ENTERING INDIA:

LICENSING OR JOINT VENTURE?

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Competitive paper for presentation at the 28th EIBA Annual Congress

December 8 – 10, Athens

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Abstract

This paper examines the choice between licensing and joint venture (JV) as entry modes into emerging markets. Prior literature has tended to under-emphasize the role of the local firm in that choice. Using transaction cost theory we model the impact of the characteristics of foreign firms, local firms, and technologies transferred on the choice between licensing and JV. Testing our hypotheses on 126 licensing and JV entries into India, we find that local firm characteristics are crucial determinants of the choice. We also find that the peculiar institutional and market characteristics of India, such as the poor state of intellectual property protection and the complexity of its markets, render some of the traditional determinants of entry mode insignificant.

Key words: Licensing, joint venture, emerging market, local firm, India

1. Introduction

The international business literature on entry modes has typically considered licensing, joint venture (JV) and wholly owned subsidiary (WOS) as different means of expanding into new markets. The ample attention paid to the choice of the optimal entry mode is evidenced both in the large number of theoretical and empirical studies on the subject (see Sarkar & Cavusgil 1996, Andersen 1997, Harland & Wheeler 2000 for reviews) and in the diversity of theoretical approaches used (transaction cost theory e.g: Hennart, 1982, Anderson & Gatignon 1986; eclectic theory e.g. Dunning 1988, Hill et.al 1990, Kim & Hwang 1992 and resource based theory e.g. Madhok 1997, Kogut and Zander 1993).

Most of these studies, however, have been developed in the context of developed and mature economies. When it comes to expanding into emerging markets, the foreign firm faces new challenges. First, these markets are often quite different from western ones, necessitating new marketing programs. For example Kellogg, three years after its entry into the Indian market, had a very unimpressive sales figure of $ 10 million, definitely short of the 'one billion' breakfast eaters it had targeted. "Most (Indian) consumers either prepared breakfast from scratch every morning, or grabbed some biscuits with tea at the local roadside tea stall (and hence) advertising positions common in the West, such as convenience of breakfast cereal did not resonate with the mass market" (Chattopadhyay and Dawar 2000, p2). Secondly, complementary local assets, (such as land, manufacturing space, access to distribution networks) that need to be bundled together with the foreign firm's technology expertise to enable its exploitation in the new market, are often hard to acquire. For example, McKinsey (2001) reports that at least 90% of land has no clear and undisputed ownership title in India and that tenancy protection laws have artificially driven up non-protected rents and real estate prices. Thirdly, in most emerging markets, "having the right contacts, being in the right networks and knowing the rules of the game is crucial to run any business" (Managing Director, Elkem India, personal interview, Mumbai, July 2002).

Given that the complementary assets, personal networks and skills needed to do business in these markets are hard to acquire it makes good sense for the foreign firm to ally with a local firm as a first step towards expanding into the market. This alliance could either be of a contractual (licensing) or an equity form (Joint venture).

The literature on the choice between licensing and JV is scant, especially when applied to emerging markets, and is generally polarized between 'technology transfer' studies which deal with the choice between licensing and equity ventures, which sometimes includes only WOSs (Davidson & McFetridge 1985, Arora and Fosfuri 2001) and sometimes both JVs and WOSs (Telesio 1979, Davidson 1980) and 'ownership structure' studies which deal with that between JV and WOS (Stopford & Wells 1972, Gomes-Casseres 1989, Hennart 1991), thus ignoring the choice between licensing and JV.

Most of the work on entry mode has also tended to overlook the local firm perspective with the attention mainly focused on the foreign firm's assets. Yet a decision by the foreign firm to license or joint venture actually coincides with that of a local firm to 'inward license' or joint venture with the foreign firm. The portrait of the choice between licensing and JV is therefore complete only when both these perspectives are taken into account.

In this paper we use transaction cost theory to formulate hypotheses on the choice between licensing and joint venture. Using firm level data from an emerging market (India) we test the effect of foreign firm, local firm and technology characteristics on entry mode, breaking new ground in two major respects: First and foremost we make perhaps the first ever attempt to determine the firm-level factors that influence the choice between licensing and joint venture from the foreign firm and the local firm perspectives. In other words, besides foreign firm characteristics, we look for those of the local firm that affect the choice between licensing and JV. Secondly, this is, to the best of our knowledge, the first firm-level study to examine the choice between licensing and JV in India, thus adding to our currently quite limited knowledge on entry modes in emerging economies (Hagedoorn and Sedaitis 1998, Meyer 2001, Tse, et. al 1997).

The rest of the paper is organized into 8 sections. Section 2 surveys the literature to bring out the gaps that motivate this paper. Section 3 describes our theory and hypotheses. Data and methods are described in section 4, section 5 describes our variables and their measurement and section 6 reports our results. Section 7 discusses the results while section 8 presents our conclusions.

2. Literature review

There are few empirical studies of the choice between licensing and JV. Pisano (1989) examines the choice between equity and non-equity modes of technology transfer, finding that equity arrangements are

more likely when R&D is one of the functions to be performed in the collaboration. This study, however, is limited to the biotechnology industry, where R&D activity is relatively high, and hence raises doubts about its generalizability. His specification leaves out a number of crucial variables, the characteristics of technology being exchanged (Zander 1991, Kogut and Zander 1993) being one of them. Hagedoorn and Narula (1996) and Hagedoorn and Sedaitis (1998) examine the effect of industry characteristics (e.g: technology intensity) on the choice between equity and contractual forms of alliances. While Hagedoorn and Sedaitis (1998) is an encouraging attempt to examine the choice in a transition economy (Russia), both studies provide little new knowledge on the impact of firm level factors on the decision to license or JV. Killing (1980), set up from the point of view of the 'technology dependent' firm, examines the impact of product characteristics on the choice between licensing and JV. Using data on 74 licensing contracts and 28 JVs he found JV to be preferred over licensing, the farther the foreign product is from the core lines of the local firm and the larger the scale of the project.

