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Contents

Outward FDI by Singapore:
a different animal?*

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Singapore's outward foreign direct investment is unique in important respects, even though it shares some characteristics with foreign direct investment undertaken by traditional investor countries. The focus of this investment on manufacturing in lower-income Asian host countries suggests that the motivations and trade repercussions of Singapore's foreign direct investment differ from those of such investment undertaken by major industrialized countries. We apply basic gravity models in order to investigate the relationship between Singapore's outward foreign direct investment and trade and, thereby, to assess whether the concern that outward foreign direct investment has adverse labour market implications are economically founded. We do not find that Singapore's foreign direct investment has replaced exports, but the balance-of-payments effects differ considerably across manufacturing industries.

1. Introduction

The fear that outward foreign direct investment (OFDI) has adverse labour market repercussions for the home economy is widely shared in advanced economies, even though public

concerns are not necessarily grounded on rigorous empirical research. J. P. Agarwal (1997) pointed out that such worries existed in countries such as France, Germany, Japan, and the United States in the mid-1990s and earlier. In the United States, FDI flows to Mexico following the creation of the North American Free Trade Agreement (NAFTA) were supposed to represent a "giant sucking sound" of jobs in the United States. S. Brainard and D. Riker (1997a) as well as M. J. Slaughter (2000) found little evidence to this effect, whereas M. Blomström et al. (1997) as well as R. C. Feenstra and G. H. Hanson (1996) argued that the employment and earning opportunities of less qualified workers are negatively affected by the FDI-induced relocation of production and outsourcing of labour intensive stages of the value chain. In European home countries, the accession of Central and East European countries to the European Union (EU) has fuelled public concerns about the labour market implications of outward FDI. Again, the evidence is mixed. J. Konings and A. Murphy (2001) rejected the hypothesis that the emergence of Central and Eastern Europe as an attractive production location has resulted in an exodus of jobs from European home countries. D. Marin (2004) even found positive employment effects in German parent companies. In contrast, the results reported by S. O. Becker et al. (2005) suggest that cost-oriented German FDI in Central and Eastern Europe substitutes, at least partly, for employment at home.

Against this backdrop, one can reasonably expect that labour market concerns may also arise in major investor countries in the developing world. T.-Y. Chen and Y.-P. Chen (1995) for example, pointed to the risk of de-industrialization in their short account of FDI from Taiwan Province of China. The share of developing economies in the world's outward FDI stocks is still modest (11% in 2003). However, FDI stocks held by developing economies abroad soared from less than $130 billion in 1990 to almost $860 billion in 2003 (UNCTAD 2004; annex table B.4).

This article considers the case of outward FDI from Singapore and assesses its impact on the home country labour

market by analysing the relationship between OFDI and foreign trade. It is for two reasons that this study focuses on the case of Singapore. First, Singapore is one of the most important outward investors in the developing world. Second, its FDI stock is concentrated in lower-income host countries. The debate in advanced economies suggests that this may result in de-industrialization and the outsourcing of jobs by replacing exports and increasing imports.

The rest of this article is organized as follows. The development of Singapore's OFDI and important FDI characteristics are described in section 2. It is shown that the Government's FDI policy forms an important part of its efforts to support the international competitiveness of Singapore. In section 3, we summarize the recent literature on the relationship between FDI, trade and domestic labour markets. A review of the literature suggests that trade effects as well as labour market implications depend on the type of FDI involved. In addition, we briefly present empirical findings for more advanced investor countries. Section 4 introduces the gravity model, which draws on previous studies analysing the possibility of negative effects of OFDI on a home country's balance of payments and its labour market. The critical question is whether OFDI and trade are complements or substitutes. We are particularly interested in finding out whether the complementary relationship between FDI and trade shown in several studies for advanced economies also holds for developing countries such as Singapore, where outward FDI is a more recent phenomenon. Furthermore, we analyse whether the FDI-trade relationship differs across manufacturing industries in order to account for the heterogeneous nature of FDI. Empirical results are presented in section 5. In section 6, we conclude that OFDI by Singapore has not replaced exports. While labour market concerns seem to be unfounded for the Singaporean economy as a whole, the balance-of-payments effects of Singapore's FDI differ considerably across manufacturing industries. Moreover, the case of Singapore is shown to be unique in several respects, even though it shares important characteristics with FDI undertaken by major industrialized countries.

2. Singapore's OFDI: stylized facts and the role of government policy

Developing economies hosted 28% of worldwide inward FDI stocks in 2003 (UNCTAD 2004, annex table B.3). Their share in the world's OFDI stock continues to be comparatively small. However, the increase in outward FDI from developing economies has outpaced the world average since 1990 (table 1). In particular, some developing economies in Asia have emerged as important direct investors. While Hong Kong (China) was clearly in the lead among them, Singapore ranked second, followed by Taiwan Province of China, China and the Republic of Korea in 2003. In terms of cumulative FDI flows during the period 1995-2001, Singapore ranked second among all source countries in Malaysia and Myanmar, and third in Brunei Darussalam, the Philippines, Thailand and Viet Nam (ASEAN Secretariat 2002).

Table 1. Outward FDI stock of developing economies, 1990 and 2003

(Per cent of worldwide stock)

			Developing economies				
Year	All	in Asia	Hong Kong (China)	Singapore	Taiwan Province of China	China	Republic of Korea
1990	7.3	2.8	0.7	0.4	0.7	0.1	0.1
2003	10.5	7.8	4.1	1.1	0.8	0.5	0.4

Source: UNCTAD (2004).

Singapore's total OFDI stock rose almost ninefold in the period 1992–2003 (figure 1). This development was supported by the Government, which encouraged OFDI and assisted direct investors in various ways, in order to promote the country's global reach. The Government began to pay explicit attention to OFDI after the recession in the mid-1980s. The International Direct Investment Programme was approved in 1988. Direct investors were offered tax incentives and financial support for evaluating FDI opportunities (Okposin 1999). The Committee to Promote Enterprise Overseas was set up in 1993; this

Committee made various suggestions aimed at facilitating overseas ventures (Tan 1995/96).

The Government considered OFDI an essential means to preserve international competitiveness through structural change and industrial upgrading (Aggarwal and Agmon 1990, p. 167; Lecraw 1985; Sithathan 2002). This meant that lower-end industrial activities were supposed to move to locations with lower labour and land costs, while more human capital-intensive and technology-intensive stages of the production process were to be retained in Singapore. Therefore, vertical (or efficiency-seeking) FDI, which tends to be motivated by cost considerations and is characterized by fragmented value chains, can be expected to constitute at least part of total OFDI.[1]

Lower-income countries in Asia, especially China, India and various South-East Asian countries, were emphasized as

Figure 1. Singapore's FDI stock abroad, 1992–2003
(Billion, Singaporean dollars)
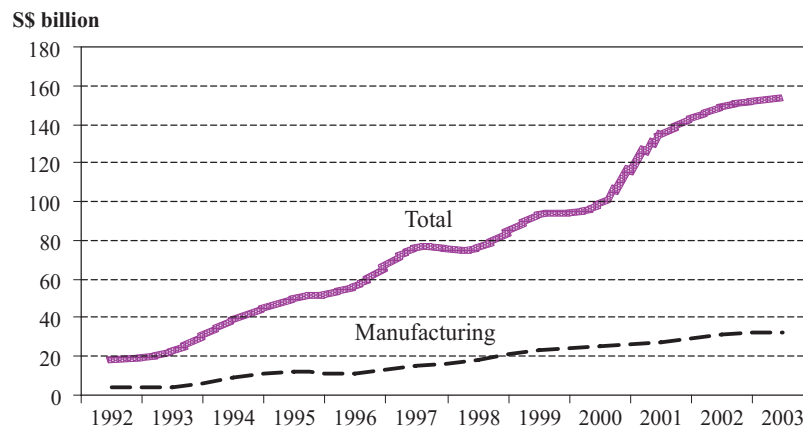
Source: Singapore, Dept. of Statistics (var. iss.).

[1] In contrast, so-called horizontal (or market-seeking) FDI is motivated by considerations of access to local markets. However, the analytical differentiation between different types of FDI is often blurred. For example, FDI undertaken in developing economies offering attractive markets may be motivated by both cost and market considerations. China represents an obvious case in point.

major target countries. For example, in the context of the Government's regionalization strategy, Singaporean investors are granted preferential treatment, and the Government is heavily involved in setting up industrial parks and infrastructure projects in China, India, Indonesia, and Viet Nam.[2] At the same time, the Government encouraged FDI in advanced industrialized countries to facilitate the acquisition of new technology. Government-linked companies were occasionally used as spearheads in this process.

The financial industry accounts for more than half of Singapore's overall OFDI stock (figure 2). Other services contributed another 17% in 2003. As we show in section 5 below, the gravity-model results depend on whether financial and other services are included in the estimation. One might suspect that the prominence of FDI in services limits adverse labour market repercussions of Singapore's OFDI. FDI in the services sector has traditionally been considered market-seeking, and the non-tradability of many services precludes the replacement of exports by FDI.[3] However, the recent experience of advanced economies suggests that outsourcing has gained momentum in services industries, too, especially in banking.[4] It should also be noted that a sizeable part of Singapore's OFDI is accounted for by holding companies. Holding companies may be engaged in manufacturing activities, but it is unknown to what extent this is the case.

Singapore's OFDI stock in the manufacturing sector, which is the focus of our empirical analysis in sections 4 and 5 below, increased by roughly the same proportion as its total FDI stock (figure 1). Excluding financial services, FDI in manufacturing figured most prominently, with 47% of the remaining FDI stock in 2003. In Asian host countries, the corresponding share of the manufacturing sector was 53%. Again, government policy is a major factor in explaining Singaporean FDI in manufacturing.

[2] See, for example, Yeung (1999).
[3] See, for example, UNCTAD (1998, p. 113).
[4] A disaggregated analysis of whether Singapore's balance of payments and its labour markets were affected by OFDI in the services sector is not possible because of the lack of data on trade in services.

National development strategies favoured technology intensive and high value-added manufacturing in Singapore in order to transform the country into a coordination centre for regional production networks in Asia (Yeung 2001). This is likely to have resulted in vertical FDI. At first sight, this proposition seems to be in conflict with surveys on the motives underlying Singapore's OFDI. Survey results point to market presence as the most important driving force of Singapore's FDI (Yeung

Figure 2. Sector and regional structure of Singapore's FDI stock abroad, 1992 and 2003

(Per cent)

Source: Singapore, Dept. of Statistics (var. iss.).
[a]   Commerce; transport, storage and communications; business services.
[b]   Including Latin America.
[c]   Australia and New Zealand.
[d]   Of which 93% in finance.

2001). However, cost considerations turned out to be of greater importance for FDI in neighbouring Asian host countries, compared to FDI in economically advanced host countries in Europe and North America.[5]

The regional and industrial composition of OFDI may provide first clues as to whether Singapore's FDI differs from that of major investor countries, such as the United States, Japan, Germany, and the United Kingdom (table 2). As noted before, the structure of Singapore's FDI differs from others in that the financial sector plays a dominant role. Taking financial and other services together, however, the share of the services sector in Singapore's OFDI is similar to that of Germany and the United States. It is only in the total FDI stock held by the United Kingdom that the share of manufacturing is substantially higher than it is for Singapore (32% versus 21%).

In several respects, the regional structure of the FDI stock reveals striking differences between Singapore and major investor countries:

- The concentration of Singapore's FDI in Asia is almost as pronounced as the concentration of German and British FDI in Europe. This contrasts sharply with Japanese FDI, for which the Asian region is of minor importance.
- The focus on Asia is even stronger for FDI in the manufacturing sector. More than 90% of Singapore's FDI stock in manufacturing was located within Asia in 2003 (Singapore Department of Statistics, var. iss., 2003).
- In contrast to the European pattern, the focus of Singapore's FDI on Asia cannot largely be attributed to institutionalized regional integration. Member countries of the Association of Southeast Asian Nations (ASEAN) hosted just about one fifth of Singapore's total FDI stock, or less than half of the stock accounted for by all Asian

[5] Moreover, cost considerations may be understated in the survey results presented by Yeung (2001). Labour-intensive manufacturers appear to be under-represented in the sample. The sample consists mainly of technologically advanced manufacturers and service providers for whom labour costs constituted a relatively small fraction of total operational costs.

countries. For FDI in manufacturing, there has been a considerable shift from ASEAN host countries to other Asian countries since 1992. This was mainly because of the declining importance of Malaysia. Though still the second largest recipient of manufacturing FDI from Singapore (behind China), Malaysia's share in total FDI stock in this sector dropped from 51% in 1992 to 16% in 2003. ASEAN countries together accounted for 38% of the FDI stock in manufacturing in 2003, compared to 53% for other Asian countries (Singapore, Dept. of Statistics, var. iss., 2003).

• Most importantly, developing economies, which are economically less advanced than Singapore, host more than 80% of Singapore's FDI stock, compared to less than

Table 2. Structure of OFDI stock: Singapore compared to major home countries, recent years

(Per cent of total stock)

Item	Singapore[a]	Japan[b]	Germany[c]	United Kingdom[c]	United States[b]
Sector structure					
Manufacturing	20.8	n.a.	19.4	31.7	25.8
Financial activities	55.8	n.a.	17.0	13.9	19.6
Other[d]	23.4	n.a.	62.9	54.4	54.6
Regional structure					
Region of home country[e]	49.3	19.1	55.7	60.2	20.3[h]
Regional integration scheme[f]	22.0	n.a.	47.5	54.2	13.8
Developing economies[g]	82.3	26.5	13.7	12.6	31.7

Source: OECD (2003); Singapore, Dept. of Statistics (var. iss., 2003).
[a] 2003.
[b] 2002.
[c] 2001.
[d] Including other services, real estate, primary sector and unspecified.
[e] Asia for Singapore and Japan; Europe for Germany and the United Kingdom; The Americas for the United States.
[f] ASEAN for Singapore; EU for Germany and the United Kingdom; NAFTA for the United States.
[g] Non-OECD countries plus Czech Rep., Hungary, Rep. of Korea, Mexico, Poland and Slovak Rep. for all home countries except Singapore; for Singapore: Asia (except Japan), European countries other than EU and Switzerland, Latin America and the Caribbean and unspecified.
[h] Note that 19% of FDI stocks are "unallocated", a significant proportion of which is likely to be located in Latin America, especially the Caribbean.

one-third in the case of United States FDI. The difference is even larger when comparing Singapore to major European investor countries.

The structural characteristics of Singapore's OFDI can be attributed, at least partly, to the unique combination of the country's well-known openness to foreign trade and FDI inflows on the one hand, and the strong guidance by the Government with regard to OFDI on the other. Most of the FDI undertaken by industrialized countries in other industrialized countries seems to be of the horizontal type, whereas the regional structure of Singapore's FDI supports the proposition that vertical FDI is more prominent.[6] Cost considerations tend to be more important when undertaking FDI in lower-income countries. As a result, market-related determinants of FDI, such as population size and per-capita income in host countries, may have less impact on Singapore's FDI than on FDI by major industrialized countries. Another difference concerns the role of institutionalized regional integration, which, in contrast to FDI by European investor countries, does not appear to have stimulated Singapore's FDI.[7]

Thus, Singapore's FDI has several unique characteristics that may have an impact on the trade implications of OFDI. The Government supported OFDI, and government-linked companies played an important role in that regard. While this seems to be similar to what can be observed for OFDI by countries like China, governments in various (developing and industrialized) countries tend to discourage outward FDI.[8] The ownership structure of Singapore's OFDI also differs from that of FDI by other home countries in that a large proportion of Singapore's FDI originates from companies in which foreign-

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[6] Markusen and Venables (1998, p. 184) noted that "a large proportion of direct investment is two-way investment among similar developed economies". According to Carr et al. (2001, p. 693), horizontal firms seem to be more prevalent in the world. The review by these authors of various studies reveals strong support for the theoretical prediction of models of horizontal FDI, according to which FDI is concentrated among countries that are similar in size and per-capita income.

[7] See Buch et al. (2003) for the role of regional integration with regard to FDI within the EU.

based TNCs have major stakes (Ramstetter 1996). According to Singapore, Dept. of Statistics (var. iss.), foreign affiliates accounted for almost half of Singapore's total OFDI in 1998; their share declined to 35% in 2003.

The literature on OFDI by developing economies says little on trade and labour market implications in developing home countries at different stages of development.[9] Earlier studies such as Sanjaya Lall (1983) focus on the propensity and motives for investing abroad, the patterns and characteristics of outward FDI, and the competitive edge of transnational corporations (TNCs) based in several developing economies, whereas home-country effects are hardly addressed. Likewise, home-country effects do not receive much attention among the issues discussed by K. M. Khan (1986, pp. 11-12) and K. Kumar (1981, p. XVI). Lall (1998) provides a short account of the possible benefits developing economies may derive from outward FDI, but does not provide empirical evidence. UNCTAD's review of the home-country impact of outward FDI almost exclusively draws on evidence from industrialized countries, as "the developing-country experience has not yet received proper research scrutiny" (UNCTAD 1993, p. 77). For trade and balance-of-payments effects, J. P. Agarwal (1986) and Donald T. Lecraw (1981) represent notable exceptions:

• Agarwal's study on India concluded that the contribution of TNCs based in India to its exports and balance of payments was positive, even though about half of the product categories analysed provided evidence of export replacement.

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[8] With regard to developing economies, UNCTAD (1993, p. 82) observed that inward-oriented countries imposed tighter controls and approval requirements on outward investors than outward-oriented countries. For example, Indian regulations prohibited outward FDI in the form of cash, rather than transfers of capital goods or know-how (Agarwal 1986, p. 192). See also Lipsey (2002, p. 7) on regulations applied by the United States until the mid-1970s, specifically aimed at reducing the outflow of capital for United States direct investment.

[9] See also UNCTAD (1993, chapter III), according to which the impact of outward FDI on the development process of home countries has been largely neglected in the literature.

- Lecraw (1981) suggested that the impact of TNCs based in developing economies on both home and host economies may differ from the impact of TNCs based in industrialized countries. He found, *inter alia*, that the sample of 23 developing-country firms that had invested in ASEAN countries imported less foreign inputs and exported less of their output than firms from industrialized countries.[10]

In the subsequent sections, we follow Lecraw (1981) and address the question of whether the home-country impact of Singapore's OFDI differs from that of FDI by major OECD countries. There are several reasons for taking this approach. As noted before, the empirical evidence on the trade implications of OFDI by developing countries is extremely limited. For Singapore, earlier studies, such as Lecraw (1985, p. 399), could provide only weak evidence due to sparse data on OFDI. Moreover, previous findings may no longer apply. In earlier studies, OFDI by developing economies was typically shown to be low-tech, small-scale, labour intensive, and concentrated in mature markets with standardized, low-quality products and strong price competition (UNCTAD 1993, p. 16). More recently, however, TNCs from developing economies appear to have acquired skills and experience that allow them to compete with TNCs from industrialized countries. Dunning et al. (1996) argued that there has been a fundamental shift in the character and motivation of OFDI from developing economies that have proceeded along their so-called investment development path. UNCTAD (1993, p. 72) noted that "the 'new breed' developing-country TNCs broadly resemble its developed-country counterpart." Such observations would apply to TNCs from Singapore, which is one of the most advanced developing economies.[11] Hence, the subsequent analysis of the trade implications of Singapore's OFDI, and the related labour market concerns that may arise, attempts to fill an important gap in the empirical literature on OFDI by developing economies.

[10] In another study on OFDI by Indonesian firms, Lecraw (1993) showed that the performance of foreign investors improved after FDI had been undertaken, e.g. in terms of exports and cost of production.

[11] Singapore's per-capita income of $21,200 in 2003 amounted to 82% of the average per-capita income of high-income OECD countries.

3. Analytical background and previous findings

The recent literature on the motives and consequences of FDI by industrialized home countries offers important insights on possible trade and labour market implications. Theoretical models have been developed for two types of FDI, which are supposed to have different trade and labour market effects in the home country:

- Companies undertaking *horizontal* FDI produce the same goods and services in their home country and in the host countries.[12] This type of FDI is motivated by trade barriers, transportation costs and other transaction costs that discourage exports (Carr et al. 2001). FDI is a means to avoid such costs. Horizontal FDI is driven by market considerations. That is why this type of FDI is also known as market-seeking FDI (UNCTAD 1998, p. 91).
- Companies undertaking *vertical* FDI fragment the production process geographically and locate specific stages of the value chain in countries offering relevant cost advantages.[13] This type of FDI is motivated by cost considerations. Investors take into account the differences in factor prices across countries (Markusen and Zhang 1999). FDI of this type is also known as efficiency-seeking FDI (UNCTAD 1998, p. 91).

D. Marin et al. (2003) argued that relatively advanced home countries may suffer from adverse effects on the labour market if OFDI is of the vertical type. This is because an investor relocates the relatively labour-intensive stages of production to lower-income countries, thereby reducing the demand for unskilled workers in the home country. In contrast, these authors do not expect horizontal FDI to have effects on wage inequality or employment opportunities in the home country. However, the labour market implications of FDI are not easy to generalize. For instance, the employment effects of vertical FDI depend on

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[12] For an early model of horizontal FDI, see Markusen (1984); more recent models include Markusen and Venables (1998, 2000).
   [13] For an early model of vertical FDI, see Helpman (1984); see also Helpman and Krugman (1985).

whether the cost reduction associated with such a strategy results in an overall expansion of the investing company, including complementary operations at home (Becker et al. 2005). On the other hand, FDI that appears to be horizontal may affect employment prospects if foreign production negatively affects the production of the same goods produced at home.[14] In other words, the counterfactual of what would have happened in the absence of OFDI is difficult to establish for both types of FDI.[15]

For practical purposes, the composition of sales by the foreign affiliates of TNCs has been suggested as a criterion for distinguishing the type of FDI (Hanson et al. 2001; Marin et al. 2003). FDI is considered horizontal if foreign affiliates sell their output (almost) exclusively in the host country. In contrast, a high share of affiliate sales destined for markets other than the host country is taken as an indication of vertical FDI. Especially if a substantial share of the output of foreign affiliates is exported back to the home country of the investor, the foreign engagement of this investor can be regarded as vertical.

Gravity models are widely used in the literature on the determinants of FDI and trade. As noted by A. Deardorff (1998), this class of models first appeared in the empirical literature on bilateral trade flows without much serious attempt to justify them theoretically. However, Deardorff showed that even simple gravity models can be derived from standard trade theories. Specifications used in the empirical literature vary, but population, per-capita income and geographical distance (hence the allusion to Newton's theory of gravity) are typically included as explanatory variables. The first two variables are representative of market size and effective demand, while distance serves as a proxy for transportation and other trade costs.

Based on a similar line of reasoning, gravity models are also applied to analyse bilateral FDI (Mutti and Grubert 2004).

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[14] See Nunnenkamp (2004) on the relocation of German automobile production to Central European countries.

[15] This is also because of indirect effects such as the possible replacement of domestic investment by FDI. Feldstein (1994) found support of this being a one-to-one substitution effect.

This approach, which we follow in section 4 below, clearly has some limitations. Similar to the case of trade, FDI is supposed to be attracted by local market size and effective demand, proxied by population and per-capita income. However, the impact of per-capita income is ambiguous in the case of FDI. While horizontal FDI should be stimulated by higher effective demand in the host country, host countries with lower per-capita income may offer cost advantages and, thus, attract vertical FDI.[16] Likewise, the impact of the distance variable is not as clear-cut as in the case of trade. On the one hand, FDI flows to distant countries may even be encouraged if distance acts as a deterrent to trade in the first place. On the other hand, FDI should decline to the extent that distance is associated with higher costs of coordinating and managing foreign affiliates due to, for example, costs related to language and cultural differences (Mutti and Grubert 2004). Finally, simple gravity models ignore various other factors that may have an impact on FDI decisions, such as taxation, exchange rate volatility, political risk and bilateral investment treaties.[17]

The limitations of gravity models in explaining FDI decisions are less serious in the present context, as our focus is on the trade implications of OFDI. We follow Edward M. Graham (1996) as well as M. Kawai and S. Urata (1998), who combine gravity models for trade and FDI. In this way, it can be assessed whether OFDI is complementary to a home country's imports from the respective host country. At the same time, it is possible to evaluate whether OFDI is associated with higher exports of the home country to the host country, or rather

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[16] Differences in per-capita income between the home country of foreign investors and the host country tend to be associated with differences in the endowment of skilled labour. A relative abundance of less skilled labour in the host country can be expected to give rise to vertical FDI, as foreign investors outsource relatively unskilled labour intensive parts of the value chain (Carr et al. 2001).

[17] Mutti and Grubert (2004) focus on taxation; they find that United States-owned foreign affiliates are particularly sensitive to host-country taxation if FDI is export oriented. Grosse and Trevino (1996) show, inter alia, that FDI in the United States is negatively affected if the home base of the foreign investor is culturally and geographically distant from the United States, and if the currency of the home country depreciates against the dollar.

replaces exports. The argument that OFDI has adverse labour market repercussions would appear weak if its relationship with the home country's exports was complementary and if a complementary relationship with the home country's imports did not exist. On the other hand, it would appear more likely that OFDI has adverse effects on the labour market if it was associated with both rising imports and declining exports.

Early theoretical models suggested that trade and FDI are perfect substitutes (Mundell 1957). However, more recent studies, such as James R. Markusen (1983), have demonstrated the theoretical possibility that FDI and trade are complements rather than substitutes. Therefore, the relationship between FDI and job opportunities at home is indeed an empirical question. Numerous empirical studies have failed to support R. Mundell's "perfect substitution" theory, pointing instead to a complementary relationship between FDI and trade.[18] Major findings summarized in the remainder of this section provide a useful benchmark against which to compare the case of Singapore.

P. Brenton et al. (1999) explored the deepening economic integration between the EU and Central and Eastern European countries. Their estimations based on aggregate bilateral flows of trade and FDI indicate that the relationship between the two is complementary. M. Kawai and S. Urata (1998) reported similar results for Japan's trade and investment. After finding support for a complementary relationship at the aggregate level, these authors investigated different industries within the manufacturing sector. The relationship between exports and FDI turns out to be complementary in all manufacturing industries except for wood and pulp, for which the relationship is

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[18] For a concise review of the literature on OFDI and home-country exports, see Lipsey (2002, pp. 7-14). Well-known studies include Lipsey and Weiss (1981, 1984), who found that exports and foreign production by United States firms were, for the most part, complementary; Lipsey et al. (2000), who show that, in the minority of Japanese industries where any relationship between foreign production and exports could be discerned, the relation was positive.

substitutive.[19] Interestingly, the significance of per-capita income as an explanatory variable also varies considerably between industries, underscoring the need for examining the relationship between specific types of FDI and trade. C.M. Buch et al. (2003) provided further evidence to this effect. Investigating firm-level data of German FDI, they found that the determinants of FDI vary significantly between industries, while the overall relationship between FDI and trade was shown to be complementary.

According to Edward M. Graham (1996), the relationship between FDI and trade is also affected by the host region in question.[20] His estimates indicated that United States FDI and trade are complements in Europe and East Asia, but substitutes within the Americas. Graham interpreted this result as being a legacy of Latin American import substitution policies. A similar substitutionary relationship is found for Japan's relations with Indonesia. The importance of location is also emphasized by S. Brainard and D. Riker (1997a, 1997b). These authors estimated the elasticity of substitution between employment in the parent company and their foreign affiliates, as well as that among affiliates. The elasticity of substitution between parent firm and affiliate employment was shown to be very small. While there was a high degree of substitution between affiliates in developing countries, the relationship between employment in industrial-country affiliates and in developing-country affiliates turned out to be complementary. Magnus Blomström et al. (1997) showed that overseas investment in developing countries by United States firms replaced domestic employment, whereas investment in developed countries did not. Replacement effects were limited to production workers. The finding that the employment effects of FDI differ between skill categories of workers implies that

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[19] This is in line with Agarwal (1997), who considered it unlikely that employment in the home country is affected equally in every industry by FDI outflows.

[20] Graham (1996) also reviewed earlier empirical studies on the trade effects of FDI, almost all of which find that home-country exports tend to increase along with FDI.

FDI has important consequences for income distribution. This was also emphasized by Feenstra and Hanson (1996).[21]

According to Lipsey (2002, p. 12), positive associations are more common in the empirical literature on the effects of OFDI on home-country exports. At the same time, the author stressed "the frequency of results indicating no association in either direction". This ambiguity is probably because the export effects differ across host countries, industries and the types of OFDI. For instance, Lipsey (2002) supposed export substitution to be more likely for horizontal FDI in the manufacturing sector than for vertical FDI. This view contrasts with D. Marin *et al.* (2003) who, as noted before, argued that home countries may suffer adverse labour market repercussions if OFDI is of the vertical type.

