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Contents

Internationalization of R&D: industry-level analysis of United States transnational corporations' affiliates in developing and developed countries

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This study examines the determinants of the internationalization of R&D by affiliates of United States transnational corporations (TNCs) in developed and developing countries. The study investigates three hypotheses related to the impacts of labour cost, spillover and networking, and existing technology in a host country. Industry-level data on United States TNCs with majority ownership of the affiliates in a host country between 1989 and 2003. The results of the study suggest that labour cost had positive impact on the internationalization of R&D only for developed host countries. Spillover and networking effects seem to influence high-tech and low-tech industries in developed countries, whereas only medium-tech industries respond to spillover and networking effects to locate R&D in developing host countries. Furthermore, affiliates' proportion of local sales and sales back to the United States have exhibited differential impacts on R&D spending in developed and developing countries.

1.   Introduction

Although scholarly work has focused on the issue only since the 1980s, the internationalization of R&D is not a recent phenomenon. Expansion of communication networks to perform new R&D, to tap into foreign innovations, and to exploit home grown innovations are all considered as different ways of internationalizing R&D. As the world becomes even more integrated and as other driving factors become more favourable, the focus may have shifted from one form to the other.

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The phenomenon of overseas operations by transnational corporations (TNCs), especially concerning R&D tasks and activities, has attracted the attention of some recent theoretical and empirical studies. Gassmann and Zedtwitz (1999) discussed an organizational shift in managing international R&D operations, and UNCTAD documented this phenomenon in its *World Investment Report* (UNCTAD, 2004 and 2005). The UNCTAD reports indicate that the share of foreign affiliates' R&D spending is growing in both developing and developed countries. The large number of majority-owned foreign affiliates with R&D as their main activities reflects the spread of TNCs' R&D activities outside of their home countries. Close to 70 per cent of these affiliates are located in developed countries, but the presence of such affiliates in developing countries, especially in Asia, is apparent especially in recent years. UNCTAD (2004) also reported that the use of technology allows knowledge to be codified, standardized and digitized, making it easier for some activities to be located elsewhere in order to take advantage of cost, quality and economies of scale.

In the United States, the implications of the internationalization of R&D have raised concerns from both academics and politicians alike[1]. Nevertheless, home countries did not consider the overseas expansion of R&D networks a threat until recently, when fully or partly relocated or expanded activities spread from low-tech call centres and manufacturing activities to high-tech R&D activities (Studt, 2001). As the expansion reaches developing countries, this has become a concern for some politicians. For instance, data from the United States Bureau of Economic Analysis (BEA) show an increase in R&D spending in developing countries by United States majority-owned foreign affiliates between 1989 and 2003. For all industries in developing countries, the

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[1] In the United States, the concern about TNCs' overseas high-tech (i.e., R&D) activities reached high levels of the Government. Although there is no concrete evidence backed by extensive empirical studies, anecdotes from various industries in the country point to the momentum in the expansion of R&D activities overseas by United States TNCs. A report from the Office of Senator Joseph Lieberman describes a high degree of concern. After listing anecdotes about overseas expansion of R&D activities from the United States, the report goes further and states that the continued shift of corporate R&D to other countries is a threat to economic prosperity and national security (Office of Senator Joseph I. Liberman, May 11, 2004). A similar threat to United States prosperity has also been echoed by Houseman (2007). Other studies, however, concluded that expansion of R&D activities has significant benefits that mainly accrue to the home country (Smith, 2006) and has no effect on employment, at either the sectoral or industry level (Hijzen and Swaim, 2007; Mankiw and Swagel, 2006).

average spending on R&D increased from about $11 million in 1989 to $96 million in 2003 in a given host country, whereas it jumped from $335 million to $772 million during the same period for developed countries. Although the absolute number looks small, it is obvious that R&D spending in developing countries has increased significantly, which calls for a better understanding of the determinants in developing countries as well.[2]

Do these concerns ignore the benefits of the internationalization of R&D by TNCs? To answer this question, one needs to identify the factors driving the internationalization of R&D. This study aims to further investigate this issue for the case of majority-owned United States TNCs' affiliates in developed and developing countries. This internationalization of R&D are in effect vertical foreign direct investments (FDI) by United States TNCs in the area of R&D tasks, since TNCs have management control over majority owned affiliates in each host country. The purpose is to examine the determinants of R&D spending by majority-owned United States affiliates in developing and developed countries. I expect that affiliate spending on R&D may differ by country due to different incentive systems. I also expect that the incentive system and other determinants differ by the type of industries that expand R&D networks overseas, since industries differ by their R&D intensities. To examine these differences, I have disaggregated spending on R&D according to the level of technological intensity. This will allow me to investigate the effects of key explanatory variables on R&D spending for each industry group.

The remaining part of the paper is organized as follows. The next section presents a review of literature and hypotheses. Section 3 provides a description of data and methodology. Section 4 discusses results. The last section concludes and draws some policy implications.

2.   Determinants of R&D location choice by TNCs

There is a bourgeoning literature on the significance, impact and consequences of the internationalization of R&D in different parts of the world. Given the increasing amount of high-tech tasks performed overseas by TNCs, the traditional international trade/production

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[2]   For detailed discussion of the determinants, see UNCTAD's *World Investment Report*, UNCTAD (2004, Chapter IV).

models may not fully explain the pattern and determinants that drive the choice of location (Dunning, 1988). The early work of Vernon (1966) on original product life cycle theory argued that overseas R&D tasks simply aim to meet foreign demand. Hence, activities are limited to the transfer of home-grown innovations. Among other things, Vernon focused more on the roles of the timing of innovation, the technology gap and the effects of scale economics in explaining the decision to locate overseas, which prior theories of trade and investment had ignored. However, Vernon's theory was questioned on the basis of its relevance to explain patterns of R&D investment as early as the 1970s (Lall, 1979; Vernon, 1979; Mansfield et al., 1977; Cantwell, 1995).

Castellani and Zanfei (2006) also challenged the view that TNCs are institutions that exploit foreign markets by way of technological advantages accumulated in their home bases. They argued that the increasing importance of asset-seeking activities lead firms to organize their innovative activities in order to develop both internal and external networks. They contend that internal webs interconnect the innovative activities of a growing number of affiliates located in different countries and that external networks help these affiliates to set up linkages with other local firms and institutions to exploit their knowledge (i.e., networking effects).

Vernon (1979) acknowledged that "the power of such hypothesis [product cycle] has been changing". In his view, two reasons accounted for the change. One, as Vernon reported, was an increase in the geographic reach of the TNCs as they established affiliates overseas. The other was a change in the markets of developed countries, which reduced the differences between these countries and eliminated the home country advantage (in this case, the United States). Unsatisfied by the revised version of the theory, most empirical studies confronted the original hypothesis with data from United States TNCs and other European countries.

Due to lack of consensus on a theory that explains the driving force behind the location decision for R&D activities, some studies formulated original hypothesis and carried out empirical analysis (Lall, 1979; Feinberg and Gupta, 2004). The only exception that I am aware of is Antras et al. (2006), which attempts to model the possibility of high-value task agents (or managers) that decide to go to other countries

with low-skill labour in order to maximize the leverage from their knowledge. Yet even this study did not entertain the possibility of asset-seeking firms. Rather, it focused only on the labour cost saving theme.

Mansfield et al. (1977) attempted to identify key factors for overseas R&D expenditure by United States-based firms. In their empirical study, the percentage of overseas sales and firm size were directly related to a firm's R&D expenditure. At least from the percentage of overseas sales variable, their result seems to support the role of foreign demand as a driver of the location decision. After contending the absence of a well-received theory on the determinants of R&D location, Lall (1979) presented an empirical study that touched on areas that previous studies missed. The study tested the impact of four factors: the foreign spread (measured by foreign sales), the technological intensity of an industry at home (for this case the United States), the skill requirement (measured by employee compensation), and the royalty and fee earned abroad. In most cases, the results of the study were weak. Nevertheless, the study showed that the factors tested as key determinants of location choice affect each industry differently. This conclusion supports the contention raised in this study, namely that the presence of industry-level variation is in response to key location decision factors.

Based on evidence from 100 years of United States patent office data, Cantwell (1995) rejected one of the key hypotheses of product cycle theory and modified the other. He rejected the idea that innovations are almost always located in the home country. The second hypothesis argues that the international dispersion of activities is led by technology leaders. Although considered valid historically, it is modified to refer to the globalization of technology and not necessarily to innovation. The study argued that technology leaders engaged in developing internal international networks in order to exploit the differentiated potential of foreign centres of excellence. Kuemmerle (1997) explored this idea further by classifying foreign R&D sites into two categories: home-base-augmenting and home-base-exploiting. Kuemmerle argued that companies must act strategically and locate foreign R&D sites not only to move new products from development to market but also to access new knowledge from foreign competitors. Florida (1997) arrived at the same conclusion, arguing that a firm's decision to globalize R&D laboratories is driven by technology factors in order to secure access

to scientific and technical human capital. These studies push away from product cycle theory, calling for a coherent model to explain the determinants of R&D location choice.

In 1999, the journal *Research Policy* devoted an entire issue to the internationalization of industrial R&D. In this issue, Niosi (1999) presented an excellent review of the literature on the empirical and theoretical trends, and pushed for consensus on a new model. Similar to Lall (1979)'s study, Niosi argued that the new direction should consider industry differences, and technological intensity differences, more specifically, in order to understand the force driving the location choice of R&D tasks. Two of the studies in the special issue (Pearce, 1999; Serapio and Dalton, 1999) are closely related to the purpose of the present study. Serapio and Dalton (1999) looked at the determinants of foreign R&D operations in the United States. They concluded that the motives that influence foreign companies to locate their R&D operations in United States are mainly supply considerations. They serve to gain access to science and technology in order to enhance global capabilities, as well as to acquire technologies that compliment their own. The latter argument is in line with what Kuemmerle (1997) termed "home-base-augmenting investment abroad". Patel and Vega (1999), however, countered this argument with the notion that firms locate their technology abroad in areas in which they are strong at home. They saw little evidence of home-base-augmenting R&D operation abroad.

Pearce (1999)'s study added a much longer list of factors that influence location decision. Based on a survey of TNCs' R&D operation in the United Kingdom, Pearce identified the key determinants of location decision or determinants of the decentralization of R&D labs. The results of the survey imply that the positioning of decentralized labs was an indication of the increasing involvement of TNCs in product development rather than adaptation. As in Serapio and Dalton (1999), Pearce also emphasized the increased relevance of a supply side influence, i.e., host country technology competencies and capacities. Pearce identified an additional key determinant of decentralization not explored in previous studies: the decline of centralizing forces on overseas R&D location choice. These centralizing forces were economies of scale, communication and co-ordination problems, and concerns

of knowledge security. Are these forces relevant for contemporary developing economies to explain the difficulty in attracting more R&D labs into their markets? I attempt to capture the communication and co-ordination issues and examine its impact on host developing countries.

Relatively recent studies have focused on the role of spillovers and networking, and host country skills to influence the decision of location choice (Cantwell and Piscitello, 2000 and 2005; Feinberg and Gupta, 2004). Cantwell and Piscitello (2000) added another dimension to the already established finding that a firm locates labs abroad in order to tap into foreign expertise. Their finding implies that, in addition to getting access to foreign expertise, the decision to locate abroad allows a firm to provide a further source of new technology that can be utilized internationally. The role of affiliate firms was emphasized as key in providing the complementarity between competence accumulation, diversification and the internationalization of corporate technology. In their recent study, Cantwell and Pisctello (2005) addressed the influence of spillovers and externalities in location decision by TNCs in the European regions. They argued that spillovers and externalities emanate from the collection of firms in the same sector, co-presence of firms working in different fields, and presence of sufficient scientific and educational infrastructure. The first factor is associated with agglomeration, which can be proxied by the number of same sector affiliate firms in a host country, whereas the last factor is an indication of the host countries' skill level and the capacity of institutions. This study attempts to capture these factors in a bid to explain their differential role in developed and developing countries.

In line with Cantwell and Piscitello (2000), Overby (2007) presented anecdotal evidence on the role of non-traditional determinants for the case of United States TNCs. Overby identifies three driving forces: the rise of virtual prototyping, difficulty doing the same task in the United States, and the issue of intellectual property rights (i.e. the degree of control that a firm can have over the intellectual property created by one of its affiliates in a host country).

One closely related empirical study is that of Feinberg and Gupta (2004).[3] They examined how a firm's potential to capture

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[3]   I am aware of two other rigorous empirical studies (Bunyaratavej et al., 2007; Lundin and Serger, 2007) that investigate the determinants of captive off-shoring. From

spillovers of external knowledge and its own internal capacity to utilize such knowledge influence its location decisions. They used data on United States TNCs' majority owned affiliates abroad between 1989 and 1996 to address the issue. Unlike the present study, they used more detailed firm-level data. Thus, the comparison may be inappropriate. Nevertheless, their variable selection has implications for our empirical analysis. Their study attempted to shift the focus from factor endowments of host countries to the role of spillover effects from competitors and internalization of firm-specific knowledge in influencing location choices. In addition to control variables for host countries and industries, they used total R&D spending by other firms, inter-firm dispersion of host country R&D, affiliates local sales, TNCs' ownership stake in the affiliate, TNCs' cross-border intra-firm trade, and the number of TNCs' foreign R&D units as key predictors. They hypothesized that the probability of assigning R&D responsibility to an existing foreign affiliate would be positively associated with the aforementioned predictor variables.

Fienberg and Gupta (2004) also argued that cross-border intra-firm trade and affiliates local sales are proxies for the capacity of TNCs to utilize externalities or firm-specific knowledge locally (local sales) and globally (cross-border intra-firm trade). A larger number of pre-existing affiliates abroad is also taken as an indication of the absorptive capacity to transfer and utilize affiliates' knowledge on a global basis. For the case of United States TNCs' affiliates, they concluded that these factors played a significant role in influencing location decisions. The present study proposes similar hypotheses for the behaviour of affiliates in a host country. Although the predictor variables resemble each other, the present study has framed the hypotheses differently due to differences in the level of analysis. In the results section, I indicate how the results of the present study stack up with their results. In this study, although I cannot hypothesize on a priori expectations on the role that technological intensity plays in location decision due to limited existing theoretical and empirical analysis, I formulate three hypotheses on the key predictors of overseas R&D spending by United States TNCs.

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these studies, some insight can be drawn from the methods and variables they have used in their estimations for the determinants of location choice for service activities and internationalization of R&D tasks, respectively.

The limited theoretical frameworks and empirical studies leave us with scattered predictions regarding the significance of each variable considered in previous studies. Nevertheless, although limited, the predictions and empirical findings of previous studies can provide a stepping stone to frame our hypotheses. The present study attempts to expand upon concepts that address the role of labour cost, foreign expertise and technological knowledge as well as spillover and networking effects. I attempt to do so by comparing the outcome for the case of developing and developed countries as well as for the case of industries at different levels of technological intensity. This study differs from previous studies in four ways. First, I examine the case of affiliates in developing countries as well as in developed countries. Second, the period of analysis is longer and more recent (1989–2003). Third, I use industry data disaggregated by technological intensity, whereas previous studies looked at only aggregated industry data. Fourth, in addition to the spillover and networking effects indicated in previous studies, I examine the role of host country labour cost, existing technology, and communication infrastructure, since these factors appear to influence location decision for the case of developing countries.

Hypotheses

Following the aforementioned empirical studies and scattered theoretical frameworks, I formulate three hypotheses relating to the key factors that influence R&D spending of the affiliates of United States TNCs.

The theoretical work of Antras et al. (2006) provides some clues regarding the role of labour cost in foreign operation of TNCs. Others demonstrate the significance of labour cost in the decision process for TNCs not for the internationalization of R&D per se but in outsourcing/ offshoring activities (Bunyaratavej et al., 2007; Magnani, 2006; Piga and Vivarelli, 2004; Nayak et. al, 2007; Deavers, 1997; Abraham and Taylor, 1996; Segal and Sullivan, 1997; Autor, 2003; Bartel et al., 2005). In most of these studies, labour cost is considered to be one of the key determinants of the decision to locate abroad or to outsource some activities to a foreign firm. In most of these studies, the direction of the relationship between labour cost and foreign activities by TNCs is negative, where the exception is Bunyaratavej et al. (2007). Firms locate

their overseas service activities in countries or places where the cost of labour is cheaper than in the home country.

The contention above applies mainly to manufacturing jobs and customer service activities. The negative correlation may be questioned for the case of high-value tasks such as R&D activities. I argue that labour cost affect the decision to locate R&D activities in a different manner. This is because the study is dealing not only with the decision to spend on affiliate firms (as opposed to outsourcing) but also on high-value tasks. I hypothesize that TNCs look for a host country where the labour cost is higher than other host countries, since this is an indication of the level of skill and human capital sophistication in that host country. It is also possible that, due to the close relationship between wage and productivity, higher labour cost may be a result of productivity (Braconier et al., 2005). This link may help explain the labour cost coefficients in my estimation.

From the above studies that deal with TNCs' R&D operation overseas, labour cost saving is unlikely to be an important pull factor in the case of high-value tasks. Hence, I hypothesize that firms internationalize R&D tasks to locations with wages that are comparable to those in the home country and higher than other host countries. To test this hypothesis, I consider the average wage paid by affiliate firms in a host country.

Hypothesis 1. The higher the wage rates of a host country in comparison to other host countries, the greater the relative R&D spending by the affiliate of the TNC in that host country.