2.1. Technology transfer literature

The technology transfer literature has examined how firm level and technology variables affect the choice between licensing and WOS (Davidson and McFetridge 1984,1985, Kogut and Zander 1993, Arora & Fosfuri 2000) and that between licensing and equity ventures (JV and WOS) (Telesio 1979, Mansfield and Romeo 1980, Davidson 1980). Three main sets of variables have been hypothesized to affect the choice (Zander 1991):

(a) Characteristics of technology suppliers

(b) Technology characteristics

(c) Environmental factors

(a) Characteristics of Technology suppliers

Based on a sample of 43 US, European and Canadian firms, Telesio (1979) found that firms with higher *R&D* to sales ratios had a greater propensity to license (measured by the ratio of royalty receipts to sales) than firms with lower R&D to sales ratios. But Davidson and McFetridge (1984,1985) analyzing 1226 intra firm and market technology transfers of 32 US based firms and found that firms with high R&D intensity tended to exploit their know-how through wholly-owned affiliates rather than through arm's length licensing. Telesio's (1979) contention that parent firm's *product line diversification* has a positive correlation with licensing activity has been generally supported by others like Blomstrom & Zejan (1989).

The expanding firm's *country and industrial experience* has been generally found to enhance the probability that it enters the foreign market via WOS. Besides Telesio (1979), Blomstrom and Zejan (1989) also find experience to enhance the odds of observing an equity venture rather than licensing. However, Zander (1991) finds no significant effect of international experience on the mode of technology transfer. Davidson and McFetridge (1985) find that the more *distant the affiliate's business is from the U.S parent's core business*, the more it would prefer to license rather than exploit its technology advantage all on its own.

(b) Technology characteristics

Davidson and McFetridge (1985) find that characteristics of the technology being transferred strongly influence the choice between licensing and FDI. Strong statistical support is found for the hypotheses that the probability of internal transfer of technology (i.e. FDI) is greater: (a) *for newer technologies* (b) *for technologies with fewer previous transfers* (c) *for technologies not far from the transferors principal line of business* and (d) *for transferors with little experience with prior technology transfers*. There is further support for the contention that older technologies will be transferred through licensing agreements (Mansfield and Romeo 1980, Zander 1991).

Using survey data on 82 instances of technology transfers by Swedish firms, and controlling for age and prior transfers of the know-how, Kogut and Zander (1993) found that *codifiability* and teachability of know-how enhanced the probability of its transfer through licensing rather than to WOS. Arora and Fosfuri (2000) also found that codifiability (measured by the number of patents taken on that technology) enhances the probability that, in the chemical industry, the parent's know-how would be transferred through licensing rather than to WOS.

Davies's (1977) study on technology transfers to India revealed that most licensing agreements transferred only a 'limited technology package' compared to a more 'comprehensive package' in equity joint ventures. While a 'comprehensive package' conveyed tacit aspects of the transferred technology by sending personnel to the recipient firm, a limited package comprised only of basic designs and blueprints. Few licensing contracts provided licensees with management skills, showing that licensing was not the preferred mode for transferring tacit skills.

(c) Environmental factors

Some studies have found that host country characteristics, such as the *geographic distance* between the recipient and home country, host country *demographic attributes* (Davidson & McFetridge 1985) and *level of development* in terms of GDP or GNP per capita (Contractor 1984, Blomstrom & Zejan 1989 also see Stobaugh 1988), have an effect on the mode of market entry. Contractor (1984) also finds the level of *host country technical capabilities* (measured by R&D expenditures per capita) to enhance the propensity of a firm to license its technology to a local firm. *Cultural distance* between the technology transferor and transferee has also been found to have a negative effect on the propensity of choosing a WOS over licensing (Arora and Fosfuri 2000).

Some of the above studies assume JV and WOS to be similar and do not distinguish between them while comparing licensing to equity (e.g: Telesio, 1979; Davidson,1980). Kogut & Zander (1993) found better results when licensing was compared to WOS rather than to JVs and WOSs grouped together, suggesting that JVs and WOSs exist due to different reasons and hence, need to be treated as distinct groups when comparing them to licensing. Another major shortcoming of the 'technology transfer studies' is that they are primarily from the point of view of the foreign firm. Due to data constraints, less attention is paid to the other party – the licensee or the local JV partner. Researchers, however, do admit that ignoring the local firm leads to incomplete specification of the entry mode choice model (Kogut and Zander 1993). Some amount of attention, though, has been paid to the licensee in a separate stream of 'inward licensing' studies.

