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# Ownership, technology and buyers: explaining exporting in China and Sri Lanka

Ganeshan Wignaraja \*

This paper examines several characteristics besides foreign ownership that influence the decision of clothing firms in China and Sri Lanka whether or not to export – namely, the acquisition of technological capabilities and learning from buyers. As a by-product of the exercise, the model also describes the effect of other explanatory variables (capital, skill adjusted wages and age). The findings indicate that foreign ownership, the acquisition of technological capabilities and learning from buyers are positive and significantly correlated with the probability of exporting in Chinese and Sri Lankan clothing firms. Skill adjusted wages are also significant and with the expected negative sign. Comparative econometric analysis is a powerful tool to verify and extend the findings of detailed enterprise case studies on innovation and learning processes in developing countries.

**Key words:** foreign investment, technological capabilities, buyers of output, exports, China, Sri Lanka

JEL Classification: F14, O31, L67

## 1. Introduction

There is a large literature on the determinants of international trade across countries and industries. With the increased availability of firm-level surveys, there has been growing attention to firms' export behaviour using econometric analysis (for surveys see Bleaney and Wakelin, 2002; Rasiah, 2004; and Greenaway and Keller, 2007). Drawing on the literature on applied international trade and investment as well as that on innovation and learning, attempts have been made to explain why some firms are better exporters than

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\* Principal Economist, Asian Development Bank, Manila. Email address: gwignaraja@adb.org. The views expressed here are solely mine and are not to be attributed to the Asian Development Bank. I am indebted to the late Professor Sanjaya Lall for introducing me to industrial technological development. Thanks are due to Rosechin Olfindo for efficient research assistance and to two reviewers for comments. I am also grateful to suggestions from participants at seminars at UNUMERIT, Maastricht in June 2006, the University of Colombo in December 2006 and Renmin University, Beijing in April 2008.

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others. A positive relationship between foreign ownership and firm-level export behaviour emerges from several studies (Lall, 1986; Wilmore, 1992; Rasiyah, 2003; Correa et al., 2007; Du and Girma, 2007). The superior export behaviour of foreign firms relative to domestic firms is typically attributed to access to the marketing connections and know-how of their parent companies coupled with accumulated learning experience of producing for export. Research and development (R&D) intensity (and innovation more generally) has also been found to have a positive effect on export behaviour at firm-level (Kumar and Siddharthan, 1994; Ito and Pucik, 1993; Bleaney and Wakelin, 2002).

Case studies of firms have long indicated that exporters in developing countries rarely undertake formal R&D activities at frontiers of technology. Instead, they focus on the difficult process of acquiring technological capabilities to use imported technologies efficiently and learning from buyers of output (e.g. Lall, 1987, 1992; Rhee, 1990; Ernst et al., 1998; and Keesing and Lall, 1992; Wignaraja, 1998; Mathews and Cho, 2002). However, there has been limited econometric analysis to date to verify the findings of case studies. Further econometric study of innovation and learning processes will provide statistical confirmation of case study findings and significantly improve our understanding of firm-level exporting behaviour in developing countries.

This paper examines a variety of characteristics besides foreign ownership that influence a firm's decision of whether or not to export – namely, the acquisition of technological capabilities and learning from buyers. As a by-product of the exercise, the model also describes the effect of other explanatory variables such as capital, wages and age in production. Background studies and hypotheses are reviewed in section 2. The results of Probit estimates carried out on samples of 353 clothing firms in China (surveyed in 2003) and 205 clothing firms in Sri Lanka (surveyed in 2004) are presented in section 3. Both economies sought to promote exports and attract foreign investment by adopting outward-oriented policies in the late-1970s. An improved incentive regime and inward investment has facilitated China's rapid emergence as one of the world's largest clothing exporters and allowed Sri Lanka to achieve the highest clothing exports per capita in South Asia. This paper suggests that technological and marketing factors also underlie export success at firm-level in both countries. The econometric results indicate that foreign ownership, acquisition of technological capabilities and learning from foreign buyers are positively associated with the probability of exporting in Chinese and Sri Lankan clothing firms. Skill adjusted wages are also significant and with the expected negative sign. Section 4 concludes.