Networking is important for high-value activities like R&D. Unlike manufacturing activities, firms look for external benefits from other firms and hence may choose to locate in a country with a larger number of affiliate firms within the same industry. Although the presence of a large number of firms suggest intense competition, the location of R&D activities may not necessarily be the location of a market for final goods. Castellani and Zanfei (2006) argued that the increasing importance of asset-seeking activities leads firms to organize their innovative activities in order to develop both internal and external networks. They contend that internal webs interconnect the innovative activities of a growing number of affiliates located in different countries.

Furthermore, external networks help these affiliates to set up linkages with other local firms and help institutions to exploit their knowledge. Concentration of firms in one location may also imply competition for resources, and human resources in particular. However, I argue that the benefits of the spillover and network effect can make up for the loss due to competition. In addition, spillover and networking effects from other firms also influence location decision (Cantwell and Piscitello, 2000 and 2005; Fienberg and Gupta, 2004). These spillover and networking effects can be captured by the number of affiliate firms in the same industry through an agglomeration effect. I approximate these effects using the number of affiliate firms in a host country. Although their analysis was on the firm level, Fienberg and Gupta (2004) argued that the number of affiliate firms in a host country can be a good proxy for the absorptive capacity to transfer and utilize an affiliate's knowledge on a global basis. It would not be far-fetched to extend this idea to the industry level. Hence, I argue that the number of affiliate firms in a host country can serve as a good proxy for the degree of spillover and networking effects for that particular industry or industry group. Existence of high quality communication infrastructure is also important to tap into the expected spillover and networking effects. I controlled for ease of communication using host countries' level of spending on information and communication technology (ICT).

Hypothesis 2. The greater the expectation of benefiting from the spillover/networking effect, the greater the relative R&D spending by an affiliate of a TNC in a host country, provided that communication is easier.

As stated in hypothesis 2, firms look for spillover and networking benefits. In turn, spillover and network benefits come as a result of, or driven by, existing technologies, institutional infrastructure, and human capital relevant for R&D activities. In other words, the supply side consideration of pre-existing technology and other R&D-enhancing facilities attract affiliates of TNCs (Pearce, 1999; Serapio and Dalton, 1999; Kuemmerle, 1997). In such high-value activities, asset-seeking firms actively engage to tap into existing superior (or cheaper) technologies globally. We argue that this motivates TNCs to locate affiliates in a country where relevant technologies, expertise and talents are readily available. I use the amount of royalty and fees received by a host country from licensing or leasing these existing technologies to

capture the existing technological capability of a host country. I believe that this indicator is a good proxy for the degree of accumulated skill and technological sophistication of a host country, which can serve as an asset to attract affiliates into their markets.

Hypothesis 3. The greater the availability of R&D-enhancing technologies in a host country, the greater the relative R&D spending by an affiliate of a TNC in that host country.

In addition to the three hypotheses indicated above, previous empirical studies have referred to the potential role of trade link and host country's foreign income tax incentives in influencing affiliate location choice decisions.[4] It is often assumed that demand side factors, in addition to supply side factors, are the driving forces that influence location choice. Demands for products in local and regional markets may induce R&D spending to develop products that respond to the needs of such markets. On the other hand, home country markets may also demand products from places where the demand structure and tastes are similar (i.e. developed country markets, in the case of the United States). In such cases, affiliates may need to spend more on R&D in order to meet not only the demand of local and regional markets but also of home country markets. Fienberg and Gupta (2004) argued for the need to account for the influence of trade link, including inter-firm, intra-firm and local sales by affiliates. They contend that the degree to which trade is linked is an indication of the absorptive capacity of a TNC at the global (intra-firm) and local (local sale) levels. Whether the trade link indicators capture the absorptive capacity or the market demand is unclear. However, I argue that the trade link is mostly an indication of a response to demand, as it often precedes any foreign investment. It would seem far-fetched to link the trade indicators to absorptive capacity.

In such a highly interconnected world of global production and sales networks, it is not difficult to imagine the relevance of trade links in influencing overseas activities. It is worthwhile to incorporate these indicators in my estimation models, although I do not have a priori

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[4] For instance, see GAO (2006) and Hartman et al. (2007). Hartman et. al (2007) present empirical evidence that support the impact of United States tax depreciation law on asset location and ownership decisions of TNCs.

expectations for the impacts of the trade link and foreign income tax[5] on the decision to locate R&D tasks overseas.

3.   Data and methodology

I use data from the Bureau of Economic Analysis (BEA) of the United States Department of Commerce. The variables are specific to affiliates of a TNC in a given host country, including R&D spending[6], sales, assets, foreign income tax, wages, and employment for the period of study (between 1989 and 2003). As indicated in tables 1 and 2 below, I have identified 13 industrial groups and classified them according to their level of technological intensity, following UNCTAD's system of classification (see table 2A in the appendix). I include only majority-owned affiliates of a TNC in order to focus on affiliates where a parent firm had managerial control over the allocation of R&D spending and other decisions. In addition, only non-banking TNCs are included in the sample, as reported in the BEA documentation. A total of 57 sample countries (22 developed and 35 developing countries) are selected based on availability of data both at the industry group level and the country level. Not all countries are included in the estimation either due to missing values for some key variables or due to outlier values.

It is not that difficult to discern the nature of affiliate firms from table 1 below. The table shows the amount of R&D spending of affiliate firms in 2004 by industry and by country. These affiliates are the basis of the analysis. In 2004, affiliates of United States TNCs undertook R&D activities mainly for their own use. However, it is difficult to tell whether this was to meet local market demand or to sell final goods elsewhere. These affiliates also funded their R&D spending as they undertook the research, mostly for their own purpose and not for a third party. In terms of R&D spending, three industries dominate the list: transportation equipment, chemicals, and computers and electronic products. Chemical and computer industries are not surprising, since pharmaceutical and IT firms are included in these groups, respectively. Transportation and chemicals industries also top the list in terms of

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[5]   For the impact of income tax on the sales destination of affiliates of United States TNCs, see Lemi (2006).
[6]   In the BEA data, R&D spending includes wages and salaries, taxes, materials and supplies, depreciation, amortization, and allocated overhead and indirect costs. Routine capital expenses are excluded.

R&D activities performed by affiliates for a third party, other than their parent firms in the United States.

Table 1. Research and Development Performed by Affiliates,
by Industry in 2004
(in millions of dollars)

	Performed by affiliates			Funded by affiliates
	Total	For affiliates themselves	For affiliated persons, including United States parents	For others	
All industries	27,529	24,453	2,479	597	25,910
Transportation equipment	8,067	7,379	295	392	7,482
Chemicals	7,004	6,513	317	174	7,275
Computers and electronic products	5,658	5,117	540	1	5,499
Professional, scientific, and technical services	1,651	1,192	458	1	1,192
Information	1,190	723	467	0	723
Machinery	876	807	59	9	817
Food	454	445	9	1	445
Primary and fabricated metals	265	205	57	3	205
Electrical equipment, appliances, and components	210	147	51	12	149
Wholesale trade	209	183	26	0	252
Finance (except depository institutions) and insurance	62	62	0	0	62
Utilities	10	10	0	0	10
Mining	8	8	0	0	12
Other industries	128	128	0	0	243

Source: United States Bureau of Economic Analysis (2004), table 3.

In table 2, I present the mean values of the model variables included in the specifications (see table 1A in the appendix for the source and construction of each variable). The dependent variable is the ratio of R&D spending to total sales, which represents R&D Intensity (RDE) for majority-owned United States TNCs' affiliates. One of the explanatory variables incorporated in the R&D spending models is wage bills per employee (WAGE) that affiliates paid in host countries. As hypothesized, this variable is used to test the labour cost parity or saving prediction of previous studies. Another explanatory variable included is the ratio of foreign income tax to total affiliate income (FINTX) to examine the

importance of host country government's incentive system to attract foreign affiliates. Mansfield et al. (1977) also described the role that government regulation played in affecting overseas R&D spending, although they did not use foreign income tax as a proxy for host countries' incentive systems. To investigate the role of the trade link with both intra-firm and local sales, I use the ratio of affiliates' sales to the United States (SALETUS) and the ratio of affiliates' local sales (SALELOC) to total affiliate sales. To account for size of affiliates in each host country, I include the value of total asset (ASSET) in the estimation. One issue is that the level of R&D intensity does not conform to the UNCTAD classification of the industries, as low-tech industries had slightly greater intensity than medium-tech industries. The same is true for the case of the level of average wage payment. On average, low-tech industries paid more than high-tech industries, though the reverse is expected. As I will discuss later, in the results sections, this mismatch between the data and the UNCTAD classification can help explain some unexpected results. In terms of detailed industrial groups, as indicated in table 2, computer, chemical, machinery, and transport industries top the list of highly R&D-intensive industries. Firms in the finance and insurance industries, which exclude depository institutions, paid the highest wages, followed by firms in the information industry. In terms of the trade link, firms in the electrical and computer industries sell over 16 per cent of their total sale back to the United States, either to their parent firms or to other non-affiliated firms. This holds for electronics industry affiliates from the Republic of Korea, Japan and other Asian countries, in particular, as they supply many electronic products to the United States market.

In addition to these industry specific variables, I incorporate host country-specific factors (COCHAR) that account for skill levels, availability of technology and communication infrastructure. I use expenditure on information and communication technology (ICT) by a host country to proxy for communication infrastructure. The proportion of researchers engaged in R&D activities (RDPMP)[7], and royalty and fees received (RLFR) by a host country can serve as good proxies for the availability and sophistication of technology in a host country. These variables also help to examine the supply side argument indicated in

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[7] Due to limited data for this variable, it is difficult to compare the results with those of the royalty and fees variable.

Table 2. Mean values of some model variables by tech-intensity and by industry

Tech Intensity	R&D Intensity	R&D per asset	Total Asset	Average Wage	Sale to US	Sale to Local	Foreign Tax	Employment (in '000)
High-tech	10.19	101.39	6 727.48	28.01	0.06	0.70	0.48	16.27
Medium-tech	4.33	46.30	6 609.05	35.95	0.08	0.69	0.36	6.41
Low-tech	4.49	58.53	2 055.32	30.43	0.05	0.77	0.32	8.75
By Industry								
Computers & Electronics	18.87	184.15	2 988.15	32.42	0.16	0.57	0.43	13.23
Chemicals	11.64	119.54	3755	32.3	0.04	0.69	0.43	9.81
Machinery	11.27	132.06	1 628.73	30.39	0.1	0.58	0.37	8.4
Transport Equipments	10.81	138.2	2 677.62	28.71	0.1	0.61	0.41	14.34
Electrical Equipments	6.73	78.24	913.3	24.25	0.15	0.55	0.28	8.83
Professional, Scientific, and Technical services	5.77	57.19	1 993.91	38.17	0.03	0.83	0.32	10.13
Food Manufacturing	2.88	40.33	1 328.83	25.05	0.03	0.77	0.45	6.9
Primary and fabricated metals	2.85	27.49	823.46	26.71	0.06	0.67	0.49	3.72
Information	1.63	16.1	2 543.05	47.37	0.02	0.91	-0.02	6.47
Wholesale Trade	1.18	20.39	4 983.59	37.52	0.04	0.73	0.37	11.09
Mining	0.08	1.06	4 157.27	45.55	0.07	0.73	0.58	2.91
Finance & Insurance	0.05	0.06	30 597.47	48.7	0.07	0.78	0.21	4.01
Utilities	0.03	0.08	2 036.33	30.72	0	0.99	-0.07	0.94
Other industries	0.52	3.51	13 066.16	20.84	0.03	0.88	0.6	25.78
Total	5.26	55.90	10 600.84	32.97	0.07	0.70	0.39	18.49

Source: United States Bureau of Economic Analysis, various years, author computations.

previous studies. I focus on royalty and fees received by a host country as an indicator of a country's level of technology, as discussed above, whereas the availability of information and communication technology infrastructure is a complementary input for an affiliate to take advantage of the spillover and networking effect and/or agglomeration. In the absence of other viable variables to approximate spillover and networking effect, I adopt the number of affiliates of United States TNCs in a host country. In his overseas R&D spending equation, Lall (1979) used a royalty and fee variable to measure a United States TNC's propensity to rely on licensing as a means of exploiting technology abroad. I use it to measure the extent of host countries' accumulated skill and talent levels.

Estimation

To test the stated hypothesis empirically, I run regressions for different specifications after controlling for unobservable host country and industry characteristics. As indicated in previous studies (Abramovsky and Griffith, 2005; Lall, 1979; Niosi, 1999) an industry's level of technological intensity matters in location decision, in addition to industry-level factors and characteristics of the host country. To examine the significance and differential effects by technological intensity, I create three industry groups: high tech-intensive, medium tech-intensive and low tech-intensive industries, following UNCTAD (2004). I run separate estimations for each industry group and for each country group, both developed and developing, in order to examine the differential effects of the predictor variables.

The general form of the estimation equation is as follows:

$Y_{ijt} = X_{ijt}\beta + \alpha_i + \delta_j + U_{ijt}$, where $i = 1,......,N$; j = 1,.......M, and $t = 1,......T$ (1)

I assume that X_{ijt} is 1x k vector of time-varying regressors, α_i denotes the unobservable country specific effect, and δ_j denotes the unobservable industry specific factor. U_{ijt} denotes the random disturbance and is i.i.d. $N(0, \sigma_u^2)$. The $\alpha_{i'}$ s and δ_j s can be fixed or random. The setup involves t h r e e dimensions: country (*i*), year (*t*) and industry (*j*). In principle, the estimation must rely on the appropriate technique for all three factors. However, standard panel-data estimation techniques account only for

two of the three dimensions at a time. I need to account for the other unobserved effects using dummy variable. To save space, I do not report industry and country dummy coefficients. However, the results show the presence of industry and country effects. I report coefficients for year effects for all estimations. As expected, year dummies are significant mainly for the developing countries cases, due to year-to-year shocks.

One can represent the equation in a vector form as (the variables are as defined above):

$$RDE_{ijt} = [\text{ASSET}_{ijt} \ \text{WAGE}_{ijt} \ \text{FINCTX}_{ijt} \ \text{SALETUS}_{ijt} \ \text{SALETO}_{ijt} \ \text{COCHAR}_t \ ] \ , \quad (2)$$

where i is the index for country, j for industry and t for time. Some of the explanatory variables (i.e., COCHAR) have only country and time dimensions. COCHAR includes the number of foreign affiliate firms (AFFILIATE), expenditure on Information and Communication Technology (ICT), proportion of researchers in research and development activities (RDPMP)[8], and royalty and fees received by a host country from patents and copyright ownership (RLFR). The last three variables are in ratios to GDP of a host country to account for country size. Although the collinearity test (i.e., *variance inflation factor*) between these variables turns out to be insignificant, there is relatively large correlation coefficient between the number of affiliates and royalty and fees received in a host country. This is expected, since royalties and fees attract affiliates into a host country. As I indicate in the results below, there are very few changes when both variables are included in the same regression. I have also considered alternative specifications, which allow for heteroscedasticity; the results, nonetheless, are not that much different from the results reported here.[9]

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[8]   I have tried alternative indicators for existing R&D sophistication of a host country. I do not find significant change in the coefficients and their statistical significance. However, due to missing values, the model with RDPMP has fewer observations compared to models with other indicators. I do not report the results, but they are available on request.

[9]   Another estimation issue is the problem with limited information of the dependent variable (R&D spending). The BEA censors some of the R&D spending data for affiliates in a host country. The BEA reported "*" for values between -$500,000 and $500,000 and/or for fewer than 50 employees. The BEA also reported "D" to avoid disclosure of data for individual companies in cases where there was only one company in a country during a given year. To fix the impact of these censored values, I have used a Tobit random effects model that accounts for the censored values of dependent variable

Since I am interested in comparing results between developed and developing countries, I generate separate results for developed and developing countries. As a reference, I also report results for all countries pooled together. Tables 3-5 present the results of the full sample, for developed countries and for developing countries, respectively. The significance of the Wald chi-square tests for all of the estimated equations suggests the joint significance of the explanatory variables in each specification.

4.   Results and discussion

The results overall support the hypotheses for the pooled sample and for developed countries. For developing countries, however, the results do not support some of the a priori expectations stated at the outset. There are variations when comparing results by technology intensity of the industries considered in this study, even within a group of countries.

For the pooled sample, the results support positive effect of labour cost[10] as a factor that attracts R&D spending to both high- and medium-tech industries. For low-tech industries, the effect of labour cost becomes weak, especially after controlling for existing technology effects. It is important to note that, as one can see from table 2A in the appendix, the major industries in the low-tech industry group are mostly manufacturing firms, such as food processing firms. Among these firms, labour cost saving for purpose of manufacturing tasks is traditionally a major factor. Nevertheless, the results do not support the labour cost saving argument. Hence, it would not be far-fetched to argue that these low-tech industries are not after the top talent in a host country. The technologies in the manufacturing sectors are relatively standardized and these sectors are not into competing for talent to develop new products.

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to compare results with the panel technique that allows for a heteroskedastic error term. There were no significant differences between the two estimation techniques. To save space, I do not report the results from the Tobit estimation, but they are available on request.
[10]   I have tried alternative labor cost indicators, including ratio of average wages to average United States wages. Almost all alternatives yielded similar results.

In the case of United States TNCs and for all the different grouping of industries, Lall (1979) found no effect of labour cost on the propensity to conduct R&D overseas. However, Bunyaratavej et al. (2007) looked at service industry off-shoring (not R&D per se) and found evidence of a positive labour cost parity effect, in line with these results. The disaggregated results presented in this study attempt to resolve the conflicting findings of the aforementioned studies after controlling for tech-intensity of industries.