The gravity models applied in many of the above-mentioned studies are similar in that the model specification is rather basic. An extended model is presented by D. L. Carr et al. (2001), who argued that the existence of trade costs and different factor intensities call for a model encompassing both horizontal and vertical FDI. The so-called knowledge-capital model incorporates the skill ratios of countries as well as indices of perceived trade and investment costs as additional explanatory variables. Other methodological improvements are suggested by P. Egger and M. Pfaffermayer (2001), C. Carrère (2004) and B. A. Blonigen et al. (2004).[22]

These recently developed models are more in line with microeconomic theories of the firm; their theoretical foundation is clearly superior to basic gravity models. However, we use

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[21] According to Feenstra and Hanson (1996), United States FDI in Mexico raised the demand for skilled workers in the United States, thus raising the relative wage of skilled labour and worsening income distribution, while the reverse occurred in Mexico.

[22] Blonigen et al. (2004) employed spatial econometric techniques to analyse the pattern of United States FDI in OECD countries. They take into account the potential interdependence between FDI decisions with respect to alternative host countries. Empirical findings point to an export-platform motivation of United States FDI in Europe.

basic specifications of the gravity model in the subsequent analysis of Singapore's OFDI. This is mainly because the data needed for applying the knowledge-capital model are not readily available for Singapore and the host countries of its FDI. Moreover, most studies based on the knowledge-capital model use aggregate trade and FDI data, while we aim at a disaggregated analysis. Finally, the results of basic gravity models reported above are largely consistent with the results of extended models, thus providing a reasonable benchmark to which we can compare the case of Singapore.

4. Approach and data

In the first step of our analysis, we employ a basic gravity model of FDI. Two different specifications are used, following Kawai and Urata (1998) (equation 1) and Brenton et al. (1999) (equation 2), respectively:

(1) $\ln(\text{FDI}) = \beta_0 + \beta_1 \ln(\text{population}) + \beta_2 \ln(\text{GDP/cap}) + \beta_3 \ln(\text{distance}) + \beta_4 \ln(\text{FDI}_{(-1)}) + \varepsilon;$

(2) $\ln(\text{FDI}) = \beta_0 + \beta_1 \ln(\text{population}) + \beta_2 \ln(\text{GDP/cap}) + \beta_3 \ln(\text{distance}) + \varepsilon.$

In the next step, we use the same approaches to estimate whether the relationship between Singapore's FDI and trade is complementary or substitutionary:

(3) $\ln(\text{trade}) = \beta_0 + \beta_1 \ln(\text{population}) + \beta_2 \ln(\text{GDP/cap}) + \beta_3 \ln(\text{distance}) + \beta_4 \ln(\text{FDI}_{(-1)}) + \varepsilon;$

(4) $\ln(\text{trade}) = \beta_0 + \beta_1 \ln(\text{population}) + \beta_2 \ln(\text{GDP/cap}) + \beta_3 \ln(\text{distance}) + \beta_4 (\text{residualsFDI}) + \varepsilon.$

In the above equations, "trade" stands for bilateral imports or exports. "Population" refers to the number of inhabitants in Singapore's partner countries, and "GDP/cap" to their per-capita income. "Distance" is measured by the number of kilometres "as the crow flies" between Singapore and the partner country's capital (except for the United States, where Indianapolis, Indiana, is regarded as the economic centre). "$\text{FDI}_{(-1)}$" represents the lag of Singapore's FDI stock in the partner country. Finally, the variable "residuals FDI" refers to the residuals obtained from

equation (2). According to Graham (1996), the coefficient of "residuals FDI" reflects a causal relationship between FDI and trade flows. A positive coefficient would suggest complementarities in production or distribution, and a negative coefficient substitutability due to, for example, outsourcing and relocation. Similarly, a positive (negative) coefficient of lagged FDI stock would suggest a complementary (substitutionary) relationship.

In additional estimations, we include dummies for ASEAN members and members of the Asia-Pacific Economic Cooperation (APEC) to test for the effect of regional trade and cooperation agreements. We also consider the population share of ethnic Chinese in the host countries of Singapore's FDI in order to assess the impact of Chinese networks. As shown by J. E. Rauch and V. Trindade (2002), such business networks reduce the psychological distance between countries and may have considerable effects on trade and investment patterns.[23]

The two alternative approaches of Kawai and Urata (1998) and Brenton et al. (1999) have different limitations. Hence, both approaches are considered in order to check the robustness of results. The two approaches differ in the way they make use of the available data. Kawai and Urata allow for using an uneven panel of data.[24] In contrast, the approach of Brenton et al. is

[23] Furthermore, we ran estimates with an additional dummy for bilateral investment treaties (BITs) concluded between Singapore and various partner countries, based on information provided by UNCTAD (http://www.unctad.org/fdistatistics). However, the promotion and protection of investments offered by BITs never turned out to be significantly positive. This may be because the BITs Singapore had agreed to with a highly diverse group of countries differed in terms of qualitative content. Note also that UNCTAD (1998, p. 117) considers it unreasonable to expect a significant impact of BITs on FDI flows. Hence, results of estimates including the dummy for BITs are not reported in the following.

[24] This is useful for the case of Singapore. The number of observations available per partner country ranges from two to eleven, which is due to an imperfect overlap between trade and FDI data. Our analysis covers the period 1992-2002. Hence, we have a maximum number of eleven observations for host countries for which statistical authorities in Singapore report both FDI and trade data for each year. The number of observations declines if either FDI data or trade data are missing for a particular year.

based on average values for all available years. This translates into higher significance of the results obtained with the approach of Kawai and Urata. As shown below, however, the results of both approaches are fairly similar.

Trade data are obtained from several editions of the International Trade Centre's PC-TAS CD-Rom. Data on FDI stock are from Singapore's Department of Statistics (DOS var. iss.). Population figures are taken from the United States Census Bureau's International Data Base (http://www.census.gov/ipc/www/idbnew.html) and GDP figures from the IMF, except for Brunei in which case the data are taken from UNCTAD. The population share of ethnic Chinese is based on estimates for 2002 by Ohio University (http://www.library.ohiou.edu/subjects/shao/databases_popdis.htm). Not all variables could be obtained for all years. Hence, our estimations are based on an unbalanced panel of 23 economies[25] over the period 1992–2002. These countries include all major recipients of Singaporean FDI.

5. Empirical results

First, we apply two simple gravity models to OFDI by Singapore (table 3). Not surprisingly, the model based on Kawai and Urata (1998) reveals that FDI stock is strongly dependent on previous FDI decisions. This holds for both total FDI in all sectors and FDI in manufacturing. The inclusion of lagged FDI considerably reduces the coefficients of other variables. The results of both models are, however, similar in several respects. Larger markets, measured by host-country population, attract more FDI from Singapore. The importance of population size as a driving force of FDI increases if the models are estimated for FDI in manufacturing. The minor relevance of this variable in services industries can, at least partly, be attributed to the strong engagement of Singaporean direct investors in financial

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[25] These economies are: Australia, Brunei, Cambodia, Canada, China, France, Germany, Hong Kong (China), India, Indonesia, Japan, Malaysia, Myanmar, Netherlands, New Zealand, Philippines, Republic of Korea, Switzerland, Taiwan Province of China, Thailand, United Kingdom, United States and Viet Nam.

and insurance services in small Caribbean economies. Latin America and the Caribbean accounted for 46% of Singapore's OFDI stock in finance and insurance in 2003 (Singapore, Dept. of Statistics, var. iss., 2003).

The strong engagement in the finance and insurance industry of distant countries also helps explain why the coefficient of the distance variable is much higher, in absolute terms, for FDI in manufacturing (columns 5 to 8 in table 3). The discouraging effect of distance is less pronounced for FDI in services as it is mainly for financial transactions that globalization has resulted in sharply declining transaction costs. Compared to finance, distance costs remain relatively high for manufacturing activities.

Table 3. Gravity model results: FDI equation[a]

Variable	Total FDI				FDI in manufacturing			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln(population)	0.41*	0.09***	0.09***	0.08***	0.76***	0.13***	0.14***	0.13***
	(0.22)	(0.02)	(0.02)	(0.02)	(0.25)	(0.04)	(0.04)	(0.04)
ln(GDP/cap)	0.29	0.04*	0.04*	0.02	0.23	0.01	0.01	-0.07*
	(0.29)	(0.02)	(0.02)	(0.03)	(0.33)	(0.03)	(0.03)	(0.04)
ln(distance)	-0.78*	-0.07***	-0.06**	-0.13***	-1.32**	-0.12**	-0.13**	-0.24***
	(0.43)	(0.03)	(0.03)	(0.04)	(0.48)	(0.06)	(0.07)	(0.08)
ln(FDI lagged)		0.91***	0.90***	0.90***		0.93***	0.90***	0.86***
		(0.03)	(0.03)	(0.03)		(0.03)	(0.03)	(0.05)
Share Chinese			0.16***				0.27***	
			(0.05)				(0.09)	
ASEAN				-0.20*				-0.46***
				(0.11)				(0.18)
APEC				-0.01				0.37**
				(0.08)				(0.15)
Constant	3.78	-0.49	-0.52	0.42	0.73	-0.85	-0.83	1.13
	(4.45)	(0.39)	(0.41)	(0.56)	(4.98)	(0.75)	(0.85)	(0.96)
R²	0.23	0.94	0.94	0.94	0.53	0.90	0.90	0.91

Source: Authors' calculation.

[a] ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively; standard errors in parentheses. The simultaneous inclusion of the variables "share Chinese" and "ASEAN" does not produce significant results, which are thus not reported.

The findings reported so far are largely in line with gravity-model results obtained for FDI by major industrialized countries. This applies especially to the role of market size as a driving force of FDI and the deterrent effects of distance.[26] In contrast to the pattern typically observed for industrialized home countries, however, the effect of the host countries' stage of economic development, measured by their per-capita income, on Singapore's OFDI remains insignificant in most estimations.[27] This is especially so for FDI in manufacturing. The focus of Singapore's FDI in manufacturing industries of lower-income Asian host countries, mentioned in section 2 above, makes this finding plausible. It supports the proposition that a considerable part of Singapore's FDI in manufacturing is vertical rather than horizontal. This does not imply that market considerations are irrelevant for Singapore's FDI. Rather, the positive coefficient of the population variable in combination with the insignificant coefficient of the per-capita income variable reinforces the point made above that market and cost considerations tend to be interlinked. It is consistent with this reasoning that the per-capita income variable turns out to be significantly positive, though only at the 10% level for FDI in manufacturing, if FDI equations reported in table 3 are estimated for a reduced sample including only developing host countries.[28] Yet, the results for Singapore differ from results of earlier studies on the motives of FDI by major home countries, which found

[26] Brenton et al. (1999) showed that market size, measured by the log of GNP, is positively related to FDI by all major OECD home countries. At the same time, the coefficient of the distance variable typically turns out to be significantly negative. Similar results for German FDI are reported in Buch et al. (2003). Chakrabarti (2001) argued that the correlation between FDI and market size is robust to changes in the conditioning information set. According to Nunnenkamp and Spatz (2002), the distribution of FDI from all home countries taken together continues to be shaped by market-related determinants in the era of globalization.

[27] According to UNCTAD (1998, p. 135), higher-income countries typically attract more FDI. For German FDI, Buch et al. (2005) find that the difference between the per-capita income of Germany and the per-capita income of host countries is positively and significantly related to FDI stocks.

[28] These results are not shown, but are available from the authors upon request.

stronger support for the predominance of horizontal FDI (Brainard 1997; Carr et al. 2001; Blonigen et al. 2003). For example, it is in striking contrast to the case of Singapore that the results presented in Buch et al. (2005, p. 74) are "highly supportive of the notion that German multinationals are primarily motivated by a search for market access rather than by a search for lower production costs". As argued by these authors, the case for horizontal FDI is particularly strong if both population and per-capita income have a positive impact on FDI when considering the whole set of host countries.

The results obtained for the basic specification of the gravity model prove to be fairly robust once additional FDI determinants are taken into account.[29] Nevertheless, the extended specifications offer additional insights. Host countries with a higher population share of ethnic Chinese attract significantly more FDI from Singapore. Similar to the trade-promoting effect found by Rauch and Trindade (2002), Chinese networks are relevant for FDI: these networks counteract distance-related transaction costs by providing better information, trust and informal enforcement mechanisms.[30] Including dummy variables for membership in ASEAN and APEC somewhat increases the magnitude of the coefficients for geographical distance, while the coefficient for host countries' per-capita income diminishes further. Most strikingly, however, the ASEAN dummy turns out to be negative. This is in sharp contrast to the positive effect reported for other regional integration agreements, notably the effects of EU membership on intra-regional FDI (Buch et al. 2003). Two factors seem to account for this difference. First, ASEAN has achieved substantially less economic integration among its members, compared to the EU. R. J. Langhammer (2001) noted that free intra-ASEAN investment flows, requiring the freedom of establishment and mobility of investment-related labour, are a

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[29] Extended specifications are reported only for the model based on Kawai and Urata.

[30] See also Lecraw (1985, p. 392), who stresses the role of ethnic ties for Singapore's FDI.

distant target.[31] Second, as mentioned in section II, Singaporean direct investors were strongly encouraged by the Government to reach beyond ASEAN, and increasingly shifted their attention to other Asian host countries, particularly to China. It fits into this picture that, in contrast to the ASEAN dummy, the dummy for APEC members turns out to be significantly positive with respect to Singapore's OFDI in manufacturing.

In the next step, we assess the trade implications of Singapore's OFDI. Table 4 reports the results for Singapore's total exports and imports as well as its exports and imports of all manufactures. As before, we draw on two slightly different gravity models. Following Kawai and Urata (1998), lagged FDI is added to the standard list of right-hand variables.[32] The second model suggested by Brenton et al. (1999) considers FDI residuals, resulting from the FDI equations reported in columns (1) and (5) in table 3, instead of lagged FDI.

All coefficients of the standard variables "population", "GDP per capita" and "distance" have the expected sign and are highly significant. Both exports and imports are increasing in the partner country's population as well as its per-capita income, and decreasing in distance between Singapore and the partner country. This applies to total trade as well as manufacturing trade. Extending the specification of the Kawai-Urata model by the population share of ethnic Chinese and the ASEAN dummy has little effect on the coefficients of the standard variables, except that the coefficient for geographical distance becomes smaller. The population share of ethnic Chinese has a significantly positive effect on trade, which is in line with the findings by Rauch and Trindade (2002). Moreover, in contrast to the FDI equation reported in table 3, the ASEAN

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[31] See also Hew and Soesastro (2003, p. 295), who concluded that "implementation (of political initiatives) has always been a problem for ASEAN".

[32] As before in table 3, we present extended specifications of the Kawai-Urata model by including the population share of ethnic Chinese and the ASEAN dummy. The APEC dummy turned out to be insignificant in the trade equation and, thus, was dropped.

Table 4. Gravity model results: the effect of FDI on exports and imports[a]

Variable	Total trade						Manufacturing trade					
	Exports			Imports			Exports			Imports		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ln (population)	0.55***	0.62***	0.59***	0.89***	0.90***	0.93***	0.56***	0.63***	0.60***	1.01***	1.08***	1.06***
	(0.10)	(0.08)	(0.08)	(0.05)	(0.07)	(0.03)	(0.13)	(0.11)	(0.10)	(0.09)	(0.10)	(0.07)
ln (GDP per capita)	0.70***	0.78***	0.80***	1.04***	1.12***	1.14***	0.86***	0.85***	0.98***	1.24***	1.40***	1.38***
	(0.09)	(0.11)	(0.10)	(0.07)	(0.09)	(0.06)	(0.11)	(0.14)	(0.12)	(0.12)	(0.13)	(0.12)
ln (distance)	−0.88***	−1.08***	−0.57***	−1.21***	−1.31***	−0.90***	−0.82***	−1.06***	−0.42	−1.28***	−1.47***	−0.85***
	(0.16)	(0.16)	(0.17)	(0.08)	(0.13)	(0.10)	(0.19)	(0.21)	(0.27)	(0.15)	(0.20)	(0.21)
ln (total FDI lagged)	0.27***		0.27***	0.08*		0.09						
	(0.07)		(0.06)	(0.05)		(0.06)						
ln (manufacturing FDI lagged)		0.29***					0.19***		0.20***	0.10*		0.08
		(0.09)					(0.08)		(0.08)	(0.06)		(0.07)
residual total FDI					0.17**							
					(0.07)							
residual FDI in manufacturing								0.17			0.16	
								(0.10)			(0.10)	
Share Chinese			0.62**			0.54***			0.66*			0.92***
			(0.31)			(0.18)			(0.35)			(0.32)
ASEAN			1.01**			0.99***			1.28**			1.39***
			(0.47)			(0.30)			(0.65)			(0.55)
Constant	4.51***	6.03***	−0.16	−0.72	−0.35	−5.30***	3.18*	4.81**	−2.61	−4.17***	−4.89**	−10.46***
	(1.49)	(1.67)	(2.83)	(0.81)	(1.32)	(1.58)	(1.88)	(2.19)	(3.18)	(1.60)	(2.03)	(3.00)
R²	0.84	0.82	0.87	0.92	0.93	0.94	0.79	0.73	0.82	0.86	0.89	0.89

Source: Authors' calculation.

a ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively; standard errors in parentheses.

dummy is significantly positive in the export and import equations for both total and manufacturing trade. This suggests that the integration of trade within ASEAN, at least as far as Singapore's trade is concerned, is more advanced than its integration with regard to FDI.[33]

Turning to the FDI variable, which is the principal concern in the context of this article, the models based on Kawai and Urata (1998) and Brenton et al. (1999) point to significant complementarities between total FDI and total trade. The estimates suggest that complementarities are considerably stronger for total exports than for total imports. One might, therefore, conclude from columns (1) to (6) in table 4 that, on balance, Singapore's OFDI has positive balance-of-payments effects and that labour market concerns are not warranted. However, the picture is less clear when it comes to FDI and trade in manufacturing. According to the model based on Kawai and Urata (1998), complementarities are still stronger for exports than for imports, even though complementarities turn out to be weaker for manufactured exports than for total exports. Applying the approach proposed by Brenton et al. (1999) results in both coefficients of the residuals of manufacturing FDI being insignificant. This means that Singapore's trade balance with regard to manufactured goods is hardly affected by OFDI.

The ambiguous relationship between FDI and trade in the manufacturing sector provides a reason for undertaking further analysis with more disaggregated data and evaluating how FDI affected trade in particular manufacturing industries. Indeed, the results reported in table 5 support the view that the results for manufacturing as a whole disguise considerable differences with regard to the trade implications of FDI within the manufacturing sector.

[33] This is so, even though the ASEAN Free Trade Area (AFTA) "is not quite what it is cracked up to be" (*The Economist* 2004, p. 44). Several members refused to lower tariffs on critical products (see also Hew and Soesastro 2003). Carrère (2004) observed that ASEAN members are more outward looking than is typically the case for South-South integration schemes; in contrast to other regional trade agreements, ASEAN does not seem to have resulted in trade-diverting effects.

Positive balance-of-payments effects and, thus, favourable labour market effects are most likely in the chemical industry (SITC 5). On the one hand, the complementarity between Singapore's FDI and its exports of chemicals is most pronounced (rows 1 to 3 in table 5). On the other hand, there is no evidence that FDI has resulted in higher imports of chemicals (rows 4 to 6). These findings may be explained by some characteristics of FDI in the chemical industry. Data on FDI undertaken by the United States in developing countries reveal that FDI in this industry is most human capital-intensive and technology-intensive, while the export orientation of foreign affiliates in this industry is particularly low (Nunnenkamp and Spatz 2004). If similar characteristics applied to Singapore, this would explain the strong complementarity with regard to Singapore's exports and rather weak import pressure.

Indeed, several observations indicate that Singapore possesses competitive advantages vis-à-vis lower-income host countries in which its FDI in the chemical industry is concentrated. Chemicals, including petroleum products, represent one of Singapore's top five export items. The focus of the industry is on R&D and manufacturing of pharmaceuticals, medical devices, biotechnology and agro-biotechnology products. The development of high value-added downstream chemistry chains has been supported by the Government since the mid-1990s. Singapore's Economic Development Board sought to attract investment to establish vertically integrated structures, by helping producers in sourcing inputs and marketing their output (PESA 2000). Moreover, the Government encouraged TNCs to invest in the chemical industry by offering incentives, including seed financing to projects, and providing infrastructure. Pharmaceutical production and life sciences were identified as key areas for new investment. Human capital-intensive chemical production was also supported by on-the-job training of workers and training of students, in which the Institute of Chemical Sciences, established by the National Science and Technology Board, played a major role.

In contrast to chemicals, we observe strong complementarities with regard to both exports and imports in

Table 5. Gravity model results: the effect of manufacturing FDI on trade in SITC categories 5–8[a]

Item		ln (population)	ln (GDP per capita)	ln (distance)	ln (man. FDI lagged)	residual man. FDI	ASEAN	Share Chinese	Constant	R^2
Chemicals (SITC 5)										
Exports	(1)	0.51*** (0.09)	0.60*** (0.11)	-0.69*** (0.17)	0.31*** (0.07)				2.24 (1.83)	0.76
	(2)	0.66*** (0.11)	0.60*** (0.15)	-1.12*** (0.22)		0.28** (0.11)			4.65* (2.26)	0.74
	(3)	0.56*** (0.07)	0.71*** (0.12)	-0.35 (0.25)	0.30*** (0.07)		1.12* (0.65)	0.72** (0.36)	-2.81 (3.07)	0.78
Imports	(4)	1.28*** (0.19)	1.69*** (0.23)	-0.86*** (0.33)	0.11 (0.12)				-19.49*** (3.51)	0.85
	(5)	1.38*** (0.16)	1.71*** (0.21)	-1.07*** (0.30)		0.17 (0.15)			-19.12*** (3.15)	0.86
	(6)	1.25*** (0.18)	1.61*** (0.24)	-1.14*** (0.45)	0.10 (0.13)		-0.87 (0.89)	-0.40 (0.58)	-15.58*** (4.83)	0.86
Manufactured goods (SITC 6)										
Exports	(7)	0.33*** (0.09)	0.46*** (0.07)	-1.02*** (0.15)	0.18** (0.07)				9.37*** (1.64)	0.76
	(8)	0.38*** (0.11)	0.42*** (0.15)	-1.27*** (0.21)		0.18 (0.11)			11.78*** (2.22)	0.72
	(9)	0.36*** (0.08)	0.49*** (0.10)	-0.95*** (0.20)	0.12* (0.08)		0.27 (0.61)	0.61* (0.34)	8.11*** (2.87)	0.78
Imports	(10)	1.05*** (0.10)	1.21*** (0.11)	-0.99*** (0.14)	0.19*** (0.05)				-9.76*** (2.33)	0.88
	(11)	1.21*** (0.09)	1.25*** (0.12)	-1.33*** (0.17)		0.27*** (0.08)			-9.22*** (1.78)	0.92
	(12)	1.03*** (0.09)	1.10*** (0.14)	-1.37*** (0.23)	0.13** (0.07)		-1.14* (0.69)	-0.08 (0.33)	4.69 (3.98)	0.89
Machinery, transp. equipm. (SITC 7)										
Exports	(13)	0.59*** (0.13)	0.93*** (0.12)	-0.80*** (0.19)	0.22*** (0.08)				1.21 (1.83)	0.79
	(14)	0.71*** (0.12)	0.95*** (0.15)	-1.07*** (0.23)		0.24** (0.11)			2.32 (2.36)	0.74
	(15)	0.64*** (0.11)	1.06*** (0.12)	-0.40 (0.28)	0.23*** (0.08)		1.28** (0.66)	0.59 (0.38)	-4.56 (3.18)	0.81
Imports	(16)	1.36*** (0.14)	1.73*** (0.21)	-1.24*** (0.22)	0.40*** (0.12)				-17.44*** (3.86)	0.83
	(17)	1.47*** (0.15)	1.76*** (0.20)	-1.64*** (0.30)		0.42*** (0.15)			-14.20*** (3.08)	0.87
	(18)	1.41*** (0.14)	1.91*** (0.22)	-0.66 (0.55)	0.44*** (0.16)		1.82 (1.57)	0.66 (0.74)	-25.64*** (7.63)	0.84
Miscellaneous man. articles (SITC 8)										
Exports	(19)	0.49*** (0.11)	0.83*** (0.08)	-0.78*** (0.17)	0.14* (0.07)				2.13 (2.10)	0.77
	(20)	0.49*** (0.11)	0.78*** (0.14)	-0.91*** (0.21)		0.03 (0.10)			4.45* (2.17)	0.69
	(21)	0.52*** (0.09)	0.92*** (0.13)	-0.50* (0.27)	0.17* (0.09)		0.86 (0.81)	0.29 (0.44)	-1.73 (3.72)	0.78
Imports	(22)	0.89*** (0.16)	1.07*** (0.16)	-1.37*** (0.23)	-0.04 (0.10)				-1.19 (2.82)	0.75
	(23)	0.84*** (0.12)	1.15*** (0.16)	-1.44*** (0.24)		-0.02 (0.12)			-0.62 (2.46)	0.78
	(24)	0.95*** (0.14)	1.13*** (0.19)	-1.23*** (0.26)	-0.14** (0.07)		0.57 (0.76)	1.19*** (0.35)	-3.85 (5.37)	0.79

Source: Authors' calculation.

a ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively; standard errors in parentheses.

the machinery and transport equipment industry (SITC 7). Furthermore, both models result in coefficients of the FDI variable (FDI residuals and lagged FDI, respectively) that are almost twice as high in the import equation as in the export equation. Negative balance-of-payments effects appear to be most likely in this industry. The structure of Singapore's foreign trade fits into this picture; while electronics, which belongs to SITC 7, represented slightly less than a quarter of its total exports in 2003, machinery and equipment accounted for almost 60% of its total imports. According to United States FDI data, the factor intensities differ considerably across major branches included in SITC 7. However, transport equipment as well as non-electrical and electrical machinery have a common characteristic, namely that foreign affiliates are relatively strongly integrated into trade networks with parent companies. Vertical integration of this sort would explain that outward FDI leads to higher exports as well as higher imports. The particularly pronounced effect on imports may be attributed to the strong export orientation, which foreign affiliates tend to have in (electrical and non-electrical) machinery. Moreover, the high labour intensity (and, correspondingly, the low human capital and technology intensity) of many operations related to electrical and electronic equipment points to comparative advantages of lower-income host countries of Singaporean FDI. The outsourcing of labour-intensive stages of production by Singaporean investors seems to have played an important role in inducing higher imports in this industry.

Even though the share of foreign affiliates in Singapore's OFDI in specific manufacturing industries is not reported by the country's Dept. of Statistics (var. iss.), there are strong indications that the relationship between FDI and trade in the chemical industry and the machinery and transport equipment industry is significantly influenced by the vertically integrated structures of foreign affiliates. Taken together, these two industries accounted for 83% of all manufacturing FDI projects approved in Singapore during the period 1995-2001 (figure 3). At the same time, Singapore's OFDI in the manufacturing sector in lower-income Asian countries is clearly dominated by foreign affiliates. In 2003, these firms accounted for more than two thirds

of manufacturing FDI stock in Asia, which is almost twice their share in Singapore's total FDI stock in all sectors and all host countries (Singapore, Dept. of Statistics, var. iss., 2003). This implies that it is mainly due to the activities of foreign affiliates that an important part of Singapore's OFDI is of the vertical type. More specifically, the aforementioned characteristics of chemical production plus the prominence of FDI approvals in this industry (figure 3) suggest that foreign affiliates have contributed considerably to Singapore's exports of chemicals. On the other hand, it appears to be mainly in electrical machinery that these firms have contributed to negative balance-of-payments effects by giving rise to imports from lower-income Asian host countries. The important role of foreign affiliates may also explain why most coefficients of the population share of ethnic Chinese remain insignificant in the chemical industry and the machinery and transport equipment industry.

The remaining two industries range between the extremes represented by chemicals and machinery and transport equipment. We find only weakly significant results for SITC 8.

Figure 3. Industry structure of approved manufacturing FDI projects in Singapore[a], 1995-2001[b]
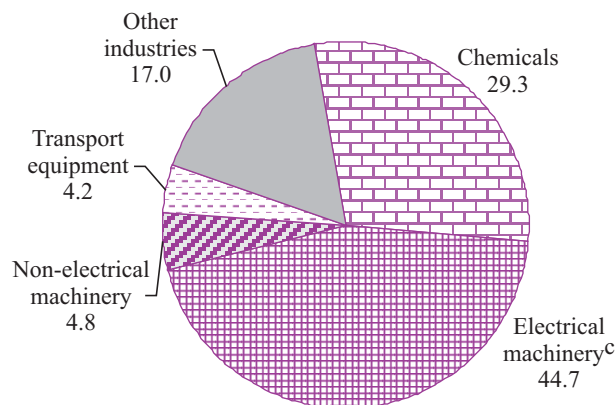
Source: ASEAN Secretariat (2002, table 6.1.9)
[a]   Total project cost basis of foreign investment commitments.
[b]   Cumulative.
[c]   Including radio, TV and communication equipment.

