. But whereas this difference is very robust for mature industries like chemicals, the same cannot be claimed for high technology global industries like electronics and transport equipment. This suggests that the behavioural differences between the two groups of firms are tempered by market structural variables impinging upon the industries in which they compete. The findings provide a contrast to previous studies, which have used pooled data, thereby underestimating structural market factors.

Economic liberalisation in India in 1991 spurred a healthy rise in inbound foreign direct investment in the sub-continent. The liberalisation of policies resulted in a considerable enhancement of foreign investor interest in the country. The results from this study have important implications insofar as how policy mechanisms need to be devised for TNC-affiliates to streamline their global strategy with the pressures of the local task environment in a newly emerging economy. This backdrop provides a good justification to use samples of industries in India to test our theory.

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[1] Promoting Linkages, World Investment Report 2001.

[2] For a survey on TNCs in developing countries see Prahalad and Lieberthal (1998); Bartlett and Ghoshal (2000), Khanna and Palepu (1998). Their analyses underscore the mismatch of strategy and the demands of the task environment that TNC-affiliates face in developing countries.

The paper is arranged as follows. In Section 1, we begin with a general discussion on adaptation and linkages and their implications on industrial development in host countries. Section 2 states the research hypothesis followed by a discussion of research methods in Section 3. Section 4 presents the results and the implications of the findings. This is followed by a conclusion in Section 5.

2. Theoretical Underpinnings

The question we are mainly concerned in this paper is about differences between TNC-affiliates and LEs in how they adapt to their local task environment and the extent to which they strike up linkages within intermediate markets. Predictions about possible differences emanate from a general conjecture that TNC-affiliates could belong to a different strategic group due to idiosyncrasies of their assets bundles (Caves, 1974; 1982; Newfarmer and Marsh, 1981, McAleese and McDonald 1978). The strategic group hypothesis recognises that there are alternative ways of doing business. The strategy of firms in a particular industry differs in respect of variables such as scale, degree of vertical integration, geographical extent of markets served, nature of distribution channels employed, breadth of product line etc (Caves and Porter, 1977). An industry therefore is composed of a group of firms and firms in a group are similar to each other in terms of competitive strategy. Being a part of an established global enterprise, a TNC-affiliate may enjoy an array of ownership assets lending it special advantages over purely national firms such as brand goodwill, proprietary technology, captive access to parent's research labs, reservoirs of organisational and managerial skills and international marketing and information networks.[3] In order to maximise such advantages the TNC needs to internalise its operations with the parent. The act of internalisation reduces the scope for local adaptation and the development of in-depth inter-firm linkages in the host, but maximises the need for linkages with its parent. Internalisation also offers significant benefits to the affiliate in terms of lowered costs, and higher quality through global scale economies - in the mother or world mandated plants of TNCs.

The notions of 'adaptation' and 'linkages' need to be spelt out clearly here. We suggest that 'adaptation' relates primarily to product-markets while 'linkages' relate to intermediate and factor markets. More commonly, adaptation involves modifying product offerings of the TNC organisation through local R&D in order to ensure product-market compatibility. In the jargon of the organisation theory literature, adaptation may be likened to the biological process - 'isomorphism.' Isomorphism is a constraining process that forces an organisation's characteristics to be modified in the direction of increasing compatibility with the environmental characteristics.[4] For example, a drug TNC-affiliate in South-Africa may change its product portfolio to suit the country's epidemiological profile. This may be achieved by providing anti-retroviral drugs to treat South Africa's HIV-AIDs rather than by providing drugs to treat male sexual dysfunction.

It seems likely that a TNC that does not modify its global mix of goods in a low-income developing country will fail to break into a much wider local market. For example, a

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[3] A summary of this hypothesis is given comprehensively in Kumar (1991).
[4] The literature on adaptation in organisation theory draws heavily on DiMaggio and Powell, (1983); Westney, (1989); Rosenweig and Singh, (1991).

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TNC that promotes luxury transport exclusively for a high-income sector in a developing country leaves the rest of the population deprived of appropriate products or of technology.[5] On the other hand, the TNC adapts its business model to reengineer its existing product mix when it provides fuel-efficient utility oriented vehicles. It needs to be borne in mind however that TNCs are socialised under different market and non-market institutions in their home countries.[6] Hence they need to rethink their business models for developing countries to circumvent possibilities of misalignment (Prahalad and Liberthal, 1998).

The notion of linkages goes deeper and refers to the relationship of the enterprise with its local environment insofar as how it interacts with the local wellspring of factors of production, components, raw materials, and equipment (see Lall, 1978). It is possible for a TNC enterprise to achieve an 'organic' adaptation by drawing closely on the local intermediate and factor markets.[7] For instance, the production of semiconductors in Singapore draws heavily upon a host of related local industries in silicon, air and water purifiers, and cutters – all of which are adequately developed (see Lall, 1995; Matthews, 1997; Ray and Venaik, 2001). When the TNC forges linkages with these industries, it aligns substantive parts of its local value chain with these industries, i.e., with the local value system.[8]

Conversely, global linkages signify to what extent the organisation resists local adaptation and harmonises its own operations with those of the parent and other affiliates of the TNC enterprise, i.e., global integration (*a la* Prahalad and Doz, 1987, Bartlett and Ghoshal, 1989). An example of global integration is that of an auto manufacturer's import dependence on global sources of supply rather than local sources.

3. Empirical Evidence

Bearing in mind that the analysis on whether TNCs adapt and forge linkages has suffered from methodological shortcomings (Caves 1982., p 275) we report some of the studies below, but the list is by no means comprehensive.

The forging of linkages locally implies the avoidance of excessive import dependence on foreign suppliers or on the parent organisation. Studies by Rugman (1982), Rugman and Eden (1995), Hennart (1986), Kumar (1991), Ray and Venaik (2001) appear to suggest that TNCs differ with LEs in so far as they tend to be more import intensive in their procurement practices than the latter. In Hungary, Toth (2000) finds[9] that the share of inputs procured from Hungarian suppliers is markedly higher (59-62 per cent) in domestic enterprises than foreign affiliates (39 per cent). Siddharthan and Kumar (1990) argue that TNCs internalise markets for R&D intensive capital goods and import more because they would not like the newly developed technology to spill over to

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[5] A body of literature point to the conflicts in the normative concept of welfare in neoclassical economics insofar it relates to developing countries. See for example Lall (1974), Lall and Streeten (1977), Stewart (1991).

[6] An element compounding this problem is the TNC's lack of local knowledge of host country markets.

[7] Its linkages hence illuminate how adaptation, i.e., modification of its external features is actually forged.by drawing on the inputs of production from local sources.

[8] See Porter (1980) for value chain analysis

[9] Cited in World Investment Report (2001), p 134

unrelated parties. In Nigeria, foreign affiliates reportedly have a higher propensity to import than their local counterparts (Landi, 1986).[10] In Brazil's electrical industry, Newfarmer and Marsh (1981) report that TNCs import more per unit of sales but not necessarily export more. Studies by Langdon (1981), and O'Laoughlin and O'Farrel (1980) suggest that TNCs are more import intensive than LEs. Empirical studies by McAleese and McDonald (1978) and Lall (1978) conclude that TNCs competing in low-technology, labour intensive and export oriented production are less likely to establish local linkages than local enterprises. Vaitsos (1984) point to the shallowness of a development process fostered by presence of the TNC in terms of the hollow linkages it engendered in the local industry. A study of central American manufacturing industry by Wilmore (1976) finds that foreign firms import a relatively larger portion of their raw materials. Similarly, Jo's (1976) study in South Korea shows that foreign firms have higher import propensity than local firms. Daferty and Borghey (1976) conclude that only a few among 13 TNCs in Iran set up significant local linkages in terms of local purchase of indigenously processed raw materials.

However Carvalho's (1977) study in Brazil, Colombia and Mexico indicates that foreign firms are no different from domestic firms in terms of their import propensities. Cohen (1975) also reports similar findings for TNCs in Singapore. Lim and Pang's (1982) study of Singapore's electronic industry notes that while European firms buy a fair amount of their inputs locally (40-50%), Japanese firms purchase 20%, while those of U.S. origin - a mere 10%.[11]

The measurement of adaptation is somewhat complex, but the extent of a TNC's innovative activity in host countries is often an indication whether it is attempting to adapt products to suit local preferences (more on this in Section III).[12] Fairchild and Sosin's (1986) comparison of Latin American firms and TNCs observes that domestic firms have relatively higher level of internal innovative activity, while foreign firms rely more heavily on sources external to the subsidiary. In a survey of six Asian country studies, Enos (1988) finds that there is greater local technological effort associated with non-equity transfers, for example, in Indonesia the degree of technological mastery is greater in the LEs than in TNCs. For India, Ray and Rahman (2000) and Ray and Venaik (2001) finds that LEs depend much less on imported technology as shown in their lower expenditures on payment of foreign royalties than TNC-affiliates.