For most estimations, the existing technology effect is significant, implying that firms at all levels of technological intensity (including low-tech firms) expect to tap into existing technologies in host countries when they decide to spend more on R&D. This confirms the supply side argument discussed in the literature (Cantwell, 1995; Pearce, 1999; Serapio and Dalton, 1999; Kuemmerle, 1997). Spillover and networking effects, proxied by the number of affiliates, proved valid only for the case of high-tech industries. That is, high-tech industries spend more on R&D in a country where there is the expectation of spillover benefits from similar affiliates in the country. This result is in line with the network effect implied by Castellani and Zanfei (2006); namely that affiliates increase R&D spending in a country with high concentration of other affiliate firms from the United States For medium-tech and low-tech firms, the spillover effect disappeared once I controlled for existing technology effects. As indicated above for low-tech industries, these firms do not count on the spillover and networking effects from other affiliates. It may be true that, for these affiliates the number of other affiliate firms in a host country may be picking up competition, not complementarity. Related to this result, high-tech firms that expect to benefit from spillovers also benefit from better information and communication technology (ICT) infrastructure, as expected. That is why only high-tech industries spend more on R&D as host countries' ICT spending increases.

The two trade link variables (local sales and sales back to the United States) influence R&D spending in almost all specifications. For high-tech industries, an increase in both trade link variables increases R&D spending. For local sales, this result seems to support the idea that high-tech industries increase R&D spending as a response to local demand in a host country. Studies in the late 1970s support this view of

Table 3. Determinants of R&D Intensity by United States TNCs' affiliates for all host countries

	All Industries		High-tech		Medium-tech		Low-tech	
Cost of labour	0.05*** (3.17)	0.03** (2.39)	0.16*** (5.08)	0.10** (2.44)	0.04*** (2.67)	0.02* (1.82)	0.03** (2.04)	0.02 (1.25)
Sale to United States	-7.3** (-2.39)	-3.33 (-1.14)	21.74*** (4.20)	19.89*** (3.76)	-11.6*** (-3.26)	-7.08** (-2.28)	-10.6*** (-3.01)	-10.9*** (-2.99)
Local Sale	-2.99** (-2.20)	-2.49** (-1.97)	15.22*** (6.43)	6.32** (2.47)	-7.57*** (-5.78)	-6.54*** (-5.66)	-4.75*** (-2.68)	-4.54** (-2.55)
Total Assets	-0.02*** (-3.04)	-0.02*** (-3.56)	-0.13*** (-4.79)	-0.17*** (-8.01)	-0.01*** (-2.93)	-0.01*** (-2.99)	0.16*** (2.66)	0.18*** (2.92)
Foreign Income Tax	0.31*** (2.83)	0.23** (2.30)	0.56*** (3.55)	0.71*** (3.36)	0.06 (0.66)	0.04 (0.59)	0.17* (1.89)	0.21 (1.36)
Number of Affiliates	0.00*** (7.44)	0.00** (2.05)	0.01*** (10.01)	0.01*** (5.15)	0.00*** (2.85)	-0.00 (-1.09)	0.00** (1.96)	-0.00 (-0.81)
ICT expenditure	0.03 (0.24)	-0.07 (-0.68)	0.66*** (3.07)	1.07*** (5.09)	-0.04 (-0.37)	-0.16* (-1.69)	0.10 (0.61)	-0.13 (-0.93)
Royalty and fee		0.53*** (5.19)		0.98*** (5.22)		0.43*** (4.01)		0.34*** (2.60)
Developed Country	2.20*** (3.21)	1.88*** (3.02)	1.36 (0.70)	4.70*** (2.88)	1.61** (2.26)	0.84 (1.45)	0.16 (0.24)	0.73 (1.18)
year	0.12 (0.70)	0.05 (0.32)	-0.17 (-0.76)	-0.12 (-0.48)	0.19 (1.06)	0.07 (0.47)	0.33* (1.80)	0.44*** (3.14)
N	946.00	861.00	232.00	208.00	398.00	356.00	216.00	203.00
Chi2	835.30	875.24	962.34	774.25	267.99	264.66	455.24	717.35

Source: Author's analysis

*P<0.1, **P<0.05, ***P<0.01

positive association between overseas R&D spending and foreign sales to meet foreign demand (Mansfield et al., 1977) or to represent foreign experience and exposure (Lall, 1979). Concerning sales back to United States, it is difficult to say whether the sale involved parent firms, other affiliate firms or non-affiliated firms. Although it is not possible to tell how much of this trade is between an affiliate firm and a parent firm, it is highly likely that the majority of sales back to the United States involved parent firms for high-tech industries. Since high-tech firms spend more on R&D to take advantage of a host country's talent, it is not surprising to see increased intra-firm transactions to transfer some of the products of R&D from a host country to a home country. This implication supports the views forwarded in Fienberg and Gupta (2004).

What is observed for the case of medium- and low-tech industries is the reverse, in that both trade link variables result in low R&D spending. These results do not support the views about the local market demand and the capacity to transfer technology to parent firms. These industries spend less on R&D as they sell more in the local market and in a home country. For these industries, R&D spending in a host country does not necessarily aim to meet the demand in the local market or to transfer the R&D products to a parent firm in a home country. One possible explanation is that as they spend more on R&D, these affiliates may serve other regional markets more so than local and home markets. The dummy variable for developed countries also turned out to be significant, suggesting that affiliates spend more on R&D in developed countries compared to developing countries. This result is not surprising, but warrants further investigation into the specific factors that influence R&D spending in each sub-sample. I present the sub-sample findings below.

Developed Countries

Some of the results for the developed countries sub-sample echo those of the pooled sample (see table 4). The results support the positive labour cost effect argument for the case of developed countries (even for the case of low-tech industries), although the significance of the coefficient became weak for high-tech industries after controlling for

existing technology effects. Similar result is also observed for the two trade link variables. The estimations show similar results, again with weak coefficients for high-tech industries. One possible explanation for the weak coefficients of high-tech industries could be that since the results refer to affiliates of United States TNCs in developed countries, I suspect that there may be competition effect between United States affiliates and other local firms in these advanced economies. As a result, affiliate firms may not spend more on R&D on areas already crowded by other affiliates in developed host countries. The effects of foreign income tax and total asset value on R&D spending are similar to the results of the pooled sample (see Table 4). Higher income taxes promote high R&D spending by high-tech industries in developed countries. This may be due to a strategic decision by a parent firm to minimize tax payments (and as a result maximize global profit) in a country where tax rates are higher (see Lemi (2006) for similar results).

Provided that there is adequate communication infrastructure to network with other affiliates, spillover and networking effects turn out to be significant for the case of high-tech and low-tech industries, but not for medium-tech industries. It is puzzling that low-tech industries spend more on R&D to take advantage of the spillover effects, but not medium-tech industries. This could be a result of UNCTAD's industry grouping system. As I have discussed in the descriptive statistics, on average low-tech industries have higher R&D intensity ratios than medium-tech industries. For the medium-tech industries, the spillover effect is rather negative, which seems to support the notion that competition dominates complementarity for medium-tech industries in developed countries.

On the other hand, the existing technology effect, or the supply side argument, is valid for both high-tech and medium-tech industries, but not for the low-tech industries. For low-tech industries, existing technology has the reverse effect. That is, the higher the extent of existing technology in a host country, the lower the R&D spending by low-tech industries. This is not surprising. Low-tech industries may decide to just tap into existing technology rather than spend more on R&D, since the technology of the products they are involved with are typically standardized.

**Table 4. Determinants of R&D Intensity by United States TNCs'
affiliates in developed host countries**

	All Industries		High-Tech		Medium-Tech		Low-Tech	
Cost of labour	0.15***	0.11***	0.26***	0.14	0.12***	0.09**	0.07***	0.11**
	(4.32)	(3.01)	(2.78)	(1.44)	(2.86)	(2.22)	(3.26)	(2.33)
Sale to United States	-11.27**	-7.13	11.24	14.11	-13.54***	-4.68	-22.9***	-30.72***
	(-2.24)	(-1.33)	(0.89)	(1.00)	(-2.64)	(-0.85)	(-4.51)	(-5.10)
Local Sale	-3.52	-2.65	5.28	3.01	-14.34***	-10.8***	-2.04	-5.70*
	(-1.53)	(-1.13)	(1.21)	(0.64)	(-5.64)	(-4.81)	(-0.89)	(-1.85)
Foreign Income Tax	0.73***	0.77***	0.96***	0.98***	0.32	0.47	-0.23*	-0.32**
	(3.00)	(3.18)	(2.81)	(3.03)	(0.62)	(1.08)	(-1.90)	(-2.13)
Total Assets	-0.02***	-0.02***	-0.17***	-0.18***	-0.01**	-0.01**	0.12	0.10
	(-3.54)	(-3.40)	(-6.30)	(-7.53)	(-2.48)	(-2.57)	(1.56)	(1.37)
Number of Affiliates	0.00***	0.00	0.01***	0.01***	0.00	-0.00**	0.00***	0.00***
	(4.82)	(1.44)	(8.97)	(4.41)	(0.25)	(-2.42)	(2.91)	(2.82)
ICT expenditure	1.16***	0.64*	2.79***	1.10	0.29	-0.25	1.06***	1.50***
	(3.25)	(1.72)	(4.23)	(1.36)	(0.88)	(-0.90)	(3.68)	(3.98)
Royalty and fee		0.32**		0.87***		0.52***		-0.33*
		(2.37)		(3.05)		(3.48)		(-1.73)
year	-0.01	-0.04	0.41	0.50	-0.05	-0.16	0.45	0.57*
	(-0.04)	(-0.12)	(0.62)	(0.78)	(-0.16)	(-0.50)	(1.45)	(1.65)
N	536.00	490.00	137.00	125.00	227.00	203.00	112.00	106.00
chi2	646.35	641.27	354.86	408.43	185.03	180.16	681.15	888.45

Source: Author's analysis.
*P<0.1, **P<0.05, ***P<0.01

Developing Countries

Table 5 reports results for the developing countries sub-sample. The positive effect of labour cost does not hold, and no strong negative results emerge for any of the industrial groups. This implies that affiliates' R&D spending in developing countries was not influenced by labour cost saving nor do they expect to benefit from the skilled labour force pool in developing countries. As the coefficients for other variables indicate, other pull factors, other than labour cost, attract more R&D spending in developing countries.

The results for the trade link effects are not as strong as in the developed countries case. Local sales and sales back to United States had negative effects on R&D spending for low-tech industries, as in the case of developed countries. Local sales had a positive effect on R&D spending for the case of high-tech industries. That is, affiliates in high-tech industries spend more on R&D to meet local demands. This is unlike the results for the developed countries case, where the trade link did not influence R&D spending in high-tech industries. Why did high tech-industries spend more on R&D, as they sell more in the local market in developing countries but not in developed countries? It is important to highlight the fact that developing countries have emerging markets with much different demand preferences compared to advanced countries. Affiliates need to develop a new product or adapt home-grown products to the local demand and taste by incorporating local needs. To this end, affiliate firms need to spend more on R&D to meet the local market demand. Hence, as the local demand increases with the high growth rate in these emerging markets, affiliate spending on R&D increases as well.

The spillover and networking effects are positive and significant only for medium-tech industries. Note also that ICT infrastructure had a positive effect on medium-tech industries. For the other industry groups, both the ICT effect and the spillover and networking effects are either insignificant or negative. For high-tech industries, networking through communication is important. It may be that the ICT infrastructure is not big or good enough for the high-tech industries to benefit from the spillover effects. As a result, they pull back on the R&D spending as the country becomes crowded with other affiliate firms. For low-tech industries, the significant spillover and networking effects disappeared

Table 5. Determinants of R&D intensity by United States TNCs' affiliates in developing host countries

	All Industries		High-Tech		Medium-Tech		Low-Tech	
Cost of labor	-0.00	-0.01	0.17***	0.05	0.00	0.00	0.02	0.00
	(-0.16)	(-1.48)	(4.28)	(1.45)	(0.25)	(0.32)	(1.59)	(0.29)
Sale to U.S	0.07	0.65	-0.64	8.01*	3.20	3.58	-4.02**	-4.01**
	(0.04)	(0.34)	(-0.11)	(1.65)	(1.23)	(1.34)	(-1.97)	(-2.40)
Local Sale	1.92*	1.44	17.60***	14.31***	0.41	0.82	-1.49	-2.92**
	(1.75)	(1.37)	(5.05)	(5.57)	(0.46)	(0.74)	(-0.88)	(-2.03)
Foreign Income Tax	0.03	-0.00	1.20***	0.39	0.01	0.01	-0.15	-0.16
	(0.56)	(-0.03)	(4.35)	(1.46)	(0.27)	(0.24)	(-0.40)	(-0.62)
Total Assets	-0.01	0.01	0.25**	0.27***	-0.03*	-0.02	0.09	0.12
	(-0.32)	(0.52)	(2.43)	(3.98)	(-1.68)	(-1.27)	(0.79)	(1.00)
Number of Affiliates	0.1***	0.10***	-0.1	-0.1**	0.1***	0.1***	0.1**	0.00
	(4.15)	(3.05)	(-0.07)	(-2.30)	(4.45)	(3.57)	(2.34)	(1.42)
ICT expenditure	0.18**	0.22***	-0.14	0.26	0.08**	0.09*	0.09	-0.08
	(2.42)	(3.02)	(-0.50)	(1.44)	(2.00)	(1.95)	(1.16)	(-0.76)
Royalty and fees		1.94***		3.45***		-0.88		2.69***
		(2.65)		(2.63)		(-1.16)		(2.84)
year	0.11	0.01	-0.08	-0.70***	0.18*	0.16	0.43***	0.26*
	(0.99)	(0.06)	(-0.32)	(-6.96)	(1.75)	(1.39)	(2.85)	(1.83)
N	410.00	371.00	95.00	83.00	171.00	153.00	104.00	97.00
chi2	517.55	416.98	739.40	9614.08	158.72	151.57	115.85	120.16

Source: Author's analysis.

*P<0.1, **P<0.05, ***P<0.01

once I controlled for the effect of existing technology in the estimation equation. This implies that the extent of existing technologies mainly influence low-tech industries, unlike the case for the low-tech industries in developed countries.

As expected and as is the case of developed countries, high-tech industries spend more in developing countries as the level of existing technology increases. This supports one of the key hypotheses of this study: The expected benefit from existing technological accumulation in developing countries influence R&D spending of high-tech industries. Medium-tech industries, unlike the results for developed countries, spend more on R&D in order to take advantage of spillover effects. Nevertheless, the extent of existing technologies in a host country did not persuade firms to spend more on R&D. What are the reasons behind such variation for medium-tech industries between developed and developing countries? One explanation may lie in the type of industries grouped as medium-tech. Petroleum and mineral products are included in the medium-tech industries and are often located in developing countries, especially in Africa and Latin America, which naturally attract more of such industries. For these industries, the large number of affiliate firms implies the presence of resources in a particular host country, among other things. From the results, existing technology did not drive affiliates' R&D spending. Rather, the availability of resources attracted them more than technology. In the end, the significance of the number of affiliates' coefficient imply the availability of resource, and for these resource-seeking firms the role of the existing technology is small when they decide on R&D spending.

These results should be interpreted with caution. It is important to note that in some cases the sub-sample for industry groups is small and that outliers, especially in cases where we have less than 100 observations for estimation, may drive some of the results. Nevertheless, the results are expected and the overall message is consistent with the predictions of other theoretical studies. That is, firms locate their R&D activities in a host country not to take advantage of cheap labour but to take advantage of existing technology and spillover effects. It is difficult to make comparison with previous studies that addressed similar issues for the case of developing countries, since most studies only considered developed countries.

5. Conclusions and implications

The aim of this study was to examine the determinants of R&D spending by affiliates of United States TNCs, both in developed and developing host countries. I have tested three hypotheses: the role of labour cost, spillover and network effects, and the role of existing technological sophistication of a host country. The results confirm the fact that labour cost saving does not drive international R&D spending, even in developing countries. Furthermore, the hypothesis that affiliates spend more in a country where there was relatively skilled labour or high labour cost is supported for the pooled sample and for the case of developed countries, but not for developing countries.

There are variations between developed and developing countries in terms of the effects of spillover and networking in influencing R&D spending. In developed countries, spillover and networking effects attract both high- and low-tech industries, whereas only medium-tech industries seem to respond in developing countries. For high-tech industries, in both developed and developing countries, an existing technology attracts more R&D spending, which confirms the notion that high-tech firms expect to tap into the technologies that best suit their needs on a global scale. For medium- and low-tech industries, I observe different, almost reverse, results in both developed and developing countries.

What are the implications of these results, especially for developing countries? Two recent studies attempted to shed some light on the policy implications for both the home and the host countries. Should the United States be worried about the internationalization of R&D by its TNCs? What should host countries do, given the fact that some affiliates come to their country to tap into their talents and technological capabilities? Archibugi and Iammarino (1999) and Ernst (2002) presented policy implications of an increased global innovation/ production network. Both studies suggested that there is no one-size-fits-all policy to respond to such dynamic phenomena. As Archibugi and Iammarino (1999) indicated, global innovation takes several forms: exploitation of technology produced at home, global generation of innovation, and global technological collaborations. Each form implies a different policy direction. My results suggest that the purpose of the

internationalization of R&D is mostly in the form of global generation of innovation in both developed and developing countries. None of the three types of globalization of innovation makes national policy obsolete (Archibugi and Iammarino, 1999). In fact, for developing countries, Ernst (2002) contended that international knowledge linkages can help to broaden the range of options. Ernst went further to recommend that developing countries should follow a development strategy of openness to foreign ideas and knowledge, and to build capacity to absorb and blend them with existing capabilities. As our results indicate, most firms come to host countries to take advantage of exiting capabilities and talents. Developing countries should design policies to make sure they benefit from the talents and technologies of foreign affiliates and attempt to combine them with local capabilities. Another issue with innovation is lack of institutional capabilities. Unless the institutions and incentives are in place in host developing countries, it would be difficult to imagine tapping into technological capabilities of entering affiliate firms.