This is probably because "miscellaneous manufactured articles" comprise a fairly heterogeneous bundle of goods, ranging from clothing and footwear to prefabricated buildings, furniture as well as professional and scientific instruments. This heterogeneity renders it likely that the pattern observed for the whole industry disguises intra-industry differences in the relation between FDI and trade, similar to what we find for overall manufacturing. Likewise, manufactured goods in SITC 6 include widely different items such as non-metallic mineral manufactures, metal products, iron and steel, textile yarn as well as manufactures made from leather, rubber, wood, and paper. Still, there are some, if only weak, indications that FDI may have negative trade implications in this industry. The lagged FDI variable is positively related to both exports (rows 7 and 9 in table 5) and imports (rows 10 and 12) of Singapore in SITC 6; but FDI residuals remain insignificant in the export equation (row 8), while pointing to strong complementarity with imports (row 11).

6. Summary and conclusions

The aim of this article is to investigate the relationship between Singapore's FDI and trade and, thereby, to assess whether OFDI is likely to have adverse effects on the labour market. The home-country effects of OFDI by developing economies have received little attention in the literature so far, even though "the 'new breed' developing-country TNCs" are no longer confined to low-tech, small-scale and labour intensive activities. The analysis of the trade implications of Singapore's FDI attempts to fill this gap. The case of Singapore offers interesting insights, not least because FDI in the manufacturing sector is strongly concentrated in lower-income Asian countries. The structural characteristics of FDI let us suspect that the motivations and thus the trade repercussions of Singapore's FDI differ from previous findings on FDI undertaken by major industrialized countries.

Indeed, although Singapore's FDI is far from being a completely "different animal", it is unique in several respects. Most strikingly, perhaps, institutionalized regional integration

does not appear to have stimulated FDI by Singapore in its ASEAN partner countries. This is in sharp contrast to the experience of EU integration. ASEAN's insignificant effect on Singapore's FDI also differs from the positive effect ASEAN has had on Singapore's overall exports and imports. Our FDI-related findings tend to support the sceptical assessment of ASEAN's effective degree of integration by Langhammer (2001) as well as D. Hew and H. Soesastro (2003). Singapore's outward FDI has been stimulated by informal business networks, reflected in a high share of ethnic Chinese in the host countries' population, and by incentives the Government of Singapore has offered to investors reaching beyond ASEAN.

Furthermore, in contrast to what is typically observed for industrialized countries, the per-capita income of host countries does not represent an important driving force of Singapore's FDI. This supports the proposition that the share of vertical FDI is higher, and that market-related considerations are less important than in the case of FDI by major industrialized countries.

Labour market concerns appear to be unfounded when considering the trade effects of OFDI in the manufacturing sector as a whole. In particular, we do not find evidence that Singapore's OFDI has replaced exports. In that regard our results are similar to previous studies on the effects of FDI by industrialized home countries. However, the balance-of-payments effects and the labour market implications of Singapore's FDI differ considerably across manufacturing industries. These differences are related to industry characteristics such as factor intensities and the degree of vertical integration between parent companies and their foreign affiliates. In particular, our results indicate that FDI went along with fragmented production of machinery and transport equipment, thereby giving rise to Singaporean exports, but even more so to Singaporean imports of such goods.

Government policy in Singapore suggests that outsourcing and relocation in particular industries are not an unwanted effect of FDI, but rather the result of a deliberate strategy to shift

economic activity towards higher value-added manufacturing as a means to preserve international competitiveness. Even 15 years ago, R. Aggarwal and T. Agmon (1990) concluded that Singapore represents a case of what these authors coin "government directed dynamic comparative advantage". The promotion of inward FDI constitutes an important element of this concept. By luring foreign TNCs with advanced technological and managerial skills into Singapore, notably in the chemical industry and the machinery and transport equipment industry, the Government facilitated the process of industrial upgrading. As argued by Lall (1998), policymakers should actively support FDI in both directions, in order to boost the level and range of domestic technological capabilities.

In the short run, however, restructuring through the promotion of vertical FDI is likely to give rise to distributional conflicts within specific industries. Low-skilled workers in relatively labour intensive lines of manufacturing are most likely to suffer deteriorating employment and wage prospects. Most importantly, increased educational and training efforts would be required to upgrade the skills of less qualified workers. In other words, forward-looking government policies must not only focus on technological upgrading but also on the employment and wage prospects of workers who are ill-prepared to participate in this process.

Our findings have implications for future research on the trade and labour market implications of OFDI. The conclusion that considerable differences across industries exist warrants further studies based on more disaggregated data. Moreover, Singapore's FDI may be different not only from FDI by traditional investor countries, but also from FDI by other newly emerging investor countries. This applies especially to FDI undertaken by lower-income countries such as China. Hence, it would be useful to perform similar studies on the links between OFDI, trade and labour market repercussions for other developing economies. Finally, it is obviously desirable to overcome data constraints in order to be able to apply more sophisticated models than the gravity models used here. ∎

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Regional integration and foreign direct investment in developing countries*

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The potential for regional trade agreements to foster growth and reduce poverty is increasingly discussed, but the empirical literature has hitherto offered little guidance on how this might be done, i.e. on whether and why some regions are more successful in attracting foreign direct investment than others. This study introduces a new approach that quantifies the level of trade and investment provisions in regional trade agreements and assesses their impact. It estimates a model for the real stock of United Kingdom and United States foreign direct investment in developing countries during the period 1980-2000. It finds that membership of a regional grouping as such is not significantly related to inward foreign direct investment. However, a country that is a member of a regional trade agreement with a sufficient level of trade and investment provisions is in a better position to attract more inward foreign direct investment. Furthermore, countries that have larger economies or are geographically closer to larger countries within the regional grouping can expect a larger increase in foreign direct investment as a result of joining a regional trade agreement than those of countries that have smaller economies or are located on the periphery.

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1. Introduction

The purpose of this article is to contribute to our understanding of the relationship between regional integration (RI) and foreign direct investment (FDI)[1] in developing countries. There is increasing research on the effects of RI, and its effect on FDI forms an integral part of that discussion (e.g. Mirza, 2002 for Asian countries; Nina and Andersen, 2004 for Bolivia). However, there is little in the literature that suggests whether and why certain regions perform better in attracting FDI than others. This is the focus of this article.

A theoretical and empirical literature on the relationship between RI and FDI has emerged in recent years, coinciding with strong growth in both the number of regional trade agreements (RTAs) notified to the World Trade Organization (WTO) and the value of FDI in developing countries. There appears to be a consensus in the literature that RI leads to further (extra-regional and, to some extent, intra-regional) FDI. One of the factors often cited is the increase in the "market size" that follows RI.

There is an emerging literature on the effects of specific trade provisions in RTAs (e.g. Estevadeordal and Robertson, 2002 on tariffs; Estevadeordal and Suominen, 2003 on rules of origin). However, on the whole, the empirical literature seems to offer little guidance on whether *different* RTAs (as opposed to RTAs *per se*) have different effects on attracting FDI and, if so, why some regional groupings are more successful. It, therefore, has little to say on whether trade negotiators can develop an RTA designed to have the best possible outcome for attracting FDI.

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[1] "FDI" in this article refers to inward FDI, unless it is United Kingdom FDI or United States FDI, in which case, it refers to outward FDI.

Empirical studies on RI and FDI can be divided into the following categories:

- studies that describe the investment-related provisions included in a growing number of RTAs, with a prediction on how these might affect FDI (e.g. UNCTAD, 1996; te Velde and Fahnbulleh, 2003); and

- studies that base their findings on econometric models explaining FDI, in which one of the explanatory variables is a "black box" 0/1 dummy or binary variable describing whether or not a country is a member of a regional grouping (e.g. Levy *et al.*, 2002).

This article aims to bring these two approaches together by moving beyond describing RTAs as a "black box", and to identify the effects of specific investment-related provisions in RTAs on FDI. This will be done by estimating a model of the real stock of United Kingdom and United States FDI in developing countries over the period 1980-2001. The use of United Kingdom and United States FDI data ensures that the coverage of developing countries can be larger than that contained in the OECD FDI database, which is often used for such analyses. Moreover, the two countries are amongst the key investors. An innovative feature of the analysis is the use of a variable that measures the scope of investment and trade provisions in RTAs in addition to standard explanatory variables.

The structure of this article is as follows. Section two reviews the theory on the relationship between RI and FDI, concentrating on regional trade and investment rules. Section three discusses econometric studies and argues that most of them offer little guidance for trade negotiators on whether different types of RTAs have different effects on FDI. This is because they use a simple 0/1 dummy variable to describe regional groupings and, therefore, measure RTAs as a black box that either exists or does not. In section four, we attempt to step inside the black box of RTAs and measure trade and investment provisions in RTAs. Sections five and six present our model and discuss methodology and econometric results on the effects

of RI on FDI; the focus is on trade and investment provisions in RTAs and on differences in the effects on FDI amongst members of a regional grouping. Section seven concludes.

2. RI and FDI: the theory

There are various provisions through which an RTA can influence FDI. They can be categorized into investment rules, trade rules and other initiatives (e.g. Blomström and Kokko, 1997; Dunning, 1997a).

Regional investment rules and FDI

Investment rules govern cross-border investment in a regional grouping and usually consist of rules on the treatment and protection of FDI contributing to a favourable investment climate. Investment rules exist in a number of RTAs,[2] although they are not as common as trade rules, particularly amongst the poorer developing countries. Some RTAs include investment rules as voluntary principles (e.g. Asia-Pacific Economic Cooperation), while others include rules with effective dispute settlement procedures. In some RTAs, the provisions apply only to regional investors, while in others they also apply to extra-regional investors. Several studies discuss investment provisions in RTAs (scope, standard of treatment, performance requirement, expropriation, dispute settlement mechanisms) and their expected effects on the volume of FDI (e.g. Page, 2000; UNCTAD, 1996, 2003).

There is a heated discussion on how investment rules (bilateral, regional and multilateral) affect investment decisions. Surveys of investors usually show that investors require a predictable investment climate (European Commission, 2000). The predictability of the investment climate may be enhanced when domestic policies are enshrined or locked into regional treaties. Much will also depend on the existing treatment. If the

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[2] Investment rules also appear in bilateral trade arrangements (e.g. Singapore-Japan), which are included here as RTAs if they are notified to the WTO, but more often they appear in bilateral investment treaties.

existing treatment of investors is already adequate, new (regional) rules may add little to creating a better investment climate other than offering a little more long-run security. There seems to be no empirical studies that address the effects of individual investment provisions on FDI.

Regional trade rules and FDI

The elimination of intra-regional tariffs will, in general, affect the level of sales by foreign affiliates, but its extent will depend on the importance of transport costs and plant-level and firm-level costs in setting up foreign affiliates (Markusen and Venables, 1997; Brainard, 1997; Carr *et al*., 2001). Hence, the type and motive of investment play an important role in determining how FDI is affected by RTAs (Barrell and te Velde, 2002). We, therefore, distinguish between intra-regional and extra-regional FDI and between horizontal (market-seeking: affiliates selling similar products) and vertical (efficiency and natural resource seeking: affiliates exploiting efficiencies or control over inputs) FDI.

RTAs can decrease horizontal (tariff-jumping) intra-regional FDI because it may become cheaper to serve other economies in the region through trade rather than establishing an affiliate with production facilities and thus incurring plant-level costs. However, on the other hand, the removal of intra-regional tariffs may encourage vertically-motivated intra-regional FDI, because lower trade costs will reduce the costs of establishing international production networks across member countries of an RTA. Transnational corporations (TNCs) may therefore establish efficiency-seeking affiliates in different countries within the regional grouping that can process imports for re-export.

Extra-regional FDI (the focus of the empirical part of this article) can also be affected by RTAs in different ways. First, as tariffs amongst parties to the RTA are removed, it may become profitable for an extra-regional TNC to serve an effectively larger market (horizontal market-seeking FDI) from one or more

locations in the region (export platforms). If individual countries of a regional grouping are previously served by trade, this may then raise inward FDI for establishing export platforms or beachhead locations (Ethier, 1998). However, if the member countries of a regional grouping are already served through sales of foreign affiliates, consolidation of those affiliates may take place, with ambiguous or negative effects for the volume of extra-regional FDI in each country. This may also concentrate FDI inflows to the most cost-efficient location (usually nearest to the largest market), possibly at the expense of FDI to other members in the same regional grouping.

The effects of an RTA on extra-regional vertical (or efficiency-seeking) FDI are likely to be small, though it may lower costs and raise efficiency in the vertically motivated affiliates when it uses inputs from more than one country in the region.

In addition to the removal of internal trade barriers, rules of origin can also affect location decisions for FDI. The effects of rules of origin on investment can vary depending on the type of investment as well as the interaction with regional tariffs. Rules of origin would encourage the use of intra-regional inputs instead of extra-regional ones. The higher the most-favoured-nation (MFN) tariffs are, the greater the incentive to comply with the rules of origin becomes (Estevadeordal and Suominen, 2003).

Non-tariff barriers to trade, such as voluntary export restraints, can also affect investment. The threat of imposing European Union (EU) quotas and using anti-dumping measures against Japanese exports motivated Japanese TNCs to set up operations inside the EU. Ray Barrell and Nigel Pain (1999) found that, after controlling for relative labour costs and market size, Japanese investment flows to European Community countries over the period 1980-1991 were significantly influenced by anti-dumping measures taken by the Community.

Hence, there are various effects of an RTA on inward FDI. However, in the context of developing-country regions, where most inward FDI is extra-regional, even though South Africa is

an important investor in the Southern African Development Community (SADC), the market size argument would be the most important and, other factors being equal, an RTA would raise inward FDI. It must be noted, however, that the strength of this argument depends on the difference between tariffs applied regionally and tariffs applied to non-members on an MFN basis.

Other regional initiatives and FDI

There are various other channels through which RTAs can affect FDI. Many provisions are region specific and cannot be easily categorized. For example, some regional groupings, including the Andean Community (ANDEAN), the Association of Southeast Asian Nations (ASEAN) and the Mercado Común del Sur (MERCOSUR), have cooperation schemes that aim at establishing regional enterprises by promoting joint ventures. ASEAN seems to be one of the most advanced in this area. The ASEAN Industrial Cooperation Scheme promotes joint manufacturing industrial activities between ASEAN-based companies. More than 100 projects have been selected for special tax and tariff incentives. The ASEAN Secretariat has also begun various activities in the area of investment facilitation, by providing information through portals, databases, publications and statistics. Thus, a regional grouping can do much more to promote investment than simply setting trade and investment rules. They can put in place the regional infrastructures (legal, institutional etc.) to deal with investment issues at the regional level.

Some argue that the effects of RTAs on FDI are not so much about trade and investment rules, but about the increased predictability of the investment climate by "locking in" general reforms (regulation, competition policies, property rights, contract enforcement, guaranteed access to members' markets, stable trade policies) in international treaties, thus making policy reversals less likely. In practice, this argument depends on how strong a regional grouping is *vis-à-vis* individual members.

Many argue that important effects of RTAs on FDI are dynamic, with competition creating a more efficient industry and growth, which, in turn, affect FDI. Peter Neary (2001) includes dynamic effects in a theoretical model of TNCs. First, there is the tariff-jumping motive as discussed above; FDI is more favoured over exporting if tariffs are higher and the fixed costs of a new plant are lower. Second, the export platform motive could affect FDI, as lower intra-regional tariffs would favour a single plant in the region. Finally, lower intra-regional tariffs would lead to increased competition from stronger domestic firms and hence lower FDI. On the other hand, a more efficient private sector can raise efficiency-seeking investment by firms that become efficient regional suppliers; this will raise strategic asset-seeking investment.

Magunus Blomström and Ari Kokko (1997) also argue that RI leads to efficiency gains and higher growth, and thus further FDI. FDI can actually be such a catalyst through spillovers through technology transfer and other linkages with local firms. There can thus be long-lasting effects on growth and productivity as opposed to a one-off effect based on a more efficient allocation of resources. Maurice Schiff and Yangling Wang (2003), for example, show that imports from NAFTA countries have raised productivity in Mexico (between 5.5-7.5%), while other imports had no effects.

Apart from trade and investment rules and regional institutions, regional groupings can also decide to harmonize fiscal and monetary policies. For instance, the Euro area (within the EU), the Western African Economic and Monetary Union (UEMOA) and four out of five Southern African Customs Union (SACU) members (within SADC) have common currencies. A common currency removes intra-regional exchange-rate variability and may reduce cross-border transaction costs.

Spatial distribution of FDI across the region

While RI can lead to more extra-regional investment for a region as a whole, this may not lead to more FDI in each individual member country. While certain peripheral countries

of the EU, such as the Republic of Ireland, have caught up in terms of productivity levels with other members of the EU, there has been a degree of divergence and agglomeration in developing regions such as the East African Community and the Central American Common Market, dating back to the 1950s and 1960s.

Agglomeration effects – due to a spatial clustering of economic activities – may accentuate an uneven spread of benefits amongst members (Venables, 1999). Agglomeration can occur within a country (e.g. cities) or across countries. Clusters of economic activities can lead to efficiency gains, because, for instance, providing specialized support services becomes feasible owing to economies of scale (Porter, 1998). If relocation effects occur within a region, this may lead to efficiency gains, which may reinforce further relocation effects. This would lead to further divergence or convergence, which could affect the distribution of gains from – and ultimately the motives for – RI processes. On the other hand, as argued in Wilfred Ethier (1998), smaller (and possibly poorer, though this is obviously not the case in regions such as ASEAN) countries may actually have incentives to join a regional grouping in order to attract investment away from other members, particularly extra-regional FDI. This may be the case when foreign investors set up beachhead locations in a small (or poor) country to serve the entire regional market. Hence, the spatial distribution of FDI is an empirical question and depends on factors such as the level of external MFN tariffs, the strictness of rules of origin, market size and agglomeration effects in individual member countries.

3. RI and FDI: econometric evidence

Empirical studies have begun to address the links between RTAs and FDI. Table 1 provides a review of studies. They tentatively find that RTAs in most cases boost extra-regional FDI and, in some cases, intra-regional FDI also. Y. E. Levy *et al.* (2002) address the issue of RI and FDI at a basic level, using dummies for regions, applying the analysis to the OECD database covering 60 countries (hence excluding many developing countries). The regressions control for a number of

factors and use a variable for market size. Other studies have examined individual regional groupings: Andreas Waldkirch (2003) and A. Monge-Naranjo (2002) for NAFTA, Daniel Chudnovsky and Andreas Lopez (2001) for MERCOSUR, and UNCTAD (2003).

John H. Dunning (1997b) analyses empirical findings regarding the effects of the formation of the Internal Market Programme (IMP) in Europe largely on the basis of econometric studies. He finds that the main dynamic impact of FDI is through effects on other determinants of FDI, such as market size, income levels, structure of activity and agglomeration economies. The inclusion of IMP as an independent variable raised extra- (and to a lesser extent intra-) regional FDI but not by as much as other variables. The effects of the IMP were industry specific, with extra-EC FDI increasing more in FDI sensitive industries. There is limited evidence that economic activity has become geographically concentrated as a result of the IMP, although high value-added activities remained clustered and lower value activities became more dispersed. Finally, the study found complementarity between trade and FDI.

As already mentioned, most econometric studies, by using a 0/1 dummy variable to describe regions, in effect measure RTAs as black boxes that either exist or do not exist, but do not differ in content. There is, however, one recent exception. Philippa Dee and Jyothi Gali (2003) examine how "new" trade provisions in preferential trade agreements affect the patterns of trade and investment flows. They use gravity models of trade and investment between pairs of countries over the period 1988-1997. They include two types of indices. The first covers "traditional" trade provisions regarding agriculture and industrial products. The second index covers "new age" provisions covering services and other provisions such as investment rules. The indices are unweighted averages of scores on sub-categories. They also include the usual control variables in gravity equations and three dummies for each RTA provision to measure intra-regional effects, extra-regional effects on inward FDI and extra-regional effects on outward FDI. The traditional trade provisions affected both intra-regional inward

Table 1. RTAs and FDI inflows, selected econometric studies

Study	Research question; Region; countries; years; methodology	Explanatory variables	Findings
Levy, Stein and Daude (2002)	How do RTAs affect the location of FDI? FDI from 20 OECD countries to 60 OECD/non- OECD countries, 1982-1998	RTA membership, extended market host, extended market source, capital/worker ratio, distance, market size, bilateral trade, inflation, trade/GDP, privatization, investment, environment, common border, common language	• RTA membership doubles FDI stocks on average FDI increases upon joining a FTA with: • more trade/GDP (openness) • more similar capital/worker ratios • better investment environment • larger market
Mody and Srinivasan (1998)	Which factors determine United States and Japanese FDI? 35 OECD and non-OECD countries, 1977-1992, split out in groups of low-middle, high income countries; and EEC, Latin America, East Asia	Market size, labour costs, capital costs, previous FDI infrastructure (telephone, electricity), country risk openness	• When split by periods (1977-1981; 1982-1986; 1987-1992), no evidence that IMP increased United States and Japanese FDI (but we should bear in mind that IMP was complete only in 1993)
Brenton *et al.* (1998)	Does European integration increase FDI? Does it divert FDI? Are trade and FDI substitutes or complements? FDI in and outflows, imports, exports for EU and CEEC countries	Population, distance, trade/FDI agreement dummies, host country economic freedom dummies, CEE dummies, host country EU membership dummy, FDI residual in trade regression	• Single European Act (1992) and Iberian enlargement led to more FDI but no observed FDI diversion
Pain and Lansbury (1996)	How has intra- and extra EC FDI by United Kingdom and Germany in different sectors changed with the introduction of the IMP? United Kingdom and German outward FDI for seven sectors, 1980/81-1992	Sector output, factor costs, currency volatility, corporate finance conditions, non-tariff barriers (1–3 scale), IMP dummy, sector dummies	• FDI determinants differ over sectors • IMP introduction boosted FDI • IMP redirected United Kingdom FDI from United States to EC

Source: authors.

FDI stocks and extra-regional inward FDI stocks in the South Pacific Regional Trade and Economic Co-operation Agreement (SPARTECA) (investment creation), but only extra-regional outward FDI in the EU and United States-Israel RTA (investment diversion). The new age provisions led to net investment creation in the European Free Trade Agreement (EFTA), EU, NAFTA, MERCOSUR, SPARTECA, the Closer Economic Relations of Australia and New Zealand (CER), net investment diversion in the ASEAN Free Trade Area (AFTA), and no impact in ANDEAN and United States-Israel (Dee and Gali, 2003, tables 4-7).

While the study by Dee and Gali has gone some way towards understanding the effects of different provisions in RTAs on trade and investment flows, many questions remain unanswered. For instance, the study focused on RTAs relevant for Australia, excluding many developing countries (while we can include many developing countries due to the choice of the United Kingdom and the United States as investor countries). It did not track regional provisions over time, while in reality provisions can and do change over time (e.g. ASEAN). Finally, it is not clear whether different types of countries within regional groupings are affected differently.

4. Looking inside the "black box"

This section moves beyond describing RTAs as a black box and classifies regional groupings on the basis of provisions included in the RTA. While several studies have included a discussion of investment and other provisions (UNCTAD, 1996; Page, 2000), none – to our knowledge – includes a measurement of trade and investment provisions over time.

Description of provisions in regions

Generally, RTAs differ with respect to trade and investment provisions in two fundamental respects:

• *Over time*, when regions change or add investment-related provisions.

- *Across regions*, when investment-related provisions differ between regions at one point in time.

Dirk Willem te Velde and Miatta Fahnbulleh (2003) discuss different trade and investment provisions in seven RTAs, as well as changes in each over time. The following provisions are compared across RTAs: investment rules (scope and coverage; national treatment; MFN and fair and equitable treatment; performance requirements; transfers of funds; provisions with respect to expropriation; settlement of disputes) and trade rules (rules of origin; tariff structures; other provisions). The comparison yielded some interesting insights. For instance, ANDEAN restricted FDI in the 1970s, but this changed over the 1980s and 1990s. ASEAN has gradually added more investment provisions over time. NAFTA included quite strong provisions from its inception in 1994. SADC and the Common Market for Eastern and Southern Africa (COMESA) contain weak trade and investment provisions.

Table 2 measures trade and investment provisions for seven regional groupings that are arguably the more advanced in the developing world regarding the inclusion of investment-related provisions. As indicated in the note to the table, the Investment Index captures provisions on investment rules in RTAs and the extent of investment provisions. The Trade Index covers trade rules in RTAs such as MFN tariff status. Bearing in mind the theoretical discussion of section two, a higher value of the index should lead to further (extra-regional) FDI.

5. The model

Several determinants of FDI in developing countries are frequently found to be significant in empirical studies (Wheeler and Mody, 1992; Dunning, 1993; te Velde, 2003). In particular, the following factors are found to be important: (i) the general potential for viable projects on the demand side (growth and size of market) and supply side (skills, infrastructure, financial and technological development); (ii) the domestic regulatory framework (e.g. protection of property rights); and (iii) specific

factors (e.g. availability of project finance, technical assistance, provision of specific information etc.). Moreover, RI can be one additional factor or it can affect the underlying determinants of FDI (Dunning, 1997b).

Table 2. Regional Integration Index

Region and (date of establishment of RTA)	Investment provisions			Trade provisions		
	1970s	1980s	1990s	1970s	1980s	1990s
NAFTA (1994)	0	0	3 (1994)	0	0	2 (1994)
MERCOSUR (1991)	0	0	2 (1994)	0	0	3 (1991)
CARICOM (1973)	0	1 (1982)	2 (1997)	1 (1973)	2	3 (1997)
ANDEAN (1969)	-1(1970)	1 (1987)	2 (1991)	1	1	2 (1993)
ASEAN	0	1 (1987)	2 (1996), 3 (1998)	1	1	1
SADC (1992)	0	0	1 (1992)	0	0	1 (1992)
COMESA (1994)	0	0	1 (1994)	0	0	1 (1994)

Source: te Velde and Fahnbulleh (2003); in parentheses are the specific years in which certain provisions were announced.

Note: keys to the indices

Investment Index
= 0 if not member of group
= 1 if some investment provisions in region (as in COMESA, SADC),
= 2 if advanced investment provisions in region (e.g. improved investor protection in ASEAN)
= 3 if complete investment provisions in region (e.g. Chapter XI of NAFTA)
= -1 if more restrictive provisions (restrictions on foreign investors in ANDEAN in 70s)

Trade Index
= 0 if not member of group
= 1 if some trade provisions (e.g. tariff preferences),
= 2 if low MFN tariffs, (close to) zero intra-reg tariffs
= 3 if high MFN tariffs, (close to) zero intra-reg tariffs

Recent advances in understanding locational decisions have led to the use of gravity models in explaining the determinants of FDI (Carr *et al.* 2001; Levy *et al.,* 2002). Holger Görg and David Greenaway (2002) apply the gravity model to bilateral United Kingdom FDI stocks in Central and Eastern European countries. We follow the empirical approach broadly

in line with Nigel Pain (1997) who applies the methodology to United Kingdom FDI in Europe and the United States. We take a standard FDI model with standard explanatory variables and include an additional variable measuring the degree of implementation of the investment provisions. In this way, we can isolate a separate RTA (provision) effect.[3] The model can be written as:

(1) $FDI_{ijt} = f(HOME_{ijt}, HOST_{ijt}, RTA_{jt})$,

where *FDI* is the real stock of FDI, and subscripts *i, j, t* are indices for the home country (here the United States and the United Kingdom, and hence we refer to extra-regional FDI only, except of course United States FDI in NAFTA), the host country and time, respectively. *HOME* refers to home country factors, such as GDP, interest rates or simply a dummy if it is expected that different source countries react differently. *HOST* refers to host country factors including market size, human capital and infrastructure. *RTA* denotes measures of (the sum of) investment-related provisions in an RTA applicable in host country *j* at time *t*. Rules that are expected to raise FDI (extra, and/or intra-regional FDI) should appear in the regression with a significant and positive regression coefficient.[4]

As we indicated above, we cannot expect all countries to be affected by RTAs in the same way. Hence we include an interaction term between RTA and the position of the countries within the region.