On the other hand, Kumar's (1991) study of 252 TNC affiliates and 1022 LEs in Indian manufacturing show that TNC affiliates are more vertically integrated firms with more skilled personnel. In a more recent survey of 32 R&D units of TNC affiliates in India, Reddy (1997) observes that while a majority (56.2%) performed transfer of technology, the remaining 43.8%, consisting of technology intensive TNCs, involved subsidiaries in higher-order R&D activities and assigned them innovation roles.

In the light of these empirical findings it would be perhaps dubious to draw anything definitive on the issue of adaptation or linkages. Hence the proposition that the two ownership groups could in fact differ in their mode of competitive rivalry needs to be tested more precisely as it has implications on their extent of trade dynamism, degree of

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[10] Ibid.

[11] See Lall,(1978) for a comprehensive review of empirical studies

[12] The bulk of the innovative activity conducted in host countries is usually adaptive R&D (Kumar, 1998).

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product-environment compatibility, local linkages and technological dynamism. In the next section, we synthesise a set of hypotheses based on our specification of adaptation and linkages earlier in the paper. The hypothesis themselves are drawn from different empirical postulations in International Business.

4. Research Hypotheses

4.1 Strategic Group Effects on Adaptation

It is possible that the ability of firms to adapt and forge linkages would be strongly influenced by the strategic group effects based on their respective foreign or local ownership. Accordingly we look at the following propositions.

Product differentiation versus price competition (cost leadership): Extant literature about the final market behaviour of TNCs concurs that their affiliates tend to focus on markets where innovative products is demanded (see Casson, 1990). For example, TNCs provide life saving drugs, which fills gaps in the innovative new product segment of the pharmaceuticals industry. TNC-affiliates are therefore likely to rely on high advertising intensity to differentiate their innovative new products from local ones (Caves, 1974; Kumar, 1991).[13] By contrast, the counterpoint of a differentiation strategy is to compete in 'generic' products, whose features, formula, and embodied technology are no different from competing substitutes, but which tend to give low cost competitors the edge in hotly contested markets (Prahalad and Liberthal, 1998). Herein, LEs might be compelled to compete on price rather than product differentiation, not being in a position to compete with the proprietary advantages of TNCs. It is instructive to add however that advertising conducted by TNC-affiliates has substantial lagged returns, which yields proportionately higher returns than that of LEs (Kumar, 1991). To overcome this barrier, LEs may require to invest heavily in image building. Hence we cannot unambiguously predict the differentials between the two ownership groups, though on balance one would be inclined to accept the product differentiation hypothesis for TNC-affiliates.

Hypothesis H1.1: TNC-affiliates are more likely to engage in product differentiation strategy through higher advertising intensity (ADVERT) in comparison to the LEs.

Distribution strategy (Mass markets versus niche market strategy): The literature on this issue is fairly anecdotal in scope (see Khanna and Palepu, 1998, Prahalad and Liberthal, 1998). It is plausible that given the product-market diversity in India, LEs would prefer to compete across a range of market segments to fill diverse consumer preference spaces. Moreover, LEs may draw on cross subsidisation of product-markets as a source of competitive advantage.[14] By contrast, many TNC-affiliates focus on niche segments to avoid spreading too thinly across a large range of markets in which

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[13] However markets markets in developing countries such as India are often characterised by a high degree of fragmentation (Khanna and Paelpu, 1998), multilevel market pyramid structures containing large income differentials, and above all, customers who are very discerning about price-performance trade-offs (Prahalad and Liberthal, 1998).

[14] See Prahalad and Liberthal (1998) on the existence of market pyramids in India with its attendant income disparities. This complicates the strategy of firms even as they deal with highly fragmented markets.

their knowledge is limited. This reasoning becomes more compelling when we recognise that TNC-affiliates are often attracted to regions, which benefit from agglomeration benefits or better infrastructure, usually within the vicinity of major metropolises. Only certain exceptional TNC-affiliates in fast moving consumer goods in India like Hindusthan-Lever or ITC regard their local distribution systems as being a part of their key sources of competitive advantage. Therefore, if the wider line hypothesis for LEs is correct, it is plausible that LEs will spend a greater proportion of their revenue in distribution expenses in order to service multiple product-markets across geographic regions. Hence, it may be predicted that LEs' distribution intensity will be higher than TNC-affiliates who, on balance, tend to focus on fewer niche markets (Caves, 1974, 1996).

Hypothesis H1.2: TNC-affiliates are more likely to engage in niche-market strategy through narrower distribution intensity (DIST) than the LE.

Development of appropriate technology: A TNC-affiliate's access to not only patented but also unpatented know-how (learning) through transfers of personnel from the parent provides a lower impetus to undertake local R&D. To many affiliates, 're-inventing the wheel' by duplicating R&D in the local market often appears illogical (see Ray, 2001b). A recent study by Kumar and Agarwal (2000: 17) has found that only LEs appear to follow up disembodied technology with further effort. For local enterprises, transfers of technology at arms-length from developed countries may only engender the 'know-how' embodied in the drawings or manuals, but not the 'know-why' (Stewart, 1977; Kumar, 1991; Lall, 1993; Vyasulu, 1994).[15] It would therefore hold that the local recipient firm has to undertake substantial developmental efforts on its own to understand the know-why, i.e., principles behind such know-how to be able to modify products to local requirements. Empirical literature has found evidence that in the case of Indian enterprises, technological imports are followed up by further technological effort for adaptation and absorption of imported knowledge (Lall and Mohammad, 1983, Katrak, 1985, Kumar 1987, Siddhartan 1988; Agarwal 2000). However contrary findings (see Fikkert 1993) reporting that the relationship is actually inverse, or that the two are not really related (see Kumar and Saqib, 1997) have also been reported.

In the case of LEs, one may predict that they are likely to operate production facilities through reverse engineering (E-D-R) to adapt quickly to domestic market requirements. Therefore the R&D spending will be devoted towards adaptation rather than new product discoveries (See Ray and Rahman, 2000). We use R&D expenditures, and the royalty and technical know-how fees paid in foreign currency (as a ratio of sales) as measures of the firm's internal dynamism, or its lack thereof.

Hypothesis H1.3: Due to their access to parent laboratories and innovations, TNC-affiliates are likely to spend lower proportion of their revenue on local R&D (R_D) expenses in comparison to LEs.

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[15] The need for TNCs to devote R&D expenditure to the invention of appropriate technologies in developing countries, rather than simply importing technologies from developed countries has been underscored by several scholars (see Lall and Streeten, 1977; Streeten, 1991).

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Hypothesis H1.4: Due to their dependence on the parent's technological innovations, TNC-affiliates are likely to spend a greater proportion of their revenue on foreign royalties (IMP_ROY) in comparison to LEs.

We next consider the implications of strategic group influences on backward and forward linkages of TNC-affiliates and LEs, predicting some important differences to arise between these two ownership groups in so far as how they would deploy their strategy across intermediate markets.

5. Strategic Group Effects on Linkages

Export Intensity: The impact of an ownership variable on export orientation cannot be uniquely predicted. However, higher foreign ownership could accompany greater global (forward) linkages, i.e., exports. TNCs enjoy better marketing networks overseas than local firms. If the nature of FDI is primarily trade-seeking (see Dunning 1998), the TNC-affiliates may demonstrate high engagement in exports. Conversely, when the nature of FDI is market-seeking, TNC-affiliates may demonstrate low engagement in exports. In fact, there is empirical evidence that LEs are often more export intensive than their foreign counterparts (see Solomon and Ingham, 1977, Kumar and Agarwal, 2000 on this). In the case of India, this finding is corroborated for industries such as drugs and pharmaceuticals and electrical machine tools (Ray, 1999; Ray and Venaik, 2001). Accordingly, the competing hypothesis would expect LEs to have greater export intensity (EXP) than foreign affiliates.

Hypothesis H2.1: TNC-affiliates are likely to be less export-intensive (TOT_EXP) than LEs.

Import of finished goods: A TNC-affiliate may choose to produce a more homogeneous output-mix than similar sized national firms, possibly because it may obtain from its parent any complementary products which cannot be produced locally at efficient scale (Caves, 1996). This, in turn, implies heavy foreign dependence on the parent or its associates for finished goods imports. Hence a significant difference between TNC-affiliates and LEs is hypothesised. However, with economic liberalisation, LEs may emulate the import propensities of TNC-affiliates to cope with increased competition.