2.2. Inward licensing studies

Research on inward licensing has brought some focus to the licensee whom most of the mode of entry literature has unfortunately overlooked. Parry and Watson (1979) report that large and R&D intensive Australian firms were more likely to inward license from unaffiliated firms. Ford (1985) obtained similar results for American firms. In a study of 51 licensees in Ohio, Shahrokhi (1987) reported that firms with strong internal R&D and technical capabilities were more likely to take arm's length technology licenses. Caves, Crookel and Killing (1983) in their analysis of 80 licensees report that in 74 of these cases the product for which technology was sourced through licensing was an existing product or was a closely related diversification for the licensee. Their basic finding here was that "licensees are not randomly drawn firms that acquire a license and then procure the complementary assets; only if those assets lie at hand and command low internal shadow prices do they seek the missing technology in the licensing

market" (p. 254). In other words, firms sought technology licenses only to complement existing capabilities.

While these studies shed light on some characteristics of the licensees a common shortcoming is that they do not compare them to a control group. In an attempt to rectify this, Reid and Reid (1988) and Kwaku (1993) examined how licensees differ from non-licensees. Quite surprisingly, and contrary to the conclusions in Caves, Crookel and Killing (1983) and Shahrokhi (1987), Kwaku (1993) found no differences between licensees and non-licensees in internal R&D, marketing and manufacturing capabilities.

To sum up, our knowledge of the firm-level determinants of the choice between contractual (licensing) and equity (JV) forms of alliance is quite limited. Most of the existing studies on licensing can be broadly grouped into 'technology transfer' and 'inward licensing' studies. The former group consistently adopts a foreign investor perspective in that it considers the modal choice of technology transfer as a decision solely made by the foreign firm on the basis of firm and technology characteristics, paying little attention to the local firm. Yet a decision by the foreign firm to license or JV coincides with one by a local firm to inward license or JV with the foreign firm and a more accurate specification thus requires looking at both sides.

Studies on inward licensing look at the decision to license from the licensee's point of view but fail to include a control group for comparison. The few studies that do so compare licensees with non-licensees and not with local joint venture partners and thus provide no information on the characteristics that systematically differentiate licensees from joint venture partners.

In the next section we formulate hypotheses based on transaction cost theory to explore the effect of foreign firm, technology and local firm characteristics on the choice between licensing and JV.

3. Theory and hypotheses

Transaction cost theory has been a dominant perspective in the literature on international technology transfer (Davidson and McFetridge 1984, 1985) and ownership structure of foreign subsidiaries (Stopford & Wells 1972, Gomes-Casseres 1989, Hennart 1991). Contrary to the ideal neo-classical economic model, in real life markets are often prone to failure. These natural market imperfections (Hennart 2000)

arising primarily from bounded rationality and opportunism of economic agents (Williamson 1985) often result in high transaction costs while using the market to organize transactions. When transaction costs of using the market exceed the perceived benefits from the transaction the market ceases to be an efficient means of organizing it. Typical of such instances are when it is difficult to define and measure the good being transacted and when transacting a 'public good'.

One way to get around the problem of high transaction costs is to reduce the incentives of agents to cheat by organizing the transaction within the firm and thus replacing the market price mechanism with hierarchy as the mode of organizing the transaction (Hennart 1982, 2000).

One particular instance where transaction costs tend to be high is in the market for know-how. In fact most applications of the transaction costs theory to international business has focussed on the exchange of know-how between firms (Buckley and Casson 1976, Magee 1977, Rugman 1981, Teece 1981, Caves 1982, Hennart 2000). The inefficiency of the market for know-how emanates primarily from the nature of the good being transacted (i.e. knowledge). Information asymmetries exist between the seller and buyer of technology in that the buyer, ex ante, is not aware of the exact characteristics of the technology being transferred and hence, is more likely to undervalue it. The seller, on the other hand, cannot spell out specific features of the know-how because he runs the risk of revealing too much to the buyer, and thus for all practical purposes, transferring it free of charge (Arrow, 1962 Hennart, 2000). Another reason why markets for know-how are often inefficient is because it is sometimes difficult to ensure and maintain property rights to knowledge, given its public good nature. Patents are a limited solution to this, but the efficacy of patenting depends largely on the codifiability of the know-how and the enforcement of patents in the given geographical region (Hennart 1982). Besides, exchange of know-how is sometimes shrouded in uncertainty regarding its performance when it is finally in the hands of the buyer. This uncertainty, particularly aggravated when technology is transferred across borders to new and unfamiliar markets, adds to the difficulties of specifying a contract to govern its exchange and hence, transaction costs of using the market are high (Williamson 1981, Pisano 1989). When high transaction costs render markets for know-how inefficient firms have incentives to bypass contractual modes and integrate into production.

There are however, particular situations when knowledge can be transacted on the market through contracts. For example some researchers have observed growing amounts of technology trade in the 1990s (Arora et al 2001a) particularly in the chemical industry (Arora & Gambardella 1998, Arora and

Fosfuri 2000). This, as the authors suggest, is primarily due to the specific nature of technologies in that industry. With the development of chemical engineering, more general and abstract ways of conceptualizing and codifying chemical processes have emerged. Because of this enhanced codifiability patents are thought to work better in chemicals than in other industries (Levin et al 1987, Cohen et al 1997, Arora et al 2001). In the next sub-sections we formulate hypotheses that map the effect of technology and firm characteristics on transaction costs and thereby, on the decision of the firm to use the market (licensing) or integrate into production (joint venture).

3.1 Centrality of the know-how to the foreign firm

Organizing transactions in-house is not without costs. A minimum size of investment is required to set a plant up and running. These costs could be considerably higher when the investment is made in a foreign country. Hence diversified firms where resource allocation between divisions is stringent may frequently license to independent firms to avoid the costs of investing abroad (Telesio 1979).