(2) $FDI_{ijt} = f(HOME_{ijt}, HOST_{ijt}, RTA_{jt}, RTA_{jt} * POSITION_{jt})$

[3] Dunning (1997b) argues that important effects of RTAs can work through the explanatory variables and are dynamic. We can control for the regional market size effect, by including it as an explanatory variable in the regression. However, this is not so straightforward for the other effects. We assume that the variable RTA in the above equations will ultimately pick up such effects.

[4] We limit the choice of key determinants of FDI to avoid over-parameterization, but acknowledge that there could be additional factors that we cannot deal with. For example Dunning (1993) and Carr *et al.* (2001) provide a rationale for including variables such as infrastructure, human capital and market size.

where *POSITION* measures the position of country *j* in a region in the following three ways.

- Real GDP of country *j* compared to the largest economy in the region at time *t*. This tests whether countries of different sizes attract different amounts of FDI. Different views on the relevance of this effect exist (Ethier, 1998; Venables, 1999).
- GDP per capita of country *j* compared to the richest country in the region at time *t*. This tests if richer or more productive countries attract more FDI than poorer and less productive countries.
- Distance of country *j* from the largest market in the region. This tests whether core and periphery countries attract different amounts of FDI.

Ideally, we would estimate a dynamic version of equations 1 and 2. However, this is difficult because we deal with bilateral FDI data containing many gaps, either for reasons of confidentiality or because they are not measured. The same applies to some of the explanatory variables. Therefore, it is difficult to use first differences or dynamic panel data estimators to the most extensive database. While it is possible to have time continuing variables for a selective group of countries, initially, we have chosen to keep as many countries as possible in the sample. One alternative to a dynamic specification is to include time dummies. Another is to use an error correction model which distinguishes between long-run and short-run effects for a sub-sample of countries:

$$(3)\ \Delta \ln FDI_{ijt} = \alpha \ln(FDI_{ijt-1}) + \beta \ln(HOSTGDP_{ijt-1}) + \chi RTA_{jt} + \gamma \Delta \ln(HOSTGDP_{ijt}) + cons + USdum + \varepsilon_{ijt}$$

6. Methodology and results

We apply versions of equations 1 and 2 to a pooled sample of United States and United Kingdom FDI in developing countries over the period 1980–2001 (see appendix for data description). There are many gaps in the data, with observations for countries varying, so it is an unbalanced panel with a total

of 1,561 observations. Tables 3 and 4 contain the results of estimation using OLS or GLS estimation. We correct the standard errors for serial correlation and heteroscedasticity using White's robust estimator. We approximated the home country effect by a United States fixed effect.

Column I shows an FDI model with standard explanatory variables, including infrastructure, education and inflation. The coefficients are significant and with the expected sign, except in the case of inflation, which is not significant in this regression. The column also contains a variable *region,* which has value 1 if a country is part of any of the developing country regional groupings (as notified to the WTO and in force) and 0 otherwise; its coefficient is insignificant. This result suggests that it is important to examine the nature of regions, as opposed to the mere existence of them, in order to understand whether RTAs affect FDI. We, therefore, proceed to account for the nature of regions in more detailed models, particularly with respect to the level of provisions. This, we do by the variable, *region7*, which focuses on seven regions that already have or are planning to have substantial regional investment provisions (ANDEAN, ASEAN, the Caribbean Community and Common Market (CARICOM), COMESA MERCOSUR, NAFTA, SADC). Its coefficient is significant and positive.[5] The equation in column II shows that the real stock of FDI is significantly higher if countries become a member of one of the seven regions identified above.

One of the main motivations behind this article is that one should not expect each regional grouping or each country in such a grouping to have the same capacity to attract FDI.

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[5] This would provide evidence that regions with provisions attract more FDI than those without it. If the other regions did include trade and investment provisions, which our analysis did not measure because it assumed these were negligible, the subsequent analysis is still relevant but with the caveat that it relates to the effects of investment provisions in the 7 key regions only. As discussed in UNCTAD (2005, p.28), there are currently over 200 regional arrangements that contain some investment provisions; the subject of this article is confined to RTAs as notified to the WTO and in particular to those RTA which contain substantial provisions.

Regional groupings are different with respect to trade and investment rules, and countries within a regional grouping also differ. Column III provides a breakdown by region: relative to being outside one of the seven regional groupings, the formation of CARICOM, ASEAN, ANDEAN and NAFTA has resulted in attracting additional extra-regional FDI. This is not true for three other regions: SADC, COMESA and MERCOSUR. This result can, in part, be explained by the low level of investment provisions in SADC and COMESA as shown in table 2; however, it may also reflect factors not accounted for in the model.

In the next columns IV and V, we explore why different regional groupings attract different amounts of FDI. We use the indices constructed on the basis of a careful examination of investment and trade provisions in the seven key regions (table 2). Column IV shows that the coefficient on the variable measuring *regional investment provisions* is positive and significant. This implies that regions with more investment provisions provide United Kingdom and United States investors with positive signals about how such regions will treat their investors. The coefficient of 0.41 means that regions with some investment provisions (index 1) will raise their real stock of FDI by 41% and increase by a further 41% (or 82% in total, compared to the original FDI stock) if they include further investment-related provisions (i.e. a move on the index from 1 to 2 will lead to an increase of 41% FDI over the original stock).[6] For instance, ASEAN would have increased FDI by 123% on average, while COMESA only by 41%, because so far it has included fewer investment-related provisions. Column V shows that similar observations apply to trade provisions – in fact, it is hard to distinguish between trade and investment provisions because they tend to be announced at the same time (e.g. NAFTA), although the indices need not have the same value. Thus, the results with respect to trade or investment provisions should be interpreted with some caution.

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[6] Because the explanatory variable is ordinal one should be careful in interpreting the movement from 1 to 2 and 3. In reality movement may be more gradual.

The formation of a regional grouping does not necessarily lead to an equal distribution across countries, and some countries may achieve a greater increase in the stock of real FDI than others. Columns VI-VIII explore some underlying reasons. Column VI is as column V, but includes an interaction term between investment provisions and the relative size of the country in the regional grouping (ratio of country GDP to largest GDP in the regional grouping varying between 0 and 1).[7] As the coefficient is positive and significant, it follows that the larger the country relative to others in the regional grouping, the more FDI it will attract on the back of RI. This would be consistent with the observation that United Kingdom and United States investors seek to invest in the largest or larger markets of the regional grouping in order to be closest to most of the demand. As an example, United States FDI as a percentage of GDP has increased much more in Argentina (threefold) than in Uruguay (twofold) after the formation of MERCOSUR.

Column VII shows that the interaction term with relative GDP per capita in the regional grouping is not significant. This indicates that it is not necessarily poorer countries in a regional grouping that attract less FDI. Finally, column VIII shows that countries that are further away in distance from the largest economy in the regional grouping attract less FDI. A distance of 1,000 km would decrease the effects of regional investment provisions on FDI by around 15%. This finding is consistent with the hypothesis that core countries would attract more FDI than periphery countries.

Sensitivity analysis

We performed several sensitivity analyses. First, while the regressions reported in table 3 included a fixed effect for United States FDI, it could also be that United States FDI responds differently than United Kingdom FDI to all explanatory variables, including the variables on RI. Therefore, we ran separate regressions for United Kingdom FDI and United States FDI as reported in table 4. We omit regressions with education

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[7] Interaction terms with trade provisions yield similar results.

or inflation, as these did not appear to give satisfactory results. However, we gained more observations.

As can be seen from columns 1 and 2, United States and United Kingdom investors behave differently.[8] Simple F-tests in a panel context confirm that coefficients on each explanatory variable are significantly different between the two home countries. Qualitative results are largely the same. However, the effects of RI on United Kingdom FDI in one of the seven regional groupings are much more equally distributed than United States FDI (see the coefficient on the interaction term), but it is not clear why this is so.

Columns 3 and 4 in table 4 also present separate regressions for United Kingdom and United States FDI, but now using a different panel estimator. Whereas previous estimations presented OLS estimates with robust standard errors, we now present Random Effect Panel data estimates (these are preferred to Fixed Effects Panel estimates for both the United Kingdom and United States; see the Hausman tests at the bottom of the chart). The results are similar, but the investment provisions variable is insignificant for the United States and significant for the United Kingdom. However, there is no evidence that the United States and United Kingdom behave significantly differently.

We also explored the use of dynamic specifications (equation 3). Because there are gaps in the data, the use of first differences does involve an unbalanced panel. In column I of table 5, we take the most simple equation explaining changes in FDI by changes in host country market size and regional investment provisions in order to have as many observations as possible. Clearly, the significance and positive sign of regional investment provisions is robust to using a dynamic specification. Columns II and III estimate an error correction term for the United Kingdom and United States FDI, respectively. United

[8] Differences amongst source countries can be due to many factors including different sectors of involvement or the specificity of the home country or of the host-countries in which they operate.

Table 3. Regional integration and the real stock of United States and United Kingdom FDI in developing countries (1980–2001): results of estimates

Variables	ln (FDI) – United States and United Kingdom Pooled							
	I	II	III	IV	V	VI	VII	VIII
Ln (GDP_host)	0.67	0.70	0.65	0.68	0.73	0.67	0.68	0.67
	(21.9)**	(23.1)**	(17.7)**	(22.7)**	(23.0)**	22.3)**	(22.7)*	(22.4)**
Education	0.006	0.003	0.003	0.004	0.003	0.004	0.004	0.004
enrolment	(4.67)**	(2.49)**	(2.09)**	(2.97)**	(2.08)**	(2.85)**	(2.98)*	(3.10)**
Inflation	0.00	-0.00	-0.00	0.00	0.00	0.00	0.00	0.00
	(0.30)	(-0.33)	(-0.30)	(0.10)	(0.20)	(0.39)	(0.90)	(0.40)
Phonelines per	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
1000 inhabitants	(5.51)**	(6.57)**	(6.59)**	(6.16)**	(5.69)**	(6.16)**	(5.85)**	(5.84)**
Roads	0.20	0.17	0.33	0.17	0.08	0.11	0.17	0.15
	(4.58)**	(3.71)**	(7.06)**	(3.72)**	(1.42)	(1.90)*	(3.56)**	(3.01)**
Region	0.12							
	(1.00)							
Region7		0.68						
		(7.10)**						
SADC			-0.37					
			(-1.65)*					
COMESA			0.35					
			(1.38)					
CARICOM			1.31					
			(8.08)**					
ASEAN			1.42					
			(13.7)**					
ANDEAN			1.07					
			(8.10)**					
NAFTA			1.48					
			(4.08)**					
MERCOSUR			-0.00					
			(-0.01)					
Regional Investment			0.41		0.17	0.39	0.63	
Provisions				(6.35)**	(1.93)**	(4.65)*	(7.55)**	
Regional Trade					0.43			
Provisions					(8.45)**			
INVPROV*						0.80		
GDPRATIO						(6.66)**		
INVPROV*							0.08	
GDP pcRATIO							(0.59)	
INVPROV*								-0.0001
DISTANCE								(-3.11)**
US fixed effect	0.60	0.63	0.60	0.62	0.63	0.63	0.62	0.61
	(6.48)**	(6.95)**	(6.56)**	(6.84)**	(6.98)**	(6.96)	(6.81)**	(6.70)**
No of observations	1521	1521	1521	1521	1521	1521	1521	1521
R-squared	0.43	0.45	0.48	0.44	0.45	0.45	0.44	0.45

Source: authors.

Notes: robust standard errors within parentheses, constant omitted from tables

** (*) denotes 5% (10%) significance level.

Table 4. Differences between United Kingdom and United States FDI, 1980–2001

Variables	Ln (FDI)			
	United States FDI	United Kingdom FDI	United States FDI	United Kingdom FDI
	1	2	3	4
Ln (GDP_host)	0.79	0.40	0.75	0.51
	(24.2)**	(12.53)**	(9.37)**	(5.83)**
Phonelines per 1000 inhabitants	0.006	0.002	0.005	0.005
	(10.6)**	(4.48)**	(6.67)**	(6.11)**
Roads	0.18	0.19	0.22	0.26
	(3.20)**	(3.35)**	(0.74)	(1.03)
Regional Investment Provisions	0.09	0.35	0.01	0.17
	(0.89)	(4.11)**	(0.13)	(3.00)**
INVPROV*GDPRATIO	1.14	0.46		
	(7.47)**	(3.57)**		
No of observations	1161	562	1161	562
No of countries	97	68	97	68
R-squared	0.52	0.35	na	Na
Robust standard errors	Yes	Yes	No	No
Hausman-test (RE vs FE): P-value			0.05	0.22
Estimation method	OLS	OLS	RE-GLS	RE-GLS

Source: authors.
Notes: OLS robust standard errors within parentheses for OLS estimations
          GLS Random effects model (no R-squared available)
** (*)   denotes 5% (10%) significance level

Kingdom FDI appears to respond particularly well and rapidly to changes in market size (short-run coefficient is 1.34); United States FDI follows market size in the long run (long-run coefficient is approximately $1.2 = 0.05/0.04$); United States and United Kingdom FDI grow between 4% and 11% faster in countries that become a member of one of the seven regional groupings.

Finally, we tested for the inclusion of time dummies and other variables, such as bilateral investment treaties between the United States or United Kingdom and developing countries.[9] However, the effect of the regional variables did not change substantially. We find that bilateral investment treaties signed

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[9] The relevant table not included but available from the authors.

between the United Kingdom or the United States and developing countries are not significant as in Mary Halward-Driemeier (2003). We also carried out estimations for total FDI inflows. While in the latter case the effects on regional provisions are significant and positive overall, the coefficient became smaller (0.35). The results for the seven regions thus point to investment creation. The final regressions are for the United Kingdom and the United States FDI real stocks in manufacturing, and again the coefficient is positive and significant.

Table 5. Dynamic specifications for United Kingdom and United States FDI, 1981-2001

	$\Delta \nabla_{\ll} \backslash \mu Å\!\int \div \simeq \angle \gg \mid \supset c$ $\int$	$\Delta \nabla_{\ll} \backslash \Re \mp \mu Å\!\int \div$ $\iint$	$\Delta \nabla_{\ll} \backslash \Re \hbar \, \mu Å\!\int \div$ $\iiint$
$\Delta \nabla_{\ll} \backslash ^{-}Å^{-}{}_{\jmath \gg \ominus \ominus} \div$	(2.46)**	(2.65)**	(0.98)
Regional Investment Provisions	0.04	0.11	0.04
	(2.47)**	(3.83)**	(2.15)**
Ln(GDP_host)$_{-1}$		0.08	0.05**
		(5.44)**	(4.70)
Ln(UK FDI)$_{-1}$		-0.13	
		(-7.28)**	
Ln(US FDI)$_{-1}$			-0.04
			(-5.16)**
US fixed effect	-0.01		
	(-0.31)		
No of observations	2024	613	1411
R-squared	0.01	0.10	0.02
Robust standard errors	Yes	No	No
Estimation method	OLS	OLS	OLS

Source: authors.
Notes: Robust standard errors within parentheses for first column.
** (*)   denotes 5% (10%) significance level.

7. Conclusions

This article examined the relationship between RI and FDI in developing countries. The theoretical and empirical literature on RI and FDI that has begun to emerge over the past decade appears to show that RI leads to further (extra and to some extent

intra-regional) FDI. However, the empirical literature seems to offer little guidance on whether different regional groupings are more successful in attracting FDI than others.

We argued that it is important to move beyond describing RTAs as a "black box" and conduct empirical research that can help to identify the effects of specific investment-related provisions in RTAs on FDI. In particular, we estimated a model explaining the real stock of United Kingdom and United States FDI in developing countries, covering 68 (for United Kingdom FDI) and 97 (United States FDI) developing countries thus moving beyond analyses on the basis of the familiar OECD database. The period covered is 1980-2001; we added a variable that measures the scope of regional investment and trade provisions in key regional groupings.

The econometric evidence in this study shows that, for seven key regional groupings: (i) while membership in a regional grouping can lead to further extra regional FDI inflows, the type of regional grouping matters for attracting FDI, i.e. whether or not RTAs include certain trade and investment provisions; (ii) the position of countries within a regional grouping matters for attracting FDI, i.e. smaller countries and countries located further away from the largest country in a region benefit less from being part of a regional grouping than larger countries and those close to the core of the region (although indirectly smaller countries could gain from this). We showed that the results were robust to a number of alternative specifications.

This empirical exercise provides more detail on the benefits of RTAs than previous work. In particular, the following findings may be of practical relevance to, for instance, developing country trade negotiators designing the features of the RTA they wish to form or join:

i)   Joining just any RTA does not necessarily increase FDI inflows. Regional groupings are too heterogeneous with respect to the level of integration to expect a universally positive effect.

ii) Regional groupings, such as ANDEAN, ASEAN, CARICOM, and NAFTA,[10] have had a positive effect on FDI from the United Kingdom and the United States.

iii) RTAs with more trade and investment provisions attract more inward FDI; it is thus sensible to negotiate more investment and trade provisions if the aim is to attract additional FDI from the United Kingdom and the United States.

iv) Countries that have larger economies or are geographically closer to other larger countries within a region can expect a larger increase in FDI as a result of joining than those countries that have smaller economies or are located in the periphery. However, on average, all countries in the seven key regional groupings benefited from additional FDI through regionalization.

An important area for future work is to investigate who are the winners and losers of specific RI agreements and what determines whether a particular country wins or loses its capacity to attract and/or retain FDI as a result of the process of RI. Additionally, it might be interesting to discuss alternative types of regional groupings; while this article examined South-South integration, the effects of North-South integration are becoming relevant (e.g. EU trade agreements with developing country regions). ∎

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[10] There are studies that find a positive effect of NAFTA on inward FDI to Mexico and studies that find no or only small effects. Our results are mostly in line with the views contained in an IADB report on this issue. See further references in box 10.2 in http://www.iadb.org/res/publications/pubfiles/pubB-2002E_18.pdf

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Appendix on data and variables

Foreign direct investment data

United States FDI: United States direct investment position abroad on a historical cost-basis, in millions of dollars, 90 countries, 1980–2001, see www.bea.gov.uk

United Kingdom FDI: net book value of FDI by United Kingdom enterprises, '000 $, 60 countries, 1981, 1984, 1986-2001, Business Monitor MA4 (and data obtained directly from CSO).

Variables are deflated by home GDP deflator from the World Development Indicators, and are in natural logarithm form.

List of variables
EDU   sum of EDUPRIM (school enrolment, primary, % gross),
EDUSEC (school enrolment, secondary % gross) and EDUTERT (school enrolment, tertiary, % gross)
GDP_USD   Gross domestic product, current dollar
GDPG   Annual change in gross domestic product, percentage

Inflation   Inflation rate (in %) from World Development Indicators
PHONES   telephone landlines, # per 1,000 population

ROADS Road network length, kilometres
INVPROV*GDPRATIO
INVPROV*GDPpcRATIO
INVPROV*DISTANCE
GDP_host   Real GDP from World Development Indicators
Ln   Natural log

Transformed variables

GDPpcRATI0   Ratio own GDP/capita to highest GDP/capita within own RTA
GDPRATIO Ratio own GDP to highest GDP within own RTA
DISTANCE Distance to largest market

Δ = change term or first difference operator

A list of countries included and details on data sources are available from the authors.

The propensity for local innovation and inter-firm linkages in transnational corporations versus local enterprises in India*

Pradeep Kanta Ray and Shams-ur Rahman**

The issue of whether transnational corporations (TNCs) form complementary linkages with domestic suppliers and contribute to the process of creating appropriate new technologies in developing countries has not been systematically explored. Using a rich dataset of over 300 companies in India, we examine if the propensity of foreign affiliates to innovate and to create linkages in host countries is in any way different from that of their local counterparts. Our results show that foreign affiliates foster beneficial horizontal linkages with local suppliers of final goods but spend less effort than local enterprises to develop vertical inter-firm linkages and to create appropriate technologies for Indian markets.

1. Introduction

Foreign direct investment (FDI) has emerged as the most significant source of international capital flows to developing countries – accounting for 72% of all resource flows and six times higher than official flows (UNCTAD 2004, p 5). Despite its significance in terms of volume, its impact on the process of

creating linkages and innovating appropriate new technologies in developing countries is far from clear. In the case of India, the issue of direct spillovers of TNC operations is yet to be analysed in a satisfactory manner. Indeed, empirical studies on this issue undertaken since the commencement of economic liberalization in 1991, when India began to seek FDI enthusiastically, do not go beyond anecdotal.

In this article, we examine certain qualitative aspects of FDI. In particular, we ask if it enhances or retards the process of local innovation and linkage creation activities compared to investment by domestic firms in India? We test for differences between foreign affiliates and local enterprises using a dataset of more than 300 companies in the context of India's economic liberalization since 1991 and an expansion of FDI inflows. Our results indicate that foreign affiliates do foster beneficial horizontal linkages with local suppliers of final goods but spend less effort than local enterprises to develop vertical inter-firm linkages, or create appropriate technologies for Indian markets. The results have implications for Indian policymakers as to how to devise policy mechanisms to assist the process of industrial development under a more liberal trade and investment regime. The article is organized as follows. The first section begins with a general discussion on innovation and linkages and their implications on industrial development in host countries. Next, some empirical evidence is considered, and the research hypotheses are outlined. Then the research methodology is specified, followed by the results and a discussion of the implications of the findings. The article concludes in the final section.

2. Theoretical underpinnings

Innovation – the introduction of new products or processes - does not only mean pushing the frontiers of knowledge; rather, innovation can be new to the world or just new to the user (UNCTAD, 2005). Promoting new uses of an existing technology by adapting it to serve local needs of a host country is often an innovation in itself (Lall, 1996). For

developing countries in particular, innovation is often aimed at creating locally appropriate technologies. *Linkages,* on the other hand, help the expansion of the local capacity for the production of specialized inputs. Direct and indirect linkages with local sources of components, raw materials, and equipment spur new industrial activity and industrial clustering (Lall, 1978; Park 2004). For instance, the production of semiconductors by TNCs in Singapore draws heavily upon a host of related local industries in silicon, air and water purifiers as well as cutters (Mathews, 1999; Ray and Venaik, 2001).[1] Such linkages increase the industrial depth and competitiveness of the economy (Porter, 1990).

However, TNCs may differ strategically from local enterprises in their innovatory activities, and the linkages they forge with local industries in host countries. Internalization, or global integration of economic activity, reduces the TNC's need for undertaking innovatory activities at their affiliates. Internalization of ownership-specific assets, such as proprietary technology, brand goodwill, and managerial skills, offers significant opportunities for benefiting from lower costs, higher quality as well as scale and scope economies (Buckley and Casson, 1991; Hymer, 1960).[2] However, the largest drawback of internalization lies in the reduction of the deeper learning processes and spillovers in the host economy. There is likely to be less effort to absorb, to adapt, to improve or to innovate technology in affiliates than would be the case when local companies buy a licence or equipment in the externalized mode of technology transfers and build upon the acquired technology (UNCTAD, 1999). On the whole, the literature suggests that major strategic decisions with regard to innovation are not usually delegated to the affiliates (Birkinshaw and Morrison, 1995). Birkinshaw (1996) found that there was a risk in having a product innovation mandate in the affiliate, because it may be

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[1] A value system consists of the entire gamut of a production system embedded in the linkages of the firm with suppliers and buyers. See Porter (1980) for an analysis of value chains.

[2] A summary of these hypotheses is given comprehensively in Kumar (1991).

at variance with the corporate (parent) strategy. Even so, some TNCs often foster global competencies in local contexts (local for global - *a la* Nohria and Ghoshal, 1997). For example, the "local implementers" are plants that assemble a full range of products in the local market and also have the role of adapting global products to local standards (Jarillo and Martinez, 1990). We will develop some conjectural propositions about these configurations in the section on research hypotheses.

3. Empirical evidence

Existing empirical studies on linkages and innovation have methodological shortcomings, but serve to illustrate the evidence on the value of FDI in developing countries.

R&D activities of TNCs serve as a good indicator of innovatory activity in host countries.[3] Fairchild and Sosin (1986) compared Latin American firms and TNCs and observed that domestic firms had a relatively higher level of internal innovatory activity, while foreign affiliates relied more heavily on external sources. In a survey of six Asian country studies, Enos (1988) found that there was a greater local technological effort associated with non-equity transfers: e.g. in Indonesia, the degree of technological mastery was greater in the local enterprises than in TNCs. For India, Ray and Rahman (2000) and Ray and Venaik (2001) found that local enterprises depended less on imported technology, as indicated by their lower expenditures on foreign patents, than foreign affiliates. Furthermore, in a survey of 32 R&D units of foreign affiliates in India, Reddy (1997) observed that a majority (56.2%) of TNCs performed wholesale transfers of technology, but the remaining TNCs, consisting of technology-intensive firms, assigned their affiliates global innovatory mandates and linked such innovatory activities to the overall transnational repository of capabilities. According to Cantwell (1995), TNCs tend to be *more* R&D intensive compared to their local competitors and are regarded

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[3] The bulk of the innovatory activities conducted in host countries is usually adaptive R&D (Kumar, 1998).

as the dominant agents of international technology diffusion (Findlay, 1978; Cantwell, 1995). Roth and Morrison (1992) propound that, in many TNCs, certain affiliates are given a "world mandate" and develop an entire product range to cover worldwide markets. In a survey of 2,109 affiliates, Holm and Pedersen (2000) found that 25.1% of the affiliates claimed that they conducted basic research while 54.3% were engaged in developing products or processes. The results also show that 4.5% of all the affiliates are "centres of excellence" for basic and applied research worldwide.

However, even though empirical evidence suggests that affiliates engage in and undertake basic and applied research, the question of whether the TNC's innovatory activities contribute to the development of appropriate new technologies - for developing countries in particular - has not been addressed in these studies. Studies by Rugman (1988), Hennart (1986), Kumar (1991) and Ray and Venaik (2001) appear to suggest that TNCs differ from local enterprises in that they tend to be more import-intensive in their procurement practices.[4] Toth (2000) found that, in Hungary, the share of input procured from Hungarian suppliers is markedly higher in domestic enterprises (59-62%) than in foreign affiliates (39%).[5] Siddharthan and Kumar (1990) argue that, in India, TNCs tend to procure capital goods internally - thus import more - because they would not like the new technology embodied in capital equipment to spill over to unrelated parties. For Nigeria, Landi (1986) reported that foreign affiliates had a higher propensity to import than their local counterparts.[6] In a study of Singapore's electronic

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[4] Studies by Langdon (1981) and by O'Loughlin and O'Farrel (1980) suggested that TNCs are more import intensive than local enterprises. Empirical studies by McAleese and McDonald (1978) and Lall (1978) concluded that TNCs competing in low-technology, labour-intensive and export oriented production are less likely to establish local linkages than local enterprises.

[5] Cited in UNCTAD (2001, p. 134).

[6] However, Carvalho's (1977) study for Brazil, Colombia and Mexico indicated that foreign firms are no different from domestic firms in terms of their import trends. Cohen (1975) also reports similar findings for TNCs in Singapore.

industry, Lim and Pang (1982) noted that while European firms bought a substantially share of their input locally (40-50%), Japanese firms purchased 20% of their input locally and United States firms a mere 10%.[7]

Thus, no conclusive evidence emerges, either way, whether TNCs contribute more (or less) to linkage creation and innovatory activities in host countries in comparison to their local counterparts. These studies also suffer from methodological shortcomings. Most studies were conducted on industry-level, rather than firm-level, data. Almost without exception, the number of variables in these previous studies was smaller. Above all, these empirical findings need to be validated using more sophisticated measures, especially for India, where there has been much debate in both academic and political establishments about the value of FDI (Saha, 2004).

4. Research hypotheses

In this section, we formulate a set of hypotheses based on our earlier discussion of adaptive innovation and linkages.

i) *Group effects on innovation*

We first hypothesise that TNCs and local enterprises belong to two different strategic groups,[8] and hence display dissimilar propensities in their use of foreign technology and efforts towards product differentiation. Our propositions concerning foreign royalty payments, R&D spending and advertising expenditures, are complementary descriptors of innovatory activities, discussed next.

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[7] See Lall (1978) for a comprehensive review of empirical studies.
[8] A strategic group is a group of firms in an industry following a similar strategy. The concept of strategic groups helps us to understand the competitive role of TNCss and their affiliates - a concept which follows from the theory of industrial organization. Some firms are vertically integrated or diversified while others are not; some produce a full product line, whereas others specialize; some advertise heavily, whereas others do not.