Hypothesis H2.2: To exploit their internalisation advantages, TNC-affiliates are likely to be more import-intensive in finished goods (IMP_FIN) in comparison to LEs.

Import of raw materials and capital goods: There are several reasons to expect higher imports of raw materials and capital goods for foreign affiliated firms than for local enterprises. First, foreign affiliates appear to have better access, capacity and information to import, absorb and utilise capital goods through intra-firm transfers than local firms (Siddharthan and Safarian, 1997). Second, TNCs tend to internalise markets for R&D intensive capital goods because they would not like the newly developed technology to spill over to unrelated parties. Third, under the internalisation approach, TNC-affiliates economise on transaction costs of dealing with at arms-length by using internal sources of supply of raw materials. Fourth, TNCs come with international supply chains and well-established suppliers who know their quality, scale and cost

needs. Foreign suppliers also have the capability to keep up with the changing technologies (WIR, 2001: 133). TNC-affiliates therefore fear that the costs and resources of changing their business models to suit local preferences may outweigh their ownership and internalisation advantages of being transnational. According to this hypothesis, raw materials and capital goods imports (total imports) will be more significant for TNC-affiliates than LEs.

Hypothesis H2.3: TNC-affiliates are likely to be more import-intensive (TOT_IMP) in comparison to LEs due to the need to reduce transaction costs in the host environment.

Outsourcing/purchase of finished goods: TNC-affiliates in India like Philips and Hindustan-Lever have long used product outsourcing to boost their product line breadth (see Ray, 1999; Ray and Venaik, 2001). The main motive behind this strategy is to fill uncovered niches of consumer preference spaces so that potential entrants find it difficult to find a conduit to enter the industry.[16] Hence, the tendency of TNC-affiliates may be to broaden their product line initially by buying out finished products on the basis of transferred designs rather than establish fully integrated facilities to manufacture them. In fact, there may be strong resistance to commit full manufacturing resources by the TNC-parent if the TNC's output consists of a narrow line of differentiated goods. This is a feature of risk-aversive behaviour of the TNC, since it perceives that the local market is not yet fully 'proven' for its array of international products. By contrast certain well established LEs in India like Ranbaxy in pharmaceuticals, and BPL in electronics tend to have more manufacturing in-house than rely on sub-contractors (cf. Ray, 2000, 2001a). Hence, we propose the hypothesis that there are differences between TNC-affiliates and LEs in respect of their local outsourcing of finished goods, measured as a ratio of sales.

Hypothesis H2.4: TNC-affiliates are more likely to outsource finished goods (PUR_FIN) from subcontractors on the basis of transferred designs in comparison to LEs.

Local content and vertical integration: Empirical evidence suggests that where industries are geographically isolated, manufacturing establishments tend to use locally purchased inputs less intensively.[17] The presence of structural and cognitive market imperfections in the local region might compel the manufacturing enterprise to either vertically integrate, or to resort to imports. Often however, manufacturing establishments do not undertake full vertical integration but resort to quasi-vertical integration. Whilst still relying on local suppliers, manufacturing enterprises take on higher in-house processing of raw materials to suit their internal production processes.[18] This strategy is especially common to those enterprises whose products are highly differentiated, but who cannot find suitable local suppliers, and yet do not wish to backward integrate up to the stage of raw materials themselves. Therefore, the choice boils down to i) vertical integration ii) quasi-vertical integration (higher intermediate processing) and iii) imports. Large LEs in India rise over quality and supply volatility in arms-length transactions through greater local vertical integration (D'Costa, 1995),

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[16] In the marketing literature this is known as flanking strategy, i.e., reinforcing the 'flanks' at the two ends of the product line spectrum so as to stave off attacks from competitors.
[17] The occurrence of industrial sparseness is frequent in developing countries.
[18] Porter (1980) defines this as aligning the supplier's value configuration with the buyers value chain.

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while simultaneously establishing backward linkages with suppliers of semi-finished or unfinished intermediate goods. This cushions against volatility in exchange rate fluctuations and supply bottlenecks due to infrastructure problems. By contrast, TNC-affiliates tend to be *less* locally vertically integrated than LEs since the TNC is more import intensive (see Ray and Venaik, 2001).

It is therefore predicted that the TNC-affiliate will undertake lower local vertical integration, and depend in larger measure upon its intra-firm linkages for the supply of intermediate goods. By contrast, large LEs are likely to have a higher proportion of their value-added generated in-house than the TNC affiliate. In this study, we measure vertical integration by using ratios of gross value-added as a proportion to sales.

Hypothesis H2.5: Due to their intra-firm linkages for the supply of intermediate goods, TNC-affiliates are likely to have lower vertical integration (VAL_ADD) than LEs.

Capital Intensity: Several factors may cause the TNC-affiliate to employ greater capital intensity than its local counterparts. It may be dominant in those upper-end segments of industries, which are more amenable to employing capital intensive techniques. Originating in countries where capital is relatively abundant, the TNC-affiliate may have better access to competitive rates of capital and as a result afford large capital expenditures. It may also be easier for the TNC to transfer in unadapted form, the same capital intensive techniques that are proven abroad. In the case of India, the government has also promoted a highly capital intensive pattern of industrialisation going against the country's comparative advantage in labour intensive activities (Lall and Mohammad, 1983). On the one hand, this could prompt TNC-affiliates to adopt the same capital intensive techniques as the rest of the firms in the industry. On the other, the TNC-affiliates could avoid capital intensive techniques to avoid creating excess capacity which could wipe out the industry profits. The expected sign of this variable is therefore unpredictable.

Hypothesis H2.6: TNC-affiliates are likely to have higher capital intensity (ENERGY) than LEs.

6. Research Methods

The dataset used in this study is from the Center for Monitoring Indian Economy's (CMIE) 'Prowess' database. This specific dataset includes 338 enterprises in a wide range of industries known elsewhere as 'industry clusters' (See Porter, 1990 for a definition). These clusters are defined in Prowess as 'industry sets'. The classification of these three industry sets were as follows: i) *chemicals and plastics cluster* consisting of organic and inorganic chemicals, dyestuffs, drugs and pharmaceuticals, cosmetics, paints and varnishes, and, soaps and detergents etc. ii) *electronics cluster* consisting of communications equipment, computers, consumer electronics and electronic components. iii) *transport equipment cluster* consisting of commercial vehicles, passenger cars, four-wheel drives, two and three wheelers, heavy vehicles, and a whole host of auto ancillaries. Since industries within each cluster are closely interrelated, their factor conditions and related industries are similar. Therefore, decisions with regard to such things like vertical integration and imports are guided by the same set of factors that are applicable to all or most industries within the sets. This methodology

served to increase the size of the database and to circumvent the problems of small numbers without blurring the differences that obtain between mature industry clusters like chemicals on the one hand and the strategic industry clusters on the other.

The sample of cases represents a select group of large enterprises in India, both transnational and local. This is because smaller enterprises do not constitute the beat of TNC-affiliates, who represent a different strategic group (see Lall and Mohammad, 1983; Jenkins, 1990; Kumar and Agarwal, 2000). The methodology employed here differs from the studies of Wilmore (1976), and Fairchild and Sosin (1986) who did not distinguish between industries and could not control for industry variations. Controls for industry differences gives a clearer statement on rivalry than a diffuse cross sectional analysis.

We allowed a gap of a 5-year period after economic liberalisation for TNCs and local enterprises to adapt to changed conditions and constructed a dataset from the 1997-98 financial performance of TNC-affiliates and LEs with sales revenues of Rs. 400 million (US$ 10 million) and above. The 338 firms comprised of i) chemicals (n=169) consisting of 42 TNC-affiliates and 127 LEs ii) electronics (n=71) consisting of 29 TNC-affiliates, and 42 LEs and iii) transport equipment (n=98) consisting of 34 TNC-affiliates and 64 LEs. The pool of TNC-affiliates were foreign controlled firms with over 20% foreign equity[19]. Further test of foreign control of the board of directors was attempted by scrutinising the local ownership through the shareholding patterns of top 50 (local) shareholders, so as to ensure local equity did not exceed foreign equity. Also scrutinised, in the case of LEs, was foreign dividend paid so as to exclude any LE with overt foreign interest.

The tests were conducted industry-wise, to control for industry specific factors. We believe this is an improvement on a few previous studies, which did not control for industry factors. Finally, all variables were deflated as ratio of sales as a control for firm size.

7. Results and Discussion

We present two results. First, we report the statistical significance of the mean differences using the Wilcoxon's Matched Pairs Signed Ranks Test and second, we present the discriminant functions under the multivariate framework. Table 1 summarises industry-wise predictions and corresponding results of means and standard deviations of the variables under each ownership group. Subject to tests of significance, these findings reveal the overall discriminating characteristics of TNC-affiliates and LEs arising from the nature of their inter-firm and local linkages respectively. Again as mentioned previously, the tests are done industry-wise, following the logic that the dynamics of competitive rivalry are unique to particular industries, and not similar across all industries.