One would expect firms to set up wholly or partially owned foreign operations when the costs of losing control over the know-how being transferred are high. This is the case when know-how is core to the firm, for two reasons. First, firms are likely to generate future technologies in core lines rather than in non-mainstream ones (Davidson and McFetridge 1984). Maintaining control over the use of the core technology prevents its unauthorized dissipation and makes it easier to obtain feedback on its performance in various settings. Second, core technologies and products contribute more to sales and profits. It is then reasonable that firms will be more hesitant to renounce control over foreign operations in these profitable lines (Telesio 1979). Thus we would expect that:

H1: *Technology core to the foreign firm is more likely to be exploited through JV than through licensing*

3.2 Know-how codifiability

Codifiability of know-how makes its valuation relatively easier and thus reduces information asymmetry in its exchange (Kogut and Zander 1993, Teece 1977, Balakrishnan and Koza 1993, Winter 1987, Arora, Fosfuri and Gambardella 2001). Besides, codifiable knowledge can usually be patented. When patent laws are in place and are effectively enforced, it is possible for technology suppliers to extract rents on their technology through arms length licensing and hence their incentive to internalise its transfer will be

lower (Hennart 1982). Empirical evidence has been generally supportive (Kogut and Zander 1993, Arora and Fosfuri 2000). Hence:

H2: *The more codifiable the know-how, the higher the probability of its transfer through licensing than through JV*

H3: *Patented know-how is more likely to be exploited through licensing than through JV*

3.3 Age of know-how

Studies have observed a positive correlation between age of the know-how being transferred and the propensity to license it (e.g. Davidson and McFetridige 1984,1985). This is because older technologies are typically of lower value to the innovating firm in preserving its competitive strengths (Telesio 1979) and as a result control over older technology loses urgency. Age should also lower the costs of external technology transfer as with the passage of time the transferor understands better the detailed aspects of the technology and its transfer (Teece 1976, Kogut and Zander 1993). Hence:

H4: *Older technology is more likely to be transferred through licensing than through JV*.

3.4 Prior know-how transfer by the foreign firm

Transfers that have taken place before, are, ceteris paribus, the least costly to perform because the transferor over time (and previous transfers) has learned how the know-how could be effectively transferred (Teece 1976). Prior licensing implies know-how codification and greater public knowledge of its characteristics (Kogut and Zander 1993), thus reducing information asymmetries between transferor and transferee. Hence technologies with prior transfer histories are more likely to be exploited through licensing.

However prior transfers to a particular market also indicate that the technology supplier has had prior experience with the transfer of his technologies in that market. This may have given the technology supplier a chance to learn the economic and technical performance of his know-how in the new market and the absorptive capacity of the local technology recipient. A prior contact may also have enhanced the absorptive capacities of the local firm and could persuade the technology supplier to transfer more recent versions of his technology, versions which are most efficiently transferred through internalisation (i.e. joint ventures). In this sense prior transfer of a technology to a particular foreign market could be

considered an initial stage on the 'establishment chain' (Johanson and Vahlne 1977, Johanson and Wiedersheim Paul 1975). The incremental internationalisation perspective would then suggest that:

H5: *Prior technology transfers to the foreign market increase the probability that subsequent transfers will take place through JV rather than through licensing*

3.5 Local firm technology capability

As we have seen, the impact of the technology capabilities of the technology recipient firm on the mode of technology transfer has received limited attention (Dunning 1981, Contractor 1981, 1984, Davidson and McFetridge 1984) but has been seen to be an important determinant of that transfer (Kogut and Zander 1993, p. 633). Our contention is that technology proficiency of the recipient firm lowers the transaction costs of transferring know-how using arms length contracts. This is primarily because the information asymmetry between the transactors concerning the know-how and its economic performance will be smaller when their technological capabilities are similar (Hennart 2000). As a result valuation of the know-how is much easier and transaction costs are much lower (Arora, Fosfuri & Gambardella, 2001). Davies (1977) has also shown that licensing is an inefficient means of technology transfer when the local firm needs broader assistance with implementing the foreign technology. Thus:

H6: *The broader the range of technical assistance needed by the local firm, the higher the probability of observing a JV than a licensing agreement*.

3.6 Centrality of product to the local firm

Organizing transactions internally is not without its costs. While internalisation reduces the incentives of parties to be opportunistic it heightens the risk of 'shirking'. Shirking occurs when employees pretend to be working while they really aren't. The cost of employee shirking to the firm will be higher, the higher the costs of measuring output and monitoring employees (Hennart 2000). Besides, setting up a firm entails legal and administrative costs as well (Alchian and Demsetz 1972, McManus 1975). Thus when the know-how being transferred is of peripheral importance there is a lower likelihood of its transfer being internalised (Davidson and McFetridge 1985).