Finally, future research should focus on the nature of networking and existing technologies of a host country, since they seem to derive the decision of the affiliates of United States majority-owned TNCs. It is worthwhile to look into the details of these technologies. Are these technologies owned by local firms, host country Governments, or other TNCs? Would it make a difference if these technologies were owned by local firms as opposed to TNCs? Can host countries really gain from the inflow of such high-value activities? Answers to these questions may help host country policy makers to make relevant decisions, and hence warrant further investigation.

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Appendix: Data and variable descriptions

Table 1A: Model variables and sources

Variables	Code/Formula
Host country variables (Source: the World Bank Development Indicators)	
GDP (constant 2000 US$)	GDPC
Information and communication technology expenditure (% of GDP)	ICTE
Research and development expenditure (% of GDP)	RDE
Researchers in R&D (per million people)	RDPMP
Royalty and license fees, receipts (BoP, current dollars)	RLFR
Average wages in United States for professional, science and engineering jobs	WAGEUS
Industry level variables (Source: Bureau of Economic Analysis, Department of Commerce)	
Total Assets (in millions of dollars)	ASSET
Sales by Affiliates (in millions of dollars)	SALES
Foreign Income Tax (in millions of dollars)	FINTX
Net Income (in millions of dollars)	NINC
Sales to United States by affiliates (in millions of dollars)	SALETUS
Sales in the local market (in millions of dollars)	SALELOC
Employment (in thousands)	EMPLY
Wages/compensation (in millions of dollars)**	WAGES
Expenditure on Research and Development (in millions of dollars)	RDE
Number of Affiliates in a country (Not at industry level)	AFFILIATE
Constructed variables from the above coded variables	
Total Assets (in thousands)	ASSET/1000
Ratio of sales to United States to total sales	SALETUS/SALES
Ratio of sales to local market to total sales	SALELOC/SALES
Average wages (wage bills per employee)	WAGES/EMPLY
Ratio of average wages to United States average wages	WAGES/WAGESUS
Ratio of foreign income tax to net income	FINTX/NINC
Ratio of research and development expenditure per sales (in '000), R&D Intensity	(RDE/SALES)*1000
Ratio of research and development expenditure per asset (in '000)	(RDE/TASSET)*1000
Ratio of ICT expenditure to GDP	ICTE/GDP
Ratio of researcher in R&D to United States researchers in R&D	RDPMP/RDPMPUS
Ratio of royalty and fee receipts to GDP	RLFR/GDP

Source: Author.

* **Industry level wage values are also gathered from the Bureau of Labor Statistics of United States to compute ratio of the wages by industry**

Table 2A: Industry category by R&D intensity

R&D Intensity	Industries
High technology >5%	Aircraft and spacecraft; pharmaceuticals; office, accounting and computing equipment; radio, television and communications equipment; medical, precision and optical instruments
Medium-high 1.5-5%	Electrical machinery and apparatus not elsewhere classified; motor vehicles, trailers technology and semi-trailers; chemicals excluding pharmaceuticals; railroad equipment and transport equipment not elsewhere classified; machinery and equipment not elsewhere classified
Medium-low 0.7-1.5%	Coke, refined petroleum products and nuclear fuel; rubber and plastic products; other technology non-metallic mineral products; building and repair of ships and boats; basic metals; fabricated metal products, except machinery and equipment
Low technology <0.7%	Manufacturing, not elsewhere classified, and recycling; wood, pulp, paper, paper products, printing and publishing; food products, beverages and tobacco; textiles, textile products, leather and footwear

Source: UNCTAD(2005).

Raising corporate debt in India: Has foreign ownership been an asset or a liability?

Sumit K. Majumdar [*]

This article examines the relationship between the extent of foreign ownership and debt composition using a sample of 1,000 firms in India. The estimation results show that firms with foreign ownership do not access more expensive funds from commercial banks while they do enjoy relatively greater access to funds from development finance institutions, compared to domestic firms. Thus, Indian development finance institutions appear not to have discriminated against foreign affiliates in their lending activities.

Key words: Bank debt, corporate finance, corporate governance, financial institution lending, foreign direct investment, Indian economy, institutional issues, international investment, liability of foreignness.

1. Introduction

When a firm operate overseas, does its status as a foreign-owned firm give it an advantage, or is foreign ownership a liability? One perspective, owing its origins to the ideas of Hymer (1960 [1976]) and Kindleberger (1969), takes the view that firms operating overseas face considerable disadvantages, such as spatial distance from the home country, unfamiliarity with the local environment, possible discrimination against foreign firms and restrictions imposed by the home country (Zaheer, 1995). The larger the institutional differences between the home and host countries, the greater the "liability of foreignness" is likely to be (Miller and Parkhe, 2002).

An alternative perspective, associated with the international trade and business literature (Buckley and Casson, 1976; Caves, 1971, 1996; Dunning, 1993; Knickerbocker, 1973), contends that foreign firms must possess certain unique capabilities that permit them to expand abroad despite the disadvantages due to their foreignness. The major sources of competitive performance are the firm-specific advantages and the advantages of being

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global in operational scope. These are advantages which local firms do not possess (Nachum, 2003). Thus, foreign identity may be perceived as an asset (Sethi and Guisinger, 2002).

Can foreign firms raise money as easily as domestic firms in host countries? This is an important question addressing the fundamental attributes of a firm operating in a foreign environment. This article evaluates the ability of firms with foreign ownership to raise different types of finance in India. The context is also important. India has become critical to the world economy; it is the fourth largest economy in the world, arguably the most important in terms of economic growth rates, and has a unique institutional environment. Yet, we know relatively little about the structure of financing of firms or the behaviour of firms in this country.

For a sample of over 1,000 firms listed on stock exchanges in India, principally the Bombay Stock Exchange, detailed information on the structure of ownership as well as debt financing of these firms is available. Such detailed data on ownership and debt are rare, but are useful for understanding the nature of corporate behaviour in an emerging market.

On the question of how firms with different types of owners have access to different types of debt, evidence is scarce. The literature on the relationship between ownership and strategic behaviour tends to concentrate on advanced market economies rather than emerging economy contexts (e.g. Hansmann, 1996; Shleifer and Vishny, 1997).

We know less about the implications of ownership type for firms' financial strategy choices in economies where the institutional environment is evolving. Such institutional variations can have different impacts on how foreignness is perceived, and this will influence firms' abilities to obtain certain types of funds.

Institutional issues have shaped the contours of Indian firms' strategic decision-making (Bhagwati, 1993; Das, 2002; Haksar, 1993; Marathe, 1989; Ray, 1999) and influenced industrial performance (Rudolph and Rudolph, 1987). Thus, institutional considerations are explicitly factored in developing the hypotheses on the relationship between foreign ownership of firms and their access to different types of funds.

The primary yardstick utilized in assessing the relationship is whether, relative to domestic firms, foreign affiliates have had an advantage or disadvantage in accessing different types of debt. The available data allow controlling for different types of shareholder structures among domestic firms. This helps further delineate the specific advantages foreign ownership may or may not possess.

2. Foreign ownership and debt composition

2.1 Background

Two types of debt account for over 70 per cent of all corporate borrowings in India. These are short-term unsecured borrowing from commercial banks and long-term borrowing, typically secured on collaterals, from term-lending institutions.

Term-lending institutions were established, de-novo, by the Government after independence. For example, the Industrial Finance Corporation of India (IFCI) was set up in 1948, and the Industrial Development Bank of India (IDBI) in 1964. They were classified as development finance institutions. These two bodies have been the two major suppliers of long-term loans to Indian industry. A quasi private-sector development finance institution, the Industrial Credit and Investment Corporation of India (ICICI), was established in 1955. The ultimate government holdings in this development finance institution were over 80 per cent through a variety of indirect means. In addition, every state in India has a State Financial Corporation or a State Industrial Investment Corporation to provide finance to firms.

Bank borrowing and institutional borrowing are both classified as monitored debt (rather than arm's length debt) (Majumdar and Sen, 2007). There is, however, an important distinction between borrowings from banks and development finance institutions, because of the nature of regulations that banks are subject to and the control over interest rates they charge. The types of debt are classified in table 1.

In the case of India, non-bank debts have been provided by development finance institutions set up to promote industrial development. Loans they provide are typically very long-term and secured on collateral. The differences are important, because bank loans, which tend to be short-term, are subject to the requirement of

the credit and monetary policies of the Reserve Bank of India; the cash reserve ratio (CRR) as well as the statutory liquidity ratio (SLR) need to be maintained, and banks are governed by the Banking Companies Act of 1948. These limit the degrees of freedom that banks have in their lending operations.

Table 1. Two main categories of corporate borrowing[*]

	Relational or Transactional?	Short-term or Long-term?	Nature of Regulation?	Secured or Unsecured?
Bank Borrowing	Relational	Short Term, with possible annual rollovers	Regulated by the canons of monetary policy and by the central banking authority which is the Reserve Bank of India	Unsecured
Institutional Borrowing	Relational	Long Term, of up to 30 years duration	Regulated by the canons of economic and industrial policy and by the Ministries of Finance and Industry	Secured

Source: Majumdar and Sen (2007).

Notes: Other categories of debt are debentures which are relational long-term debt provided by private parties which may or may not be secured; fixed deposits which are transactional long term debt provided by private parties which is unsecured; other borrowings which are both relational and transactional, can be short term or long term and provided by private and state-owned parties and can be secured or unsecured.

As a result of these factors, funds available for lending by banks are often highly constrained and banks tend to charge higher rates of interest. Bank lending is also more expensive than loans from development finance institutions because they are mostly unsecured. Loans from development finance institutions are secured on collateral (Rajan and Winton, 1995).

There are large interest rate differentials in the lending rates of commercial banks and development finance institutions in India. The gap between lending rates for banks (average 14.4 per cent for the years studied) and development finance institutions (average 16.8 per cent for the years studied) has been at least 2 per cent per annum and in one year was 4 per cent per annum. This rate differential can substantially add to the cost of capital borrowed from commercial banks.

2.2 Hypotheses related to debt type and foreign ownership

Foreign ownership and bank debt

The distinctions between secured and unsecured debts and the nature of financial regulations associated with each type of debt are important. Since each type of debt has distinct attributes, predictions as to what type of lending behaviour is more likely for foreign affiliates can be made conditional on the opposing characterizations of foreignness as a liability or as an asset.

The first attribute relates to debt security. One begins by addressing the implications of unsecured versus secured borrowings. Secured creditors provide funds against collateral, which can be claimed in the event that the borrower defaults. If the firm were to become bankrupt, secured creditors would have higher priority over unsecured creditors in claims on the firm's assets. Risks associated with unsecured lending would imply that the providers of unsecured loans would charge the borrower a higher interest rate.

At this stage, it is useful to review the issue regarding the perception of foreignness as an asset or a liability. Even though foreign firms account for only a handful of the number of firms in India, they produce a third or more of India's industrial output (Athreye and Kapur, 2001; Kidron, 1965; Majumdar, 2007).

Foreign affiliates have been operating in India for decades (Kidron, 1965; Majumdar, 2007).[1] Given that banks and development finance institutions engage in relational lending, foreign affiliates will also have built up many of the important processes associated with relational banking over time.

Transnational corporations are likely to possess better skills at managing the business environment, acquired from operating in a variety of countries. These skills are a factor of high performance (Sethi and Guisinger, 2002). These skills help reduce the liability of foreignness and give foreign affiliates an advantage over their rivals.

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[1] In fact, after independence, the most important private commercial bank in India, the Imperial Bank of India, was foreign owned till its nationalization in 1955.

A substantial amount of corporate resources, particularly in the case of foreign firms (Das, 2002; Haksar, 1993), has been allocated to managing the institutional environment of India (Marathe, 1989; Ray, 1999), and engaging in dialogue with government agencies has been of paramount importance to management. These relationship-building investments would have enabled foreign owned firms to understand and deal with the institutional environment of India.[2]

The majority of the foreign affiliates have originated from economies with Anglo-Saxon corporate governance models, such as those in the United Kingdom and the United States (Kidron, 1965). Thus, institutional unfamiliarity would not have been an issue with many such firms. Their origins would have made these foreign affiliates attractive customers for banks. Foreign affiliates' "intangible assets", such as international management expertise, may well have provided a degree of assurance to lenders in comparison to domestic firms. Conversely, possession of these assets would have given the foreign affiliates a stronger bargaining position to seek cheaper funding relative to the higher interest rates charged by the commercial banks.

The second attribute relates to the nature of regulation that commercial banks face in India. The operation of the CRR and the SLR, described earlier, has meant that funds available to commercial banks for lending are considerably constrained relative to the funds available to other development finance institutions. This, of course, not only makes interest rates charged higher but leads to funds rationing. If foreign affiliates were unwelcome customers, then they would find themselves receiving relatively less bank loans than domestic firms.

On the other hand, if the foreign affiliates did have capabilities that resulted in superior performance relative to domestic firms, they

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[2] The views of Das (2002), Haksar (1993) and Ray (1999) are important because they are written from the perspective of Chief Executive Officers of foreign firms operating in India. Das (2002) recounts the instances in which he had to deal with government agencies of all types, including development finance institutions. Marathe (1989) has written from the point of view of an implementer of government policies, of which, as Secretary to the Government of India in the Ministry of Industrial Development in the late 1970s, he was the most senior officer in managing the system of controls and regulations that existed. Thus, he dealt with several foreign-owned firm CEOs who would regularly visit the Ministry.

would generate adequate cash flows to internally fund their operations and would not need access to short-term lending that commercial banks offer, as has been discussed in the literature on the performance of foreign firms (Agmon and Lessard 1977; Balasubramanyan, et al. 1996; Chhibber and Majumdar, 1999; Doukas and Travlos, 1988; Dunning, 1993; Fatemi, 1984; Grant, 1987; Li and Guisinger, 1991; Michel and Shaked, 1986). Following the foregoing discussion, the first hypothesis may be posited:

Hypothesis 1: The proportion of borrowing from providers of unsecured loans, such as commercial banks, with typically higher rates of interest is lower for firms with higher levels of foreign ownership.

Foreign ownership and development finance institution debt

The second hypothesis deals with the relationship between foreign affiliates' access to loans from Indian development finance institutions. Development finance institutions have provided long-term debt typically with the maturity of 15 years and in some cases even up to 30 years. The debt is secured on the assets of the borrower and typically cheaper than bank loans. The objective of lending for development finance institutions has been to develop the long-term industrial profile of India.

Development finance institutions have not been subject to regulation by the Reserve Bank of India. Their funds for investment have come from shareholders; the principal shareholder has been the Government, though private sector involvement has also existed to a small degree. Relative to their capital base, development finance institutions have had a greater proportion of funds available for lending.

The issue of whether firms with foreign ownership will want to access funds from development finance institutions is easily dealt with.[3] Firms in India, whether foreign-owned or domestic, were not able to

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[3] In addition, firms with foreign ownership may reduce their own risks and hedge their bets about a host country by raising money in that country rather than bringing in large quantities of own equity.

access overseas sources of funds until recently. If foreign firms had wanted an infusion of foreign capital, they would have had to enhance their share capital. Thus, firms with foreign and Indian ownership alike would have tapped the India's domestic sources of finance.

At the heart of the question on whether or not foreign affiliates would have had relatively greater access to development finance institutions' funds again lie two issues. The first issue is the perceptions of foreignness and its influence on development finance institutions' lending to foreign affiliates. In this regard, the reasons advanced for the first hypothesis are again relevant but with additional points. In India, foreign affiliates have been a part of the industrial landscape for generations, and the liability of foreignness in terms of perception would have diminished over time. At the same time, their ability to leverage their parent firms' strength, expertise, technologies and brand equity would have enabled these firms to achieve better performance.

Internationalization as a facet of firms' activities has been preferred by investors because exposure to other markets reduces the risk associated with conducting operations in one particular setting. Thus, foreign owned firms have been considered safer alternatives (Shaked, 1986).

In addition, transnational operations have been associated with the enhancement of firm value (Morck and Yeung, 1991). For a variety of reasons, foreign affiliates have been valued more than purely domestic ones in the Indian stock market as well (Feinberg and Majumdar, 2001). Foreign affiliates are able to offer the security of higher market valuations – a factor that generally enhances credit ratings and reduces cost of capital – to long-term lenders. Hence, they are able to access sources of funds which are relatively cheaper than those from commercial banks. Thus, the second hypothesis is:

Hypothesis 2: The proportion of borrowing from creditors such as development finance institutions with typically lower rates of interest and secured on collateral is higher for firms with a higher level of foreign ownership.

3.   Empirical analysis

3.1   Data

The current study uses firm-level data for 1,026 firms listed on the Bombay Stock Exchange for the period 1988–1993 to evaluate the relationship between foreign ownership and debt composition. There were over 3,000 firms listed on the stock exchange, but the majority of these were smaller firms with inadequate data. The firms selected account for about three-fourths of the market capitalization of the Bombay Stock Exchange, which is the largest stock exchange in India. As such, the firms represent some of the most important firms in India.

The data were collected from multiple sources. The Centre for the Monitoring of the Indian Economy (CMIE) provided the base data. The corporate borrowing data were taken from the balance sheets of individual firms. Details on ownership and aspects of firm behaviour and performance were collected from the Bombay Stock Exchange and the office of the Registrar of Companies in the Ministry of Law, Justice and Company Affairs.