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[19] This is in line with the IMF categorisation, which uses a lower threshold of 10 per cent.

	Hypothesis	Chemicals and Plastics		Electronics		Transport Equipment	
		Means (Std Dev)		Means (Std Dev)		Means (Std Dev)	
		TNC	LE	TNC	LE	TNC	LE
Adaptation	$H1.1$: $ADVERT_{TNCi} > ADVERT_{LEi}$	1.46 (2.64)	0.81 (1.62)	1.24 (1.74)	0.64 (1.08)	0.78 (2.12)	0.47 (1.00)
	$H1.2$: $DIST_{TNCi} < DIST_{LEi}$	1.61 (1.46)	2.69 (2.59)	1.02 (1.03)	1.02 (1.35)	1.28 (1.12)	1.48 (1.42)
	$H1.3$: $R\&D_{TNCi} < R\&D_{LEi}$	0.70 (0.83)	0.79 (1.06)	0.29 (0.44)	0.43 (0.86)	0.09 (0.13)	0.38 (0.52)
	$H1.4$: $IMP\_ROY_{TNCi} > IMP\_ROY_{LEi}$	0.28 (0.56)	0.01 (0.04)	0.42 (0.60)	0.17 (0.28)	0.60 (0.66)	0.15 (0.23)
Linkage							
	$H2.1$: $TOT\_EXP_{TNCi} < TOT\_EXP_{LEi}$	11.50 (16.24)	19.13 (19.03)	12.96 (22.47)	37.85 (36.58)	4.98 (4.41)	5.82 (8.43)
	$H2.2$: $IMP\_FIN_{TNCi} > IMP\_FIN_{LEi}$	1.70 (4.00)	0.06 (0.12)	1.22 (3.02)	0.11 (0.53)	0.28 (0.87)	0.00 (0.00)
	$H2.3$: $TOT\_IMP_{TNCi} > TOT\_IMP_{LEi}$	16.01 (11.98)	10.15 (8.15)	21.81 (13.77)	19.32 (16.55)	12.84 (8.30)	7.88 (5.79)
	$H2.4$: $PUR\_FIN_{TNCi} > PUR\_FIN_{LEi}$	10.00 (11.68)	4.75 (6.38)	9.52 (12.36)	1.67 (3.96)	1.49 (2.46)	0.29 (1.06)
	$H2.5$: $VAL\_ADD_{TNCi} < VAL\_ADD_{LEi}$	24.44 (6.88)	28.73 (10.61)	25.72 (17.75)	40.14 (18.78)	23.11 (7.21)	28.82 (9.31)
	$H2.6$: $ENERGY_{TNCi} < ENERGY_{LEi}$	3.78 (3.97)	6.83 (7.50)	1.04 (1.175)	3.24 (5.70)	2.51 (1.82)	3.54 (2.42)

Table 1: Means and standard deviations of variables by ownership groups

Note: ADVT=Advertising revenue spent   VAL_ADD=Vertical integration
DIST=Distribution expenditure spent   ENERGY=Energy expenditure (Capital intensity)
R&D= Research and development
IMP_ROY=Foreign royalty paid
TOT_EXP=Total exports
IMP_FIN=Import of finished goods
TOT_IMP=Total import of raw materials
PUR_FIN=Purchase of finished goods (outsourcing intensity)

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7.1 Univariate Analysis

In the non-parametric Wilcoxon's Matched Pairs Signed Ranks Test, we arranged the pair–wise comparison of TNC-affiliates and LEs. Since the number of LEs far exceeded the number of TNC-affiliates, we randomly chose 40 LEs in the chemicals cluster, 28 LEs in the electronics cluster and 27 LEs in the transport equipment cluster, all matched by an equal number of TNC-affiliates. The 190 firms chosen for analysis were therefore clustered as i) chemicals (n=80; TNC-affiliate=40, LE=40) ii) electronics (n=56; TNC-affiliate=28, LE=28) and iii) transport equipment (n=54; TNC-affiliate=27, LE=27).

	Chemical Industry	Electronics Industry	Transport Industry
Variable	Z	Z	Z
ADVERT	-1.453	-0.877	-0.406
DIST	-2.097^*	-0.229	-0.471
R_D	-0.645	-0.296	-2.103^*
IMP_ROY	-3.027^{**}	-2.000^*	-2.543^*
TOT_EXP	-2.030^*	-2.152^*	-0.649
IMP_FIN	-2.999^{**}	-2.090^*	-2.023^*
TOT_IMP	-2.258^*	- 0.508	-2.378^*
PUR_FIN	-2.561^*	-2.906^{**}	-2.330^*
VAL_ADD	-2.070^*	-3.125^{**}	-2.210^*
ENERGY	-2.500^*	-2.325^*	-1.369

$^{**}p<0.01,\ ^*p<0.05$

Table 2: Wilcoxon's sign ranked test results

Local Adaptation: The findings of Wilcoxon's test are presented in Table 2. The differences between TNC-affiliates and LEs are most significant in the chemicals cluster. Eight out of 10 variables were found significant. These are distribution expenditure (DIST, $p < 0.05$), foreign royalty paid (IMP_ROY, $p < 0.01$), total exports (TOT_EXP, $p < 0.05$), import of finished goods (IMP_FIN, $p < 0.01$), total imports (TOT_IMP, $p < 0.05$), purchase of finished goods (PUR_FIN, $p < 0.05$), degree of vertical integration (VAL_ADD, $p < 0.05$), and plant efficiency (ENERGY, $p < 0.05$). In the electronics cluster, TNC-affiliates and LEs differ significantly along six variables. These are foreign royalty paid (IMP_ROY, $p < 0.05$), total exports (TOT_EXP, $p < 0.05$), import of finished goods (IMP_FIN, $p < 0.05$), purchase of finished goods (PUR_FIN, $p < 0.01$), degree of vertical integration (VAL_ADD, $p < 0.01$), and capital intensity (ENERGY, $p < 0.05$). In the transport equipment clusters, TNC-affiliates and LEs also differ along six variables. These are research and development (R&D, $p < 0.05$), foreign royalty paid (IMP_ROY, $p < 0.05$), import of finished goods (IMP_FIN, $p < 0.05$), total imports (TOT_IMP, $p < 0.05$), purchase of finished goods (PUR_FIN, $p < 0.05$), and degree of vertical integration (VAL_ADD, $p < 0.05$).

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Across all three industries generally, the mean differences between TNC-affiliates and LEs are statistically significant at $p < 0.05$ and higher for four variables. These variables are foreign royalty paid (IMP_ROY), import of finished goods (IMP_FIN), purchase of finished goods (PUR_FIN), and degree of vertical integration (VAL_ADD). Foreign ownership has no impact on advertising intensity (ADVERT) in any of the three industries analysed. Finally there are some mixed results for the rest of the variables. Significant differences arise in total imports (TOT_IMP), total exports (TOT_EXP) and capital intensity (ENERGY) across two industries whereas distribution expenditure (DIST) and R&D is significant in at least one industry.

Hypothesis H1.1: As noted above, we discerned no difference in any industry insofar as whether TNC-affiliates engage in product differentiation (ADVERT) in contrast to LEs. A possible cause for the lack of discrimination is perhaps the propensity among large LEs to compete in similar strategic groups with TNC-affiliates and to emulate the latter's high advertising spending. Heavy product differentiation by TNC-affiliates affects the conduct of large oligopolistic LEs within the industry - who attempt to protect their home turf by increasing their spending on advertising. Another reason could be that current advertising expenditures by TNC-affiliates are not always a true reflection on the scale of their advertising activity, for they do not cover the advertising investments made over time world-wide by their parent and associates (Kumar, 1991).

Hypothesis H1.2: As for our prediction that TNC-affiliates were 'niche players' signifying that they do not compete across a range of segments like LEs, differences in distribution expenditures (DIST) appeared as significant, $p < 0.05$ (Table 2) only in the chemicals industry. In chemicals, LEs appear to spend greater outlays in distribution, in line with the prediction that they are multi-market and multi-product competitors, a strategy that addresses the asymmetries that obtain in fragmented markets. In electronics and transport equipment industries, LEs have first-mover advantages in having established channels earlier, and therefore enjoy substantial lagged advantages from past investments with a lower distribution outlay.[20] The TNC-affiliates who are late entrants, have to acquire distribution assets like space, hoardings, window displays at much higher prices due to an inflationary economy.[21] This increases the distribution outlays of TNC-affiliates and hence as a consequence reduces the differentials in distribution spending. This result however does not categorically detract from our wider product line hypothesis.