Prior literature has put forth this argument primarily from the transferor perspective. However the arguments apply equally to technology recipients, who may be unwilling to commit resources to joint

ventures with technology suppliers when the technology is of peripheral importance. Besides, when sourcing technology from abroad for its core operations the local firm will seek to get access to both current and future technology, and to continuing technical and management support. Licensing contracts typically lack such 'comprehensive technology packages' (Davies 1977). More commitment from the foreign firm in terms of technical assistance is ensured in a JV as opposed to in a licensing contract. Thus:

H7: When the know-how is core to the local firm there is a higher probability of observing a JV than a licensing agreement

3.7 Product skills of the local firm

Specific product skills as well as technological skills (as per section 3.5), could also affect the local firm's choice between licensing and JV. Caves, Crookel & Killing (1983) suggest that when the technology recipient has all the relevant or closely related product skills it is likely to license in technology to complement its in-house product skills. The argument becomes more complete when read in conjunction with Killing (1980) who finds that the lower the product related skills of the local firm, the more it will prefer a JV to a contractual agreement (licensing). Following these two studies we hypothesize that:

H8: *The lower the product skills of the local firm, the higher the probability it will choose a JV over a licensing contract*

4. Sample and Method

Data was collected by means of a survey sent to 1258 Managing Directors of Indian firms which had taken technology licenses from, or had entered into joint ventures with, foreign firms. The population was identified from a database of over 7000 Indian firms and from the listings of foreign chambers of commerce in India. We developed our questionnaire by means of Dillman's (1978) Total Design Method and pretested it with Managing Directors and other managers of six foreign collaborations in Kerala, South India and with officials of the Confederation of Indian Industry. The survey asked for basic information on the foreign collaboration, on the characteristics of the know-how transferred, on the experience of the foreign firm in India, on the technical and product skills of the Indian firm, and on the characteristics of the product manufactured under the collaboration.

We sent an announcement card introducing the survey and its objectives and the actual survey a week later. Close to 450 announcement cards were returned indicating that they had failed to reach their targets because the targeted firm had closed down or moved to another location and so the first mailing was directed to the remaining 800 firms. After a second mailing we received 94 filled surveys by mail. We paid personal visits to firms located in Delhi, Bombay and Madras and these yielded 32 more responses. Our sample thus consists of 126 Indian firms of which 75 are local partners in joint ventures with foreign firms and 51 are licensees of foreign firms. Our 16% response rate is comparable to that of other surveys of Indian firms.

The sample is distributed over 20 manufacturing industries. Twenty percent of the respondents are in the industrial and commercial machinery industry, 18% in chemicals and allied products and 12% each in the electronics and electrical equipment and transportation equipment industries. Seventy-three percent of licensing cases and 80% of JVs involve producer as opposed to consumer goods. Collaborations are with foreign firms from 19 countries with German and U.S firms accounting for the largest share (22% and 21% respectively).

To check for non-response bias we performed a t-test for difference in means between a subset of 40 respondents and 355 non-respondents for whom data was available from secondary sources. The two groups did not significantly differ in annual sales and firm age (t value was insignificant at $p > 0.10$ on both variables).

Method

Our model is:

$$JV = f(\text{Technology, foreign and local firm attributes, Control variables})$$

where JV, the dependent variable is a dummy equal to one if the Indian firm chose a JV and zero if it chose a licensing agreement. Given the binary nature of the dependent variable we use a binomial logistic regression to estimate the parameters (Agresti 1996, Long 1997).

5. Independent variables

EXISTCLOSE measures the product skills of the Indian firm. Indian partner firms were asked to mention whether the product design, production process and marketing skills they had prior to the foreign collaboration were exactly those relevant to the collaboration, similar to the ones needed,

or totally unrelated. Following Caves, Crookel & Killing (1983), the product produced under collaboration was then coded an *existing product* if the Indian firm skills were exactly those relevant to the collaboration, a *closely related product* if they were similar ones and an *unrelated product* if the skills held by the Indian firm were totally unrelated to those needed by the collaboration. Put differently, we defined *existing and closely related products* as products for which the Indian firm possessed either all the necessary product skills or related ones. EXISTCLOSE is equal to 1 when the product produced under collaboration with the foreign firm is either an existing product of the Indian firm or a closely related one and 0 if the Indian firm lacked not only the required but also similar product skills.

To measure the centrality of the transferred foreign know-how to the Indian firm we use the dummy variable INDCORE. Survey respondents were asked if the know how was core to the Indian firm and INDCORE takes the value 1 when they responded in the affirmative and 0 otherwise.

Contractor (1981) suggests that the extent to which additional services are required from the transferor firm depends heavily on the technological capabilities of the recipient firm. FHLP indicates the technology capability of the Indian firm in that it measures the extent to which it is requires management, marketing or other technical assistance from the foreign firm to implement the transferred know-how. Survey respondents were asked to indicate which of these three types of assistance were required and HFLP takes the value 1 if only one of these three forms of assistance is required, 2 if two are required and 3 when all three forms are required to implement the transferred know-how. A higher value on HFLP thus indicates a greater dependency on the foreign firm.

The centrality of the know-how to the foreign firm is measured by the dummy FORNCORE which takes a value of 1 when the know-how was indicated to be core to the foreign firm by the respondent and 0 otherwise.

AGE, a measure of know-how age, takes the value 1 when the respondent indicated that the transferred know-how was introduced in the foreign firm's home country within the past one year, 2 when it was two to three years old, 3 when it was three to five years old and 4 when its first introduction was more than five years ago.

PRIORIND denotes whether the know-how in question has been transferred to India prior to its transfer within the present collaboration. PRIORIND takes a value of 1 if the know-how has been transferred to India before, either to the responding Indian firm within the framework of an earlier alliance or to any other Indian firm. It takes a value of 0 otherwise.

PTNTIND is a dummy variable equal to 1 if the know-how has been patented in India and 0 if not. Data on PRIORIND and PTNTIND were obtained from survey responses.

MANUAL measures the codifiability of the transferred know-how. Survey respondents were asked to indicate on a scale of 1 to 5 whether the know-how being acquired in the collaboration could be described in a manual. Higher values on MANUAL suggest greater codifiability.