The principal limiting factor was the availability of ownership data. After consultation with officials at the Department of Statistical Analysis and Computer Services of the Reserve Bank of India, ownership data were collected for the sample of firms included in the study. Detailed ownership data for Indian firms were simply not available for earlier and later periods and it is believed that this data source is the only one from which the total make-up of the ownership structure for a large number of Indian firms can be obtained.

Of course, a dummy or indicator variable can be used to represent the presence or absence of a particular ownership category. But detailed information on the proportions of different ownership categories is needed for the assessment of the impact of variations across major ownership categories of firms in India.

The data collected are cross-sectional and not time-series because of difficulties associated with obtaining consistent ownership patterns data over extended time periods. Each observation in the

data set belongs to one specific year. The TIME variable accounts for temporal variations in the observations.[4]

3.2   Variables

The data base provides details of the debt composition of each company. The determinants of different types of debt are estimated for the companies studied. The two dependent variables of interest are the types of debt held by firms in India: bank borrowings *(BANK DEBT)* and borrowings from development finance institutions *(INSTITUTIONAL DEBT).* The independent variable of interest in both equations is the extent of foreign ownership *(FOREIGN).*

Several variables that may impact on debt structures are introduced as controls. The choice of debt made by firms could also depend on whether the firm is publicly or privately held. Firms with a higher degree of state ownership are more likely to tap public sources of funds rather than private sources and could prefer long-term debt, where the degree of monitoring would not be as demanding as short-term debt. The opposite would be true for privately owned firms. The extents of government ownership *(GOVERNMENT)*, corporate ownership *(CORPORATE)*, directors' ownership *(DIRECTOR)* and ownership by significant private shareholders that control a large and concentrated block of shares *(TOP 50)* have been included as control variables.

There is evidence that corporate ownership networks in Germany (Franks and Mayer, 2001) and Japan (Hoshi, Kashyap and Scharfstein, 1991) have positive impacts on firm performance. Corporate owners, if motivated (Roe, 1994), can bring their own capabilities for monitoring (Coffee, 1991) to bear on relationships with lenders. Firms with corporate ownership would be attractive clients for loans. However, corporate owners of Indian firms are mostly government development finance institutions, and corporate owners will attract the same interest as government owned firms from the providers of finance.

Similarly, directors' influence is likely to be weak. The directors nominated by development finance institution do not own shares. Many of the members of boards of directors in India are the founder

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[4] It turns out that the regression results are robust to the inclusion or exclusion of this variable.

of the company, descendants of the founder or those close to the founder (Ray, 1999). In other words, they are insiders. They will have little incentive to rock the boat.

The literature on concentrated ownership of large blocks of shares (Barclay and Holderness, 1989; Holderness, 2003) posits an important effect that such shareholders often try to impose decisions that enhance firms' value. Yet, the concentrated ownership of large blocks of shares is phenomenon still nascent in India, and firms in this category of ownership are unlikely to attract interest from the various categories of lenders.

Additionally, firm size (*SIZE*), measured as the log of sales, the age of the firm (*AGE*), and a variable (*TIME*) are included as control variables. Large firms have a greater variety of capabilities and can enjoy economies of scale (Penrose, 1959). Additionally, larger firms can exploit market power, both in product as well as in factor markets, an issue germane to India where institutional factors have fostered rent-seeking (Rudolph and Rudolph, 1987; Marathe, 1989), and are able to earn greater profits.

Next, the *TIME* variable controls for time-specific shocks to the debt structures due to changes in regulatory policies that may have occurred during the period under consideration. The year 1991 was a landmark for the economy of India, as far-reaching policy changes took place with the opening up of the economy to foreign investment and competition. The *TIME* variable is an index that takes on increasing values for the different years of the observations. This index picks up the time effect and takes into consideration that the sample contains observations from the periods before and after the enactment of liberalization policies, which may have impacted on the financing decision of firms in India. This approach is consistent with the literature (e.g. Hensher et al., 2005).

3.3   Estimation

The choice of the type of debt by firms is an inter-dependent decision. There are likely to be various unobserved firm-specific features, and features within the institutional environments that are also related to each other. The two separate equations, where each type of debt is a dependent variable, are treated as a system of equations. To achieve

efficient estimates, it is necessary to estimate the equations for the two dependent variables simultaneously and allow for the correlation of error terms between the equations.

A related estimation issue concerns the treatment of the *SIZE* variable as endogenous. Treating the size variable as endogenous allows the issue of firms' heterogeneity to be dealt with. Large firms are likely to have become larger because of specific managerial capabilities or the possession of unique intangible assets. These attributes may motivate or, in some cases, deter lenders from providing finance to larger firms. On the other hand, instrumental controls need to be incorporated for some of the factors that, while not really related to the financing decision, help determines firms' size patterns.

The empirical design requires the use of a simultaneous three-stage least squares instrumental variable method, in which part of the explanatory variables may be pre-determined and all model parameters are estimated jointly. These simultaneous three-stage least squares estimates are consistent and asymptotically normal, and these asymptotic properties are equivalent to that of the full information maximum likelihood estimator (Zellner and Theil, 1962; Judge et al., 1988).

Four variables are used as instruments: the ratio of advertising expenses to total expenses *(ADVERTISING)*, the ratio of marketing expenses to total expenses *(MARKETING)* and the ratio of distribution expenses to total expenses *(DISTRIBUTION)*, and the ratio of net fixed assets to sales which captures the capital intensity of a firm *(CAPITAL).* These variables will correlate with size.

Larger firms, with more resources at their command, are more likely to incur expenditures on advertising, marketing and distribution activities in order to maintain or increase their market share. Capital intensity can enhance the minimum efficient scale requirements and are likely to be associated with larger firms. On the other hand, these variables are unlikely to be correlated with corporate borrowing; thus, these variables provide suitable instruments to control for the endogeneity of firm size in the equations to be estimated.

The use of these variables as instruments also helps take industry-related factors into account. Industry characteristics are

captured by variables that measure advertising, marketing and distribution intensities (Caves and Barton, 1990), and these industry features simultaneously influence how large a firm can become. Since the *SIZE* variable reflects both heterogeneous firm-specific influences as well as external industry-related features at work, the instruments also help account for some of these influences within the regression framework.

4.   Results

The descriptive statistics are in table 2. The correlation matrix is in table 3. Commercial bank borrowing is the most important source of borrowing at 41 per cent followed by borrowing from other development finance institutions at 30 per cent. Across all the firms, the average foreign ownership is just under 11 per cent. Government shareholding is just under 15 per cent. The average holding of shares by the corporate sector is 26 per cent, while the directors and large concentrated shareholders hold under 9 and under 6 per cent of shares respectively. The residual category of the Indian public holds on average 33 per cent of the shares of the Indian firms. There is also a large variation in the size and age of firms.

Table 2. Descriptive statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
BANK [a]	41^1	24	0	100
INSTITUTION [a]	30^1	25	0	100
DEB[a]	10^1	17	0	95
FIXED[a]	6^1	12	0	100
OTHER[a]	13^1	17	0	100
FOREIGN[b]	11^2	16	0	74
GOVERNMENT [b]	15^2	16	0	100
CORPORATE[b]	26^2	18	0	93
DIRECTORS[b]	9^2	12	0	76
TOP 50[b]	6^2	7	0	91
PUBLIC [b]	33	18	0	100
SIZE[c]	4	1	0	8
AGE	25	21	1	130
TIME	0.8	0.3	0	5
NUMBER OF FIRMS		1,026		

Source: Author's calculation.
Notes: [a] As a percentage of total debt; [b] As a percentage of total equity; [1] The sum of these debt categories equal 100; [2] The sum of these ownership categories equal 100.

Table 3. Correlation Matrix

	Bank	Institution	Foreign	Government	Corporate	Directors	Top50	Size	Age	Time
1	1.000									
2	-0.503	1.000								
3	-0.015	-0.049	1.000							
4	-0.184	0.153	-0.116	1.000						
5	-0.058	-0.014	-0.271	-0.187	1.000					
6	0.152	-0.002	-0.223	-0.207	-0.331	1.000				
7	0.107	-0.030	-0.147	-0.194	-0.142	0.215	1.000			
8	-0.138	-0.115	0.131	0.300	0.054	-0.206	-0.206	1.000		
9	0.030	-0.236	0.051	0.146	0.038	-0.039	0.009	0.367	1.000	
10	-0.042	-0.032	0.032	-0.006	0.014	-0.048	-0.069	0.136	0.066	1.000

Source: Author's calculation

The three-stage least squares estimates are presented in table 4. The explanatory power of the individual regressions varies from 0.010 to 0.101, while the system R^2 is 0.083. The chi-square test of overall significance of the explanatory variables is significant at the one per cent level. The important result is the large positive coefficient on the foreign variable for the equation on institutional borrowing, in column (2), which is significant at the five per cent level, along with the large negative coefficient on the foreign variable for the equation on bank borrowing, in column (1), which is also significant at the 1 per cent level. The base ordinary least squares results show that the coefficient for the foreign ownership variable in the bank borrowing equation is non significant while for the institutional borrowing equation is significant at the five per cent level in a one-tailed test.

Tests for exogeneity show that the instrumental variable specification is valid and is preferred for all of the equations, and for these equations the null hypothesis of exogeneity is rejected. It is correct to treat the variable *SIZE* as endogenous. The Hausman (1978) χ^2 test statistic is significant at the one per cent level for the *BANK* equation and for the *INST* equations. Controlling for other characteristics, a greater degree of foreign ownership in Indian firms is associated with a lower level of borrowing from commercial banks and a higher level of borrowing from development finance institutions.

Table 4. Three stage least squares regression estimates[#]

The two dependent variables are bank borrowings *(BANK)* and borrowings from development finance institutions *(INSTITUTION);* the independent variables in each equation are the extent of foreign ownership *(FOREIGN)*, the extents of government ownership *(GOVERNMENT)*, corporate ownership *(CORPORATE),* directors' ownership *(DIRECTOR)* and block shareholders' ownership *(TOP 50)* as proportions of total equity*;* other variables are firm size *(SIZE)* is the log of sales, the age of the firm is the numbers of years from incorporation till the observation data *(AGE)*, and a time index variable *(TIME).*

Dependent Variables	BANK	INSTITUTION
	Column (1)	Column (2)
Intercept	39.86***	52.16***
	(5.30)	(5.58)
FOREIGN	-0.09*	0.13**
	(0.06)	(0.06)
GOVERNMENT	-0.36***	0.55***
	(0.06)	(0.06)
CORPORATE	-0.13**	0.16***
	(0.05)	(0.05)
DIRECTORS	0.15**	0.07
	(0.07)	(0.07)
TOP 50	0.19*	-0.12
	(0.12)	(0.12)
SIZE	3.39**	-9.29***
	(1.36)	(1.43)
AGE	0.01	-0.16***
	(0.04)	(0.07)
TIME	-1.23*	0.78
	(0.67)	(0.72)
Individual R^2	0.013	0.013
System R^2		0.083
N		1,026

Source: Author's calculation.

Notes: ***, ** and * denotes significance at the 1, 5 and 10 per cent levels respectively; standard errors in parentheses; [#] four variables are used as instruments: the ratio of advertising expenses to total expenses (ADVERTISING), the ratio of marketing expenses to total expenses (MARKETING) and the ratio of distribution expenses to total expenses (DISTRIBUTION), and the ratio of net fixed assets to sales capturing capital intensity (CAPITAL).

Higher levels of government and corporate ownership are also associated with lower levels of bank borrowing and higher levels of institutional borrowing. The results are as expected since government

owned firms, and firms in which development finance institutions have higher stakes, will have preferential access to funds by way of borrowings from development finance institutions, a finding consistent with evidence in other countries (Sapienza, 2004). In the case of privately owned firms with higher levels of foreign ownership, there will be a positive reputation effect, which is likely to explain the result.

In comparison, other private firms in India with higher levels of directors' ownership and concentrated ownership do not seem to have the same ability to borrow from development finance institutions. They do, however, borrow more from commercial banks. These loans are, typically, short-term and more expensive than loans provided by development finance institutions. Hence, relative to domestic firms in India, firms with higher levels of foreign ownership have greater access to cheaper and more long-term oriented sources of finance.

Larger firms have higher levels of bank borrowing and lower levels of institutional borrowing. Older firms seem less likely to rely on institutional borrowing.

The liability versus asset of foreignness idea can only be gauged by a process of empirical association of foreign ownership with the relevant behavioural attributes. On this basis, the overall results show that foreignness is an asset with regard to the ability of firms to raise funds in India.

5.   Discussion and conclusion

This article makes a specific contribution to the international investment literature by investigating the relationship between foreign ownership in Indian firms and the ability of these firms to raise different varieties of debt finance in India. Specifically, it examines the issue of whether foreign ownership is an asset or liability in the context of firms' fund-raising activities from the debt market, which is the largest source of funds for firms operating in India.

The principal finding is foreign ownership is an advantage. First, firms with foreign ownership borrow relatively less from commercial banks, which typically lend more expensive unsecured short-term funds. Next, it is observed that firms with foreign ownership do enjoy

relatively greater access to funds from development finance institutions, compared to domestically owned firms.

Overall, what do the findings imply? First, the findings suggest that ownership structures within Indian firms have a significant impact on their access to different debt types. This conclusion is consistent with prior studies for developed economies, primarily for the United States. The second implication is that in India, even if there has been ambiguity and equivocalness in the way foreign firms were treated with respect to entry into India, the treatment that they received was no worse than that for firms owned by Indian shareholders, and in reality much better as indicated by the relatively higher levels of lending from development finance institutions that they had access to.

Several extensions to the current of study are feasible. Two possible lines of investigations may be considered. The first is reviewing the relationship between ownership types, particularly foreign ownership, and the degree of leverage of firms in general. The second is reviewing the relationship between ownership types, particularly foreign ownership, and firms' choices of raising debt either fully domestically or from overseas or in some geographic mix. Transnational corporations in general may choose to raise finance in their domestic markets as well as from overseas markets. In fact, their forays into foreign markets may be in search of cheaper financing since, for instance, interest rates in the United States and Europe are currently considerably lower than those in India. The geography of financing becomes, thus, an important issue requiring attention.

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The single European Market, the European Monetary Union and United States and Japanese FDI flows to the EU

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This paper investigates the possible impacts of the two major structural changes, namely the establishments of the Single European Market and the European Monetary Union, on FDI flows from the United States and Japan to 12 European Union countries. It applies the panel LM unit-root methodology to a data set consisting of United States and Japanese FDI flows to twelve EU countries for the period 1965–2005. The findings reveal that the patterns of FDI changed after the major institutional changes in question. However, Japanese FDI was affected more by the implementation of the Single Market Programme while the United States FDI was affected more by the creation of the European Monetary Union.

Key words: foreign direct investment, Single European Market, European Monetary Union

1.   Introduction

In 1986, the Single European Act, known as the Single Market Programme (SMP), was signed by the Member States of the then European Community. The aim of the Act was to remove the remaining internal barriers to the cross-border mobility of goods and services as well as capital and people in order to increase the competitiveness of the European economy. In 1992, the Treaty of European Union, was signed in Maastricht aimed at the creation of the European Monetary Union (EMU). Since 1 January 1999, the euro became the official currency in eleven participating countries and Greece followed two years later. The SMP and the establishment of the EMU gave rise to concern outside the EU that its aim was to keep non-EU goods and businesses out of

the EU market. "Fortress Europe" was the term given to this prospect (Neary, 2002).

Transnational corporations (TNCs), especially those based in Japan and the United States, sought to position themselves strategically in the EU market through increased investment flows in response to the SMP. Foreign Direct Investment (FDI) flows to the EU experienced a significant growth in the second half of the 1980s. The growth rates of FDI flows from the United States and Japan to EU were 23.4% and 46% respectively during the period 1985–1989 (UNCTC, 1991). A number of empirical studies have found evidence that the SMP was responsible for the increased FDI flows to EU countries (Yannopoulos, 1990a; Vernon, 1994; Balasubramanyam and Greenaway, 1992; Yamada and Yamada, 1996). According to Dunning (1997), the SMP changed the behaviour of the non-EU TNCs, because the SMP modified the parameters in terms of the ownership, locational and internalization advantages.

The establishment of the EMU, by removing the exchange-rate uncertainty, was expected to encourage cross-border investment in the EU economies (Commission of the EC, 1990) since uncertainty about future returns was likely to discourage investment within the region (Dixit and Pyndick, 1994). Furthermore, the EMU was thought to minimize destabilizing speculation, to increase transparency and to enhance the reliability of rules and policies. Stiegert et al. (2006) found evidence that investment patterns and trends to EU countries were significantly influenced by the Maastricht Treaty and the cross-border effects that took place after 1992.

This paper contributes to the existing literature on the impact of the two institutional changes, the SMP and EMU, by using a methodology different from previous studies. More specifically, it investigates FDI inflows from Japan and the United States by using the Lee and Strazicich (1999, 2004) panel LM unit root methodology to identify possible structural break dates. The analysis makes use of the annual data for Japanese and United States FDI flows to 12 EU countries and covers the period 1965–2005. The results reveal that the patterns of FDI inflows did change due to the two institutional developments. FDI from Japan was affected more by the implementation of the SMP while FDI from the United States was affected more by the EMU.

The remainder of this paper is organized as follows. The second section introduces the theoretical framework and sets out the hypotheses. The third section presents the methodology. The fourth section describes the data and presents the empirical results. Finally, the fifth section offers some concluding remarks.