Hypothesis H1.3 and *Hypothesis H1.4*: TNC-affiliates in all three industries appear to rely more on foreign know-how than their local counterparts as reflected in foreign royalty paid (IMP_ROY). However, R&D spending *per se* did not turn out to be significant in chemicals or electronics. We need to bear in mind that R&D spending is not always reported, or often at best inaccurately reported in India (cf. Lall and Mohammad, 1983; Kumar and Agarwal, 2000). Also because of the relative backwardness in the semi-conductor industry, LEs are within a technological trajectory of developed countries, which leads to performing minor engineering adaptations on the fringes of major innovations already performed overseas. Finally it needs to be borne in

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[20] See Ray, Pradeep Kanta, 1999, 'The institutional context and the strategic role of multinational and local enterprises in India', unpublished doctoral dissertation, The University of Western Australia, Nedlands

[21] *ibid.*

mind that spending in R&D is only an input of innovation not its output, and is not always a robust indicator of technological dynamism. Therefore, it would be more accurate to discriminate on the aspect of foreign royalty paid (*IMP_ROY*) – i.e., the output of innovation, which is significant in all three industries (chemical, $p < 0.01$, electronics, $p < 0.05$, Transport, $p < 0.05$). This signifies that there is greater dependence amongst TNC-affiliates on their global technological asset pools, which most likely reside in the parent enterprise or other affiliated enterprises.

Linkages: *Hypothesis H2.1- H2.6*: Overall, LEs appear to strike up more favourable backward linkages than TNC-affiliates. In terms of forward linkages, LEs appear to have higher export intensity (TOT_EXP) in both chemicals and electronics ($p < 0.05$). This implies that their proportion of domestic sales as a ratio of total sales is lower than that of TNC-affiliates. There were also significant differences in imports of finished goods (IMP_FIN) in all three industries, with LEs showing a lower intensity to import. The import propensity amongst LEs for raw materials and capital equipment (TOT_IMP) is lower in all three industries. This is an indication of the LE's propensity to strike deeper linkages with local ancillary industries. The measure of vertical integration – value-added (VAL_ADD) is significant across all three industries (chemical, $p < 0.05$; electronics, $p < 0.01$; transport, $p < 0.05$), indicating a significantly higher propensity among LEs to vertically integrate in order to rise above market failures in intermediate goods. In electronics, there were no significant differences in total import (TOT_IMP) propensities. The relative deficiency of ancillary industries in electronics makes it imperative for LEs to source components overseas in global/strategic industries, which leads to a diminution of the differences between TNC-affiliates and LEs.[22]

On the other hand, TNC-affiliates tend to have higher local outsourcing from third party vendors (PUR_FIN). This creates favourable backward linkages and follows our prediction that TNCs resist commitment of vast manufacturing resources by the TNC-parent to the affiliate concerned, especially under major uncertainties in a newly liberalised regime. Outsourcing products from vendors on the basis of transferred deigns and technology spills over skills and knowledge. Such practices tend to have beneficial effects in the host economy.

The variables found to be significant discriminators in the univariate analysis are next considered for the multivariate analysis.

7.2 Multivariate Analysis

A step-wise two-group discriminant analysis was performed to examine the significance of the mean differences by way of the interaction between the variables (such as influence of vertical integration with export intensity). This test also gave the extent of accuracy in the classification of the firms belonging to the two ownership groups. The discriminant analysis has three assumptions. (1) no variable may be a linear combination of other discriminating variable, (2) the population covariance matrices are similar for each group (industry cluster), and (3) each group (industry cluster) is drawn from a population which has a multivariate normal distribution. It has been proved however, that discriminant analysis is rather robust statistical method and can tolerate

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[22] A similar finding for the television industry was reported in Ray (2000b).

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some degree of deviation from these assumptions (Hair et al., 1998). In this study, since data are taken from the same industry clusters for both ownership groups the covariance matrices are expected to be identical. We report the results industry-wise, since such a format allows clear-cut comparison between TNC-affiliates and LEs for each industry.

7.3   Chemicals Cluster

Table 3 presents the correlation matrix of the eight significant variables. Each correlation coefficient is an estimate of the degree of relationship between the corresponding pair of variables. Results show that no two variables are highly correlated and hence there exists no multi-collinearity problem.

The step-wise procedure found five out of 10 variables to be significant at $p < 0.05$ and above (Table 4). These are distribution expenditure (DIST, $p <0.01$), degree of vertical integration (VAL_ADD, $p <0.01$), total exports (TOT_EXP, $p <0.01$), total imports (TOT_IMP, $p <0.05$), and capital intensity (ENERGY, $p <0.05$). The estimated discriminant score functions are as follows:

LEs: Y_{LE} =-13.020 + 0.108 *TOT_EXP* + 0.550 *VAL_ADD* + 0.141 *TOT_IMP* + 1.317 *DIST* + 0.252 *ENERGY*

TNCs: Y_{TNC}= -9.426 + 0.056 *TOT_EXP* + 0.466 *VAL_ADD* + 0.212 *TOT_IMP* + 0.929 *DIST* + 0.143 *ENERGY*

To assess predictive accuracy in discriminant analysis it is not possible to use a measure such as coefficient of determination (r^2), as is done in multiple regression. In discriminant analysis, each observation must be assessed as to whether it was correctly classified. The classification results (of two ownership groups) reveal that the discriminant functions correctly classified 74% of the cases (Table 5). Hence, they appeared to be good fits.

The coefficient of TOT_IMP for LEs is 0.141 and for TNC-affiliates it is 0.212, which suggests that LEs tend to be less import intensive than TNC-affiliates. Two other features are of interest here. First, LEs post greater global forward linkages through higher exports (TOT_EXP). Second, they produce a greater proportion of output in-house, i.e., appear to be more vertically integrated (VAL_ADD) suggested by the higher value of the coefficient (0.550 for LEs against 0.466 for TNC-affiliates significant at $p < 0.01$). However, LEs appear to be less technically efficient (ENERGY) than TNC-affiliates.[23] If energy is taken as a measure of capital employed, *LEs* appear to be more capital intensive than TNC-affiliates. This finding is counterintuitive and refutes the common criticism that TNCs employ capital intensive methods of production unsuitable for developing countries. The puzzle behind this finding is explained by recent case study research which indicates that TNC-affiliates are conducting only the labour intensive parts of their value chain[24] thus exploiting India's location-specific advantages of low wage labour in order to decrease costs.[25] In so doing, TNCs are also avoiding

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[23] It is possible this is attributable to their tendency to use their own power plants to assist in-house production thereby increasing the cost of energy as one earlier study reported (see Ray, 1999).
[24] viz., assembly-oriented manufacturing.
[25] The case of Philips India is reported in Ray (2001a).

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further growth of excess capacity, which has the potential to damage industry profitability. In respect of local adaptation, LEs appear to be multi-market competitors, spending a greater proportion of their sales revenue in distribution expenses (DIST) than TNC-affiliates. These findings are in tune with our hypothesis that TNC-affiliates tend to focus on niche-markets than mass markets - unlike their local counterparts.

The remaining three variables namely, purchase of finished goods (PUR_FIN), import of finished goods (IMP_FIN) and royalties (IMP_ROY) remitted abroad did not add further to the discriminating information contributed by the other five significant variables.

Variables	TOT_EXP	IMP_FIN	PUR_FIN	VAL_ADD	TOT_IMP	IMP_ROY	DIST	ENERGY
TOT_EXP	1.000	-0.047	0.046	-0.225	0.321	-0.082	-0.030	-0.060
IMP_FIN	-0.047	1.000	0.366	-0.029	0.272	0.236	0.050	0.047
PUR_FIN	0.046	0.366	1.000	-0.224	-0.034	0.231	0.091	-0.297
VAL_ADD	-0.225	-0.029	-0.224	1.000	-0.257	-0.035	-0.303	-0.068
TOL_IMP	0.321	0.272	-0.034	-0.257	1.000	0.126	0.048	0.052
IMP_ROY	-0.082	0.236	0.231	-0.035	0.126	1.000	0.049	-0.149
DIST	-0.030	0.050	0.091	-0.303	0.048	0.049	1.000	0.001
ENERGY	-0.060	-0.047	-0.297	-0.068	0.052	-0.149	0.001	1.000

Table 3: Correlations between the variables in the chemical cluster

Variables	Sig. of F	Wilks' Lambda
DIST	0.005^{**}	0.743
VAL_ADD	0.010^{**}	0.731
TOT_EXP	0.002^{**}	0.760
TOT_IMP	0.014^{*}	0.725
ENERGY	0.019^{*}	0.720

*$p < 0.05$, **$p < 0.01$*
Table 4: Significance test in the chemicals cluster

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	Predicted Group		Total	% of cases
Ownership Group	LE	TNC		
LE	29	11	40	72.5
TNC	10	30	40	75.0
Predicted group	39	41	80	73.8

Table 5: Classification results in the chemicals cluster

7.4 Transport Equipment Cluster:

Table 6 presents the correlation matrix of the six significant variables in the transport equipment cluster. The results show a moderate correlation between total imports (TOT_IMP) and foreign royalty paid (IMP-ROY) and remaining correlation coefficients are considerably low. Given that dependence on technology imports also engender import of raw materials and capital goods, this moderate correlation is not surprising.