Control variables

A foreign firm which has already been exporting to India at the time of the collaboration may be less uncertain about the market and more willing to make greater resource commitments, i.e. to choose a JV over licensing. We control for the prior export experience of the foreign firm to India with PRIOREXPORT, a dummy variable that takes the value 1 if the respondent answered that the foreign firm had exported its products to India prior to the present collaboration and 0 otherwise.

Arora and Fosfuri (2000) document a significant and negative effect of cultural distance between the transferor and recipient country on the propensity to choose WOS over licensing. CULTDIST measures the cultural distance between India and the home country of the foreign firm by the Kogut and Singh index (1988).

Indian firms may lack the resources to implement large-scale projects and may choose JVs with foreign firms to obtain financing. INVSTRQD reflects the scale of investment required to produce and sell the collaboration product. INVSTRQD takes the value of 1 for investments of less than US$10m, 2 for investments between US$ 10 and 45m, 3 for investments between US$45 and 110m, 4 for investments between US$110 and 220m, and 5 for those above US$ 220m.

To control for changes in Indian regulations towards incoming foreign investment we include a dummy LIBDUM1991 that takes a value of 1 if the collaboration was started in the liberalized period (post 1991) and 0 if before 1991.

Descriptive statistics and hypothesized signs are presented in **table 1** and **table 2** respectively, and pair-wise correlations between the variables are presented in **table 3**. Correlations between independent variables are not high enough to suspect multicollinearity. The highest correlation is between FORNCORE and INDCORE (0.45) but most of them are below 0.20. The Variance Inflation Factors (VIF) for independent variables are below 1.22 with a mean of 1.12 and hence quite satisfactory.

6. Results

The results of the logit estimation are presented in column 2 of **table 4, labeled "model 1"** (standard errors in parentheses). A positive sign for the coefficient implies that the corresponding variable has a positive effect on the probability of JV and a negative sign implies the contrary. The model likelihood ratio (LR) chi-square is highly significant ($p<0.01$) implying that the full model has a significantly higher log likelihood than the base model. Analogous to the F statistic in multiple regression, the significant LR chi-square also implies the 'joint significance' of the independent variables taken together. The goodness of fit of a logistic model can also be determined in terms of its ability to correctly predict positive outcomes (sensitivity) and its ability to correctly predict negative outcomes (specificity). Our model is quite strong in predicting positive outcomes. In model 1, 80.65% of the positive outcomes (JV) are correctly predicted while in model 2, the sensitivity rate is 82.54%. However, there is still some room for improvement with respect to specificity – our ability to correctly predict licensing cases -- which is 65.91% for model 1 and 61.36 % for model 2. The overall predictive efficiency of the models is quite good: 74.53 % for model 1 and 73.83% for model 2.

H1 hypothesizes that technologies core to the foreign firm (FORNCORE = 1) tend to be exploited through JV rather than licensing. FORNCORE, however, is insignificant. One possible reason is the lack of variation in this variable, since transferred know-how is core to the foreign firm for 87% of our observations.

H2 predicts that codifiable know-how will be licensed. MANUAL, the extent to which transferred know-how can be explained in a manual, is not significant. Neither is the coefficient of PATENTIND, whether the foreign know-how was patented in India, contrary to H3.

The coefficient of AGE is not significant, perhaps because 85% of cases involved transfer of know-how that was over five years old. H4, which predicts that older know-how is more likely to be transferred through licensing than through JV, is thus not supported.

PRIORIND is positive and significant at $p<0.05$ supporting H5 and implying that prior transfers of technology to India increase the chances that the present transfer will be via JVs rather than licensing.

FHLP, indicating the extent of foreign assistance required by the Indian firm to implement the foreign know-how, and therefore an index of the lack of technology ability of the Indian firm, is positive and highly significant ($p<0.01$). This supports H6 that when technological capabilities between both parties are asymmetrical, transaction costs of transferring know-how on the market are high, and hence the transaction is more likely to take place through a JV rather than licensing.

INDCORE, whether the technology transferred was core to the Indian firm, has a significant positive sign (though only at $p<0.10$) implying that Indian firms choose JVs over licensing when the transferred know is core to them, thus supporting H7.

The positive and significant sign ($p<0.10$) of EXISTCLOSE, the variable which measures the extent of product related skills held by the Indian firm, implies that when the Indian firm possesses all the relevant product skills the resulting mode tends more towards JV than towards licensing. This is contrary to H8 and to the findings of Caves, Crookel and Killing (1983) and Killing (1980).

Two of our control variables LIBDUM1991 and PRIOREXPORT are significant, while two (CULTDIST and INVSTRQD) are not. The coefficient of LIBDUM1991 has a negative sign indicating a propensity to license rather than JV in the post- liberalization era while that of PRIOREXPORT has a positive sign indicating that firms with prior export experience chose JV over licensing.

7. Discussion

Our results suggest that local firm characteristics are indeed significant determinants of the entry mode. All the local firm attributes included in the model turned out significant. Technological capabilities of the local firm are found to be very crucial to the choice between licensing and JV. This is very much in line with the transaction cost argument that differences in technological capabilities between the buyer and seller result in information asymmetries and hence, higher transaction costs. The foreign firm and the local firm then have incentives to bypass contractual means of technology exchange and integrate into a JV.