Innovation and appropriate new technology

The creation of appropriate new products for the local market, given its strategic importance as the "home base", is of paramount importance for local Indian enterprises in particular.[9] Not having a global presence nor being at the forefront of knowledge frontiers, Indian enterprises need to set up in-house R&D facilities to develop products specifically for their home market (Ray 2001b; Kumar and Agarwal, 2000; Agarwal, 2002). Even with imported technologies, substantial developmental effort is required to piece together disembodied technologies (Lall, 2002). In contrast, TNCs tend to concentrate most of their R&D activities near their headquarters, given its strategic importance for their global operations (Kumar, 1991). Indeed, growth in corporate R&D activity remains highly concentrated in the main advanced industrial economies of the world, more specifically, Canada, France, Germany, Italy, Japan, the Netherlands, the United Kingdom and the United States (Pearce and Singh 1992). Therefore, R&D expenditures of foreign affiliates, which mostly import technologies, tend to be proportionately lower than R&D expenditures of local enterprises.

> *Hypothesis 1.1: Foreign affiliates are likely to spend a lower proportion of their revenue on new product R&D in the host country than local enterprises.*

It may also be financially advantageous for TNCs to integrate their systems of technology over several countries, as this allows quick internal transfers of global technological know-how. Having ready access to global reservoirs of technological know-how leads foreign affiliates to import more technology,[10]

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[9] See Porter (1990), in which he elaborates on the importance of the home base as the ground where local firms draw their competitive advantage.

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

rather than creating new technologies exclusively for local markets.[11] For local enterprises, though, in-house technology development and linkages with local technology providers enhance their ability to customize products for local markets. This lowers their dependence on foreign technology know-how. A higher amount of imported technology by foreign affiliates would result in higher royalty fees paid to the parent firm, which lead us to the following hypothesis.

> *Hypothesis 1.2: Foreign affiliates are likely to use more imported technology and pay higher foreign royalties as a proportion of sales than local enterprises.[12]*

Product differentiation through advertising

It is often not enough to have world-class technologies on their own, but firms must advertise their benefits and, make the product known to the consumers. Because TNCs tend to be better at establishing global brands for their products than national firms, they typically devote more resources to product promotion (Caves, 1974, 1982). For example, the consistent theme in Philips' advertising strategy in India was its image of *international pedigree* and technological leadership in electronics (Ray, 2005).[13] High levels of advertising expenditure (non-price mode of rivalry) also serve to elevate the barriers to

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[11] In this connection, a CEO of Alcatel in India observed that "The core [technology] strategy [in the subsidiary] cannot be any different because the core strategy is driven largely, in industries of this nature, by technology. …Since technology emanates from the centre, automatically everyone has to follow. It is not that globally Alcatel is developing product A and I find the market for product B. We cannot make product B because the volume of product B for the local market will not justify spending on R&D for product B in the Indian market" (Ray, 2001, pp. 540-541). The CEO of Siemens India remarked that "we are not here to reinvent the wheel!" (Ray, 2005). See also Saha, (2004).
[12] R&D expenditures, and the royalty and technical know-how fees paid in foreign currency (as a ratio of sales), are used as measures of the firm's internal dynamism, or its lack thereof.
[13] Philips India Ltd., Interview Transcript, Calcutta, February 1995.

entry. In contrast, local competitors with fewer financial resources tend to focus on price competition and, hence, their advertising outlays are modest when compared to the expensive media campaigns of TNCs.[14]

> *Hypothesis 1.3: Foreign affiliates are more likely to engage in product differentiation strategy through higher advertising intensity in comparison to local enterprises which focus on price competition.*

ii) *Group effects on inter-firm linkages*

Enterprises create both forward (e.g. with distributors of their output) and backward (e.g. with the supplier of raw material and components) linkages. Both types of linkages can result in creating economy-wide spillover benefits. Here, we hypothesize that the main differences between TNCs and local enterprises will be in distribution, export intensity, the extent of local outsourcing, local content, vertical integration, import of finished goods and capital goods deployed.

Local distribution strategy and export intensity

The literature on forward linkages in India is rather anecdotal in scope (see Khanna and Palepu, 1998). Indian markets are geographically fragmented and very regional, characterized by widespread income disparities and a rural-urban divide (Prahalad and Oosterveld, 1999; Bartlett and Ghoshal, 2000). In most parts of the country, consumers' purchasing power is generally low; infrastructure is poor; and the markets are culturally dissimilar. These features of the Indian market make mass-marketing a particularly difficult proposition. TNCs, competing with a narrow range of differentiated goods, tend to

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[14] The marketing literature makes a clear cut distinction between short-term, localized *sales promotion* campaigns which are suitable for price competition, and *advertising campaigns* of TNCs, which have much higher "reach" (populations served) and "frequency" (number of times the advertising message is shown to prospective buyers).

focus on metropolitan cities, rather than to compete in each and every geographical segment of the country (Ray, 2001a).[15] Such a "focused strategy" (Khanna and Palepu, 1997) lowers TNCs' distribution outlays vis-à-vis that of local firms. Smaller local enterprises usually draw their revenue from serving fragmented markets over a large geographical area (Prahalad and Liberthal, 1998). Thus, distribution expenses for local enterprises tend to be higher.

> *Hypothesis 2.1: Foreign affiliates are more likely than local enterprises to engage in niche-market strategy through lower distribution to sales ratios.*

As TNCs possess better overseas marketing networks than local firms, firms with higher foreign ownership may have a greater propensity to export. Export orientation disciplines firms, increasing competitiveness and decreasing the risk of technological sloth (Lall, 1995). However, the impact of foreign ownership on export orientation cannot be uniquely predicted. Market-seeking FDI is unlikely to result in much export activity. Some affiliates are established purely to serve the local market (Birkinshaw, 1997). In the case of India, evidence suggests that domestic enterprises, rather than foreign ones, are more export intensive (see Kumar and Agarwal, 2000). This finding is corroborated for industries such as drugs and pharmaceuticals and electrical machine tools (Ray, 1999; Ray and Venaik, 2001). Thus, we hypothesize that local enterprises have a higher export to sales ratio (EXP) than foreign affiliates.

> *Hypothesis 2.2: Foreign affiliates are likely to have lower exports to sales ratios than local enterprises.*

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[15] Semi-urban and rural markets in India sell goods in smaller pack sizes. Besides, the nature of packaging used by local enterprises makes containerization difficult. Selling agents need to visit customers many more times than in developed countries. TNCs with superior packaging and focusing on niche markets do not have to expend the same distributional resources as those of their local counterparts.

Horizontal linkages in final product markets

If the output of TNCs consists of a narrow range of differentiated goods, but the demand is for a wide range of substitutes, foreign affiliates may extend their product range by outsourcing production to local companies. By so doing, TNCs can quickly fill uncovered niches of the markets. In particular, when markets are dynamic, and the threat of entry is high, it is a good strategy to use existing capacity of (potential) competitors.[16] It also helps to create horizontal linkages with local suppliers through cooperation (see Ray, 1999; Ray and Venaik, 2001).

> *Hypothesis 2.3: Foreign affiliates are more likely than local enterprises to outsource finished goods to extend their product lines.*

Secondly, it is easier for foreign affiliates to obtain a range of final products that cannot be efficiently produced locally – from their parents or their foreign suppliers (Caves, 1996). This implies that foreign affiliates would rely more on finished goods imports. Empirical evidence suggests that local enterprises in India, in contrast, manufacture a wider range of products in-house, so as to capture economies of scope through multi-plant integration. Local manufacturers thus have lower expenditure on finished goods imports compared to their foreign rivals (cf. Ray, 2000; 2001a).

> *Hypothesis 2.4: To exploit the global economies of scale in their parent companies, foreign affiliates are likely to be more import-intensive in finished goods in comparison to local enterprises.*

Vertical (backward) linkages in factor and intermediate markets

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[16] In the marketing literature, this is known as flanking strategy - i.e. reinforcing the "flanks" at the two ends of the product line spectrum so as to stave off attacks from competitors.

Using proprietary machinery from the parent firm (or designated suppliers) serves to elevate a foreign affiliate's product-differentiation in quality. Moreover, under internalized transfer of capital equipment, there is lesser chance of the newly developed technology spilling over to unrelated third-parties. Hence, foreign affiliates internalize the procurement of capital goods and import more of such high technology equipment. Higher imports of complementary raw materials also occur because TNCs often have established international supply chains (Siddharthan and Safarian, 1997). Foreign suppliers, in comparison to local ones, are more likely to have the capability to keep up with changing technologies (UNCTAD, 2001, p 133). In contrast, domestic enterprises that cannot find suitable local suppliers must undertake higher *local* (backward) vertical integration to overcome quality and supply uncertainties in arms-length transactions (D'Costa, 1995).

Hypothesis 2.5: Foreign affiliates are likely to be more import-intensive in raw materials, supplies and equipment than local enterprises.

Hypothesis 2.6: Foreign affiliates are likely to have lower vertical integration than local enterprises.

Higher capital intensity is also a feature of foreign affiliates since it is easier to use capital-intensive techniques that are proven abroad. With higher capital intensity, TNCs may form an indirect linkage to local infrastructure providers – possibly attracting FDI from transnational infrastructure service providers, such as those in energy industries. In time, this may improve the local infrastructure. In fact, the bulk of FDI that flowed into India from 1991 to 1996 was in power, transportation and communications industries, where demand far exceeded supply due to the lack of capital and technology (Ganesh, 1997).

Hypothesis 2.7: Foreign affiliates are likely to have higher capital intensity than local enterprises.

5. Research methods

We used the Prowess database provided by the Centre for Monitoring the Indian Economy (CMIE), which has by far the most comprehensive and reliable information available to date, and includes 7,500 registered companies. The dataset in this study consists of firm specific data of 338 enterprises from three industry clusters, randomly chosen from a list of industries. Through a procedure using stratified random sampling, large enterprises with sales revenues of Rs. 400 million ($10 million) or above were selected, as it was deemed that smaller enterprises were not comparable to foreign affiliates (see Lall and Mohammad, 1983; Jenkins, 1990; Kumar and Agarwal, 2000). We allowed a gap of five years after the introduction of economic liberalization, for foreign affiliates and local enterprises to adapt to changed conditions, and constructed a data set based on the financial performance for the period 1997-1998 of foreign affiliates and local enterprises. The 338 firms comprise: a) chemicals industries (n=169), consisting of 42 foreign affiliates and 127 local enterprises; b) electronics industries (n=71), consisting of 29 foreign affiliates and 42 local enterprises; and c) transport equipment industries (n=98), consisting of 34 foreign affiliates and 64 local enterprises. The pool of foreign affiliates comprises foreign-controlled firms with over 20% foreign equity.[17] A further test of foreign control was attempted by scrutinizing local ownership through the shareholding patterns of the top 50 (local) shareholders, so as to ensure that their equity did not exceed foreign equity. Also scrutinized, in the case of local enterprises, was foreign dividends paid, so as to exclude any local enterprise with overt foreign interests. Finally, to control for firm size, all variables were re-scaled as their ratio to sales as follows:

ADVT	*advertising expenditure as a percentage of net firm sales*
DIST	*distribution expenditure as a percentage of net firm sales*

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[17] The internationally accepted definition of a foreign affiliate uses a lower threshold of 10%.

R&D	research and development expenditure as a percentage of net firm sales
IMP_ROY	*foreign royalty paid as a percentage of net firm sales*
TOT_EXP	*total exports revenue as a percentage of net firm sales*
IMP_FIN_GOODS	*import of finished goods expenditure as a percentage of net firm sales*
TOT_IMP	*import of raw materials expenditure as a percentage of net firm sales*
PUR_FIN_GOODS	*purchase of finished goods expenditure as a percentage of net firm sales*
VAL_ADD	*value added as a percentage of net firm sales*
ENERGY	*energy consumption expenditure as a percentage of net firm sales.*

6. Results

Table 1 summarizes the predictions and corresponding results of means and standard deviations of the variables under each ownership group. Subject to tests of significance, these findings reveal the overall discriminating characteristics of foreign affiliates and local enterprises.

Univariate analysis and partial F values

The results indicate that 9 out of 10 variables are significant. The only variable not significant is R&D. We report the results of the discriminant function analysis next.

Multivariate Analysis

A step-wise discriminant analysis was employed to estimate the discriminant functions using the Mahalanobis D squared. Discriminant analysis is used to classify cases into the values of a categorical dependent variable (foreign affiliates or

Table 1. Means of variables by ownership groups and test for significance

	F	Significance	Hypothesis	Three industries together Mean	
				TNC	LE
Local innovation	0.223	0.637	*H1.1*: $R\&D_{TNCi} < R\&D_{Lei}$	0.238	0.295
	22.734	0.000*	*H1.2*: $IMP\_ROY_{TNCi} > IMP\_ROY_{LEi}$	0.412	0.096
	4.022	0.046**	*H1.3*: $ADVERT_{TNCi} > ADVERT_{Lei}$	1.200	0.664
Inter-firm linkages	4.153	0.043**	*H2.1*: $DIST_{TNCi} < DIST_{Lei}$	1.342	1.855
	11.384	0.001*	*H2.2*: $TOT\_EXP_{TNCi} > TOT\_EXP_{LEi}$	10.058	20.878
	15.863	0.000*	*H2.3*: $PUR\_FIN_{TNCi} > PUR\_FIN_{Lei}$	7.443	2.576
	11.598	0.001*	*H2.4*: $IMP\_FIN_{TNCi} > IMP\_FIN_{Lei}$	1.158	0.058
	17.260	0.000*	*H2.5*: $VAL\_ADD_{TNCi} < VAL\_ADD_{LEi}$	24.438	24.438
	10.152	0.002*	*H2.6*: $ENERGY_{TNCi} < ENERGY_{Lei}$	2.612	4.838
	7.146	0.008*	*H2.7*: $TOT\_IMP_{TNCi} > TOT\_IMP_{Lei}$	16.820	12.205

Source: authors' calculation.
* significant at 0.01; ** significant at 0.05.

local enterprises) – usually a dichotomy. A discriminant function, also called a *canonical root*, is a latent variable which is created as a linear combination of discriminating (independent) variables. Consider for example, the following function:

foreign affiliates/local enterprises $= c + b_1x_1 + b_2x_2 + ... + b_nx_n$,

- where the b's are discriminant coefficients, the x's are discriminating variables, and c is a constant.

The discriminant analysis usually involves fewer violations of assumptions (independent variables need not be normally distributed, linearly related, nor have equal within-group variances), is robust, handles categorical as well as continuous variables, and has coefficients that many find easier to interpret (Hair et al, 1998). The Mahalanobis D squared procedure performs a step-wise analysis, designed to develop the best one-variable model, followed by the best two-variable model, and

so forth, until no other variables meet the desired selection rule, which is to maximise Mahalanobis D squared between two groups (local enterprises and foreign affiliates). A smaller sample size of n = 190 (groups of equal size; foreign affiliates = 95; local enterprises = 95) was used for this part of the analysis.

We present two results individually, one for innovation and another for linkages. The main differences between foreign affiliates and local enterprises in innovation are in foreign technology imports. In linkages, the differences are in exports; imports of raw materials and equipment; vertical integration; distribution; and outsourcing of finished goods. The classification accuracy is 74.7%, which implies that the results are statistically valid.

Table 2. Test of significance in discriminant analysis

Variables	Sig. of F	Mahalanobis D Squared
Foreign royalty payments	0.020**	1.405
Finished goods outsourcing	0.003*	1.299
Exports	0.003*	1.297
Imports	0.002*	1.295
Vertical Integration	0.010*	1.367
Distribution	0.032**	1.429

Source: authors' calculation.
*significant at 0.01; ** significant at 0.05.

The discriminant functions are as follows:

Local enterprises: Y_{LE} = –5.982 + 0.046 PUR_FIN_GOODS + 0.249 VAL_ADD + 0.051 TOT_IMP + 1.291 IMP_ROY + 1.147 DIST – 0.020 TOT_EXP

Foreign affiliates: Y_{TNC} = –5.349 + 0.109 PUR_FIN_ GOODS + 0.209 VAL_ADD + 0.103 TOT_IMP + 2.213 IMP_ROY + 0.922 DIST – 0.048 TOT_EXP

7. Discussion

i) Local Innovation

Significantly higher royalty payments (IMP_ROY) imply foreign affiliates (2.213) are relying more on foreign technological know-how; conversely, for local enterprises (1.291), their dependence on foreign technological know-how is lower. The purpose of drawing on local sources of technology by the latter group is presumably to design and to develop locally oriented products for the Indian market. In-house developers or local providers of knowledge are, by definition, *better integrated in the local institutions of learning and practice; hence they are able to customize products to local requirements more efficiently*. However, there is no significant difference between TNCs and local enterprises in the extent of their spending on R&D. The insignificance of the difference in R&D does not, in our view, provide a sufficient rationale for rejecting the hypothesis that local enterprises customize product technologies for local needs. It is possible that TNCs do not have high levels of R&D, because the size of the local market does not justify customizing products (see Alcatel's explanation in footnote 11). In the case of local enterprises, though, their first mover advantages in in-house R&D laboratories and returns from R&D efforts in precious years make their current R&D expenses appear rather modest.[18] Either way, R&D spending across *both* ownership groups seems limited or, at least, no different from each other. We need to bear in mind that R&D is only an input of innovation, not its output, and is not always a robust indicator of technological dynamism. Moreover, R&D spending is not always reported or often inaccurately reported in India (Lall and Mohammad, 1983; Kumar and Aggarwal, 2000). Therefore, it would be more appropriate to discriminate on the aspect of foreign royalties paid (IMP_ROY*)* – i.e. the output of innovation

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[18] A similar finding was reported by Ray (2005) in the case of BPL Ltd. (a TV manufacturer) which claimed it had lagged returns from previous investments in R&D and advertising.

- which is significantly higher for TNCs, meaning that they make intensive use of foreign technologies in comparison to their local counterparts.

In terms of product differentiation, we found no significant difference in advertising propensity between TNCs and local enterprises in the multivariate framework. ADVERT may be a good discriminator on its own in the F test, but it does not add further to the discriminating information contributed by the other significant variables. Current advertising expenditures by foreign affiliates are not always a true reflection of the scale of their advertising activity, since they do not account for the spillovers from worldwide advertising investments made over time by their parent and associates (Kumar, 1991). Another reason could be that the large-scale entry of TNCs from 1991 has forced the oligopolistic local enterprises to increase their advertising spending in order to protect their market share. Hence, the current indicator of advertising spending has limitations in representing the scale of TNCs' advertising activities on the one hand and, the behaviour of local counterparts on the other, which have become more advertising-intensive since 1991. The insignificance of this difference does not automatically nullify our hypothesis that foreign affiliates are bigger spenders on advertising.

ii) Local Linkages

In the main, differences between TNCs and local enterprises emerged in exports, imports, vertical integration, distribution and outsourcing of finished goods. As hypothesized, local enterprises (1.147) appear to be significantly more distribution intensive (DIST) than TNCs (0.922). Consequently, they end up with higher physical distribution costs than foreign affiliates. This corroborates our hypothesis that foreign affiliates tend to focus on marketing in metropolises, rather than to spread their distribution to cover a wider geographical area.

Local enterprises are also found to export more (TOT_EXP). As hypothesized, a plausible explanation is the

motivation for FDI: market-seeking FDI is likely to result in lower exports than resource- or efficiency-seeking FDI (Dunning, 1998). Moreover, there is no reason to expect that the parent firm will give a mandate to its affiliate in India to export to a third country in competition with other affiliates located elsewhere. Also, a lack of adequate product differentiation, as revealed in the results, between what is produced in India and other parts of the world, could contribute to lower export activity. The finding on exports is consistent with earlier analyses of Kumar (1991) and Kumar and Aggarwal (2000), which found that TNCs in India displayed lower propensities to export than local enterprises.

A finding of some interest here is the tendency of foreign affiliates (0.109) to have more local outsourcing (PUR_FIN_GOODS) than local enterprises (-0.046) (see Table 2). Business process outsourcing serves the important function of instantly extending the TNC's product range by using existing surplus capacity in the economy. This act of "strategic alliance" with competing firms serves two important additional functions, namely a) it eliminates the prospect of competition from those local enterprises who might otherwise enter the market and b) it benefits suppliers of final products through the knowledge spillovers, transferred designs and technologies from TNCs. Such practices tend to have beneficial effects on final goods industries and serve to increase the industrial depth and competitiveness of the host economy. However, the insignificance of differences with respect to imports of finished goods (IMP_FIN_GOODS) leads us to conclude that both foreign affiliates and local enterprises depend as much as each other on finished goods imports to boost their product range. An example of this tendency was found in the Indian television industry, where local enterprises imported more intensively in order to compete against foreign affiliates, which had introduced their global range of models after economic liberalization (Ray, 2001a).

Two other features are of significance here: first, the import propensity amongst local enterprises for raw materials

and capital equipment (TOT_IMP) is lower – with the coefficient for local enterprises being 1.291 and for foreign affiliates 2.213. Second, local enterprises appear to produce a greater proportion of output in-house – i.e. they appear to be more (backward) vertically integrated (VAL_ADD) - suggested by the higher value of the coefficient (0.249) for local enterprises compared to that of foreign affiliates (0.209). This corroborates our hypothesis that local enterprises are vertical integrated to a greater extent to circumvent market failures in intermediate goods. Frequent interruptions in supply, quality variance and transaction costs lead local enterprises to internalize much of the value-adding activities in-house, confirming the finding in D'Costa (1995). It is also possible that local enterprises are yet to realize the benefits of specialization and subcontracting and, hence, tend to favour vertical integration. Even so, the higher value-added generated in-house by local enterprises generate greater benefits to the domestic economy, since it enhances national income and learning within "infant" enterprises. The finding also supports our hypothesis that TNCs vertically integrate globally, hence lowering the scope of *local* value addition of the affiliate.

Thus, with regard to linkages, significant differences arise in five out of seven measures, whereas with regard to innovation, differences arise in one out of three measures. The present study acknowledges that local innovation and linkages are not a one-off, but a dynamic process. At the initial point of entry, a foreign affiliate is likely to be tightly integrated with the parent, internalizing most of its tangible and intangible asset flows. With time, it may begin assembly-orientated production, thereby taking advantage of the low-cost labour.[19] Once these affiliates undertake higher value-creating activities in the host country, development of greater capability should follow.

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[19] Ray (1999) verified this inference by actual field study observation of four different transnational affiliates in India.

8. Conclusion and future directions

What concerns policymakers in India is not so much whether firms are foreign or locally owned *per se*, but the implications of the difference in behaviour given their level of foreign ownership. The objective of host country governments in promoting or restricting foreign ownership in locally domiciled enterprises is to influence and to enhance the development of favourable local and foreign linkages (Ray and Venaik, 2001). Linkages developed in competitive environments and accompanied by efforts to enhance suppliers' capabilities are likely to be technologically beneficial and dynamic (UNCTAD, 2001). Given their foreign ownership and pressures for global integration, foreign affiliates appear somewhat less proactive than local enterprises in undertaking vertical inter-firm linkages with factor and intermediate goods markets; nonetheless, they forge favourable horizontal linkages with finished goods suppliers by means of business process outsourcing.

Promoting linkages, in our view, will require a much more robust support infrastructure, which, as is well-known, is woefully inadequate in India. A positive development in this regard has been the inflows of a large quantity of FDI in power, transport and communications industries, which should improve the efficiency of vital infrastructure services. The Government also needs to be mindful of the wide variance in the quality of manufactures in ancillary industries. Through the Indian Standard Institution (ISI), the Government of India is slowly implementing a national supplier accreditation system like the ISO 9000 certification. This quality accreditation system may encourage both foreign affiliates and local enterprises to have more confidence in outsourcing raw materials and intermediate products. Policymakers also need to encourage clustering and co-location of related industries, usually best done in technology parks – Bangalore being a prime example. Clustering makes it easier to form backward and forward linkages, to reduce transport and communication delays as well as to increase the

potential for positive externalities. The recent inflows of FDI into India have facilitated further clustering, as the studies of Kathuria (2002) and Park (2004) demonstrate.

Insofar as India strives to promote greater local innovation, more attractive tax allowances for conducting R&D than those recently implemented by the Government of India need to be put in place.[20] Finally, policymakers need to be watchful of the net impact of FDI, by taking into account all the inflows and outflows of resources through the operations of TNCs as well as the impact of their operations on innovation and inter-firm linkages. Progressive indigenization and local R&D could harmonize and align TNCs' goals with the national objectives. All this needs careful monitoring and reinforcement. We point out certain unavoidable limitations of this study. Arguably, the question of externalities, such as productivity increases arising from FDI in related industries, is not accounted for in this analysis. Furthermore, the analysis presented here has a smaller number of foreign affiliates as compared to local enterprises, and hence the comparative analysis was restricted to a small sample size. Finally, the analysis is not sufficiently dynamic. Ideally, it would have entailed a much more elaborate time-series analysis. One hopes that future studies would also focus on some unique aspects of firm behaviour – technology development, product differentiation and vertical integration - as the bases for discrimination across industries.

In conclusion, we believe our study makes three significant contributions to the literature on TNCs. First, our multi-dimensional methodology provides a comprehensive statement about the quality of FDI in India, and the contribution it makes to linkage creation and innovatory activities. Second, it shows that TNCs display a relatively low inclination to adapt products to suit local markets, but appear to assist the process of knowledge spillovers to local sub-contractors through

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[20] Weighted tax deduction of 125% (raised to 150% in 2000) on R&D expenditure was introduced in specific sectors like pharmaceuticals, electronic equipment, computers, telecom equipment and chemicals in 1998, with aircraft and helicopter industries added in 1999.

activities involving business process outsourcing. Third, it shows that TNCs are not superior to local enterprises in terms of vertical inter-firm linkages they generate with ancillary suppliers. We are not, of course, claiming that these are the final words on innovation and linkages, but there seems to be enough evidence in support of these assertions. Meanwhile, a careful appraisal of the host country's goals can illuminate the need for innovation and development of linkages – one that would lead to a better understanding of the dynamic interaction between the firm and its host environment.■

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RESEARCH NOTE

Biotechnology foreign direct investment in Singapore

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In recent years, Singapore has become a major recipient of biotechnology foreign direct investment (BFDI) in Asia. This article argues that the inflow of BFDI to Singapore, which is mainly for bulk pharmaceutical manufacturing, can be explained by a combination of (global) market conditions and firm strategies, along with the biotechnology policies of the Singapore and other Asian governments. These factors have allowed Singapore to capture a niche in the global biotechnology economy. This article also finds that BFDI in Singapore resembles its earlier process of becoming a manufacturing hub for the electronics industry two decades earlier. It concludes that explanations of FDI flows should not just focus on firm strategy or government policy alone, but consider how the two sides are constantly in interaction and are mutually reinforcing.

Introduction

By 2005, Singapore had become one of the largest recipients of biotechnology foreign direct investment (BFDI) in Asia. For the purpose of this article, FDI is defined as "the

process whereby firms from one country (the source country) acquire ownership of assets for the purpose of controlling the production, distribution and other activities of a firm in another country (host country)" (Moosa, 2002, p.1). BFDI in Singapore refers to investment in the biotechnology, biomedical, pharmaceutical and related industries made by business entities not legally domiciled in Singapore. In 2003, Singapore attracted over $500 million[1] in biotechnology related manufacturing fixed asset investments (Beh, 2004, p. 36); in 2004, it rose to $700 million (*Singapore Investment News*, December 2004 Special Supplement, p. 9). Also, in 2004 alone, several biotechnology transnational corporations (TNCs) made large investments (table 1).

Table 1. Selected cases of BFDI in Singapore

Company	Amount of investment pledged [a]
Schering-Plough Ltd (Multi-Product Bulk Pharmaceutical Plant and R&D Facility)	$1 billion
GlaxoSmithKlien (3rd production facility)	$1 billion
Novartis AG (Bulk Production Plant)	$200 million
Welch Allyn (R&D Facility)	..
Pfizer (Active pharmaceutical Ingredient Plant)	$375 million

Source: *Singapore Investment News*, February 2004, p.3; July 2004, p.4; September 2004, p. 4; October 2004, p. 5; October 2004, pp. 6-9.

[a] Figures reported may be spread over a period of time; hence, they do not necessarily reflect "realized" investment.

According to the Singapore Economic Development Board, the manufacturing output of Singapore's "biomedical sciences" industry was almost $10 billion, of which pharmaceuticals contributed $8.5 billion and medical technology $1.9 billion (*Singapore Investment News*, December 2004 Special Supplement, p. 9). Singapore's Deputy Prime Minister, Tony Tan, announced that the target for Singapore's biomedical

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[1] All monetary figures have been converted to the United States dollar, using the exchange rate of $1=S$1.66 (as of 31 December 2005).

sciences industry was $15 billion in manufacturing output and an employment of 15,000 by 2015 (*Singapore Business Times*, 14 April 2005).