The step-wise procedure in the discriminant analysis report four variables as significant [26] (Table 7). The estimated discriminant score functions with the four significant variables are reported below:

LEs: $Y_{LE} = -7.101 - 0.253\ PUR\_FIN + 0.426\ VAL\_ADD + 1.681\ IMP\_ROY + 1.444\ R\_D$

TNCs: $Y_{TNC} = -5.859 + 0.085\ PUR\_FIN + 0.355\ VAL\_ADD + 3.372\ IMP\_ROY + 0.055\ R\_D$

The classification results (of two ownership groups) showed that 78% of originally grouped cases are correctly classified (Table 8) and thus, they appeared to be good fits.

The coefficients of the discriminant functions suggest LEs tend to be more locally vertically integrated (VAL_ADD) vis-à-vis TNC-affiliates. The degree of vertical integration (VAL_ADD) is positive and higher for LEs (0.426) than TNC-affiliates (0.355). On the other hand, TNC-affiliates appear to strike up greater horizontal linkages with automotive suppliers for finished goods. This is revealed for PUR_FIN, where the coefficient for TNCs is 0.085 while it is -0.253 for LEs, significant at $p < 0.05$ (see Table 7). These two results imply that higher in-house production among LEs contrasts with the TNCs' lower in-house production but their correspondingly higher proportion of bought-out products. Apparently, lower in-house production at the same scale intensity increases the TNC's need to 'buy-out' locally as well as depend on the parent or other affiliates for finished goods. Thus, TNC-affiliates appear to be exploiting India's locational advantages of low labour costs by performing the labour intensive final assembly type production through subcontractors, but not getting involved in extended in-house production. Recent changes brought about by economic liberalisation and corresponding uncertainties with regard to consumption and production tends to reinforce this tendency. In respect of adaptation, LEs appear to be devoting greater efforts for technological innovation in house (R_D) whether to modify

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[26] R&D expenditure (R_D), purchase of finished goods (PUR_FIN) and value added (VAL_ADD) are significant at 5% and above and foreign royalty paid (IMP_ROY) is significant at 10%.

existing products or create new variants of the same. By contrast, TNC-affiliates are internalising existing technology to rely on captive access to foreign know-how from their parent or other affiliated subsidiaries as revealed in the higher outflow of resources in foreign royalty payments (IMP_ROY).

	IMP_FIN	PUR_FIN	VAL_ADD	TOT_IMP	IMP_ROY	R_D
IMP_FIN	1.000	0.010	0.059	-0.001	0.053	0.052
PUR_FIN	0.010	1.000	0.157	0.066	0.087	-0.004
VAL_ADD	0.059	0.157	1.000	0.104	-0.135	0.105
TOT_IMP	-0.001	0.066	0.104	1.000	0.549	0.066
IMP_ROY	0.053	0.087	-0.135	0.549	1.000	0.010
R_D	0.052	-0.004	0.105	0.066	0.010	1.000

Table 6: Correlations between the variables in the transport equipment cluster

Variables	Sig. of F	Wilks' Lambda
IMP_ROY	0.016[*]	0.702
R&D_CAP	0.082[**]	0.663
VAL_ADD	0.037[*]	0.681
PUR_FIN	0.038[*]	0.680

*$p<0.05$, **$p<0.10$
Table 7: Significance test in the transport equipment cluster

	Predicted Group		Total	% of cases
Ownership Group	LE	TNC		
LE	23	5	28	82.1
TNC	7	19	26	73.1
Predicted group	30	24	54	77.8

Table 8: Classification results in the transport equipment cluster

The remaining two variables, namely, import of finished goods (IMP-FIN) and total imports (TOT_IMP), do not add further to the discriminating information contributed by the other four significant variables.

ELECTRONICS CLUSTER: Within the electronics cluster, the variables tested for collinearity found moderate correlation between degree of vertical integration

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(VAL_ADD) and exports (TOT_EXP), and import of finished goods (IMP_FIN) and purchase of finished goods (PUR_FIN) only (Table 9). Whereas the tendency to rely on outsourced finished products may engender a reliance on imports and local products, the explanation of correlation of vertical integration and total exports is not so straightforward.[27] The remaining coefficients are low and present no multi-collinearity problem.

The step-wise procedure obtained two variables which are significant, namely total exports (TOT_EXP) and purchase of finished goods (PUR_FIN), both of which are significant at $p < 0.05$ (Table 10). The estimated discriminant score functions with the two significant variables are as follows:

LEs: $Y_{LE} = -1.487 + 0.041 \, TOT\_EXP + 0.020 \, PUR\_FIN$

TNCs: $Y_{TNC} = -1.321 + 0.014 \, TOT\_EXP + 0.113 \, PUR\_FIN$

The overall classification results showed that 73% of original grouped cases were correctly classified which indicates that the estimated discriminant functions could be considered to be good fits (Table 11).

Here, the coefficients of the discriminant functions for TOT_EXP are 0.041 for LEs and 0.01 for TNCs - significant at $p < 0.05$. This indicates that LEs export proportionally more. Again, TNCs appear to have a greater propensity to outsource finished products as in the transport equipment cluster, the positive coefficient 0.113 for PUR_FIN indicating that TNC-affiliates have a higher proportion of purchase of finished goods in their product line than LEs (0.020). The remaining four variables namely, vertical intrgration (VAL_ADD), energy consumed (ENERGY), import of finished goods (IMP-FIN), and foreign royalty paid (IMP_ROY), while significant on their own in the univariate framework, do not add further to the discriminating information contributed by the other two significant variables. The relative backwardness of this high technology industry indicated by weak backward and forward linkages leads us to conclude that both TNC-affiliates and LEs rely on global linkages as opposed to local ones to rise over the imperfections of local intermediate and factor markets. Therefore, variables such as foreign royalties (IMP_ROY) paid (signifying the technological origins of firms) are less significant when combined with other variables. We conclude this paper in section 6.

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[27] It is however plausible that a higher degree of vertical integration requires higher scale intensities, which in turn, necessitates higher export sales etc.

	TOT_EXP	IMP_FIN	PUR_FIN	VAL_ADD	ENERGY	IMP_ROY
TOT_EXP	1.000	-0.001	0.002	0.590	0.045	-0.006
IMP_FIN	-0.001	1.000	0.543	0.081	-0.045	-0.093
PUR_FIN	0.002	0.543	1.000	-0.073	-0.092	0.078
VAL_ADD	0.590	0.081	-0.073	1.000	-0.210	-0.208
ENERGY	0.045	-0.045	-0.092	-0.210	1.000	-0.045
IMP_ROY	-0.006	-0.093	0.078	-0.208	-0.045	1.000

Table 9: Correlations between the variables in the electronics cluster

Variables	Sig. of F	Wilks' Lambda
PUR_FIN	0.005[*]	0.851
TOT_EXP	0.007[*]	0.840

*p<0.01
Table 10: Significance test in the electronics cluster

	Predicted Group		Total	% of cases
Ownership Group	LE	TNC		
LE	17	11	28	60.7
TNC	4	24	28	85.7
Predicted group	21	35	56	73.2

Table 11: Classification results in the electronics cluster

8. Conclusion and Future Directions

So do TNCs adapt and strike linkages in the host environments where they invest? Based on the results of our econometric analysis, it appears that TNC-affiliates and LEs do behave *differently* along the dimensions predicted. But whilst this difference is very robust for mature industries like chemicals, the same conclusion cannot be reached for high technology global industries like transport equipment and electronics. For mature industries, these differences appear to be more comprehensive and varied than for high-technology industries like transport equipment and electronics. For example, TNC-affiliates and LEs differ along a greater number of dimensions in chemicals where the discrimination information was significant along at least five dimensions of market conduct (eight in univariate tests) than in electronics where they differed along two dimensions (six in univariate tests). It is also evident that the dimensions along which these differences arise are distinctive for discrete industries. For example in chemicals,

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the degree of local vertical integration, export, import, and distribution intensities provide the bases for discrimination; in transport equipment, local outsourcing, vertical integration, technology imports and in-house R&D are critical. Indeed, we had no *a-priori* reason to expect otherwise, for in each industry there is a different set of dynamics at play which makes certain specific conduct variables more important than others. This suggests that the behavioural differences between the two groups of firms are strongly influenced by systemic differences in the structural characteristics of industries in which they compete.