The effect of the local firm's product skills on the mode of entry (H 8) is contrary to our expectations. Following Caves, Crookel and Killing (1983) we expected local firms with substantial product skills to seek out missing technology through licensing. However our results suggest that when local firms possess all the necessary or related design, production and marketing skills the resulting mode is more likely to be a JV rather than a licensing contract. To understand what these results imply we tried to find which local firm skills (design, production or marketing) were crucial to the choice. We ran regressions successively replacing the variable EXISTCLOSE with LACKDESGN, LACKPROD and LACKMARKT. LACKDESGN is a dummy variable equal to one if the Indian partner lacked only design skills but had related or all production and marketing skills, LACKPROD is equal to one if it lacked only production skills but had related or all necessary design and marketing skills and LACKMARKT is equal to one when it lacked only marketing skills but had related or all the necessary design and production skills. LACKDESGN and LACKPRDN were not significant in the runs and their inclusion in lieu of EXISTCLOSE did not change the coefficients and significance of the other variables. (Results are not reported here). However, the coefficient of LACKMARKT turned out significant with a negative sign, which implies a higher probability of licensing over joint venture. Results of this run are shown as **model 2** in the third column of **table 4**. Among the three product skills –design, production and marketing – marketing skills are the most crucial in determining the choice between licensing and JV, suggesting that foreign firms form joint ventures only with Indian firms that possess all or relevant marketing skills. This does make sense given that for the inexperienced foreign investor, marketing in India is a complex and difficult task. Recently Coca-Cola ruined up its distribution in India primarily because it failed to understand how to do business with local bottlers (Business World, March 2000). Managing directors of foreign companies whom we interviewed in the course of data collection agreed that the Indian market is different from the other markets in which their company operates because: "the size of the country and the

diversity in its customs, religion and preferences make it a complex market to serve" (MD of a foreign firm in India, personal interview, 2002). Given these difficulties it makes sense that foreign firms making resource commitments in the form of joint ventures seek out local partners with strong local marketing skills.

Contrary to existing studies (Kogut and Zander 1993, Zander 1991) we do not find support for the role of codifiability of the know-how on the entry mode choice. This, however, could be due to the fact that even in licensing contracts the foreign firm provides a minimum level of technical service. Arora (1996) has empirical evidence in this respect. Of the 144 licensing agreements between foreign and Indian firms for which he had data he found that the foreign firm provided training in 75 % of the cases. Thus it appears that a majority of licensing agreements in India includes 'extra' support from the licensor in terms of training and help with commissioning and equipment. These services of the foreign firm enhance the transferability of tacit know-how through licensing agreements.

Patenting of the know-how in India does not appear to enhance the probability of its transfer through licensing. This is not surprising given the poor state of intellectual property protection in India. Besides having a compulsory licensing clause whereby the Controller of Patents can license a patent to any firm if the patentee has not exploited the invention in India within reasonable time or if the invention has not been made available to the Indian public at a reasonable price, the Indian Patent Act 1970 explicitly denies product patents for some goods like chemical alloys, optical glass, semi-conductors and inter-metallic compounds (Oxley, 1999). Enforcement of patent law also appears to be weak. Based on a survey of perceptions of businessmen in 100 major U.S manufacturing firms in 1991, Mansfield (1994) concludes that "…the countries perceived to have the weakest (intellectual property) protection are **India**, Thailand, Brazil and Nigeria" (p.21, emphasis added) while in a U.S International Trade Commission (ITC) ranking of host countries on costs/losses incurred by U.S investors due to poor patent protection, India figured high at rank 5, slightly better than Nigeria (USITC 1988, in Mansfield (1994)).

Another interesting result is the support for our hypothesis (H 5) that prior transfers of know-how to India (PRIORIND) enhance the probability of JV rather than licensing. While such prior transfers do imply that subsequent transfers through contractual means are relatively easier (Davidson and McFetridge 1985, Teece 1976, Kogut and Zander 1993) they also imply prior first hand experience of the foreign firm with the economic and technological performance of its know-how in new markets. Having overcome initial

uncertainty with regard to the performance of the know-how when 'transplanted' to foreign locations, the foreign firm will be less hesitant to make more serious resource commitments into its operations in the new market. In short, prior transfers of the know-how correspond to lower rungs of the establishment chain of international expansion (Johanson and Wiedersheim- Paul 1975, Johanson and Vahlne 1977). That foreign investment in India typically follows an incremental process is further supported by the significant positive sign of PRIORXPORT, which indicates that joint ventures with Indian firms (but not licensing) are typically preceded by exports to the country.

Cultural distance and size of the investment do not have significant impact on the mode of entry. The significant negative coefficient of the liberalization era dummy (LIBDUM1991) is surprising since we expected the investment-friendly measures initiated after 1991 to encourage JVs over licensing. However, a two-way contingency table tabulating the number of licensing and JVs started before and after 1991 shows that in the pre-1991 period we have a significantly larger proportion of JVs (69%) compared to licensing (31%). This is probably due to the fact that licensing agreements are of shorter duration – typically 5 or 7 years - and so there were very few Indian firms in 2001 with licensing contracts initiated prior to 1991. This imbalance in the proportion of pre-1991 licensing and JVs results in significant negative association between LIBDUM1991 and JV (χ^2 = 3.97, $p<0.05$) and in the significant negative effect of LIBDUM1991 in our runs.