It is difficult to find accurate publicly available data on BFDI elsewhere. However, most industry magazines, newsletters and journals, such as *FDI Magazine*, *Corporate Location*, *Business Week*, have frequently highlighted how Singapore has become a hub for biotechnology production for large pharmaceutical firms.[2] This article seeks to explain the recent inflows of BFDI into Singapore. A common approach - the analysis of Singapore's BFDI policies alone - would not be sufficient. This article takes into account market conditions, firm strategy as well as government policy. Furthermore, it argues that the recent large inflows were also influenced by the biotechnology policies of other Asian countries.

Biotechnology FDI

The literature on FDI is vast and wide-ranging. However, despite their theoretical differences, most theories of FDI - including the eclectic theory (Dunning, 1998) and the product cycle approach (Vernon, 1994) - acknowledge the role of government policy in influencing firm strategy. As will be discussed in detail later, governments have the ability to control access to markets as well as to manipulate the "cost" of various local resources, such as labour (Moran, 2002). Therefore, in such a conceptual framework, firms that have the intention of investing abroad are viewed as "customers" that demand resources or market access, while host countries are viewed as "suppliers" who provide them. By focusing both on the demand-side (firm strategy) and on the supply-side (government policy), the emergent process of FDI can be seen as a form of exchange and competition.

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[2] The only other Asian country with significant BFDI is India. It was recently reported that FDI in India's biotechnology industry cumulatively reached $2 billion and was heading for a target of $10 billion by the end of the decade (*Biospectrum*, 10 June 2004).

Concerning government policy, it has been argued that, especially after the 1980s, there has been an ideological shift away from state *dirigisme* towards more liberal market-oriented national economic policy (Sachs, 1999). Now, more governments have accepted that transnational capital can bring about benefits, both economic and social. This acceptance might not be with great enthusiasm, for many governments have reluctantly entered the "game" for the fear of losing out. As many governments now have FDI-oriented strategies as part of their development or industrial policies, the result is an ever-increasing competition for FDI in the global economy (Oman, 2000; Thomas, 2000, UNCTAD, 2004). There have been some attempts at regulating this competition and agreeing on some multilateral rules for FDI. However, these are not currently viewed as being effective (Young and Tavares, 2004).

Obviously, governments that have FDI-oriented development strategies will have to design specific measures for attracting FDI. These might be direct policies, offering specific incentives - subsidies, tax breaks, infrastructure provision, access to domestic markets - to potential investors; or indirect policy. For example, education policy could increase the number of tertiary education workers. Policy on social and political stability could also indirectly create an environment conducive to FDI. In what is commonly known as the "competitive advantage" perspective, the sites that will receive most FDI are those that allow TNCs to set up competitive facilities that are capable of withstanding global competition. "This means that the host country has to provide competitive immobile assets - skills, infrastructure, services, supply networks and institutions - to complement the mobile assets of TNCs" (Lall, 2002, p. 75).

The importance of government policy notwithstanding, it is impossible to ignore firm strategy or market factors when examining FDI flows (Dunning, 1998). It is important to remember that the TNC is a for-profit entity. Hence, it will do whatever it takes to maximize profits, including not only searching the world for the most efficient site for production,

but also negotiating with various governments for the best investment conditions. TNCs might even play several governments against one another in order to extract greater concessions. Thus, while governments might view FDI as a developmental tool, TNCs will only invest if they foresee benefits and returns.

In many ways, it becomes clear that it is impossible to separate the demand (firm) and the supply (government) side processes. Perhaps even more important is the relationship between the two sides. It can be argued that FDI flows results from "collaboration" between governments and TNCs (Pereira, 2000). Although there is (usually) no formal agreement between the two parties, they "use" each other in a mutually beneficial relationship to achieve developmental goals (for the government) and enterprise viability (for TNCs). This arrangement has also been termed "adaptive partnership":

> "Both states and TNCs can mutually gain from entering into such an arrangement, working with each other to respond to new challenges presented by globalization" (Dent, 2003, p. 247).

> "While TNCs seek to extract policy concessions from states, and influence state economic policy-making processes, they also view those states endowed with sufficient technocratic capacities as adaptive partners, whereby both agents gain by working in conjunction to respond to the mutual challenges presented by globalization" (Dent, 2003, p. 271).

By balancing demand and supply side perspectives on FDI flows, this article argues that Singapore's case can be explained by an unusual and somewhat unexpected combination of (global) market factors, firm strategy and government policy.

The global biotech industry

As suggested earlier, the biotechnology industry, like any other industry, has its own unique characteristics and specific

needs. The United States Office of Technology Assessment (OTA) defines biotechnology as:

> "…all potentially commercializable technologies that are based on the life sciences – biology, botany, entomology, physiology, genetics and their overlaps with physical sciences such as chemistry, physics and materials science" (United States OTA, 1991).

The characteristics of commercial biotechnology production, including research and development (R&D), create specific needs for this industry. For example, firms involved in biotechnology production necessarily require large amounts of investment capital due to the nature of its production processes. Also, due to its heavy reliance on science and technology, personnel in the industry need to be suitably qualified. Finally, for biotechnology firms to be competitive, a heavily regulated institutional framework must be in place, including intellectual property laws, anti-trust laws as well as health, safety and environmental regulations (Chase-Dunn, Lara-Millan and Niedmeyer, 2004, p. 2). Of course, the availability of high-grade raw materials, infrastructure and utilities are of central importance to the biotechnology firms. Therefore, the biotechnology industry can be characterized as being extremely capital-, knowledge- and infrastructure-intensive.

However, the global biotechnology industry also has specific constraints. It has been argued that a set of local and regional regulations prevent biotechnology and pharmaceutical companies from adopting a truly "global strategy", unlike, for example, the electronics or automobile industry (Rugman, 2005, p.114). The reasons behind this include the disproportionately large size of the United States market for pharmaceuticals; the heavy dependence on patents and intellectual property rights; and the reliance on R&D (Rugman, 2005, p.118). In addition, pharmaceutical giants are discouraged from adopting a global production approach because drugs are always heavily regulated by governments through approval processes and price controls (Rugman 2005, p.119). Thus, although the biotechnology industry has been shown to improve trade and industrial

performance (OECD, 1996a, 1996b), to help reduce poverty as well as to increase food security (ADB, 2001; UNCTAD, 2004), it has not become a "globally-oriented" industry.

The present global biotechnology economy has been described as "a complex network of corporate players, dominated by large firms with strong marketing capabilities, and start-up firms that focus on research and development" (UNCTAD, 2001, p. 7). Among the 20 largest biotechnology companies, none were "global" (defined as having its sales and production equally distributed around the "Triad" of North America, Western Europe and Japan), five were bi-regional (any two of the Triad), two were (single) regional, and the rest were home-country oriented (Rugman, 2005, pp.115-116). Thus, unlike the electronics or automobile industry, biotechnology firms cannot be described as truly "global players" in terms of sales and production. However, as mentioned at the beginning of this article, many of the largest global pharmaceutical companies have been establishing manufacturing operations in Singapore, apparently bucking the trend to remain within the Triad. The following sections will propose an explanation for this phenomenon.

The Singapore Biomedical Sciences Initiative

The Government of Singapore has been promoting FDI ever since the country gained independence in 1965 (Mirza, 1986; Pereira, 2000; Dent, 2003). The government's main logic behind this strategy has been entirely pragmatic. The island city-state, which is less than 700 square kilometres in total land size, has no natural resources other than labour (Schein, 1996). As there have been many studies on the role of FDI in the economy, there is no need to discuss the processes here again. It is, however, necessary to remember that the Government of Singapore has been correctly described as being an archetypal "developmental state" (Huff, 1994; Perry, Kong and Yeoh, 1997). It takes a highly interventionist role in the economy, constantly identifying new niches in the global economy where Singapore can gain a competitive advantage. At the beginning of the 21st century, the Government of Singapore intervened once again

with a new national industrial policy, officially known as the Biomedical Sciences Initiative.

On the surface, this Initiative might appear to follow the recent trend of many national governments to introduce biotechnology-related industrial or economic policies, not just for economic but also for social reasons. Despite some concern over the ethical aspects of biotechnology, it is seen by many governments as being a highly desirable employment-creation engine, especially for highly skilled workers (Pownall, 2000). Singapore's Biomedical Sciences Initiative is similar to biotechnology policies in nearly all other countries in that it was an obvious strategy to encourage economic growth and improve social development. Furthermore, as in many other countries (especially developing countries), it attempts to harness FDI for the development of this industry. According to Da Silva, Baydoun and Bardan (2002), most governments – especially those in the developing world – have been promoting the biotechnology industry as a response to local needs, such as those arising from weakness in the local agricultural sector. However, the governments of many developing countries do not have sufficient resources for supporting domestic biotechnology enterprises. Hence, some governments have turned to FDI. In most cases, the FDI-oriented biotechnology policies seek to attract TNCs to transfer technology and expertise to domestic firms, usually through the formation of joint-ventures.

On paper, the Biomedical Sciences Initiative is a typical set of policy instruments consisting of incentives, subsidies and institutions to encourage the development of an industrial sector. In theory, any firm, from anywhere in the world (including Singapore), can take advantage of the Initiative. Officially, in order to qualify for tax breaks, government subsidies or grants, the investing firm - which may even be a wholly-foreign owned entity - can be involved in any aspect of the biomedical sciences, including logistics management, regional headquarters operations or sales operations. However, from 2000 to 2005, the Government's main target was "Big Pharma", i.e. very large biotechnology or pharmaceutical TNCs.[3] This is the main

difference between Singapore's Biomedical Sciences Initiative and the biotechnology policies of other developing countries. In Singapore, the development of the domestic biotechnology industry is a secondary concern for the Government. Instead, the Initiative resembles the country's earlier industrial policy, which allowed TNCs to "utilize" Singapore as an export-processing zone (Mirza, 1986; Pereira, 2000).

For 30 years between 1965 and 1995, Singapore's FDI-oriented development policy was primarily aimed at generating employment and economic growth rather than developing domestic enterprises. As such, the Government had designed specific policies to attract TNCs to establish large-scale manufacturing (usually in the electronics industry) on the island (see Lim, 1988). However, since the 1980s, manufacturing costs in Singapore were rising fast, and TNCs were seeking to relocate production to countries, such as Indonesia, Malaysia, Thailand, and even China and Viet Nam, which had introduced FDI-oriented development strategies by that time. As they were at an earlier stage of development, the costs of the factors of production were significantly lower than those in Singapore. In addition, most of these countries could offer TNCs something that Singapore never had - a large domestic market. Thus, in the 1980s and 1990s, many TNCs were shifting production - especially those with lower value-added activities - to these emerging economies. The Government of Singapore realized that it was impossible to compete with them to retain low value-adding segments of production; instead, it targeted higher value-added manufacturing, mainly because Singapore's highly skilled workforce was still comparatively cheaper than its peers in Japan, the United States or Western Europe. As a result, in the 1990s, Singapore became the largest hard disk drive producer in the world (McKendrick, Doner, and Haggard, 2000). It did not take long before the expertise and technological capabilities of the neighbouring countries improved; even high technology production, including the hard disk industry, was shifting out

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[3] This phrase is used by many within the biotechnology industry. See for instance the headline in *Business Week*, 'Little Island, Big Pharma,' 17 February 2003.

of Singapore. In this context, pursuing the biotechnology industry was a strategy to upgrade Singapore's workforce further. However, the Government could not create the jobs in the biotechnology industry by itself. As Singapore did not have any domestic biotechnology enterprises, as far as the Government was concerned, the only suitable partners were TNCs.

This was "the grand design", as portrayed by the Government of Singapore, to make the biomedical sciences a "key pillar" of the economy, alongside electronics, engineering and chemicals.[4] The Initiative would generate growth (mainly through exports) and bring development to the people (mainly through the high skills jobs created in the industry). Such highly ambitious proclamations are common in Singapore. The Government is the dominant (domestic) economic agent in Singapore and has consistently made broad-ranging and long-term strategic plans, usually without much resistance from other segments of society (Huff, 1994). One of the reasons for this success is that the Government has a great deal of domestic credibility as an efficient manager of the economy. Furthermore, in the case of the biomedical sciences, few domestic firms would suffer as a result of the large inflows of BFDI, since there are almost no domestic biotechnology enterprises in Singapore.[5]

Government strategy

Despite Singapore's reputation as an excellent manufacturing hub, the new focus on biotechnology faced a few obstacles. Big Pharma had hardly ever established large wholly owned production sites in the developing world. As mentioned earlier, Big Pharma had previously concentrated its production in the Triad (Rugman, 2005). The main reason for this was the nature of drug production and regulation. The main market - which also happened to be the Triad - would insist on "first

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[4] http://www.biomed-singapore.com
[5] Indeed, one could argue that there are very few Singaporean industrial enterprises in general, other than the Government-linked corporations (Low, 2001).

world" standards of production (ibid.). In cases in which Big Pharma did invest in developing countries, it was in the form of joint ventures with domestic biotechnology firms. The reason behind this was to penetrate and expand into new markets, such as the huge consumer markets of China and India, which was otherwise impossible. In contrast, Singapore did not have a large domestic market, with a resident population of only four million people. The country did not initially have a high level of human resources to engage in biotechnology activities either, particularly when compared to the Triad countries.

To overcome these obstacles, Singapore actively sought to become more competitive in attracting biotechnology TNCs. First, the Government of Singapore invested a large amount of resources in the training of personnel ready to work in the biotechnology industry. For example, between 2001 and 2004, 276 postgraduates were awarded overseas and local government scholarships to pursue doctoral programmes in various aspects of biomedical sciences (A*Star, 2005, p.8). According to the director of A*Star,[6] which is a statutory board tasked with promoting - among other activities - the Biomedical Sciences Initiative, each scholarship recipient is expected to cost the government about $0.6 million (*FDI Magazine*, 5 August 2003). More generally, the Government of Singapore has publicly announced that it would spend at least $720 million on public biomedical research to support the broader initiative (Lim and

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[6] According to A*Star's official website, it "comprises the Biomedical Research Council (BMRC), the Science and Engineering Research Council (SERC), the Corporate Planning and Administration Division (CPAD), the A*STAR Graduate Academy (A*GA) and the commercialisation arm, Exploit Technologies Pte Ltd (ETPL). Both BMRC and SERC promote, support and oversee the public sector's R&D research activities in Singapore. A*GA supports A*STAR's key thrust of human capital development through the promotion of science scholarships and other manpower development programmes and initiatives. ETPL manages the Intellectual Property created by the research institutes and facilitates the transfer of technology from the research institutes to industries. CPAD supports the two Research Councils, A*GA and ETPL in performing the functions of Finance, Human Resource, Corporate Policy and Planning, Corporate Communications, Legal, Information Technology and Audit" (http://www.a-star.edu.sg/).

Gregory, 2004, p.353) Although the Government has created many opportunities for young Singaporeans to train to become health sciences experts, it has even gone ahead with a very liberal immigration policy for experts (as well as postgraduate students) in the biotechnology field, despite the concerns expressed by the local population. The Government understood that biotechnology TNCs required qualified specialists and they would not particularly care about their nationality.

At the same time, the Government of Singapore has invested heavily in two "mega infrastructure projects", the Tuas Biomedical Park and Biopolis. The Tuas Biomedical Park, developed and managed by the Jurong Town Corporation (a Singaporean statutory board), is a 183 hectare site at the westernmost tip of Singapore dedicated to support the growth of the biomedical industry. Costing around $331 million to develop, it is designed for "bulk active pharmaceutical and biopharmaceutical manufacturers, with special provisions for unique power, water and sewer requirements".[7] Biopolis, developed by Ascendas - a for-profit government-linked corporation - was designed to be a:

> "…world-class biomedical sciences research and development (R&D) hub in Asia. This campus is dedicated to providing space for biomedical R&D activities and it is an environment that fosters a collaborative culture among the private and public research community. Biopolis Phase 1 is a 185,000 square metre (2.0 million square feet) biomedical complex of 7 buildings slated for completion from June 2003 to March 2004. Several key government agencies, publicly-funded research institutes and R&D labs of pharmaceutical and biotech companies will be located here"(http://www.one-north.com/pages/lifeXchange/bio_intro.asp).

Biopolis Phase 1 cost around $301 million to develop (Singapore Economic Development Board, press release, 1

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[7] www.jtc.gov.sg/Products/industry+clusters/tuas+biomedical +park.asp

December 2003). The Government of Singapore is hoping that over 1500 scientists will be involved in biomedical R&D at the Biopolis within 10 years. In many ways, Singapore's Biomedical Sciences Initiative resembled the country's earlier industrial transformation policy. The Government not only created tax incentives to attract TNCs, but also intervened heavily in the economy and society at the same time, particularly in the sphere of providing adequate infrastructure and human resources. This is best summarized by the Chairman of A*Star, who is tasked with attracting BFDI:

> "These days a BSc (Bachelor of Science) qualification only means test tube cleaner and an MSc (Masters of Science) is an advanced test tube cleaner. What you need today is a PhD (doctor of philosophy). I can't go to [a large pharmaceutical company] and say we have cheap land. They can find cheaper land elsewhere. Singapore has to lead in skills and infrastructure" (Philip Yeo, Chairman of A*Star, quoted in *FDI Magazine*, 5 August 2003).

Although there are government provisions for supporting domestic biotechnology entrepreneurs,[8] it is clear that the main beneficiary, at least in the initial phase of the Initiative, has been Big Pharma. One key pre-emptive strategy was the formulation of a very strict intellectual property regime and a very explicit and clear "bioethics code". Both of these were drawn up with foreign investors in mind. The intellectual property regime is considered to be important, because large biotechnology firms do not want to face a situation where their products might be pirated or face competition from generic drugs. For bioethics issues, the Government had appointed a top-level committee known as the Bioethics Advisory Committee[9] to draft a comprehensive set of guidelines and to make recommendations

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[8] For example, the Government of Singapore has announced that domestic biomedical firms can apply to a fund of around $30 million (*Singapore Straits Times*, 11 January 2005).

[9] The Bioethics Advisory Council is a broad organization that encompasses several subcommittees. Members of each subcommittee include legal experts, biotechnology industry personnel, scientific and academic community members, as well as religious leaders.

for changes to the law (where necessary) on various aspects, such as stem cell, human tissue and genetic research.[10]

Singapore's bioethical position has already been criticized (mostly on the internet) by various anti-globalization and anti-cloning groups. Most criticisms claim that Singapore has an extremely liberal bioethics policy; others who acknowledge the existence of the guidelines claim that these only serve as a smokescreen. Thus, a common refrain is that Singapore's high level of BFDI was because it has a competitive advantage in lesser morality, encouraging scientists and companies involved in stem cell research, which is banned in developed countries, to locate on the island.[11] In reality, given that most of Singapore's BFDI is in bulk pharmaceutical manufacturing, it is impossible to argue that lax ethical rules were the reason behind the inflows. However, the Government's response has mainly been to ignore these protests and criticisms, much like the response of other Asian governments. The logic, for most of these governments, for supporting biotechnology research has always been pragmatic and economic.

For the Government of Singapore, having a clear and enforceable set of laws on biomedical research was essential for improving the country's competitiveness, both as a pharmaceutical production hub and as an R&D centre. According to some scientists interviewed by the *Wall Street Journal Europe*, they (and biotechnology companies) have chosen to come to work in Singapore, not because there is weak legislation or a poor bioethics standard but, instead, because bioethics are clearly stated so that scientists (and companies) know exactly where they can or cannot go with their research (*Wall Street Journal Europe,* 26 January 2005).

The last thrust of the Singapore's Biomedical Sciences Initiative was known as the co-investment scheme. The

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[10] http://www.bioethics-singapore.org/
[11] See, for example, "Biomedical science: a liberal regime", *Far Eastern Economic Review*, 9 January 2003; "Asia is stem cell central", *Businessweek*, 10 January 2005 (http://www.businessweek.com/magazine/content/05_02/b3915052.htm).

Government of Singapore has set aside large sums of capital for disbursement, not just for small and medium-sized biotechnology enterprises but even for Big Pharma. For example, in 2005, the Government's biotechnology investment arm known as BioOne Capital signed an agreement to form a joint venture with Lonza Group AG (legally domiciled in Switzerland) to produce "biologics" or vaccines in Singapore (*Asian Wall Street Journal,* 17 August 2005). Just the day before, A-Bio - another Government-linked corporation - announced that it was tying up with GSK Biologics, a subsidiary of GlaxoSmithKline, also to produce vaccines (*Singapore Straits Times,* 17 August 2005).[12] It could be argued that the co-investment scheme was crucial in convincing Big Pharma that the Government was committed to the Initiative and was willing to put its money where its mouth was. However, it is equally possible that the co-investment simply serves as a subsidy, especially since, in most of these ventures, the new name of the venture is derived from Big Pharma. In either case, the Government demonstrated that it was willing to host Big Pharma on the island. In comparison to many joint ventures established between Big Pharma and domestic biotech enterprises in other Asian countries, what is evident is that the joint ventures in Singapore are not primarily aimed at penetrating the domestic market. Instead, all of the end products are intended for export.

Based on its experience in investment attraction, the Government of Singapore, along with state agencies, such as the Singapore Economic Development Board and the Ministry of Trade and Industry, realized that policies alone were not enough to attract investors. They went to the biotechnology TNCs and "marketed" Singapore heavily. It could capitalize on its relatively high level of international credibility as an efficient, honest and pro-business administrator.

Moreover, from a global perspective there were some other factors that made biotechnology investment in Singapore

[12] These were just a few of several launches or announcements that were made as the Government of Singapore officially opened the 'BioLogics Hub' on 17 August 2005, which is located within the Tuas Biomedical Park.

attractive. This included the biotechnology policies of countries, such Japan, the United Kingdom and the United States, which had ethical issues with certain forms of biotechnology research. Singapore, on the other hand, had comparatively few regulations. Also, while the biotechnology policies of developing economies, such as China, India, the Republic of Korea and Taiwan Province of China, heavily favoured domestic biotechnology firms and often required joint venture tie-ups, Singapore was one of the few locations in the world in which biotechnology TNCs could operate wholly foreign-owned entities that had relative autonomy over their own business activities.

Despite the broad thrust of the Biomedical Sciences Initiative, it was evident that the Government's initial focus was to position the island as a "bulk pharmaceutical manufacturing" centre. Bulk manufacturing in the pharmaceutical industry refers to the processing of raw material to create an intermediate material in bulk form, which will be further processed or formulated into the final product.[13] From a business viewpoint, Singapore's bulk manufacturing capability made financial sense. Big Pharma could continue producing drugs in the major markets to satisfy regulatory requirements while reducing the costs of production by utilizing high quality but low cost intermediary products made in Singapore. In the current global economic environment, there are few locations in which biotechnology TNCs can remain wholly foreign-owned and involved in bulk pharmaceutical manufacturing.[14] Within Asia, Singapore appears to be the only location where such activities are taking place apart from Japan.[15] Other Asian economies, such as China, India, the Republic of Korea and Taiwan Province of China, are politically or economically unable to adopt Singapore's

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[13] Definition as given in Glennon (1997).

[14] The Republic of Ireland is one of the largest recipients of BFDI for bulk pharmaceutical manufacturing. It is within the EU and firms can enjoy access to the EU market.

[15] In Japan, bulk pharmaceutical manufacturing is actually done by large Japanese biotechnology and pharmaceutical firms (such as Takeda and Sankyo) for the domestic market.

strategies. First, these economies have a sizable domestic biotechnology industry that would lobby against any "invasion" of biotechnology TNCs. Second, these economies have relatively large domestic markets for biotechnology products, and their governments are aware that they can take advantage of this situation by using access to their domestic markets as a leverage for making the investing TNCs "transfer technology" through the formation of joint ventures.

By 2005, Singapore's biomedical industry accounted for nearly 10% of total manufacturing output. While employing only 2.6% of the industrial workforce, the value-added per worker was the highest at over $65,771 (appendix). It was reported that Singapore's biotechnology industry grew 33% over the previous year to reach $9.51 billion in 2004. "Value-added" of this industry grew 48% to reach $6.08 billion, and employment in the industry grew 6.7% to 9,225 (table 2). Within the industry, pharmaceutical production, of which the majority was in bulk manufacturing, contributed $8.69 billion, accounting for 88% of the industry (ibid.). In 2004, the biomedical industry attracted $512.5 million in manufacturing asset investments, and $66.3 million in total business spending. In addition, it is expected that more than 1,900 new jobs will be created when the projects are fully implemented (Singapore Economic Development Board, press release, 31 January 2005). Interestingly, a large proportion of the jobs currently available (and soon to be generated) will come from the so-called "med-tech" sub-industry. According to Philip Yeo, the Chairman of A*Star, Singapore wants to focus on "medtech", because it is a "steady hirer", suggesting that the industry is slightly more labour-intensive than biotech and can be a good source of employment generation.[16] As of 2005, medtech accounted for 60% of employment in the whole biomedical sciences industry, but only contributed 15 per cent of output (*Singapore Business Times,* 14 April 2005).

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[16] *Singapore Business Times,* 16 August 2005.

Table 2. Summary of Singapore's biomedical science industry

Industry	Manufacturing output (millions of dollars)			Employment		
	2003	2004	% growth	2003	2004	% growth
Pharmaceuticals	6 096	8 049	37.9	3 584	3 581	7.4
Med-tech	1 062	1 126	6.0	5 058	5 374	6.2
Total	7 158	9 175	33.2	8 642	9 225	6.7

Source: (Singapore) Agency for Science Technology and Research (A*Star) "Singapore's biomedical sciences industry recorded exceptional 33% growth in manufacturing output for 2004"' Media Release, 31 January 2005 (http://www.a-star.edu.sg/astar/about/action/pressrelease_details.do?id=0fb4e42369Mm).

The long-term outlook

It appears that Singapore's biotechnology policy, even though it has mainly attracted bulk pharmaceutical manufacturing, has so far been successful. However, can the rest of the Government's "grand design" - to make the biomedical sciences a pillar of Singapore's economy - be realistically achieved in the long run?

There are two factors that will determine Singapore's long-term biotechnology outlook. The first is endogenous or domestic. Despite all the infrastructural, financial and institutional advantages that the Government of Singapore has created, the biggest impediment to the realization of the "grand design" is the quality of Singapore's human resources. Tony Tan, Singapore's Deputy Prime Minister and Chair of the Ministerial Committee on Research and Development commented in 2005 that:

> "The Ministerial Committee on Research and Development concluded that there is an urgent need for bold reforms to transform Singapore into an R&D-driven innovative knowledge-based enterprise economy, where we compete on knowledge and talent, in addition to

efficiency and cost-effectiveness. Singapore needs to refocus its research and innovation agenda to keep up with international developments".[17]

The Government of Singapore and its key bureaucrats evidently do not have any illusions about Singapore becoming a real biotechnology hub, like those in San Diego, New Jersey, Ontario Province (Canada) or in various parts of Switzerland, which invent and patent new biotechnology products regularly. This extract from the *Singapore Straits Times* sums up the current situation:

> Ask Mr Philip Yeo how the Biopolis is shaping up and the chief architect of Singapore's biotech ambitions bristles with indignation. "For heaven's sake, it has only been two years," he chides. "It takes longer to do a PhD." The buildings may be up, but it will be years before trained Singaporeans can assume positions of scientific leadership that the biomedical industry is dependent upon" (*Singapore Straits Times*, 13 August 2005).

The Government is thus fully aware of the problem. It is in this light that it has created various schemes to encourage talented and qualified personnel to move to Singapore to work in the biotechnology industry. The Government has also invested heavily in the training of domestic human resources for the biomedical sciences. If both of these strategies are successful, then there is hope that Singapore will eventually have the level of human resources required for supporting other activities in biotechnology.

However, Singapore's biotechnology future does not solely lie in its Government's hands. Central to Singapore's long-term outlook is the continuously evolving global biotechnology economy. Here, (global) market factors, the strategies of the biotechnology firms and, perhaps most importantly, the

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[17] Speech by Tony Tan at the conference "Looking to the next 100 years in physics and its impact on engineering, life sciences and technology", 11 August 2005 (http://app.sprinter.gov.sg/data/pr/20050811990.htm).

biotechnology policies of other countries will directly affect Singapore's biotechnology ambitions. At the moment, Big Pharma has been willing to "use" Singapore mainly as a bulk pharmaceutical manufacturing hub. The investors are clearly taking advantage of Singapore's infrastructure and intellectual property rights regime but, at the same time, it is also true that bulk manufacturing does not require the same level of human resources as research and design activities. The destination for nearly all of the products is in the Triad countries. Due to Singapore's policies and institutions, the made-in-Singapore intermediate products will pass the stringent quality control measures required by the developed country governments. More importantly, production in Singapore is seen as being more cost effective than production in the industrialized countries. Like any other TNC, Big Pharma is searching for the most cost effective location. Its earlier lack of "transnationalization" was not because of a lack of motivation but because of structural constraints, such as not having the adequate infrastructure, legal frameworks and quality control in developing countries where costs savings can be realized. Now that there is a location with favourable and cost effective structures, Big Pharma has responded as expected.