Drawing on Chandler's business history of American transnationals and Vernon's hypothesis of international product cycles, we acknowledge that local adaptation and the development of backward linkages are not a one-off, but a dynamic process. At the initial point of entry, a TNC-affiliate is likely to be tightly integrated with the parent, internalising most of its tangible and intangible asset flows. By this logic, it will minimise value-creating activities in the affiliate. With time, it may begin assembly type of production thereby taking advantage of locational advantages of cheap labour. In our sample, TNC-affiliates appear to be exploiting India's locational advantages of low wage labour by performing the labour intensive final assembly, but not getting too deeply involved in fully-fledged operations just as yet. This is a novel way to establish oneself in a new market and spill over basic level capabilities and skills in the environment[28]. However assembly oriented manufacturing by itself does not engender adaptive or innovative level capabilities in affiliates. As yet, this phenomenon reveals little about the industrial capabilities engendered in the affiliate's operations or technological spill-overs that result through assembly-oriented manufacturing processes. It is only once these affiliates assume greater willingness to undertake higher-order value-creating activities in the host country that we can expect greater capability development in India.

The outcome in which the host governments are interested is not whether firms are foreign owned per se, but the implications of this difference in behaviour given their level of foreign ownership. The objective of host country governments in promoting or restricting foreign ownership in locally domiciled enterprises is to influence and enhance the development of favourable local and foreign linkages by the country's firms (Ray and Venaik, 2001). Linkages developed in competitive environments and accompanied by efforts to enhance suppliers' capabilities are likely to be technologically beneficial and dynamic (WIR, 2001). However, given their foreign ownership and pressures for global coordination, TNC-affiliates in mature industries appear somewhat less proactive than LEs to forge local linkages and undertake local adaptation in the host country. It is of course not being claimed that this is the final word on adaptation and linkages but there seems to be enough evidence to treat it as a plausible hypothesis.

The results of this study reinforces a point about industry factors, i.e., differences in behaviour is influenced by the nature and dynamics of the industry concerned – its incentive structure, nature of market failures and the capabilities (asset bundles) required (See Lall, 1991). If for some reason, there were endemic market failures in local factor markets and ancillary industries, both TNC-affiliates and LEs would have to rely on global linkages. LEs would then be forced to look elsewhere globally, to rise

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[28] See technological capabilities literature as in Baranson (1990), Lall (1995), Stewart (1993) and so on.

over selective home-based disadvantages. This would have the effect of lowering the relative magnitude of differences between the TNC-affiliate and the LE.

This study suffers from certain unavoidable limitations. The analysis deliberately did not include smaller firms, since these cannot match TNC-affiliates in terms of their size and profitability. Given the smaller number of TNC-affiliates as compared to LEs our comparative analysis was restricted to a small number of industries, which accounts for the main, yet unavoidable limitations of this study.

The final contribution of this paper lies in its identification of the issues that need further research and refinement. For example, if differences between the ownership groups will be magnified or attenuated in mature or in emerging (global) industries. Or, whether TNC-affiliates would tend to resist local adaptation to strike better global linkages whatever be the institutional and industry context. These issues need further research and verification. For future research, one hopes that prospective studies would also focus on which aspects of firm behaviour, viz., technology development, product differentiation, vertical integration are the bases for discrimination in which industry. Meanwhile, a careful appraisal of the host country's goals and the contextual asymmetries can illuminate the need for adaptation that would lead to a better understanding of the dynamic interaction between the firm and the environment.

References

Aggarwal, Aradhana (2002). "Deregulation, technology imports and in-house R&D efforts: an analysis of the Indian experience", *Research Policy,*

Baranson, Jack (1970). "Technology Transfer Through the International Firm", *American Economic Review*, 60, pp. 435-440.

Bartlett, Chris and Sumantra Ghoshal (1987). "Managing across borders: new strategic requirements", *Sloan Management Review*, Summer pp. 7-17.

Birkinshaw. Julian (1997). "Entrepreneurship in multinational corporations: the characteristics of subsidiary initiatives", *Strategic Management Journal,* 18(3), pp. 207-229.

Buckley, Peter J. and Mark Casson (1976). *The future of multinational enterprise.* (London: Macmillan).

Carvalho, L. (1977). *Comparative Performance of Domestic and Foreign Firms in Latin America*. PhD. Thesis. Cornell University.

Casson, Mark (1990). *Multinational corporations*. (Aldershot: Edward Elgar Publishing Limited).

Caves, Richard E. (1971). "International corporations: the industrial economics of foreign investment", *Economica*, 38 (February), pp. 1-27.

Transnational Corporations, Local Adaptation and Inter-Firm Linkages in Developing Countries: Some
Contrasts with Local Enterprises in India
Ray & Rahman

—— (1974). "Economic analysis and the multinational enterprise", in J.H. Dunning, ed., (London: George Allen and Unwin).

——(1982). *Multinational enterprise and economic analysis*. (Cambridge: Cambridge University Press).

——(1996). *Multinational enterprise and economic analysis*. 2nd Edition, (Cambridge: Cambridge University Press).

——and M. E. Porter (1977) 'From Entry Barriers to Mobility Barriers: Conjectural Decisions and Contrived Deterrence to New Competition', *Quarterly Journal of Economics*, 91, pp. 241-61.

Cohen, B. (1975). *Multinational Firms and Asian Exports.* (New Haven: Yale University Press).

Daferty F. and Borghey M. (1976). Multinational Enterprises and Employment in Iran, Geneva, ILO, World Employment Programme, Working Paper: 14.

DiMaggio, P.J. and William Powell (1983). "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organisational Fields", *American Sociological Review*, 48, pp. 147-60.

D'Costa, Alan P. (1995). "The restructuring of Indian automobile industry: Indian state and Japanese capital", *World Development*, 23(3), pp. 485-502.

Dunning, John H. (1998). "Location and the Multintational Enterprise", *Journal of International Business Studies*, 29(1), pp 45-66.

Enos, S. (1988). The Transfer of Technology: A Survey. Mimeo, Magdalen College, Oxford.

Fairchild, Loretta and Kim Sosin. (1986). "Evaluating differences in technological activity between transnational and domestic firms in Latin America", *Journal of Development Studies,* 22, pp. 697-708.

Fikkert, Brian (1993). An open or closed technology policy? Effects of technology licensing, foreign direct investment and technology spill-overs on R&D in Indian industrial sector firms. Unpublished doctoral dissertation, New Haven, CT: Yale University.

Ghemawat, Pankaj and Tarun Khanna (1998). "The nature of diversified business groups: a research design and two case studies." *Journal of Industrial Economics*, 16(1), pp. 35-59.

Hair J F, Anderson, R E, Tatham, R L, and Black, W C (1998), Multivariate Data Analysis, Fifth Edition, Prentice-Hall: NJ

Transnational Corporations, Local Adaptation and Inter-Firm Linkages in Developing Countries: Some
Contrasts with Local Enterprises in India
Ray & Rahman

Helleiner, G.K. (1975). "The role of multinational corporations in less developed countries' trade in technology", *World Development*, 3, pp. 161-189.

Hennart Jean Francois (1986). "What is internalisation?" *Weltwirtschaftliches Archiv*, 122, pp. 791-806.

Hymer, Sephen (1976). The international operations of national firms. Doctoral dissertation, Cambridge, Mass. M.I.T. (Accepted 1960).

Jenkins, R. (1990). "Comparing foreign subsidiaries and local firms in LDCs: theoretical issues and empirical evidence", *Journal of Development Studies*, 26, pp. 205-228.

Jo, Sung_Hwen (1976). The Impact of Multinational Firms on Employment and Incomes: the Case Study of South Korea, Geneva, ILO, World Employment Programme Working Paper: 12.

Katrak Homi (1985). "Imported technology, enterprise size and R&D in a newly industrialising country: the Indian experience", *Oxford Bulletin of Economics and Statistics,* 47, pp. 213-30.

Khanna, Tarun and Krishna Palepu (1997). "Why focused strategies may be wrong for emerging markets", *Harvard Business Review*, July-August, pp. 41-51.

Kumar, Nagesh. (1987). "Technology imports and local research and development in Indian manufacturing", *The Developing Economies,* 25, pp 220-33.