8. Conclusions

Allying with a local firm is for many reasons a sensible first step while expanding into new and unfamiliar markets. In this paper we examine the choice between contractual (licensing) and equity (joint venture) forms of market entry from the perspectives of both the foreign and the local firm. Based on transaction cost theory we formulate and test hypotheses on the effect of foreign firm, local firm and technology characteristics on that choice, using new survey data of international licensing and joint venture operations in India. Our results indicate that the hitherto underemphasized local firm characteristics are crucial determinants of the choice between the two modes of entry. We find that Indian firms choose JVs over licensing to acquire foreign technology when the imported know-how is core to its business and when its implementation requires technical help from the foreign firm. We also find the probability of joint venturing to be significantly higher than that of licensing when the Indian firm has superior product and marketing skills. Peculiarities of the Indian environment (such as its complex market and poor intellectual

property protection) render some of the traditional determinants of entry mode insignificant. For example, patenting of know-how in the country was not found to enhance the odds of licensing rather than JV.

The primary contribution of this study is that it highlights the role of the local firm (licensee or local JV partner) in the entry mode choice. Including local firm variables besides the traditional ones, we make a first attempt towards a more complete specification of entry mode models (Kogut & Zander 1993) and add to knowledge on how local firms make decisions between alternative means of sourcing technology from abroad. Secondly, by examining modes of entry into a large emerging market we contribute to the limited literature on entry mode choice in those markets. Thirdly, we find that exporting to India typically preceded joint venturing with an Indian firm, thus providing some first evidence for the incremental nature of foreign direct investment in India. This behaviour is generally in line with the establishment chain model of internationalisation (Johanson & Vahlne 1977).

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Table 1
Descriptive statistics

Variable	Mean	Standard deviation	Min. value	Max. value
JV	0.5887	0.4940	0	1
FORNCORE	0.8782	0.3284	0	1
MANUAL	3.0406	1.0274	1	5
PTNTIND	0.20	0.4016	0	1
AGE	3.7394	0.7066	1	4
PRIORIND	0.1592	0.3675	0	1
FHLP	1.1280	0.9998	0	3
INDCORE	0.7786	0.4168	0	1
EXISTCLOSE	0.1951	0.3979	0	1
LACKMARKT	0.08	0.2723	0	1
CULTDIST	7.2380	1.6189	2.632	12.168
INVSTRQD	1.4333	0.9591	1	5
PRIOREXPORT	0.2195	0.4156	0	1
LIBDUM1991	0.5440	0.5000	0	1

Table 2

Variables and expected sign

Variable	Expected sign
FORNCORE	+
MANUAL	-
PTNTIND	-
AGE	-
PRIORIND	+
FHLP	+
INDCORE	+
EXISTCLOSE	-
LACKMARKT	?
CULTDIST	-
INVSTRQD	+
PRIOREXPORT	+
LIBDUM1991	+

Table 3

Correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 JV	1													
2 FORNCORE	0.123	1												
3 MANUAL	0.001	- 0.071	1											
4 PTNTIND	0.215	- 0.013	0.019	1										
5 AGE	0.041	- 0.055	- 0.102	0.030	1									
6 PRIORIND	0.164	- 0.165	0.019	0.080	-0.079	1								
7 FHLP	0.313	0.138	-0.053	0.157	0.134	-0.001	1							
8 INDCORE	0.149	0.448	0.040	0.075	0.063	-0.062	-0.029	1						
9 EXISTCLOSE	0.164	- 0.012	0.024	0.057	-0.068	-0.067	-0.093	-0.082	1					
10 LACKMARKT	- 0.234	- 0.089	-0.041	-0.074	0.026	0.068	-0.038	-0.200	-0.146	1				
11 CULTDIST	- 0.064	0.056	0.069	0.008	-0.037	-0.058	-0.051	0.029	-0.154	0.052	1			
12 INVSTRQD	0.164	0.018	0.076	0.231	0.107	0.159	0.229	-0.031	0.088	-0.086	0.194	1		
13PRIOREXPORT	0.159	0.057	-0.036	-0.073	-0.187	-0.050	-0.058	0.068	-0.065	-0.086	0.002	-0.011	1	
14 LIBDUM1991	-0.179	- 0.084	-0.027	-0.064	-0.558	0.118	-0.011	-0.095	-0.085	0.092	-0.061	-0.040	-0.059	1

Table 4
LOGIT REGRESSIONS : JOINT VENTURE (=1) versus LICENSING (=0)

Variables	Model 1	Model 2
FORNCORE	0.218 (0.856)	0.4633 (0.851)
MANUAL	- 0.003 (0.228)	- 0.030 (0.231)
PTNTIND	0.775 (0.700)	0.917 (0.695)
AGE	0.051 (0.393)	- 0.024 (0.383)
PRIORIND	2.215** (0.963)	2.495** (0.992)
FHLP	0.836*** (0.278)	0.747*** (0.277)
INDCORE	1.232* (0.694)	1.007 (1.367)
EXISTCLOSE	1.136* (0.661)	-
LACKMARKT	-	- 2.453* (1.367)
CULTDIST	- 0.124 (0.159)	- 0.128 (0.158)
INVSTRQD	0.119 (0.318)	0.076 (0.317)
PRIOREXPORT	1.322* (0.688)	0.990 (0.677)
LIBDUM1991	- 0.897* (0.492)	- 1.046** (0.492)
CONSTANT	- 1.544 (2.282)	- 0.590 (2.212)
Number of obs.	106	107
Log Likelihood	- 54.8683	- 54.3799
LR chi-square	34.14 (df =12) ***	36.18 (df = 12)***
McFadden R^2	0.2373	0.2496

Notes:
1. Numbers in parenthesis are standard errors
2. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$