2. Theoretical framework

The decisions of TNCs to invest abroad is related to a number of factors such as market size and growth (Buckley and Casson, 1985), labour costs and skills, agglomeration effects, policy towards foreign investors, exchange rate volatility, the quality of institutions and infrastructure (Pournarakis and Varsakelis, 2004; Pain and Barrell, 1999). According to John H. Dunning's eclectic (or OLI) paradigm, the likelihood of a firm engaging in foreign production is determined by the interaction of three sets of factors, namely, the ownership advantages of the firm, the locational advantages of host countries and the internalization advantages of the firm's cross-border activities.

Regional economic integration alters the business environment in which firms operate. It facilitates the cross-border movement of goods and services as well as the factors of production, capital and labour, and hence modifies the parameters of the OLI paradigm. According to Dunning (1997, 1998), the SMP might have had positive effects on FDI flows to the EU. The SMP, by eliminating the non-tariff barriers, increased competition and productivity in the European market and encouraged firms to exploit the intra-regional product and process specialization (Dunning, 1997) and the economies of scale in order to reduce the cost and generate growth (UNCTC, 1990). Baldwin et al. (1989) showed that the one-time efficiency gains from the SMP would be multiplied into a medium-run growth bonus because of its dynamic effects resulting from more innovation, faster productivity improvement, greater investment and higher output growth. Rugman and Verbeke (1985) argued that non-EU companies would be forced to establish affiliates in the EU before 1992 in order to avoid potential barriers to entry. Also, the shifts in tax regimes, the reduced cost of intra-EU communication and transportation would also affect FDI. However, the SMP effects on the geographic distribution of the inward FDI within EU is ambiguous (Dunning, 1997). Economic integration may lead to increased geographical concentration of industries, because

firms are likely to locate close to each other (Venables, 1996; 1998) to take advantage of agglomeration economies, thus leading to regional specialization of economic activities.

Yannopoulos (1990a, 1990b), using a combination of the OLI paradigm and the theory of international integration, distinguished four types of investment strategies by TNCs as a response to the static and dynamic effects of economic integration. The defensive import-substituting investment, the offensive import-substituting investment, the reorganization investment and the rationalised investment.

Neven and Siotis (1996) found evidence that the anticipation of a barriers-free Europe significantly affected the inflows of FDI from outside the region. Pain and Lansbury (1997) argued that the initial stage of liberalization saw an increase to investment flows as firms entered the market in order to take advantage of the new opportunities.

Hence, the establishment of the Single European Market may have had significant impact on the decision of the extra-EU TNCs to invest in the newly unified market. However, the effects of regional integration through the SMP on FDI are likely to have varied across different home and host countries. It is likely that United States and Japanese FDI flows have reacted differently since United States TNCs had had a long presence in Europe since 1950s, while their Japanese counterparts had mostly served the European market through export prior to the establishment of the Single Market. Hence, we expect that the implementation of the SMP would have affected Japanese TNCs more since they are likely to have reacted to the possible emergence of a "Fortress Europe" and the consequent restriction on exports to the EU after the 1993, by undertaking FDI in the late 1980s and early 1990s. Hence, we pose the following hypothesis:

Hypothesis 1: The impact of the institutional changes in EU on inward FDI is likely to differ depending on both the host and home country.

The EMU may have affected inward FDI to EU countries through a number of channels. First, EMU would have encouraged FDI in EU economies (Commission of the EC, 1990) by reducing exchange-rate uncertainty and macroeconomic instability, helping to avoid destabilizing speculation and increasing transparency and reliability of

rules and policies. Second, it would have increased the certainty value of expected profits of risk-averse firms, reduces trade costs and favours vertical FDI. Third, the asymmetric shocks expected in a monetary union might have resulted in spatial diversification of production within the EU to minimize the impact of these shocks.

Molle and Morsink (1991) examined the effect of a monetary union on FDI and concluded that since exchange rate risks discouraged FDI, a monetary union should result in an increase in FDI inflows. OECD (1992) also predicted that the prospect of a stable exchange rate together with monetary discipline should attract more investment from outside the region. Aizenman (1992) and Goldberg and Kolstad (1995) arrived at a similar conclusion claiming that fixed exchange rates regime was more conducive to inward FDI than flexible exchange rates. However, in the case of horizontal FDI, the removal of exchange rate volatility may decrease FDI and increase trade flows as a substitute. Finally, Stiegert et al. (2006) found evidence that investment patterns towards EU were significantly influenced by the enactment of Maastricht Treaty.

Thus the establishment of the EMU is expected to have had a positive impact on inward FDI especially from Japan and the United States.

Hypothesis 2: EMU influenced positively inflows of FDI from the United States and Japan in the EU-12.

3. Methodological issues

The two hypotheses are tested using the panel LM unit root methodology proposed by Lee and Strazicich (1999, 2004) that allows us to determine the location dates of the two structural changes in FDI inflows. The impact of structural changes on economic variables is assessed using dummies in the regressions. However, since structural breaks can be mistaken for non-stationarity (Perron, 1989), Zivot and Andrews (1992) and Perron (1997), among others, proposed unit root tests that would allow a structural break to be determined "endogenously" from the data; the date of the structural change, statistically, is not predetermined by the researcher but the methodology allows for the data series to reveal the date. Lumsdaine and Papell (1997) extended the Zivot and Andrews one-break test for

two breaks. Finally, Lee and Strazicich (1999, 2004) proposed a two-break panel LM unit root test. This paper uses the panel LM unit root test of Lee and Strazicich to determine endogenously the dates of two possible structural breaks in FDI flows.

In the panel LM unit root test methodology of Lee and Strazicich, the LM-statistic follows asymptotic distribution. This also holds if dummies are included to test possible structural breaks, as long as $N/T \to k$, for each finite intercept k, and as long as $N,T \to \infty$. The LM statistic is the t-statistic when testing for $\phi=0$ in the regression:

$$\Delta y_{it} = intercept + \delta_i \Delta D_{it} + \phi_{i,\,t-1} + \sum_{j=1}^{pi} \rho_{ij} \Delta \tilde{S}_{i,t-j} + error \qquad (1)$$

where $\tilde{S}_{i,t-1} = y_{i,t-1} - \tilde{\gamma}_{2i}(t-1) - \tilde{\delta}_i D_{i,t-1}$ and $\tilde{\gamma}_{2i}$ and $\tilde{\delta}_i$ are the ordinary least square estimators of $\tilde{\gamma}_{2i}$ and $\tilde{\delta}_i$ from the restricted regression $\Delta y_{it} = \gamma_{2i} + \delta_i \Delta D_{it} + error$ letting $\tilde{S}_{i,t-1} = \tilde{S}_{i0},\ \tilde{S}_{i1},...,\ \tilde{S}_{i,-1}$ and $\Delta D_i = (\Delta D_{i1}, \Delta D_{i2},...,\Delta D_{iT})'$, the LM t-statistic that tests the null hypothesis $\phi=0$ in regression (1) series can be expressed as:

$$\tilde{A}_{LM} = \frac{[\overline{LM}_{NT} - EM(L_T)]\ \sqrt{N}}{\sqrt{V(L_T)}} \qquad (2)$$

where $E(L_T)$ and $V(L_T)$ denote the expected value and variance of each country's t-test statistics LM_i^{τ} and $\overline{LM}_{NT} = \frac{1}{N} \sum_{i=1}^{N} LM_i^{\tau}$

The implementation procedure is as follows. We determine the location of the endogenous breaks for each country and afterwards we identify the optimal number of breaks. We apply a *general-to-specific* procedure, suggested by Ng and Perron (1995), by which the existence of two breaks1 is tested; if less than two breaks is significant, the procedure is repeated using the one-break minimum LM unit root test.

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[1]   The t- statistic of each estimated break coefficient is examined for significance at the 10%, 5% and 1% level in an asymptotic normal distribution (absolute value greater than 1.645).

4.   Data and Empirical results

The empirical analysis uses data for the annual FDI flows from the United States and Japan to 12 EU countries that were members of the European Community in 1986.[2] The data for United States FDI are compiled by the United States Bureau of Economic Analysis and cover the period 1966–2006. The data for Japanese FDI flows, obtained from JETRO, cover a period from the first available year for each country to the year 2004.[3]

Table 1 presents the results of the LM unit root test methodology on the time series data of FDI inflows.[4] The upper division of the table presents the findings for United States FDI and the lower the findings for Japanese FDI. The univariate LM unit root statistics appear in the second column. The optimal number of breaks is shown in the third column of the table. The optimal differenced terms that correct for serial correlation are given in the fourth column and the time location of the breaks appears in the last column. The last row of each division presents the overall panel LM statistic.

The panel LM test with two structural breaks suggests that the examined FDI flows series should be characterized as stationary with breaks. The evidence is in contrast with the findings obtained in our preliminary tests for stationarity without allowing for possible structural breaks. However, neglecting the presence of significant breaks may lead to spurious inference regarding the integration properties of the examined series (Perron, 1989).

For United States FDI, one structural break exists in nine counties, two breaks in two countries, Ireland and Germany, and no structural break in one country, Portugal. The structural break in all countries, with the exception of Germany and Italy, took place in the period 1995–2000. The two breaks for Germany occurred in the years 1990

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[2]   These are : Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxemburg, the Netherlands, Portugal, Spain and the United Kingdom.
[3]   The first available year for the Japanese FDI ranges from 1965 for Belgium, Germany, Italy and the United Kingdom to 1977 for Denmark.
[4]   At the first stage of a preliminary empirical analysis we tested the series for stationarity using the LM test without considering for possible structural breaks and the results indicated non-stationarity. Due to space limitations the results are not reported and are available upon request from the authors.

Table 1. Panel LM unit root tests

Country	Univariate LM unit root test statistic	Optimal number of breaks	Optimal lag length (k)	Break location
Flows from United States				
Belgium	-2.435***	1	8	1997
Denmark	-3.809***	1	3	1997
France	-3.329***	1	6	1999
Germany	-2.095**	2	1	1990, 1993
Greece	-5.100***	1	0	2000
Ireland	-1.229*	2	6	1993, 1997
Italy	-2.763***	1	8	1993
Luxemburg	-2.788***	1	8	1999
Netherlands	-3.900***	1	8	1997
Portugal	-4.0645***	-	-	-
Spain	-3.887***	1	7	1997
United Kingdom	-10.271***	1	7	1995
Panel LM statistic	-3,584***			
Flows from Japan				
Belgium	-4.760***			
Denmark	-6.239***			
France	-3.078***	1	7	1996
Germany	-3.614***	1	8	1992
Greece	-5.390***			
Ireland	-5.773***	1	5	1984
Italy	-3.219***	1	6	1993
Luxemburg	-0.866	2	2	1986, 1989
Netherlands	-6.476***	1	8	1988
Portugal	-4.269***	2	4	1989, 1996
Spain	-1.955**	2	6	1983, 1986
United Kingdom	-4.178***	1	7	1994
Panel LM statistic	-3,382***			

Source: Authors

Note: All tests allow for time fixed effects and all regressions include an intercept and time trend. The 1, 5, and 10% critical values for the panel LM test with two breaks are: −2.326, −1.645, and −1.282. * indicates significance at the 10% level, ** significance at the 5% level, *** significance at the 1% level.

and 1993, the one break in Italy occurred in 1993 and finally one of the two breaks in Ireland occurred in 1993.

With regard to Japanese FDI, the data for Belgium, Denmark and Greece do not show any structural break. The data for six countries show only one structural break and for three countries, Luxemburg, Portugal and Spain, show two structural breaks. All the structural breaks took place in the period before 1993, the first year of the SMP with the exemption of the UK where the break occurred in 1994, one year after the implementation of the SMP, and Portugal where the break occurred in 1996.

It is apparent from our findings that the two major institutional changes (the SMP and EMU) that took place in the EU affected the decision of Japanese and United States firms to invest in EU countries. However, there is a clear indication that the change in the investment strategy of United States and Japanese TNCs was based on different reasoning. The pattern of United States FDI flows changed in the period before the establishment of the EMU, while the pattern of Japanese FDI flows changed in the period before the SMP.

United States TNCs, having had a strong presence in Europe since 1950s, were in a position to capitalize on their experience and to make the most of the advantage of European integration and exploit the benefits of competition at the European level. In other words, United States TNCs, due to their long presence in the EU, were likely to have anticipated the Single European Market and had already "discounted" its effects. On the other hand, the implementation of the EMU was expected to change the institutional setting for FDI in a way which was not likely to have been anticipated in the past. Furthermore, United States TNCs used to invest in different European countries in order to hedge against exchange rate fluctuations. Therefore, the removal of exchange-rate uncertainty, the implementation of new fiscal policies, the harmonization of economic institutions and the possible asymmetric real shocks might have created a new set of incentive for United States TNCs to reorient their investment strategies in Europe.[5]

[5] Concerning the policy towards foreign investors, a common approach has been observed in most areas but taxation differences remained.

On the other hand, until the late 1980s, Japanese firms had served the European markets through exporting rather than undertaking FDI. Japanese FDI flows towards European countries increased dramatically in the late 1980s and Japan became the most important overseas investor for the EU. This constituted a major strategic reorientation for Japanese firms. The SMP prompted this strategic shift because of the perceived future difficulties in exporting to the EU and exclusion from the benefits of competition from the transition to the single market.

Our findings for Japanese and United States FDI in the EU support the argument of Buigues and Jacquemin (1994) that the elimination of the non-tariff barriers was a significant reason for the increase of Japanese FDI flows to the EU but a minor one for United States FDI. Our finding concerning the change in the behaviour of Japanese firms also corroborate Balasubramanyam and Greenaway (1992) and Yamada and Yamada (1996) who argued that Japanese FDI flows towards the EU were positively influenced by the SMP.

Finally, it is worth noting that the change in the behaviour of United States TNCs, as well as their Japanese counterparts, with regard to Germany coincides with the re-unification process after the collapse of the East Germany communist regime. United States TNCs seems to precede Japanese TNCs by two years and this may reflect the fact that the United States firms were more prepared to exploit the new opportunities that would emerge in the unified Germany.

5.   Conclusions and policy implications

The aim of this paper was to explore the impact of the two major structural changes that took place in the EU, the establishments of the Single European Market and the EMU, on FDI flows from Japan and the United States to 12 EU countries. We applied the panel LM unit root methodology proposed by Lee and Strazicich (1999, 2004).

The findings of the paper verified the expected change in FDI flows into the EU in anticipation of the establishment of the SMP and EMU. However, the reactions of Japanese and United States firms were not uniform. It appears that the establishment of the SMP affected Japanese firms more while the establishment of the EMU their United States counterparts. This difference in the patterns may reflect the

different strategic orientations of Japanese and United States firms at that time.

United States TNCs, having had a presence in Europe for a long time, were likely to have already discounted the benefits of the single market. Moreover, this strategy facilitated the hedging against exchange rate fluctuations inside the EU. The process towards the EMU and the expectation of a more stable exchange rate and macroeconomic environment together with the possible existence of asymmetric real shocks inside the euro zone, affected their new strategy for investment in the EU.

On the other hand, Japanese firms had followed the strategy of serving the European market through exporting. Hence, the announcement of the creation of a single European market raised fears of a Fortress Europe but at the same time created opportunities. Our findings support the view that Japanese firms accelerated the change in their strategy towards EU countries from export to direct investment after the launching of the SMP in the year 1986.

Our results have significant policy implications not only for the EU but for other regions as well. Literature has shown that economic integration contributes to the reduction of inequality among countries and increases the growth potential. Moreover, economic and monetary integration ensures monetary and price stability. Our findings indicate that integration positively affects the strategy of TNCs to invest in the region. Hence, economic integration could increase the growth potential of the region through enhancing its attractiveness to foreign investors.

Future research should study the impact of the SMP and EMU on the FDI flows within the integrated area and also the impact on inward FDI inflows taking into account pre-integration macroeconomic and growth status of individual countries in the region. Finally, it is worth investigating the question of whether the monetary union has a greater impact in attracting inward FDI in countries where large exchange rate fluctuations and unstable macroeconomic environment had previously prevailed.

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RESEARCH NOTE

The global economic crisis: impact on Indian outward investment

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This article reviews the emerging trends of outward investment flows from India in the period of global slowdown and presents the preliminary findings on the changing behaviours of emerging Indian transnational corporations (TNCs). It shows that during the early 2000s, Indian outward investment registered a faster and sustained growth as an increasing number of Indian firms turned to the global market for growth, technologies and natural resources. However, it displayed a decline in 2008 and the first half of 2009. The global financial and economic crisis appears to have seriously dented overseas expansion plans of emerging Indian TNCs. Indian investment slowdown considerably as Indian firms are faced with declining domestic demand, falling exports, rising debt burden, uncertain and difficult financial markets, and a volatile exchange rate. Deteriorating profit and sales levels of their overseas affiliates are found to have negative impacts on the global performance of a number of Indian TNCs. Nevertheless, as global assets have become cheaper in the crisis period and there are signs of recovery in the domestic demand, Indian foreign investment could regain its growth dynamism in the coming few years.

1.   Introduction

The growth story of the emerging transnational corporations (TNCs) has attracted the world's attention. The emerging countries' outward foreign direct investment (FDI) flows has risen much faster than global FDI flows underpinned by large scale acquisitions of emerging TNCs in the developed region. This has come to signify a new wave of internationalization taking place in the world economy with emerging TNCs posing critical challenges for the incumbent global firms.