However, there is considerable movement and change in the overall global biotechnology economy, which will create various uncertainties for Singapore. The biggest unknown is whether the governments of other Asian countries will decide to compete to capture the niche that Singapore currently dominates (i.e. bulk pharmaceutical manufacturing). At the moment, as mentioned earlier, the biotechnology policies in other Asian countries have the aim of fostering domestic biotechnology enterprises. Many Asian economies, including China and India, have incorporated FDI as part of their biotechnology policies (as opposed to the policies of Japan, the Republic of Korea and Taiwan Province of China, which are, at best, "neutral" to FDI). However, the FDI sought is not the same as the type for Singapore. The policies of China and India are aimed at attracting biotechnology TNCs to establish joint ventures with domestic enterprises. In this sense, Singapore does

not face much direct competition within Asia for BFDI. Indeed, it could be further argued that the quality of the infrastructure and the regulatory institutions in some other Asian countries would probably not pass the requirements of the Triad countries. However, this does not discount the possibility that other Asian governments might decide to emulate Singapore's strategy in the future. If and when this takes place, it is possible or even likely that Singapore will lose its niche. This ought not to come as a surprise to the Government of Singapore, as it has experienced this very process (several times) in the past, particularly in the electronics industry. The Government, if it wants to keep Singapore at the forefront of the biotechnology race, should therefore focus on moving higher up the biotechnology value-added ladder
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Conclusion

Singapore's biotechnology FDI inflow has been in part due to the Government's strategy. It focused on attracting bulk pharmaceutical manufacturing and medical devices production to Singapore. This has enabled the island to capture a niche in the global biotechnology economy. Another reason why Singapore was able to capture this niche was because the BFDI policies of other Asian countries were much more focused on the formation of joint ventures, with a view to developing domestic biotechnology firms. In other words, left to market forces alone, BFDI would not have flown to Singapore. It was heavily influenced by the government policies of both Singapore and other Asian economies.

Hence, the case of BFDI in Singapore demonstrates that FDI flows, including "new" FDI flows, can be significantly influenced by government policy. Research has shown that Big Pharma was reluctant to engage in large scale FDI, especially in bulk pharmaceutical manufacturing (Rugman, 2005). The reason behind this reluctance was the poor infrastructure and institutions outside the Triad countries. When the Government of Singapore, which already had a great deal of credibility among TNCs as a trustworthy government, was able to provide high

quality infrastructure and strict regulations, Big Pharma was prepared to invest. It is possible that other Asian governments might choose this path in the future. If and when they do, the effect would be to expand the FDI market for bulk pharmaceutical manufacturing (i.e. more suppliers).

This suggests that the "collaboration" or "adaptive partnership" between governments and TNCs can be understood as follows. Governments need to be pro-active (via policy interventions) to create opportunities for TNCs to enhance their own business competitiveness. However, governments should expect policy competition for FDI and they should also expect TNCs to be selective. Hence, there will be a great deal of interaction and transaction - not just between the two sides but also within each side (e.g. states in policy competition) - that will ultimately determine FDI flows. ∎

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Appendix

Principal statistics of manufacturing (in Singapore), by industrial cluster, 2004

Industry	Employment	Total output (millions of dollars)	Remuneration per worker (thousands of dollars)	Value-added per worker (thousands of dollars)
Electronics	90 094 (25%)	44 356.9 (38.8%)	24.5	99.8
Chemicals	22 809 (6.5%)	31 709.3 (27.7%)	41.1	198.8
Biomedical	9 225 (2.6%)	10 360.9 (9.1%)	28.1	657.7
Precision Engineering	89 859 (25.4%)	11 542.7 (10.1%)	20.5	40.3
Transport engineering	54 477 (16.3%)	7 469.0 (6.5%)	22.1	46.0
Other manufacturing	83 680 (23.7%)	8 891.8 (7.8%)	18.0	30.9
Total	353 144 (100%)	114 330.6 (100%)		

Source: Singapore Ministry of Trade and Industry, 2005, p.173.

Foreign investment in a Least Developed Country: the Nepalese experience

Prema-chandra Athukorala and Kishor Sharma*

This article aims to contribute to the literature on the developmental role of foreign direct investment (FDI) through an examination of the Nepalese experience. Despite significant liberalization of the foreign investment regime and the introduction of attractive investment incentives, Nepal's achievements, both in terms of the volume of FDI and its developmental impact, failed to match national expectations. Nepal obviously has intrinsic disadvantages arising from its geography and other typographical characteristics in attracting FDI. However, comparable international experience suggests that her lacklustre achievements as a host to foreign investors cannot be explained in terms of these factors alone. Policies that underpin the overall investment climate also seem to matter. Mere liberalization of the investment regime and the introduction of financial incentives are not substitutes for an all-encompassing effort to improve the investment climate.

Key words: foreign direct investment, liberalization, land-locked country, LDCs, Asia, Nepal

1. Introduction

The past two decades have witnessed a profound shift in the policy emphasis on foreign direct investment (FDI) in developing countries. In a significant departure from the scepticism about the developmental role of FDI, which pervaded

policy thinking for over three decades during the post-war era, more and more countries have become increasingly receptive to FDI as an integral element of outward-oriented policy reform. Despite this notable policy shift, the literature on the role of FDI in developing countries still remains both sparse and skewed. The few existing studies have focused almost exclusively on the experience of the middle- and upper-middle income developing countries, in particular the high-performing countries in East Asia. Policy inferences coming from this literature are of limited value for late-comers, because the role of FDI varies across countries depending on their stage in the internationalization of the economy, the nature and timing of policy shifts as well as the initial conditions of the host country, such as the degree of industrial and entrepreneurial development. This article aims to redress this imbalance in the literature by examining the patterns of FDI in Nepal, following the market-oriented policy reforms initiated in the mid-1980s.[1] Nepal provides a particularly interesting case study of the subject, not only because of its least developed country (LDC) status, but also because of its geography, characterized by being landlocked and having a long open border with a large neighbour, India.[2]

The article is structured as follows. Section two provides an analytical account of the nature, determinants and developmental implications of FDI in late-comer countries in order to place the Nepalese experience in context. An overview of the foreign investment regime in Nepal is provided in section three. Section four examines trends and patterns of FDI during 1988-2001, while developmental implications of FDI are discussed in section five. The key findings are summarized in the concluding section.

[1] The time coverage of the study ends in 2001, because the escalation of the civil war has severely disrupted FDI inflows to Nepal in the subsequent years. Since then, most foreign investors have ceased their operations, as they became the target of a rebel group, known as the Maoists.
[2] Nepal is located between India and China. There is a road connection with China, but extensive trade contacts with or though that country are inhibited by the high costs and seasonal nature of road transport through the Himalayas. Thus, Nepal's foreign trade is conducted either through India or by air.

2. Analytical context

FDI originates from the decision of a transnational corporation (TNC) to locate or relocate part of its activities in a selected host country. This decision is underpinned by the desire to exploit its specific advantages (in the form of technology, managerial expertise, marketing know-how, etc.). Although countries do offer financial incentives and various concessions to attract such investment, they are thought to be relevant to TNCs' decision making only if the general business environment is conducive for making profit (Wells and Allen, 2001; Caves, 1996).

Assuming that a favourable investment environment exists, what are the characteristics that determine a country's comparative advantage in international production? In answering this question, it is important to emphasize that FDI is not a homogeneous phenomenon, but a complicated and finely differentiated means of globalizing production. For the purpose of discussing factors influencing TNCs' location decisions, it is important to distinguish three categories of foreign affiliates in terms of their operations in a host country. These are: producers largely engaged in serving the host-country market (market-seeking investors); firms involved in the extraction and processing of natural resources, both for selling in the host-country market and exporting (resource-seeking investors); and those engaged in production for the global market (efficiency-seeking investors).

When it comes to market-seeking investment in developing countries, the factors explaining the location decisions of TNCs are similar to those explaining their presence in industrialized countries. They depend primarily on the existence of production opportunities for meeting demand in the host country. Given the economy of scale considerations and relatively small markets in many developing countries, one of the key determinants of FDI in developing countries is the restrictions on international trade, which makes locating production in the host country the only available option for

accessing its markets. Artificially high domestic prices under stringent trade protection usually ensure profits even if the domestic cost of production is higher than it would be under free trade. Under certain circumstances, foreign affiliates that are originally set up to serve local markets could subsequently develop competitive advantage and penetrate markets in other countries. But such cases are rare and limited predominantly, if not solely, to middle-income and upper-middle-income developing countries with sizeable host-country markets.

For a typical developing economy, labour-intensive, consumer goods manufacturing is generally considered to be the natural starting point in the process of export-led industrialization.[3] While the availability of cheap and trainable labour is a prerequisite for attracting export-oriented FDI, the availability of a wider array of complementary inputs, including operator, technical and managerial skills, suppliers of intermediate goods, and high-quality infrastructure, are also essential. Also, given the large initial fixed costs involved, TNCs would be reluctant to establish assembly plants in a country without having confidence in the policy continuity and political stability of that country. For these reasons, so far, only a limited number of developing countries, mostly the high-performing East Asian countries and more recently some transition economies in Eastern Europe, have been able to attract FDI in assembly operations. The so-called "life- cycle" investors who expand their production networks globally, largely on scale-economy and efficiency considerations, rarely find low-income countries attractive locations for investment.

Based on the above typology of FDI, what are the opportunities available for Nepal in attracting FDI? Nepal does not possess mineral resources to attract resource-seeking FDI.

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[3] It is important to distinguish between two different categories of export-oriented production, namely traditional labour-intensive consumer goods (clothing, footwear, toys, sports goods etc.) and assembly processes within vertically integrated global production systems. Efficiency-seeking FDI tends to engage in the latter.

Her ability to attract market-seeking FDI is also limited given the size of the domestic market. Enticing market-seeking FDI through erecting tariff barriers is not considered an option, because of the general shift in overall development policy towards greater outward-orientation. In the area of export-oriented, efficiency-seeking FDI, Nepal is not an attractive location for assembly manufacturing for vertically integrated global industries. Therefore, Nepal's opportunities for attracting FDI are basically limited to labour-intensive consumer goods production and tourism.

High transport costs arising from its unique geography is obviously a significant constraint faced by Nepal and put it at a disadvantage compared to many other low-wage countries in attracting export-oriented FDI. Apart from the long distance to Indian ports (the port of Calcutta is about 1,000 kilometres away by the shortest route), inefficiencies of the Indian railways and ports add to the cost of transport for potential exporters from Nepal. It is also alleged that shipments from Nepal are given low priorities at the highly congested Indian ports.[4] However, focusing on high transport costs *per se* can lead to misleading inferences for Nepal's potential in labour-intensive export industries for two reasons. First, the relative cost advantage of Nepal arising from low wages (less than $20 per month for the average factory worker) may, in certain cases, outweigh the relative disadvantage arising from high costs of transport. Second, landlocked economies, such as Nepal, can choose to specialize in "low weight per unit value" products, provided, of course, the overall economic environment is conducive for the production for such products (Srinivasan, 1986). Moreover, it is important to note that adverse cost implications arising from landlessness can be minimized through suitable government policy in the areas of land and air transport, and customs administration (Bagchi, 1998).

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[4] According to some tentative estimates, the additional cost disadvantage faced by Nepalese exporters compared to their counterparts in countries in the region is around 7% of the fob value. Nepalese clothing exporters claim that their overall cost disadvantage compared to their competitors amounts to 20 to 25% (Bagchi, 1998).

3. Foreign investment regime and investment climate in Nepal

After pursuing an inward-looking development strategy for over three decades, Nepal embarked on outward-oriented policy reforms in the mid-1980s. The Industrial Policy and Industrial Enterprise Act, promulgated in 1987 (Government of Nepal, 1987), marked the beginning of Nepal's attempt to attract FDI. The Act provided a legal framework for facilitating FDI in medium and large-scale ventures in every industry with the exception of environment and defence-related activities. The Act contained a new set of incentives that were similar to - or even more attractive than - those in other developing countries. For instance, full remittance of profits from FDI ventures in convertible currency was permitted and employment of foreign workers was allowed if domestic workers were not available. A five-year tax holiday was introduced for export-oriented projects.

The democratic government that came into power in 1990 re-emphasized the importance of FDI and technology transfer in the country's development process. In 1991, the tax holiday period was extended to ten years for investments in national priority activities, which were defined to include industries producing goods that meet basic needs (such as food, clothing and housing and so forth), export promotion activities (where exports are 50% or more of total sales) and hotels and tourist projects. The Foreign Investment and Technology Transfer Act of 1992 opened up foreign investment in all industries except in defence, cigarettes, bidis and alcohol and, 100% foreign ownership was permitted. The development of hydropower was also opened up to foreign investment. The Act guaranteed 100% repatriation of equity, dividends and the payment of principal and interest on foreign loans in convertible currencies.

Under the Foreign Investment and Technology Transfer Act of 1992, the approval and licensing procedures were simplified with a view to approving investment applications within a stipulated time period of 30 days following the receipt

of the application. A One-window Committee was set up at the Ministry of Industries to take charge of the provision of all institutional facilities and services (infrastructure-related and other) under one roof. As part of the FDI policy, the Government of Nepal has entered into investment protection agreements with France, Germany and the United Kingdom. Agreements for avoiding double taxation have been signed with India, Norway and Thailand. Regarding the settlement of foreign investment related disputes, the law has made explicit the provisions for arbitration within the framework of the United Nation's Commission for International Law. The Foreign Investment and Technology Transfer Act of 1992 contained a ban on the entry of FDI into cottage industries and projects with fixed assets amounting to less than 20 million Nepalese rupees.

Recent changes in the foreign investment law include abolishing tax holidays (by the first amendment to the Foreign Investment and Technology Transfer Act in 1997) and the reduction of the corporate tax rate for domestic market-oriented manufacturing and services to 20%. Export-oriented ventures have the option of either paying corporate tax at the rate of 0.5% of export value (fob) or 8% of profits. A 5% tax was introduced on profits remitted by foreign firms in the 1999/2000 Budget. However, this new tax, introduced because of balance-of-payments exigencies, is at odds with the Government's commitment to promote foreign investment. The key elements of the Nepalese FDI policy are compared with those of the other countries in South Asia in table 1.

It is evident that, in general, the Nepalese policy regime compares very favourably with other developing countries. However, it is important to note two peculiarities in the Nepalese regime. First, after the 1997 amendment to the Foreign Investment Act, Nepal does not offer tax holiday for foreign investment projects. Second, Nepal has not set up export processing zones (EPZs) as a means of promoting export-oriented FDI. The Nepalese authorities are of the view that there is little need for EPZs given the significant reduction of import tariffs in recent years and the existence of the wide-ranging import duty rebate scheme.

Table 1. Foreign Investment Policy Regimes in South Asian Countries

Areas	Bangladesh	India	Nepal	Pakistan	Sri Lanka
Govt. Agency dealing with FDI	Board of Investment	Foreign Investment Pro-motion Board and Council	Investment Promotion Board	Board of Investment	Board of Investment
Limits on foreign equity participation	100% Up to 24% in small scale	Up to 51% in most industries; or joint venture in all industries;and 100% in export-oriented industries, power, electronic and software technology parks	100% foreign owned permission of the sectors, except for a negative list industries	100% without any government.	100%
Fiscal incentives	i) Tax holiday for industries located in Dhaka and Chittagong Division (for 5 years), and Rajshahi, Khulna, Sylhet, and Barisal District (for 7 years). ii) Tax exemption on royalties, interest on foreign loans and capital gains from the transfers of shares. iii) 5% import duty on capital equipment and spare parts for initial installation.	i) Income tax holiday of 10 years for EPZ firms and 5 years for other investors. ii) Access to finance for export-oriented industries at concessional interest rates. iii) Tax relief under avoidance of double taxation agreements. iv) 10 year income tax holiday for firms located in EPZ.	i) Corporate tax rate for export-oriented industries is 8% of profit or0.5% of export earnings. ii) Corporate tax rate for import competing industries is 20%. iii) 2.5% duties on imports of M/E and spare parts. iv) 5-10% duties on most industrial intermediate inputs refunded to export-oriented industries under the duty draw back scheme.	i) No custom duty on imports of plant, machinery & equipment for export-oriented and hi-tech industries. ii) Zero import tariff on plant and machinery (not available locally) used for agriculture.	i) Exempted from income tax on capital gains arising from share transfers ii) income tax holiday for 5 years iii) Duty drawback for export-oriented industries
Repatriation of profits and tax on expatriates' income.	100% repatriation of capital and dividends is allowed.	100% repatriation of capital, profits and dividend is allowed after payment of tax.	100% repatriation of dividends and capital is allowed.	100% repatriation of capital, dividend and profits is allowed.	i) 100% repatriation of profits and dividend is allowedii) Expatriates' income is taxed at a concessional rate of 15% for 5 years.
Infrastructure	i) Provision of EPZs ii) Provision of industrial estates.	i) provision of EPZs ii) non-resident Indians allowed to acquire any property, except agricultural land, Farm House and Plantations	i) Provision of 11 industrial estates. ii) Self arrangement of land and utilities.iii) Dry port in Birgunj, and international container depots in Biratnagar and Bhairawa are under construction.	i) Provision of EPZs.	i) Provision of EPZ.
Protection of foreign investment	i) Guarantee against nationalization. ii) International con-vention for settlement of industrial disputes.	i) Settlement of disputes is governed by the Indian Arbitration Act 1940. ii) UN Convention for the recognition and enforce-ment of foreign arbitral awards.	i) Guarantee against natio-nalization. ii) Dispute settlement through mutual consultations and in accordance with the arbitration rules of UN Commission on International Trade Law.	i) Guarantee against nationalization. ii) Settlement of disputes through the International Commission on Settle-ment of Investment Disputes.	i) Protection against nationalization under the bilateral investment agreements and constitu-tional guarantee. ii) International Convention for the Settlement of Investment Disputes.

Source: Compiled from various country sources.

There is no doubt that Nepal has gone a long way in liberalizing its investment regime. However, very few reforms have taken place in factor markets, in particular the labour market. For example, under the Labour Act of 1992, firing a worker is extremely difficult and costly. Electricity distribution is still regulated by the State-own enterprises, namely, the Nepal Electricity Authority, which suffers from inefficiency and poor management. Despite having a considerable potential for producing hydroelectricity, the country suffers from chronic shortages of electricity. In the late 1990s, on average, almost half of the production capacity in manufacturing remained unutilized due to the shortage of electricity. While some progress has been made over the years in developing the transport networks, many parts of the country are still not connected with major cities. Also, there are very few flight connections between the capital, Kathmandu, and places of tourist attraction. The eruption of civil war in the mid-1990s has slowed down the pace of reforms (Sharma, 2006). Many foreign firms have ceased their operations or indefinitely postponed implementation of newly approved projects as the security situation deteriorated rapidly.

4. FDI: trends and patterns

During the period 1988-2001, the Foreign Investment Board approved a total of 721 projects. Total capital commitment of these projects amounted to $1.15 billion (65 billion Nepalese rupees) of which 26.3% came in the form of capital contributions by the foreign partners of the projects. It was envisaged that these investments would generate a total of 86,425 jobs (table 2). The number of foreign investment approvals showed a steady increase from 1988 to 1996, with the exception of 1994 when there was a temporary dip due to uncertainty in the political climate (with the formation of the short-lived Communist government). Since 1997, the pattern of foreign investment approvals has been erratic, with all years except 2000 recording a decline compared to the levels in the mid-1990.

Only about 37% of the FDI projects approved during the period 1988-2001 were actually implemented (table 2).

While it is a universal pattern across all developing countries that a significant number of FDI projects never reach the implementation stage, the Nepalese realization rate is exceptionally low in comparison to other developing countries in Asia. For instance, the realization rates in Malaysia, Sri Lanka and Vietnam (for varying periods during the decades of the 1980s and the 1990s) are estimated at 80%, 75% and 70% (Athukorala and Menon, 1996; Athukorala and Rajapatirana, 2000; Kokko and Zejan, 1996).

Table 2. Status of Total Approved Investment Projects, 1988 - 2001

| Status | No. of Projects | Investment | | Total Fixed Investment (US$ million) | Employment (number of workers) |
		Total amount (millions of dollars)	Share of FDI (%)		
Operational	270	536.1	18.7	479.2	41 310
Under-construction	49	82.0	30.3	73.1	6 210
Licensed	135	214.1	31.9	172.7	15 399
Agreement signed	183	182.6	39.9	126	13 214
Closed	19	17.4	24.1	14.4	1 798
Cancelled	65	121.4	27.1	106.1	8 494
Total Approved	721	1153.6	26.3	971.6	86 425

Source: Investment Promotion Board, Department of Industry, Commerce and Supplies, Kathmandu.

As discussed earlier, Nepal now allows full foreign ownership with the exception of a few industries such as cigarettes, bidis and alcohol. Despite this openness, the share of foreign capital in total approved investments during the period 1988-2001 averaged a mere 26.3%, with the share in annual approvals varying in the range of 8% to 54%. Compared to the experience of other developing countries, the apparent inclination of foreign investors to settle for partial, mostly minority, ownership, perhaps, points to the unsettled nature of the investment environment in the country.

Table 3 places Nepal's performance in attracting FDI in an international perspective. Among South Asian countries, Nepal's performance, both in term of the volume and the trends

in FDI inflows is superior only to Bhutan. As already noted, Nepal is relatively disadvantaged in attracting FDI because of being landlocked. But, even in comparison with other landlocked LDCs for which data are available, Nepal turns out to be a below-average performer. While it is not possible to draw firm inferences from a simple inter-country comparison, the data reported in the table do suggest that Nepal's poor record in attracting FDI cannot be explained solely in terms of constraints arising from being landlocked.. While it is not possible to come up with hard empirical evidence, political instability, policy uncertainly and the slow pace of reform appear to have contributed to Nepal's inability to attract FDI.

Table 3. FDI Inflows: Nepal in the International Context, 1989-2002

	1989-94*	1995	1996	1997	1998	1999	2000	2001	2002
World	200145	331068	384910	481911	686028	179083	1392957	823825	651188
Developed countries	137124	203462	219688	269654	472265	824642	1120528	598379	460334
Developing countries	63021	127606	165222	212257	213763	-645559	272429	225446	190854
South Asia	817	2945	3685	4939	3504	3095	3092	3982	4581
Bangladesh	6	2	14	139	190	180	280	79	45
Bhutan	1	0	1	1	0	0	0	0	0
India	394	2144	2591	3619	2633	2168	2319	3403	3449
Maldives	6	7	9	11	12	12	13	12	12
Nepal	4	8	19	23	12	4	0	21	10
Pakistan	304	719	918	713	507	530	305	385	823
Sri Lanka	102	65	133	433	150	201	175	82	242
Land-locked LDCs									
Chad	13	13	18	44	21	27	115		901
Lao PDR	19	95	160	86	45	52	34	24	25
Lesotho	19	23	31	32	27	33	31	28	24
Malawi	12	25	44	-1	-3	46	-33	-20	
Mali	2	123	47	74	36	51	83	122	102
Mongolia	71	10	16	25	19	30	54	43	78
Niger	17	16	20	25	9		9	23	8
Paraguay	79	98	144	236	342	95	104	95	-22
Uganda	23	121	121	175	210	222	254	229	275
Zambia	90	97	117	207	198	163	122	72	197
Zimbabwe	13	118	81	135	444	59	23	4	26

Source: UNCTAD (various years).
*   Annual average

The geographic origin of FDI in Nepal is characterized by a clear developing-country bias (table 4). Among the

developing-country investors, India has been by far the largest investor in Nepal. Of the total number of approved projects, 249 are of Indian origin. A large number of these firms are "quota-hoppers". In the export-oriented garment industry, Indian firms set up production facilities in Nepal in order to circumvent quota restrictions imposed under the Multi-fibre Arrangement (MFA) on garment exports from India. Another major inducement for Indian investors has been the opportunities for profit-making created by Nepal's low tariffs. Because of the successive tariff cuts from the late 1980s, tariffs on many imported intermediate products in Nepal are much lower than in India. This difference, combined with a virtual open border between the two countries, has made simple processing industries for a number of products (including vegetable ghee, copper wires and some cosmetics) geared to the Indian market highly profitable.

In many other countries in the region, investors from the newly industrializing economies have played a key role in the expansion of garment exports. However, these investors have completely ignored Nepal despite the opportunities it offers for accessing lucrative developed-country markets, circumventing the quota restrictions (Athukorala, 1995; Wells, 1994).[5]

A majority of the projects with capital participation from developed countries are small-scale projects with the participation of individual (rather than business) investors. None of the well-known TNCs from the developed countries appear in the approval list of the Nepalese investment authority. Moreover, FDI from developed countries are predominantly in the services sector.

Data on the sectoral distribution of approved projects are summarized in table 5. Manufacturing accounts for more than half of the approved projects and 65% of total planned investment. Among other sectors, the hotel and tourism industry

[5] As a LDC, Nepal enjoys unlimited duty free access to garment markets in Canada and the EU. Exports to the United States from Nepal were subject to MFA quotas during the period under study, but less than a half of the annual quota entitlement was utilized throughout this period.

Table 4. Total Approved Investment and Foreign Equity
Participation by County, 1988-2001

	No. of Projects	Investment* Total amount (millions of dollars)	Investment* Foreign Equity Participation (%)	Fixed Investment (millions of dollars)	Employment
Developed Countries	309	425.9	25.6	380.5	27 487
Japan	77	40.6	32.0	35.0	4 842
United States	74	174.1	29.9	159.1	6 915
Germany	31	9.1	37.4	7.6	2 262
United Kingdom	26	27.7	8.1	23.8	5 153
France	19	6.4	23.6	5.5	993
Other developed countries	82	167.6	22.0	149.2	7 322
High Performing Asian Economies	119	197.5	29.9	169.6	14 144
China	57	113.6	29.1	95.2	6 716
Republic of Korea	29	22.6	49.1	18.7	2 552
Hong Kong (China)	12	18.2	35.8	15.9	2 064
Singapore	8	23.9	20.7	23.1	1 135
Thailand	7	14.2	9.5	12.1	1 106
Taiwan Province of China	6	5.0	42.5	4.5	571
SAARC Countries	271	430.3	26.1	330.9	40 301
India	249	419.7	25.9	324.9	34 553
Bangladesh	9	4.9	29.9	2.6	3 401
Pakistan	7	4.1	39.0	3.1	2 166
Sri Lanka	3	1.2	47.3	0.8	83
Bhutan	3	0.4	13.2	0.3	98
Other Developing Countries	22	99.9	26.2	90.6	4 493
Bermuda	6	29.8	5.9	25.3	1 474
British Virgin Islands	4	51.3	37.3	49.3	1 210
Philippines	3	13.9	5.3	12.8	1 329
United Arab Emirates	1	2.7	25.2	0.6	93
Others	8	2.2	29.0	2.6	387
Total	721	1 153.6	26.3	971.6	86 425

Source: Compiled from data from the Department of Industry, Commerce and Supplies Kathmandu.

* This includes investment from Nepalese and foreigner investors.

attracted a large number of investments given the attractiveness of Nepal as a tourist destination. Although tourism has experienced a major setback in recent years because of the civil war,[6] this is certainly an area where Nepal has an intrinsic

[6] The number of tourist arrivals declined from 422,000 in 1997 to 270,000 in 2002 and foreign exchange earnings from tourism dropped from $174 million (3% of GDP) to $68 million (1% of GDP) during the same period.

comparative advantage. Only two foreign firms have so far entered the hydroelectricity industry, in which Nepal has immense potential for output expansion through foreign capital participation.[7] The government monopoly in electricity distribution and the compulsion for private-sector electricity producers to supply to the national grid (owned and managed by the Nepalese Electricity Authority) is considered to be a major hurdle for FDI in this industry.