Kumar, Nagesh (1990). "Mobility barriers and profitability of multinationals and local enterprises in Indian manufacturing", *Journal of Industrial Economics*, 38(4), pp. 449-463.

— (1991). "Mode of rivalry and comparative behaviour of multinationals and local enterprises: the case of Indian manufacturing", *Journal of Development Economics*, 35, pp. 381-392.

— and Mohammad Saqib 1996. "Firm size, opportunities for adaptation and in-house R&D activity in developing countries: the case of Indian manufacturing." *Research Policy*. 25(5), pp. 712-22.

—and Aradhana Agarwal 2000. "Liberalisation, outward orientation and in-house R&D activity of multinational and local firms: a quantitative exploration for Indian manufacturing", *Research and Information System for the Non-Aligned and other Developing Countries*. Discussion Paper. 07/2000.

Lall, Sanjaya (1974). "Less-developed countries and private foreign direct investment: a review article", *World Developmemt*, 2(4&5), pp. 43-48.

— (1976). "Conflicts of concepts: welfare economics and developing countries", *World Development*, 4(3), pp. 181-195.

Transnational Corporations, Local Adaptation and Inter-Firm Linkages in Developing Countries: Some
Contrasts with Local Enterprises in India
Ray & Rahman

—— (1978). "Transnationals, domestic enterprises and industrial structure in host LDCs: A survey", *Oxford Economic Papers*, 30, pp. 217-248.

—— 1991. "Explaining industrial success in the developing world", in V.N Balasubramanyam and Sanjaya Lall eds. *Current Issues in Development Economics*. St. Martin's Press, New York.

—— (1993). "Transnational corporations and economic development", in Sanjaya Lall, ed., *Transnational Corporations and Economic Development*. (London: Routledge).

—— (1994). "The East Asian Miracle: Does the Bell Toll for Industrial Strategy?" *World Development*. 22(4), pp. 645-654.

—— (1995). "Policy in the New NIEs: Introduction", *Journal of International Development*. 7(5), pp. 741-743.

——(1996). "Transnational Corporations and Economic Development", in T. Moran, ed., *Transnational Corporations and World Development*. (London: International Thomson Publishing Company).

—— and Sharif Mohammad (1983). "Multinationals in Indian big business", *Journal of Development Economics*, 13, pp. 143-157.

Landi J. (1986). The sourcing policies of MNEs: A case study of Nigeria (University of Reading), Ph.D. thesis.

Langdon, S. (1981). *Multinational Corporations in the Political Economy of Kenya*, (London: Macmillan).

Lim, Linda Y.C. and Pang Eng Fong (1982). "Vertical Linkages and Multinational Enterprises in Developing Countries", *World Development*, 10(7), pp. 585-95.

McAleese, Dermot and Donogh McDonald (1978). "Employment Growth and Development of Linkages in Foreign Owned and Domestic Manufacturing Enterprises", *Oxford Bulletin of Economics and Statistics,* 40, pp. 321-339.

Newfarmer, Richard S. and Marsh Lawrence C. (1981). "Foreign ownership, market structure and industrial performance: Brazil's electrical industry", *Journal of Development Studies*, 8, pp. 47-75.

O'Loughlin, Brian and P N. O'Farrell (1980). "Foreign Direct Investment in Ireland: Empirical Evidence and Theoretical Implications." *Economic & Social Review*, 11(3): 155-85.

Porter, Michael E. (1980). *Competitive Strategy: Techniques for Analysing Industries and Competitors*. (The Free Press: New York).

——(1986). "Changing patterns of international competition", *California Management Review*, 28(2), pp. 9-38.

Trasnational Corporations, Local Adaptation and Inter-Firm Linkages in Developing Countries: Some
Contrasts with Local Enterprises in India
Ray & Rahman

——(1990). "The competitive advantage of nations", *Harvard Business Review*, 68(2), pp. 73-93.

Prahalad, C.K. and Yves L. Doz (1987). *The multinational mission : balancing local demands and global vision* (New York: Free Press).

——and Kenneth Liberthal (1998). 'The end of corporate imperialism.' *Harvard Business Review*, July-August, pp. 70-79.

Ray, Pradeep Kanta (1999). 'The institutional context and the strategic role of multinational and local enterprises in India', unpublished doctoral dissertation. (Nedlands, The University of Western Australia).

——(2001a). "BPL Limited: Global Competition and Guerilla Warfare on Local Territory" in Sumantra Ghoshal, Gita Piramal and Sudeep Budhiraja eds., *World Class in India: Companies in Transformation,* (New Delhi: Penguin), pp. 319-340.

——(2001b). "Center for Development of Telematics: Switching on the Telecom Revolution in India" in Sumantra Ghoshal, Gita Piramal and Sudeep Budhiraja eds., *World Class in India: Companies in Transformation,* (New Delhi: Penguin), pp. 532-552.

——and Shams-ur Rahman (2000). "Public Policy and the Role of Multinational and Local Enterprises in the Indian Drugs and Pharmaceuticals Industry", *Global Business Review* 1(2), pp. 207-228.

——and S. Venaik (2001). "Foreign firms and local linkages: A study of comparative behaviour of multinational-affiliates and local enterprises in India," *Economic and Political Weekly*, 36(46 & 47), pp. 4385-4391.

Reddy, Prasada (1997). "New Trends in Globalisation of Corporate R&D and Implications for Innovation Capability in Host Countries: A Survey from India." *World Development*, 25(11), pp. 1821-1837.

Rodriguez-Claire, Andres (1996). "Multinationals, Linkages and Economic Development", *American Economic Review*, 86(4), pp. 852-873.

Rosenweig, Philip M. and Jitendra V. Singh (1991). "Organisational environments and the multinational enterprise", *Academy of Management Review*, 16(2), pp. 340-361.

Rugman, Alan M. (1981). *Inside the Multinationals.* (London, Croom Helm).

Siddhartan, N. (1988). "In-house R&D, imported technology and firm size: lessons from Indian experience", *Developing Economies*, 26: 212-21.

——and A.E. Safarian (1997). "Transnational Corporations, Technology Transfer and Import of Capital Goods: the Recent Indian Experience", *Transnational Corporations*, 6(1), pp. 31-49.

Transnational Corporations, Local Adaptation and Inter-Firm Linkages in Developing Countries: Some
Contrasts with Local Enterprises in India
Ray & Rahman

⸺and Nagesh Kumar (1990). The determinants of inter-industry variations in the proportion of intra-firm trade: the behaviour of U.S. multinationals. *Weltwertschaftliches Archiv,* 126, pp. 581-590.

Solomon, Robert and K.P Ingham (1977). "Discriminating Between MNC Subsidiaries and Indigenous Companies: A Comparative Analysis of the British Mechanical Engineering Industry", *Oxford Bulletin of Economics and Statistics*, 39, pp. 127-138.

Stewart, Frances (1977). *Technology and underdevelopment.* (London: Macmillan).

⸺(1991). "Technology transfer for development", in H. Singer, N Hatti and R Tandon, eds., *Joint Ventures and Collaborations*. New World Order Series:10. New Delhi: Indus Publishing.

Streeten Paul M. (1991). "The impact of changing world economy on technological transformation in the developing countries", *Joint Ventures and Collaborations*. H. Singer, N Hatti and R Tandon, eds., New World Order Series:10. (Indus Publishing, New Delhi).

Toth, Istvan Janos (2000). Outstanding expectations, more balanced growth: the business situation and perspectives of the Hungarian largest exporting manufacturing firms in January 2000. Bisiness Cycles Research Papers No. 1/2000 (Budapest: Tarki Research Institute), mimeo.

United Nations Centre on Transnational Corporations (2001). *World Investment Report: Promoting Linkages.* United Nations, Geneva.

Vaitsos, Constantine V. (1984). "Strategic Choices in the Commercialization of Technology: The Point of View of Developing Countries", In Ghosh, Pradip K., editor, *Technology Policy and Development: A Third World Perspective.* International Development Resource Books, no. 3. Westport, Conn., and London: Greenwood Press: 273-91. (Previously Published: 1973)

Vyasulu, Vinod (1993). "New Economic Policy and Technological Change: Towards New Initiatives", *Economic and Political Weekly*, July 17-24, pp. 1515-1520.

Westney, Eleanor D. (1989). Institutionalisation theory and the multinational enterprise. Paper prepared for Workshop on Organisational Theory and the MNC, INSEAD.

⸺(1993). "Institutionalisation Theory and the MNE", In S. Ghoshal and E. Westney, eds., *Organisation theory and the multinational corporation*, (New York: St. Martin's Press), pp. 53-76.

Wilmore, Larry (1976). "Direct foreign investment in Central American manufacturing", *World Development*, 4(6), pp. 499-517.