Among emerging countries, India's outward FDI continued to surge ahead accompanied by large scale overseas acquisitions by Indian TNCs. Its annual average growth of 98 per cent during the period 2004–2007 had been unprecedented, much ahead of the outward FDI growth from other emerging markets like China (74 per cent), Malaysia (70 per cent), the Russian Federation (53 per cent), and the Republic of Korea (51 per cent), although from a much lower base (table 1). Indian FDI remain buoyant throughout the period 2000–2007 mainly led by a combination of factors like increased liberalization; urgency to acquire additional firm-specific intangible assets; need to secure global sources of natural resources; rising exports; increased competitiveness; easier access to domestic and international finance (i.e. growing corporate bonds and equity markets); liberalization of outward FDI policy; and favorable economic conditions in both the domestic and global economies.

Table 1. Outward FDI from Selected Emerging Economies, 2004–2007

Economies	outward FDI ($ million)				Percentage change (Annual average over 2004–2007)
	2004	2005	2006	2007	
Brazil	9807	2517	28202	7067	1176
India	2179	2978	12842	13649	98
China*	5498	12261	21160	22469	74
Malaysia	2061	2971	6041	10989	70
Russian Federation	13782	12767	23151	45652	53
Republic of Korea	4658	4298	8127	15276	51

Source: Based on UNCTAD (2008) FDI Database.
Note: * excluding Hong Kong, Macao and Taiwan Province of China.

The global financial crisis that started in the late 2007, however, eclipsed the debate of emerging Indian TNCs considerably in 2008. The bursting of the asset bubble in the United States, collapse of western financial institutions and rising insolvency of the global corporate giants resulted in the sharpest contraction in global economic activity. The year 2008 saw global FDI inflows plummeting by 21 per cent (UNCTAD, 2009), and a slowdown in growth of global merchandise trade and GDP to just 2 per cent (down from 6% in 2007) and 1.7 per cent (down from 3.5 per cent in 2007) respectively (WTO, 2009). As per the World Bank, the global GDP and world trade in goods and services is expected to

contract by 1.7 percent and 6.1 per cent, respectively, in 2009 (World Bank, 2009).

The current situation of global economic slowdown, uncertainty and the fragile financial systems are likely to affect Indian TNCs in a number of ways. Persistent fall in global demand and steep export declines are likely to hit hard these Indian firms and it is important to understand the ways they are being affected. How will emerging Indian multinational deal with the global crisis? Will they benefit from the global meltdown – for example, from cheaper asset prices – or become cautious and retreat? This article takes an exploratory look at these questions about Indian TNCs and provides some preliminary evidence.

2.   Indian FDI Falls in 2008 and the first half of 2009

The global economic crisis appears to have turned Indian firms cautious on their global expansion strategy. As a result the actual Indian FDI outflows, which rose to a historic level of $17.8 billion in 2007, fell by 6.3 per cent in 2008 to $16.7 billion (table 2). This is its first absolute decline since 1999. The negative growth of Indian FDI is in line with the worldwide FDI decline but it contrasts with China's doubling of its outward FDI in 2008.[1] The contraction in Indian FDI continues in 2009, falling by 14 per cent to $4.7 billion in the first quarter of the current year.

The differential outward FDI performance between India and China should not be surprising once one take notes of the basic differences that characterize outward FDI flows from these two emerging economies. Unlike state-driven Chinese FDI outflows, Indian FDI has been primarily led by private enterprises except a few public sector firms operating in the energy sector. Despite several Chinese sovereign wealth funds losing billions of dollars in the United States and Europe during the financial crisis in 2008, the Chinese "go global" policy successfully pushed up its FDI outflows, backed by the world's largest foreign exchange reserves of $1.95 trillion. On the contrary, Indian FDI flows, largely driven by market parameters and business opportunities, have been impacted adversely.

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[1]   Davies, K. (2009) 'While global FDI falls, China's outward FDI doubles', *Columbia FDI Perspectives*, No. 5, May 26.

Table 2. Actual Indian FDI outflows, 2008 and 2009

Year	Quarter	FDI in $ million			% change over previous year
		Equity	Loan	Total	
	January–March	3981	1422	5403	20.6
	April–June	1346	451	1797	-65.4
2008	July–September	2640	494	3134	5.4
	October–December	4254	1314	5569	-2.0
	All Quarters (January–December)	12926	3778	16704	-6.3
2009	January–March	4159	488	4647	-14.0

Source: RBI Bulletin, Various Issues.
Note: (i) The equity data do not include that of individuals and banks; (ii) Quarterly figures may not add up to annual totals due to revision in data.

The trend in Indian overseas acquisitions during January–June 2009, as compared to the corresponding period in 2008, further indicates that Indian outward FDI is likely to be under pressure in 2009. Between these two periods, the value of Indian overseas acquisitions fell by 64.7 per cent, from $8 billion to $2.8 billion and their number fell from 140 to 28 (table 3). Clearly, continuously tumbling cross-border acquisitions of Indian firms are driving the significant decline of aggregate Indian FDI of the past year and half. After years of overseas expansions, the Indian firms are consolidating their foreign operations and preparing themselves for reduced business opportunities caused by financial and economic crisis in the global economy.

Table 3. Overseas acquisitions by Indian firms, January–June 2009

Month	Value ($ million)			Number of deals		
	2008	2009	% change over previous year	2008	2009	% change over previous year
January	1304	29	-97.8	28	6	-78.6
February	602	132	-78.1	19	5	-73.7
March	3019	2316	-23.3	23	10	-56.5
April	746	40	-94.6	28	1	-96.4
May	569	54	-90.5	19	4	-78.9
June	1731	243	-86.0	23	2	-91.3
All above months	7971	2814	-64.7	140	28	-80.0

Source: Based on dataset constructed from different reports from newspapers, magazines and financial consulting firms like *Hindu Business Line*, *Economic Times*, *Financial Express*, *Business World*, Grant Thornton India, and ISI Emerging Market.

This 2008 and early 2009 plunge in Indian outward FDI has been asymmetrical across sectors and host regions (tables 4, 5 and 6). Between 2007 and 2008, the acquisition led Indian FDI outflows in primary sector (9.5 per cent) and services (19 per cent) improved, while those in manufacturing sector (-78.9 per cent) declined. These figures suggest that Indian outward FDI in primary and services sector has been more resilient during the crisis than the outward FDI in manufacturing activities. As a result, the share of manufacturing in Indian outward FDI flows has gone down from 83.5 per cent in 2007 to 48.7 per cent in 2008. The share of primary and services sectors in Indian brownfield FDI outflows rose over the last year to 19.6 per cent and 30.8 per cent, respectively.

Within the primary sector, the oil and natural gas segment received increased Indian investment despite the economic slowdown and volatile oil prices. This is primarily because of the state-owned Indian company, Oil and Natural Gas Corporation, continuing its acquisition of overseas oil resources (e.g. the acquisition of Imperial Energy Corporation for $1.9 billion). The mineral resource seeking Indian investment appeared to have taken a beating due to slowdown in global commodity demand and falling mineral prices.

Undeterred by the weak growth prospects and turmoil in the global financial sector, several Indian service companies from information technologies (IT), media and financial services continued their acquisition activities in 2008 with positive outward FDI growth. Indian service outward FDI fell in just two services segments, namely hotels and telecommunication services.

The 2008 fall in Indian manufacturing outward FDI is from a broad range of economic activities. The Indian companies from the metal sector significantly curtailed their acquisition activities in view of drastic fall in steel and iron ore prices in the international market and slowdown of demand from China and other emerging economies. Outward FDI from technology-intensive manufacturing activities such as pharmaceuticals, electrical and non-electrical machinery, and telecommunication equipment also declined in 2008.

By the first half of 2009, the negative impact of global slowdown has spread from manufacturing outward FDI to service outward FDI. The Indian brownfield FDI contracted for the entire range of services

Table 4. Sectoral composition of Indian overseas Acquisitions in 2008 and early 2009

Sector	Value ($ million) 2007 (January–December)	Value ($ million) 2008 (January–December)	% change over previous year	Value ($ million) 2008 (January–June)	Value ($ million) 2009 (January–June)	% change over previous year
Primary	2314 (6.5)	2533 (19.6)	9.5	411 (5.2)	2230 (79.2)	442.6
Agricultural & allied products	10 (0.0)	24 (0.2)	140.0	24 (0.3)		-100.0
Mining	1239 (3.5)	421 (3.2)	-66.0	277 (3.5)	1780 (63.3)	542.6
Oil & natural gas	1065 (3.0)	2088 (16.1)	96.1	110 (1.4)	450 (16.0)	309.1
Manufacturing	29919 (83.5)	6306 (48.7)	-78.9	5394 (67.7)	319 (11.3)	-94.1
Food & beverages	1269 (3.5)	56 (0.4)	-95.6	54 (0.7)		-100.0
Textiles & apparels	126 (0.4)	136 (1.0)	7.9	136 (1.7)	119 (4.2)	-12.5
Paper & paper products		9 (0.1)		9 (0.1)		-100.0
Gems & jewellery	43 (0.1)	40 (0.3)	-7.0	40 (0.5)		-100.0
Rubber & plastic products	65 (0.2)	124 (1.0)	90.8	68 (0.9)		-100.0
Non-metallic mineral products	37 (0.1)	9 (0.1)	-75.7	9 (0.1)		-100.0
Metal & fabricated metal products	22346 (62.4)	162 (1.3)	-99.3	162 (2.0)		-100.0
Machinery & equipment	1351 (3.8)	173 (1.3)	-87.2	152 (1.9)		-100.0
Electrical machinery & equipment	1560 (4.4)	827 (6.4)	-47.0	556 (7.0)	164 (5.8)	-70.5
Transport equipment	475 (1.3)	2758 (21.3)	480.6	2701 (33.9)	32 (1.1)	-98.8
Telecommunication Equipment	757 (2.1)		-100.0			
Chemicals	1117 (3.1)	1427 (11.0)	27.8	1087 (13.6)		-100.0
Pharmaceuticals	773 (2.2)	585 (4.5)	-24.3	420 (5.3)	4 (0.1)	-99.0
Services	3350 (9.4)	3989 (30.8)	19.1	2137 (26.8)	265 (9.4)	-87.6
Business advisory	9 (0.0)		-100.0			
Media & entertainment	81 (0.2)	148 (1.1)	82.7	144 (1.8)	25 (0.9)	-82.6
Hospitality & tourism	521 (1.5)	45 (0.3)	-91.4	45 (0.6)	13 (0.5)	-71.2
Banking & financial services	26 (0.1)	141 (1.1)	442.3	110 (1.4)		-100.0
Telecommunication services	330 (0.9)	84 (0.6)	-74.5	84 (1.1)	26 (0.9)	-69.0
IT & ITES	2383 (6.7)	2565 (19.8)	7.6	786 (9.9)	201 (7.1)	-74.4
Power generation & distribution		1006 (7.8)		968 (12.1)		-100.0
Others	244 (0.7)	126 (1.0)	-48.4	29 (0.4)		-100.0
Grand Total	35827 (100)	12954 (100)	-63.8	7971 (100)	2814 (100)	-64.7

Source: Same as table 3.
Note: Percentage share is in parenthesis.

and manufacturing activities. However, the primary sector remained robust led by continuing increased outward FDI flows from the oil segment and revival of it from the mining sector.

The current decline in Indian outward FDI is widespread among recipients. Among host regions, the fall in Indian brownfield investment was the steepest in the developing region (-78.8%) in 2008, with Asian and Latin American developing economies reporting large diminution. African developing economies weathered the Indian FDI downturn by receiving 69% more of it in 2008 than in 2007. The decline in the developed world (-62%) was concentrated in North America (-75%) and Europe (-53.8%), followed by developed Asia (-100%). The developed Oceania (i.e., Australia) resisted the general decline in Indian FDI with increased inflows in 2008.

Table 5. Regional Direction of Indian Overseas Acquisitions in 2008 and Early 2009

Host Region	Value ($ million)		% change over previous year	Value ($ million)		% change over previous year
	2007 (January–December)	2008 (January–December)		2008 (January-June)	2009 (January-June)	
Developing economies	3234 (9.0)	685 (5.3)	-78.8	496 (6.2)	531 (18.9)	7.1
Africa	111 (0.3)	188 (1.5)	69.4	80 (1.0)	451 (16.0)	463.8
Latin America & Caribbean	232 (0.6)	68 (0.5)	-70.7	68 (0.9)		-100.0
Asia	2891 (8.1)	429 (3.3)	-85.2	348 (4.4)	80 (2.8)	-77.0
Transition economies	37 (0.1)	20 (0.2)	-45.9			
Europe	37 (0.1)	20 (0.2)	-45.9			
Developed economies	32556 (90.9)	12249 (94.6)	-62.4	7475 (93.8)	2283 (81.1)	-69.5
America	14372 (40.1)	3570 (27.6)	-75.2	2313 (29.0)	2046 (72.7)	-11.5
Asia	492 (1.4)		-100.0			
Europe	17579 (49.1)	8122 (62.7)	-53.8	4997 (62.7)	196 (7.0)	-96.1
Oceania	113 (0.3)	557 (4.3)	392.9	165 (2.1)	41 (1.5)	-75.2
Grand Total	35827 (100)	12954 (100)	-63.8	7971 (100.0)	2814 (100)	-64.7
Memorandum item						
Number of host countries	40	42		35	14	
Number of acquiring Indian companies	150	164		109	24	

Source: Same as table 3.
Note: Percentage share is in parenthesis.

<p align="center">**Table 6. Indian Overseas Acquisitions by Selected Host Countries in 2008 and Early 2009**</p>

Host Region	Value ($ million)		% change over previous year	Value ($ million)		% change over previous year
	2007 (January–December)	2008 (January–December)		2008 (January-June)	2009 (January-June)	
UK	15374	5384	-65.0	2681	32	-98.8
USA	12003	3165	-73.6	1932	2045.94	5.9
Canada	1805	405	-77.6	381		-100.0
Indonesia	1124	258	-77.0	258	80	-69.0
Norway	900	302	-66.4	300		-100.0
Singapore	818	39	-95.2	22		-100.0
South Korea	752		-100.0			
Germany	745	812	9.0	554	164	-70.4
Bermuda	564		-100.0			
Israel	489		-100.0			
Netherlands	355	954	168.7	954		-100.0
Brazil	224		-100.0			
Malaysia	133		-100.0			
Australia	113	557	392.9	165	41	-75.2
Mozambique	86	78	-9.3			
France	71	35	-50.7	2		-100.0
Italy	61	272	345.9	187		-100.0
Vietnam	44	2	-95.5			
Russia	37	20	-45.9			
Czech Republic	25	3	-88.0	3		-100.0

Source: Same as table 3.

In early 2009, Indian FDI flows into the developing region recovered due to African sub-region sustaining its attractiveness in the oil and gas sector. Other developing sub-regions continued with sizeable decline in Indian FDI flows. The plunge in Indian brownfield investment also continued in the developed region but the fall was more concentrated in Europe. Interestingly, among the two main epicenters of the financial crisis, the United States and the United Kingdom, which registered large scale decreased inflows of Indian FDI in 2008, the United States sprang a recovery in early 2009 whereas the United Kingdom continued to suffer from declining inflows.

Undertaken mostly by private enterprises, except for a few public sector firms in the energy sector,[2] Indian outward FDI is driven fundamentally by global growth, competition and business opportunities. So it is not surprising that it shrank when market conditions turned adverse in 2008. A number of Indian companies such as Sakthi Sugars, Reliance Industries, Vardhman Polytex, Wockhardt and Suzlon Energy are reportedly wrapping up or disinvesting from some of their overseas affiliates because of the economic meltdown in 2009 (table 7).

Table 7. Illustrative Cases of Overseas Disinvestment
by Indian Firms, 2009

Indian company	Disinvestment detail
Suzlon Energy Ltd.	SEL sold 10% stake in Hansen Transmissions International on January 2, 2009 to raise Rs 600 crore (about $120 million). According to news reports, Suzlon has taken this step because of the tight liquidity situation and its obligation to buy the stake of the Portuguese company Martifer in REpower, Germany.
Sakthi Sugars Ltd.	Sakthi Germany GmbH and Sakthi Sweden AB have filed for bankruptcy and Arvika Gjuteri AB, Sweden, for financial reconstruction. According to a parent company source, these measures were taken on account of the economic meltdown in the US and Europe and the consequent drastic reduction in orders.
Reliance Industries Ltd.	RIL's German affiliate, Trevira GmbH, has started insolvency proceedings. RIL took this step to overcome the impact of the industrial slowdown in Europe, particularly in the automotive and textile sectors, to which it is an important supplier.
Wockhardt Ltd	It has divested its German business Esparma to raise resources to meet the huge FCCB (foreign currency convertible bond) debt burden under the adverse market conditions and liquidity constraints. It is even reported to have put some of its other overseas assets such as Ireland's Pinewood and France's Negma on possible disinvestment route.
Vardhman Polytex Ltd.	VPL has decided to close down its Austrian affiliate, FM Hammerle Nfg GmbH, as a part of business restructuring demanded by the current recession in Europe.

Source: (i) Hindu Business Line (2009) "Suzlon Energy sells 10% stake in Hansen" January 3; (ii) Financial Express (2009) "Sakthi Sugars' European units file for bankruptcy", Feb 06; (iii) Economic Times (2009) "RIL's German textile arm files for bankruptcy", June 4; (iv) Hindu Business Line (2009) "Wockhardt sells German biz Esparma", June 18; (V) Hindu Business Line (2009) "Wockhardt may go in for restructure of biz, subsidiaries"April 01; (vi) BSE (2009) "Corporate communication of Vardhman Polytex", June 23.

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[2]   For a list of large Indian MNEs, see *The Growth Story of Indian Multinationals*, press release, The Indian School of Business (ISB) and the Vale Columbia Center on Sustainable International Investment (VCC), 2009.