Table 5. Sectoral Distribution of Total Approved Projects and Foreign Equity Participation, 1987- 2001

Product sector	Total Investment				
	Number of projects	US$ million	Foreign Equity Participation (%)	Total Fixed Investment (US$ million)*	Total employment
1. Agriculture	12	5.2	25.5	4.7	842
2. Manufacturing	369	492.7	26.0	363.1	55 996
2.1 Food, beverages and tobacco	61	124.4	19.3	109.2	..
2.2 Textile and wearing apparel	123	118.6	33.0	75.8	..
2.3 Wood & wood products	5	1.2	34.0	0.9	..
2.4 Paper & paper products	17	24.9	15.4	21.5	..
2.5 Chemical and plastic products	68	89.8	30.7	67.1	..
2.6 Non-metallic mineral products	13	46.6	20.9	27.7	..
2.7 Basic metal products	21	30.2	30.8	20.4	..
2.8 Fabricated metal products	48	44.8	25.4	31.6	..
2.9 Machinery and equipment	0	0	0	0	..
2.10 Other manufacturing	13	12.1	22.2	8.7	..
3. Electricity, water and gas	14	243.4	17.1	230.2	..
4. Construction	16	12.8	59.9	11.2	..
5. Hotel & resorts	168	228.6	27.3	217.3	..
6. Transport & communication	24	53.5	40.6	37.5	..
7. Housing and apartments	15	3.6	56.1	1.4	..
8. Services	104	103.6	33.2	96.1	..
TOTAL	721	1 153.6	26.3	971.6	86 425

Source: Compiled from data from the Department of Industry, Commerce and Supplies, Kathmandu.
.. Data not available.

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[7] Total hydropower generation potential in Nepal has been estimated at 83,000 MW and 50% of this is considered commercially viable. However, the current installed capacity is only 253 MW, and only 25% of Nepalese households have access to electricity. Intermittent interruption of power supply is a major constraint on manufacturing and other business activities.

Despite the heavy emphasis placed on attracting FDI as a vehicle for export expansion, much of the realized projects are engaged in domestic market-oriented industries (table 6). Of the 270 operational projects, 116 (43%) are in various service industries (mostly those relating to tourism). Among 154 firms engaged in manufacturing, only 27 (18%) are in export-oriented industries, with the balance of 127 (82%) producing primarily for the domestic market. As can be expected, export-oriented firms show a greater concentration in the Kathmandu valley compared to domestic market-oriented firms. None of the export-oriented firms are located in the Hilly and Mountain regions primarily due to the lack of efficient transport networks (table 6).

Table 6. Number of Operational FDI firms by Region and Market Orientation as at 31.10.2001

Region	Manufacturing		Service	Total
	Domestic market-oriented	Export market-oriented		
Kathmandu Valley	53	21	74	148
Terai	64	6	15	85
Hilly and Mountain Range	10	-	27	37
Total	127	27	116	270

Source: Compiled by the authors from data provided by the Department of Industry, Commerce and Supplies, Kathmandu.

The bulk of export-oriented FDI projects are in the clothing industry (about 95%), attracted by the quotas system under the MFA. Perhaps because of the uncertain business climate, foreign firms in the export-oriented garment industry have largely focused on reaping easy, short-term gains in a quota-restricted market without making efforts to diversify into competitive non-quota markets. According to some tentative estimates based on interviews conducted with some key personnel in the business sector in 2001, the non-quota exports accounted for only about 10% of the total garment exports from Nepal (UNIDO, 2002). Quota-hopping foreign firms in the

Nepalese clothing industry have already begun to face severe difficulties following the abolition of the MFA from January 2005.[8]

5. Development implications

A systematic analysis of the development implications of FDI in Nepal is not possible because of the paucity of data. The Annual Survey of Manufacturing Establishments, which is the main source of data for analyzing the performance of the manufacturing sector, does not provide enough data for cross-tabulation by ownership. The Foreign Investment Promotion Board has not so far undertaken any assessment of the operations of foreign investment projects. The purpose of this section is to make some tentative inferences by analyzing the limited available information in the context of the general literature on development implications of FDI in developing countries.

One of the most obvious contributions of FDI to economic development is improved productivity by bringing with it some firm-specific knowledge (in the form of technology, managerial expertise, marketing know-how etc.) that cannot be effectively leased or purchased on the market by host country firms. For instance, affiliates of TNCs – as part of the parent company's global network – have excellent marketing networks, possess experience and expertise in the many complex facets of product development and international marketing, and are well placed to take advantage of inter-country differences in the cost of production. On these grounds, FDI is widely considered as an effective means of acquiring technology and marketing know-how. It may also allow new entrants to learn about export markets, stimulate competition with local firms, and provide training for workers. There is, however, a consensus in the literature that these various indirect beneficial effects ("spillover effects") of FDI depend crucially on the nature of the trade

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[8] Following abolition of MFA quotas, clothing exports from Nepal to the United States contracted by a staggering 26% during January-September 2005 compared to the same period in 2004 (Ahmad, 2005, Table 1-A).

regime of the host country (Bhagwati, 2004, Chapter 12; Balasubramaniyan *et al*., 1996; Athukorala and Chand, 2002). A country with an outward-oriented policy regime has the potential to reap greater benefit from FDI than a country whose policy regime has a bias in favour of import-substitution. This is because, in contrast to an import-substitution regime, an export-oriented regime generally encourages FDI in activities where the host country has a comparative advantage.

The heavy concentration of foreign firms in market-seeking activities in Nepal (table 6) suggests that national gains from FDI in productivity improvement and economic growth may have been limited. Production facilities set up to cater for the small domestic market tend to have high costs and are characterized by low productivity growth compared to those set up to produce for the global market in line with the country's comparative advantage. As mentioned earlier, a systematic analysis of the productivity implications (and other spillover effects) of FDI in Nepal is not possible given the paucity of data for a sufficiently long period of time. However, available data suggest that total factor productivity growth of industries with greater presence of foreign affiliates (identified on the basis of the Foreign Investment Promotion Board approval list) are not significantly different from, and in most cases lower than, the average level of TFP growth for the entire manufacturing sector.[9] This finding is certainly consistent with the view that foreign investment drawn in by "easy profit" is unlikely to generate much benefit in the way of technological improvements.

During the period 1988-2001, the amount of total realized FDI expressed as a percentage of gross domestic capital formation was, on average, less than 1%.[10] The relative

[9] Using Sharma (2004) data set and the model developed therein we tested if FDI has any impact on inter-industry variations in productivity growth by adding FDI variable proxied at the two-digit level of industry classification. No statistically significant evidence was found between FDI and productivity growth.

[10] This estimate is based on data obtained from UNCTAD, *World Investment Report* (various issues).

contribution of FDI projects to domestic employment has also been small. According to the official records of the Foreign Investment Promotion Board, total employment in realized FDI projects during the period 1988-2001 was 41,320, which amounted to a mere 0.06% of the increase in the total labour force in the country during the same period.[11] The data on the sectoral distribution of FDI projects in manufacturing points to a high concentration of projects in relatively more capital-intensive sectors, which receive relatively greater protection.[12] Based on data relating to investment approval, total investment per worker in FDI projects is around $14,000, which is extraordinarily high for a labour-abundant and capital-scarce country like Nepal. For example, in Malaysia, a country which is at a much advanced level of development with virtually full employment from the early 1990s, average investment per worker in foreign firms is as low as $18,000. This vast difference in the degree of capital intensity of production by foreign firms in the two countries can be explained in terms of the nature of the market-orientation of such production. As noted earlier, foreign firms in Nepal are largely involved in import-substitution activities whereas in Malaysia, they are heavily concentrated in export-oriented production. Import-substitution (market-seeking) FDI in developing countries, driven mostly by high import tariffs and other entry barriers rather than relative factor cost differentials, generally tend to be more capital intensive compared to efficiency-seeking (export-oriented) FDI (Bhagwati, 1991).

Finally, data on the spatial distribution of operational FDI projects suggest that the benefits of FDI are heavily concentrated in Kathmandu and the surrounding areas. Of the 270 operating projects, the Kathmandu Valley alone has attracted 148 projects (55% of the total) and 48% of total employment. In contrast, only 37 projects (14%) accounting for 14% of total

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[11] Of the total jobs, 28,400 were in manufacturing (or 70% of the total), while the rest were in services.
[12] Such industries include beer, distilleries, soft drinks, chemical products, radio and TV and electric apparatus.

employment are located in the Hilly and Mountain regions where about 50% of the country's population live. An analysis of the employment generated by foreign affiliates across regions suggests that over 86% of jobs are created in the Kathmandu Valley and the Terai belt, both of which have the basic physical infrastructure and higher purchasing power than the rest of the country (table 7). These two regions have together attracted 233 operational FDI projects (86% of the total). These special patterns of FDI clearly point to the importance of transportation and other infrastructure facilities, and access to administrative services in determining investment location.

Table 7. Employment and Investment in Operational FDI firms by Region as at 31.10.2001

Region	No. of Projects	Total Project Cost (US$ million)	Employment
Kathmandu Valley	148	303.85	20 049
Terai	85	112.10	15 612
Hilly and Mountain Range	37	63.35	5 649
Total	270	479.30	41 310

Source: Compiled by the authors from data provided by the Department of Industry, Commerce and Supplies, Kathmandu.

6. Conclusion

Nepal has made a promising start in implementing market-oriented reform and promoting FDI, but it has a long way to go in reaping the benefits from integration into the global economy through FDI. Under the new policy regime, foreign firms have played a role in carpets and garment exports, but their exports are largely motivated by the Generalized System of Preferences and MFA quotas rather than the country's comparative advantage. A large numbers of foreign investment projects are also based on shaky foundations, motivated by import deflection opportunities created by vast tariff differentials between Nepal and India (the major investor in Nepal). The

overwhelming majority of foreign firms are involved in import-substitution activities characterized by high capital intensity. Consequently, the contribution of FDI to employment generation has been negligible. It seems that FDI attracted to "easy profit" activities (import-substitution manufacturing as well as the quota-protected garment industry) has failed to make a significant contribution to productivity growth in the Nepalese manufacturing sector. The foreign firms are located in the Kathmandu Valley or in the Terai belt, while the geographic spread of the gains from foreign investment has been rather skewed. Most participation of foreign firms in tourism – an activity where Nepal has a huge potential – has not been much due to the lack of efficient transport networks and the civil war since 1995.

An obvious, but important, inference coming from our analysis is that trade liberalization and generous investment *per se* in the absence of basic pre-conditions cannot achieve anticipated developmental objectives. The provision of required supportive services, political stability, policy certainty and efficient administrative mechanism have an equally - perhaps even more - important role to play. Nepal obviously has disadvantages arising from its geography in attracting FDI. However, comparative international experience suggests that her lacklustre record as a host to foreign investors cannot be explained in terms of its geography alone. The overall investment climate does matter. ∎

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BOOK REVIEWS

International Investment for Sustainable Development: Balancing Rights and Rewards

Lyuba Zarsky, editor
(London, Earthscan, 2005), xiv+225 pages

The book is a contribution to the ongoing debate about foreign direct investment (FDI) and its role in development. This debate is characterized, like the general debate about globalization, by a yawning gap between viewpoints, readiness to distort the other side's arguments and exaggerated interpretations of the evidence on both sides. In the case of FDI, its promoters claim that it leads to transfer of technology, increased employment and improved labour and environmental standards, while its critics argue that it entails environmental degradation, exploitation of low-paid workers and human rights abuses. The book reviews recent research and attempts to represent both views - and the supporting evidence - in a balanced way. By and large, it succeeds in doing so, although most of the authors appear to lean more towards the critical side.

The book is divided in two parts: the first deals with the impacts of FDI, particularly the links between FDI, development and sustainability, and the second with the governance of international investment, especially bilateral investment treaties (BITs).

The first part focuses on a review of the evidence, including statistics and case studies, of positive or negative impacts of FDI, particularly as regards economic growth, technology spillovers and environmental performance. The evidence is judged to be inconclusive. This result is not surprising in view of the differences among host countries and industries. It would be more unexpected to learn that there were great similarities between a copper mine in northern Chile, a

sock knitting factory in rural China and a foreign affiliate established in Dublin to collect software license income. It appears that the only relationship that can be clearly established is between domestic policies, capacities and institutions in host countries on one hand and results of FDI on the other.

The first part also contains chapters that go into more detail about countries and regions. A review of the experience of FDI in Mexico concludes that the hopes attached to it were not fulfilled, although the author maybe goes a little too far in attributing Mexico's disappointing growth record in the late twentieth century to the effect of FDI. The evidence is circumstantial at best and not very convincing. Another chapter discusses the impact of FDI in sub-Saharan Africa (SSA). This is probably the weakest chapter in the volume. The author concludes, from a review of experiences that is unsystematic and relies on anecdotal evidence, that FDI has made a poor contribution to sustainable development in SSA. He attributes this failure mainly to the lack of "policy coherence" and "poor coordination of institutions". The examples he provides are curious: for instance, he notes that "while environmental laws of most SSA countries contain provisions to regulate FDI, most investment regimes are silent on environmental imperatives". It is not clear how environmental management would be improved by providing regulations in two different pieces of legislation. Neither is it clear why it would be necessary to single out foreign owned firms for special treatment with respect to sustainability. Another chapter deals with sustainable development and FDI in Asia. It makes the point that sustainable development is over-shadowed by "bread and butter issues" in Asia and that FDI "continues to be highly sought after by governments of developing Asian nations, negative environmental and social fallout notwithstanding". As in the case of the chapter on SSA, it is not clear why foreign firms are singled out. The few examples quoted have more to do with general consequences of economic growth and industrialization than with the ownership of industries. In addition, as has been documented over and over again, at least as far as environmental management is concerned, foreign companies do not appear to

be worse sinners than domestic ones. If anything, their practices appear to be slightly better.

The second part of the book is by far the more interesting one to anybody who does not take a particular interest in the debate between true believers in either of the two extreme interpretations of the impact of FDI. It deals with the governance of international investment, a subject to which most of us have probably paid less attention than we should have.

One of the chapters concerns BITs. For the uninitiated, it is surprising and somewhat worrying to learn about the lack of transparency associated with the application of these treaties. This is particularly so given that the number of BITs is growing rapidly, in spite of the difficulty in proving any positive effects from them. For instance, it is not clear that countries that conclude such treaties succeed in attracting more FDI than those that do not (although the lack of a real counterfactual makes this conclusion uncertain). The chapter contains a great deal of information on the characteristics of BITs, much of it is of obvious use to anybody dealing - even peripherally - with investment issues. Another chapter undertakes a critical review of investor protection in the North American Free Trade Agreement, and concludes that the investor-state dispute settlement process suffers from a lack of transparency, accountability and legitimacy, a too broad definition of "investors", and overly broad interpretations of host state obligations in areas such as expropriation, non-discrimination and minimum standards of treatment. The third chapter contains a very detailed discussion of the principle of non-discrimination in investment regimes, particularly as applied to environmental regulation. The discussion underlines the complexity of the involved issues, which is rather refreshing after the sweeping generalizations in the first part of the volume. It is perhaps inevitable, although just a little disappointing, that no clear conclusion is reached.

The final chapter of the book provides some hope for those who believe in the potential contribution of FDI to development. It deals with corporate disclosure and

transparency, an area where several new initiatives have been taken in the last few years. Among the initiatives mentioned is the Global Reporting Initiative, which has had a major impact on corporate disclosure practices. The chapter advocates the creation of a "Multistakeholder Corporate Governance Framework". While many would no doubt consider such a framework useful, it is far from certain that it could be negotiated. Those among us with good memories remember the Code of Conduct for Transnational Corporations and how it proved impossible to reach agreement on it. It can be argued that improvements in corporate disclosure can come about without any legal or quasi legal framework and that present trends are encouraging. While self regulation by firms will never solve all problems, it can make a substantive contribution and the possibility of companies with better practices influencing others should not be excluded. This is particularly important when it comes to investments in countries with weak institutions.

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International Political Risk Management:
Looking to the Future

Theodore H. Moran and Gerald T. West, editors
(Washington, D.C., World Bank, 2005), x+251 pages

Political risks still plague international investment. However, some of these risks can be alleviated or managed by way of political risk insurance (PRI). Thus, alongside the growth of foreign direct investment and other forms of cross-border capital flows, a plethora of political risk insurance providers have emerged. Some of these are public entities, like the World Bank's Multilateral Investment Guarantee Agency (MIGA) and the United States government-affiliated Overseas Private Investment Corporation (OPIC). Others, such as XL Insurance, are private companies. This book, the fourth in a series of edited volumes published by the World Bank and based on the MIGA-Georgetown University symposium, presents a truly intriguing insiders' view of how this particular industry works.

The text is divided into four main parts, each consisting of two papers, which are supplemented by a comprehensive overview section written by the editors and an illuminating extract from the discussions among the symposium participants. Throughout the book, conceptual issues are discussed and clarified, and examples of insurance claims and arbitrations are presented and commented on. As readers, we learn that the PRI industry constantly has to evaluate the wording and content of its existing policies in the light of claims experience and more general political and economic developments, so as to ensure that investors obtain the coverage they really need and to limit the number of unreasonable claims. We are also informed about the growing impact of private actors in the industry and the exciting prospects for future public-private cooperation. In short, the editors succeed in making the contributors unveil facts, advances, ideas and opinions from an area of business that is often shrouded in secrecy.

The first part of the book deals with claims and arbitration experiences and the lessons learned from investments that ran into trouble. Kenneth W. Hansen argues that the surge in insurance claims in recent years is largely a result of the "mismatch between the demand and supply sides of the market with respect to scope of coverages" (p. 13). This mismatch is attributed to the conservative bias that bedevils the PRI industry and generally ensures that only three "classic" categories of political risks can be insured against: expropriation; war and political violence; and currency inconvertibility (CI). The problem, however, is that many "new" potentially costly risks – in particular, breach of contract risk and regulatory risk – then remain uncovered by insurance policies that often leave out such risks from the contracts. As a consequence, a wide range of investors fail to obtain the coverage they actually seek and instead have to settle for policies that do not really match their needs. Not surprisingly, therefore, some equity investors and project lenders try to "stretch" the coverage (and many even succeed in doing so), for instance, by claiming expropriation loss when the host government has breached a contract.

This demand-supply mismatch is discussed by other contributors as well. Frederick E. Jenney, for example, contends that investors tend to expect too much from their insurance policies and notes that a breach of contract does not amount to an expropriation "unless it makes impossible the continued operation of the project that is the subject of the contract" (p. 104). Hence, Jenney calls for a clearer insurance policy wording that explicitly and unequivocally excludes breach of contract risk from expropriation coverage. Instead, he contends, the insured should opt for another, lesser-known class of protection, namely arbitral award default coverage. Such a policy ensures that the investor is indemnified by the insurer in case of a breach of contract and subsequent failure by the host government to honour its obligation.

From the empirical point of view at least, the second paper by Robert C. O'Sullivan is the most interesting one. Here, we are treated to an insight into OPIC's cumulative claims

history, spanning some 40 years and including nearly 300 political risk insurance claims settlements, all of which are tabulated in a highly informative annex. In many ways, O'Sullivan's text reminds us of the plight of academics in a field of research which lacks, among other things, empirical data on the relative importance of political risk effects, i.e. the events that directly cause losses for transnational corporations. In this respect, the paper is enlightening. We learn, for example, that the pattern of claims has changed over the years. While CI claims predominated over other classes of risks from 1970 to 1990, claims regarding political violence (59% of claims paid) and expropriation (37%) have become much more common in recent years. It is noted that the causal mechanism that accounts for the shrinking significance of CI claims can also explain why incidents of expropriation (broadly defined) are relatively more common nowadays. On the one hand, most developing nations have liberalized their economies, thus refraining from using the exchange control as a policy tool. On the other hand, the opening up of markets also prompt expropriation claims which "arise from the complication that occur when countries open up to foreign investment, make the transition to market economies, and deal with financial crises" (p. 32). Interestingly, the monetary impact also differs between the main classes of risks. Expropriation, which often involves total appropriation of the investment by the host government, usually entails large claims, "whereas inconvertibility claims have usually been for periodic earnings on the insured investment, and political violence claims have typically been for the loss of particular items of tangible property, not destruction of the entire project" (p. 31).

The apparent reduced relevance of CI coverage is also discussed in the paper by Daniel W. Riordan and Edward A. Coppola. Here, focus is placed on the infamous Argentinian debacle and its consequences. The question, simply put, is whether or not CI is still worth insuring against. Allegedly, a number of foreign investors thought that their CI coverages also included protection against a devaluation of the Argentinean peso. Exchange rate changes are, however, typically omitted from CI insurance policies on the grounds that such risks are

financial or commercial rather than political.

Riordan and Coppola thus follow other symposium panellists by pointing to the PRI industry's need for conceptual clarification in connection with the drafting of contracts and, not least, the necessity of learning from past and current claims and arbitrations so as to avoid the perennial mismatch between the expectations of buyers and the intentions of sellers of insurance. On this latter score, Tony Heppel, who represents FirstCity Partnership, argues that private PRI providers have a lot to offer in terms of product development and operational flexibility and adaptability. In particular, the growth of private-public joint-ventures in the industry looks promising and can, in the words of Clive Tobin of XL Insurance, "bring real added value into play" (p. 133).

Louis T. Wells' contribution is the only paper that is written by an outsider to the industry. Not surprisingly, therefore, it provides some refreshing views that contribute to broadening the scope of the book. Wells begins by commenting on the discrepancy between the broad title of the symposium and its much narrower contents. Of course, political risk *insurance*, a theme which all but one of the papers focus exclusively on, "is only one element in a program that can enable an international investor to manage political risk" (p. 87). Consequently, Wells brings into his discussion a wide set of property rights protection measures, such as international arbitration provisions, support from the investor's home government, financial backing from external (often politically powerful) institutions and official insurance. The author's main point, however, is that this system of political risk management tools, although in many ways promising, is also worryingly fragile, mainly because it has evolved in a rather piecemeal and uncoordinated fashion. Keeping in mind that some of the papers in this book (including Wells') quite explicitly criticize investors as a group for misunderstanding or deliberately trying to "overstretch" insurance policies, it is perhaps appropriate that Wells also points to the shortcomings of the PRI industry itself. In particular, PRI providers are criticized for actually encouraging moral hazard

behaviour and disputes between investors and host country governments. For example, the insurer rarely denies claims from the insured since various agreements "authorize an official insurer ... to turn around and collect its money from the host country if it pays a claim" (p. 96).

In many ways, Wells seems to be taking the side of developing host countries. However, the investors – who constitute a group that profoundly affects the PRI industry – are not represented among the contributors. This is somewhat regrettable, given that most papers dwell in detail on the inconsistency between supply and demand in this industry. The reader is thus left with only one side of the story. In fact, the only contribution from the buyer's side to this volume appears in one of the discussion extracts, where one observer succinctly comments that the PRI industry's main challenge nowadays involves attracting buyers "as many of the traditional clients are surveying their purchases of insurance and wondering if they are being well served" (p. 117).

Notwithstanding the lack of input from the demand side, the book makes for an excellent reading. Even though this is an edited volume, several common threads run through a surprisingly coherent text. The authors seem to agree that the PRI industry needs to learn from their own experience with insurance claims and disputes. Not least, contracts and policies must be meticulously written so as to avoid the misunderstandings and mistakes of the past. In addition, new and/or lesser-known products – e.g., arbitral award coverage, denial of justice coverage, and CI coverage for emerging-market lenders – deserve further attention and development.

Of course, the book should be mandatory reading for any PRI provider. Moreover, foreign investors and project lenders are also strongly advised to read carefully through it, especially given that some of the contributors clearly indicate that large amounts of money are often spent on the "wrong" class of coverage. In particular, however, *International Political Risk Management* should be studied by students and scholars

interested in the subject. Unfortunately, political risk analysis has never really taken off as an academic discipline. In part, this is due to severe conceptual confusion and a lack of sound empirical data that link political causes to loss-generating effects for transnational corporations. On both of these scores, the PRI industry in general and this book, in particular, has a lot to offer.

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New Competition Foreign Direct Investment and Industrial development in China

Guoyong Liang
(Rotterdam, Erasmus Institute of Management,2004),
xiii+325 pages

This comprehensive book examines the competitive influence of foreign direct investment (FDI) on industrial development in China. It also provides policy recommendations in the domain of competition policy at the level of institutional development. This book seeks to fill a gap in research on China in providing deep microeconomic analyses at the industrial level with two industrial case studies - the automotive industry and the electronics/information and communication (ICT) industry - and econometric analysis.

In determining how FDI as a competitive force has influenced the development of industries, three issues are examined: the collusion of transnational corporations (TNCs) and domestic firms to dominate the domestic market due to restrictive government practices and state ownership; the role of the policy environment and its impact on FDI; and the evolution of industries in China. This book, in addressing perceived theoretical gaps in the literature, develops a more dynamic theory on the basis of an eclectic use of theories and tests against a number of Chinese industries.

The first chapter provides a general and extensive background on China's economic development, the role of FDI and China as a transitional economy, providing comparisons with other transition economies and East Asian economies. The second chapter, in defining the key issues, analyses competition and Chinese economic development in terms of market creation, enterprise development, ownership and state-owned enterprises and local economic development. This chapter also highlights the importance of transitional institutions and the building of

market supporting institutions. Furthermore, it examines the development of competition policies, and comparisons are made with extant systems in Central and Eastern Europe, Africa, Asia and Latin America. The third and fourth chapters provide a literature review and theoretical underpinning to the central arguments of the book.

The empirical part of the study is divided into three chapters. Chapter five provides background research on FDI across industries as well as competition and industrial development in China. Methodological issues related to case studies are examined. The two case studies relate to the automotive industry and the electronics/ICT industry.

In ascertaining the determinants of market structure in the Chinese automotive industry, a number of hypotheses are tested. Cross-sectional data for the period 1985-2003 were utilized. There are a number of key findings. In the dynamic industrial context of China's passenger car industry, entry order, government support, the degree of foreign ownership and international experience of TNCs determine their achievement in terms of market share. The causal relationship between government policy and the lack of competition is highlighted. Investment scale is not positively related to market share achievement. It can thus be said, from a managerial perspective, early market entry is critical to market share achievement. Local partner selection is crucial, given the nature of strong government intervention. The equity structure is also an important consideration when entering into a joint venture. International operations experience is among the most important determinants of foreign market share. Furthermore, government intervention is seen to have a negative impact by leading firms to make uneconomic decisions. Interestingly, a "light asset" entry strategy is suggested as an optimal choice in terms of entry scale. Investment scale is shown to play an insignificant even negative role in determining market share achievement.

The second case study relates to an econometric analysis of the determinants of innovation in China's electronics/ICT

industry, empirically examining the relationship between foreign and domestic firms in terms of R&D spillovers. The determinants relate to firm-level factors (size, profitability, internationalization) and industry-level factors (R&D spillovers from FDI, market structure). Cross-sectional data from the 100 largest firms in China's electronics/ICT industry for 2000, 2001, and 2002 were utilized. The results provide evidence of a positive spillover effect of firm R&D expenditures in China, reflecting the innovation propensity of Chinese firms in the electronics/ICT industry. The association between inward FDI and R&D expenditure is strong. However, any observed association between innovation and FDI needs to be carefully considered before concluding that there is a causal relationship. This case study does not empirically examine the causal relationship and mechanism of the R&D spillover effect. The author notes that this would need to be integrated into the theoretical model for future studies. He also notes that longitudinal research could provide further investigation on the dynamic nature of R&D spillovers.

In concluding, the author highlights a number of factors and makes some important recommendations. He states that the competition regime in China should take into account market imperfections as a result of government intervention and indeed political activities of other countries. He further notes that, at the current stage of China's economic development, there is still a central role for industrial development policy despite the attendant risks for competition policy, and that competition policy be seen as a necessary supplement to industrial policy to ensure that inward FDI play a positive role in promoting industrial, economic and social development. Ultimately, he states that China needs to have a competition policy that takes account of its relative level of development, its specific economic and socio-political context and the long-term objective of sustained economic growth.

This is a very comprehensive book providing a deeper understanding on the impact of FDI on structural change in the automotive and the electronics/ ICT industry in China, and an

analysis of the dynamic process though which FDI influences these structural changes. It addresses a number of theoretical gaps and seeks to develop a more dynamic theory on the basis of an eclectic discussion of theories and policy issues. It then uses China's automotive and electronics/ICT industry industries as test case studies for this dynamic model. Its managerial implications are particularly welcome and the role of the Government of China in the potential success of a foreign venture. Whilst this specific study relates to China, to what degree this analysis is transferable to other transitional economies demands further research. The short-comings of this book are more at the level of editing. It is a pity there is no index. The chapters need more synthesising with clearer introductions and conclusions. Apart from these minor points, this is a very constructive contribution to the literature on FDI in China.

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GUIDELINES FOR CONTRIBUTORS

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Cantwell, John (1991). "A survey of theories of international production", in Christos N. Pitelis and Roger Sugden, eds., *The Nature of the Transnational Firm* (London: Routledge), pp. 16-63.

Dunning, John H. (1979). "Explaining changing patterns of international production: in defence of the eclectic theory", *Oxford Bulletin of Economics and Statistics*, 41 (November), pp. 269-295.

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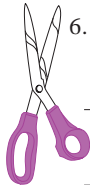
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