3. What led to the Indian FDI downturn?

An important factor in the decline of Indian outward FDI has been the credit crunch in both Indian and overseas markets. The Indian banking sector, which suffered from its exposure to distressed global financial instruments and institutions, adopted a cautious lending policy in 2008 (Pradhan, 2009).[3] This general slowdown in bank lending to the corporate sector led to several domestic and overseas projects being postponed.

In addition, the global financial crisis had a significantly negative impact on other financial sub-sectors like the Indian equity, money and foreign-exchange markets, which has, in turn, restricted Indian firms' access to cheap sources of finance and reduced their profitability. India's benchmark equity index, the Sensex, fell sharply by 48% in December 2008, from its highest ever level reached exactly a year before. Many Indian companies that had acquired overseas units in the recent past, such as Suzlon Energy, Tata Motors and Hindlaco, had to suspend their rights issues and faced difficulties in raising resources. The sudden depreciation of the Indian rupee against the United States dollar in 2008 also led to heavy losses for many export-oriented Indian companies that had acquired long-term forex derivatives.[4]

The overseas debt obligation of Indian companies also increased considerably in terms of domestic currency as a result of sharp currency depreciations and turbulence in equity markets during the crisis period. These Indian firms have raised overseas resources by issuance of foreign currency convertible bonds (FCCBs) to finance their global greenfield projects and acquisitions in the past. Currently, the conversion price of FCCBs at maturity is estimated to be many times greater than their current market prices due to fall in the stock values and many of the FCCBs of Indian firms will be maturing from October 2009. Indian firms such as Subex Azure, Aurobindo Pharma, Hotel Leela, Bajaj Hindustan, Orchid Chemicals, Wockhardt, Firstsource and 3i Infotech were thought to have debt amount with interest greater than their market

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[3]   *Hindu Business Line* (2007) "Banks' loss due to sub-prime crisis put at $2 b", October 06.
[4]   *Business Standard* (2009) "46 companies suffer forex losses of Rs 1,365cr", May 08.

capitalization in the late 2008 and are under severe debt pressure.[5] No wonder companies like Wockhardt are forced to sell off their overseas affiliates in order to overcome the liquidity constraint. The collapse of stock prices of Indian companies has worsened not only their debt situation but also their leverage and faculty to carry on M&As.

Continued falls in export earnings, especially during October–December 2008, further aggravated the condition of export-dependent Indian firms in a large number of sectors, including software, gems and jewellery, leather, textiles, auto parts, pharmaceuticals and food processing. Since exporters are leading outward investors, lower export earnings had a significant impact on Indian outward FDI in 2008. The sudden collapse of commodity prices like crude oil, natural gas and metals also moderated the outward expansion of natural-resource-seeking Indian firms. Finally, anecdotal reports suggest that Indian firms with overseas affiliates – Tata Motors, Bharat Forge, Havells India, Bajaj Auto, Tata Steel, Hindalco, JSW Steel, Punj Lloyd, Tata Communications – have suffered severe consolidated losses in recent quarters on account of their overseas operations.[6]

Indian outward FDI was also adversely affected by the global and domestic slowdown in overall growth. The advanced economies are predicted to see a sharp fall in their aggregate real GDP growth rate from 2.7 per cent in 2007 to 0.85 per cent in 2008 and -3.79 per cent in 2009, signifying further reduction in overseas demand. The real GDP growth within India fell from above 9 per cent during October–December 2007 to just 5 per cent in October–December 2008 (table-8). This has led to an erosion of business confidence, slowing investment and reduced consumption, choking off both the domestic and overseas expansion of Indian firms.

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[5]   *Business Standard* (2008) "FCCB redemptions put India Inc in a Catch 22 situation", October 03.
[6]   *Economic Times* (2009) "Foreign acquisitions: No love across the border", April 20; *Hindu Business Line* (2009) "Subsidiaries reduce profits for 2 out of 5 companies", July 06.

Table 8. India's Real GDP Growth, 2005–2009
(Percentage change over previous year)

Sector	2005–2007*	2007–2008				2008–2009		
		Q1	Q2	Q3	Q4	Q1	Q2	Q3
Agriculture, forestry & fishing	4.7	4.4	4.7	6	2.9	3	2.7	-2.2
Mining & quarrying	5.2	1.7	5.5	5.7	5.9	4.8	3.9	5.3
Manufacturing	10.5	10.9	9.2	9.6	5.8	5.6	5	-0.2
Electricity, gas & water supply	5.4	7.9	6.9	4.8	5.6	2.6	3.6	3.3
Construction	14.2	7.7	11.8	7.1	12.6	11.4	9.7	6.7
Trade, hotels, transport & communication	11.7	13.1	11	11.5	12.4	11.2	10.7	6.8
Financing, insurance, real estate & business services	12.6	12.6	12.4	11.9	10.5	9.3	9.2	9.5
Community, social & personal services	7.1	5.2	7.7	6.2	9.5	8.5	7.7	17.3
GDP Total	9.5	9.2	9.3	8.8	8.8	7.9	7.6	5.3

Source: (i) Press Information Bureau (2009) "Estimates of Gross Domestic Product for the Third Quarter (October-December) of 2008-09"**,** Government of India, 27 February; (ii) RBI Annual Report 2008, Reserve Bank of India, 29 August.

Note: *Quarterly average. Quarters Q1, Q2, Q3 and Q4 denote April-June, July-September, October-December and January-March, respectively.

4.   Crisis and performance of selected Indian TNCs

Table 9 presents sales and profitability performance of 15 Indian TNCs from five economic sectors such as metal, oil & natural gas, information technologies (IT), chemicals and pharmaceuticals. There appear to be distinct growth setbacks to Indian parent companies between the past boom period (2004–2008) and current slowdown period (2008–2009). Taken together, all the Indian parent companies demonstrated sharp decline in their sales and profitability growth. The sales of Indian parent companies rose by just 0.9 per cent in the slowdown period, compared to the more than 27 per cent average achieved in 2004–2008. The growth turns negative in the case of profit, falling from 31.7 per cent in the boom period to -17 per cent in the slowdown period. Although profit margin remain unchanged, the parent companies of Indian TNCs have suffered seriously from contracting domestic and export demand and substantial reversal in profit growth in the slowdown period.

The sharply falling sales and profit growth in the slowdown period relative to the boom period appear to have been the trend for majority

of firms at individual company levels. Among the total 15 firms, sales growth have decelerated for eight firms and sales fell in absolute term for another three companies (Hindalco, ONGC, Firstsource). As many as 10 Indian firms reported negative profit growth rates in 2008–2009, often down from double digit growth figures enjoyed in 2004–2008.

In view of the growing importance of international operation of Indian firms, performance analysis of the parent company excluding affiliates will provide an incomplete picture of firms' overall performance. The listed 15 Indian parent companies in Table-9 together own 797 affiliates abroad and more than 42 per cent of their aggregate assets are located in foreign countries. So it is important to examine the way overseas affiliates are affecting the consolidated performance of Indian TNCs during the ongoing crisis period.

An examination of table 9 reveals that sales and profit growth rates of Indian TNCs were higher on the unconsolidated basis (i.e. only the parent company) than on the consolidated basis (i.e. parent and affiliates) during 2007–2008 to 2008–2009. This is mainly because of the adverse performance of overseas affiliates under the current global crisis. The parent companies' sales growth was 0.9 per cent in 2008–2009 while the rate was 0.5 per cent for the consolidated sales; the negative growth rate of the parent companies' profit (-17.2 per cent) nearly doubles at the consolidated level (-32.8 per cent). The parent companies' profit margin of 24.6 per cent nearly becomes half at the consolidated level (11.9 per cent). In fact, for certain Indian firms like of Hindalco, Wockhardt and Dr. Reddy's, affiliate operations completely wiped out the parent company's positive profits and introduced losses into their consolidated balance sheets in 2008–2009. The parent company's profit of $585 million at Hindalco has turned out to be a consolidated loss of $132 million, Wockhardt's $99 million profit has transformed into $55 million loss on the consolidated basis and Dr. Reddy's $159 million profit has become a consolidated loss of $143 million. JSW Steel and Matrix Laboratories found the parent companies' profit halved on the consolidated accounting.

Overall this suggests that the Indian parent TNCs witnessed sharp declines in their sales and profit growth during the slowdown period. Affiliates' operation has further worsened the global sales and profit growth of Indian TNCs.

Table-9 Performance of Selected Indian TNCs in 2008–09

Company Name	% of assets held abroad	No. of foreign affiliates	Standalone						Consolidated		
			Boom Period (2003–04 to 2007–08)			Slowdown Period (2007–08 to 2008–09)			Slowdown Period (2007–08 to 2008–09)		
			Growth rate (%)		Profit Margin (%)	Growth rate (%)		Profit Margin (%)	Growth rate (%)		Profit Margin (%)
			Sales	Profit		Sales	Profit		Sales	Profit	
Metals & metal products											
Tata Steel Ltd.	78.8	364	21.2	37.0	31.9	7.4	-10.0	30.1	-2.6	-64.2	4.6
Hindalco Industries Ltd.	68.6	49	38.0	36.9	17.6	-16.7	-22.7	14.3	-4.9	-117.8	-0.9
JSW Steel Ltd.	22.7	12	45.9	48.3	20.4	6.6	-76.3	4.8	11.3	-88.7	2.0
Petroleum products											
ONGC Ltd.	17.1	30	21.8	22.0	41.6	-7.6	-17.6	37.4	-6.2	-12.5	29.6
Information technology											
Tata Consultancy Services Ltd.	9.3	58	37.1	42.0	28.2	6.5	-10.7	22.9	6.9	-8.5	22.1
Mphasis Ltd.	64.4	12	77.6	43.6	17.2	35.1	68.2	16.5	21.1	62.8	14.8
Wipro Ltd.	4.5	72	40.5	40.2	22.5	4.4	-11.1	16.9	11.3	6.0	17.7
Firstsource Solutions Ltd.	10.3	15	29.6	128.9	10.8	-2.5	-75.5	2.4	17.1	-69.2	2.9
Chemicals											
Tata Chemicals Ltd.	30.4	7	16.4	43.3	17.9	79.2	-50.4	7.9	77.0	-32.2	7.5
Nirma Ltd.	22.2	7	10.5	-9.9	12.8	13.0	-54.6	3.9	48.2	-20.5	4.7
United Phosphorus Ltd.	14.7	56	20.5	40.5	9.3	38.7	45.3	6.4	15.0	42.0	10.0
Drugs & pharmaceuticals											
Wockhardt Ltd.	50	39	15.5	23.4	26.0	5.8	45.5	30.4	17.8	-146.0	-7.0
Matrix Laboratories Ltd.	43.8	29	20.0	-93.1	9.6	33.5	-186.0	17.1	13.2	-126.1	5.3
Dr. Reddy's Laboratories Ltd.	16.6	31	29.1	194.9	16.1	7.6	8.6	17.4	20.2	-204.8	-9.5
Sun Pharmaceutical Inds. Ltd.	17.1	16	33.5	46.6	36.9	6.6	7.1	33.5	10.7	6.0	45.6
All Above Firms	42.6	797	27.2	31.7	24.6	0.9	-17.2	24.7	0.5	-32.8	11.9

Source: (i) Data on foreign assets and number of overseas affiliates is obtained from Pradhan (2008); (ii) 2009 data on sales and profit before tax were collected from individual company press releases; (iii) Boom period calculations are based on Prowess database; (iv) All the series were converted into US $ million before calculation.

Note: (i) Sales and profit data for Wockhardt and Mphasis is for the year ending December 2008 and the period from 1 April 2008 to 30 September 2008 correspondingly; (iii) Data on foreign assets and number of overseas affiliates for all Indian companies, except Wockhardt, related to the financial year ending March, 2008 and Wockhardt, data is for year ending December 2008; (iv) Boom period data for Tata Consultancy and Firstsource is for 2005–2008 and 2006–2008 respectively.

5.   Conclusion

The global economic crisis has led to a contraction of outward investment activities of Indian firms. The squeezing of liquidity from banking sectors and equity markets, wide volatility in exchange rate, deepening global recession and growing business uncertainty have accelerated slowdown in the Indian outward FDI.

The experience of the selected Indian TNCs shows that their parent sales and profit growth in the current year registered steep fall, mainly as a result of slowdown in the domestic demand and large scale decline in exports. The sales and profit growth were particularly seriously affected on a consolidated basis indicating the difficulty faced by Indian overseas affiliates in dealing with the global crisis. In some cases, crisis-hit overseas affiliates replaced the parent profit by consolidated loss. The squeeze on corporate profits will further make Indian TNCs cautious on their overseas expansion plan.

With the concerns of the global economic crisis still continuing, it is difficult to guess when Indian firms will replicate their past outward FDI performance. The revival of Indian outward FDI is clearly depend on the revival of global and domestic growth, improvements in corporate profitability and the easing of financing from banks and the equity market. The first quarter of 2009 registered stronger GDP growth in India than expected, even though global growth went down. If domestic growth turns out not to be sustainable, however, outward FDI may not recover soon.

In the current crisis period, there might be some positive surprises also such as the recently announced overseas deals of the proposed merger of Bharti Airtel and South Africa's MTN for $23 billion and Sterlite Industries' $1.7 billion revised bid for US-based copper-mining firm Asarco. Moreover, there are some cash-rich Indian firms, including SMEs, that have not undertaken FDI in the past but are interested in internationalizing. These firms are expected to explore acquisitions, given the cheap valuations of foreign assets.

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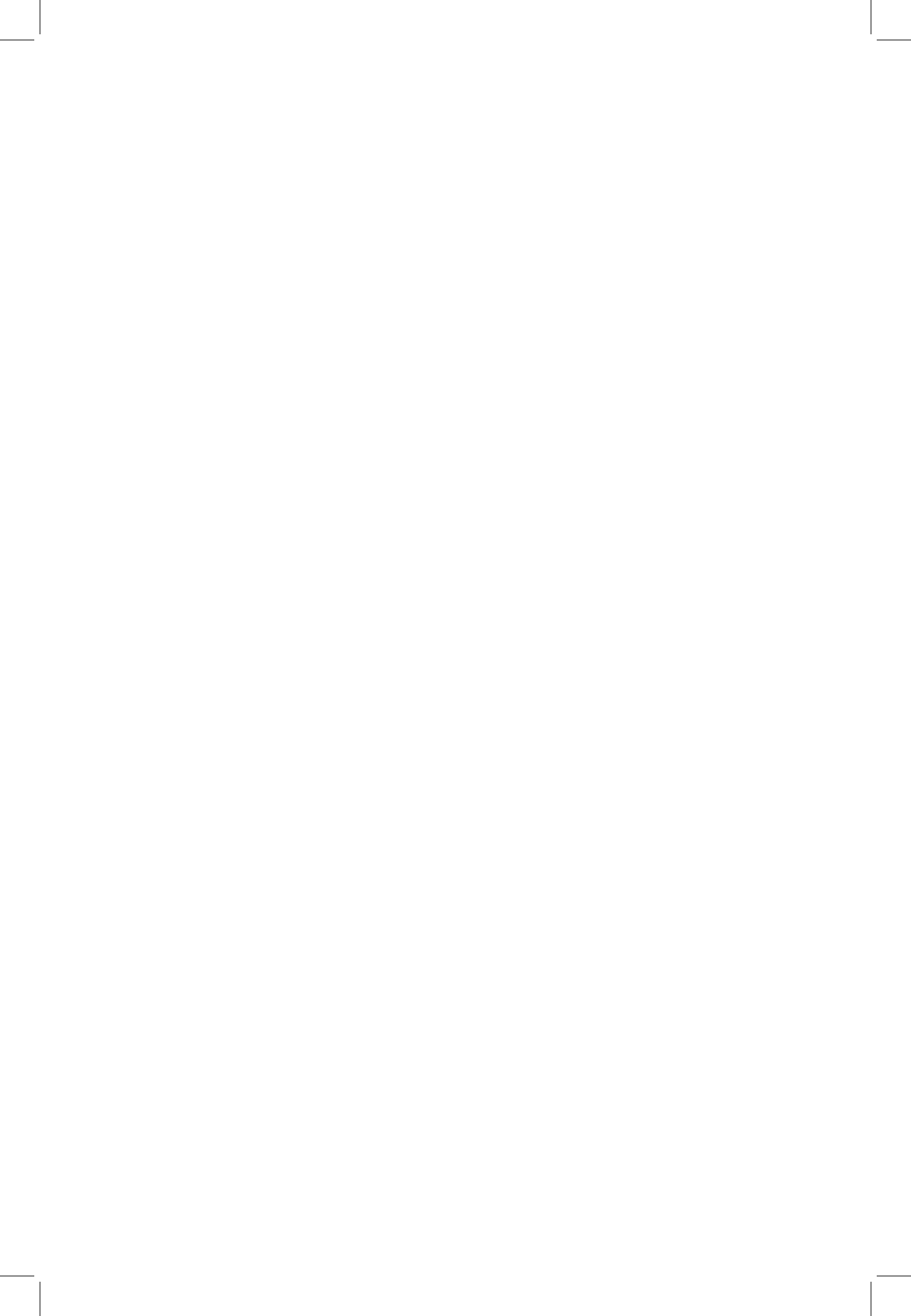
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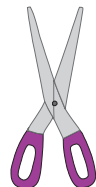
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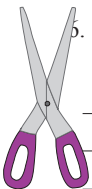
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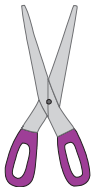Account No. _____   Expiry Date _____

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