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## 2. Background and hypotheses

### 2.1 Literature

The analysis of firm-level export performance has attracted the attention of two related schools of applied economics. Relatively recently, applied international trade and investment specialists have explored the effects of the theoretical determinants of comparative advantage on firm-level export performance. This literature (which has roots in the neo-Heckscher-Ohlin Model and the neotechnology theories) suggests that the theoretical determinants of comparative advantage, which are traditionally recognized as industry-level factors,<sup>1</sup> can also operate at firm-level (see, for instance, Lall, 1986; Dunning, 1993; Kumar and Siddharthan, 1994; Bleaney and Wakelin, 2002). Conditions of imperfect markets with widespread oligopoly as well as differences in technologies, learning and tastes underlie the notion of firm-specific advantages. It follows that almost all theories of comparative advantage can be firm-specific determining not only which countries will enjoy a comparative advantage in international markets but also which firms can exploit that comparative advantage better than others. Incorporating the notion of firm-specific advantages somewhat modifies the predictions of the theories of international trade as follows: (1) there are country-specific and industry-specific advantages which apply to all firms equally; and (2) within this, some advantages will be firm-specific since certain managerial, organizational, marketing and other skills will be peculiar to each firm as will production methods, technologies and experience based know-how.

The other group with an interest in firm-level export behaviour is the literature on technological capabilities. Focusing on innovation and learning processes in developing countries, this literature emphasizes the acquisition of technological capabilities as a major source of export advantage at firm-level (see Lall, 1987, 1992; Ernst et al., 1998; Mathews and Cho, 2002; Rasiyah, 2004; Nelson, 2008). Drawing on the evolutionary theory of technical change, the capability literature underlies the difficult firm-specific processes involved in building technological capabilities to use imported technology efficiently. The

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<sup>1</sup> The major trade theories (the Heckscher-Ohlin Model, theories of economies of scale and oligopolistic competition, the neo-technology theories and theories of economic geography) attribute the export performance of an open developing economy to its comparative advantage over another in terms of access to certain factor inputs – capital, labour, economies of scale, technology and geography (for a survey see Deardorff, 2005). Empirical applications to developing countries have sought to explain the export performance of each industry/product in terms of their various characteristics.

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central argument is that firms have to undertake conscious investments in search, training, engineering and, even research and development, to put imported technologies to productive use. Furthermore, capability building rarely occurs in isolation and involves active cooperation between firms, buyers of output and support institutions for technology and export marketing. Buyers of output have been especially helpful in supporting the firm-level learning in consumer goods industries like textiles and clothing by providing marketing advice and technical knowledge (Rhee, 1990; Keesing and Lall, 1992). Hence, differences in the efficiency with which firm-level capabilities are created are themselves a major source of competitive advantage.

It is challenging, however, to measure inter-firm differences in technological capabilities in developing countries. In the last decade or so, studies have begun to develop a simple summary measure of technological capabilities by ranking the technical functions performed by enterprises (see the pioneering work on Thailand by Westphal et al., 1990).<sup>2</sup> The ranking procedure integrates objective and subjective information into measures of a firm's capacity to set up, operate and transfer technology. The typical approach is to highlight the various technical functions performed by enterprises and to award a score for each activity based on the assessed level of competence in that activity. An overall capability score for a firm is obtained by taking an average of the scores for the different technical functions. As discussed below, the overall capability score (often referred to as a technology index or TI) has proved robust in statistical analysis of export and technological performance.

The increasing availability of large micro-level datasets, particularly for developing countries, has stimulated econometric research at firm-level rather than country or industry-level. This research has sought to test the importance of the theoretical determinants of comparative advantage as well as technological capabilities at firm-level. Multiple regressions (OLS, Tobit, Probit and Heckman selection models) were run relating export behaviour to various enterprise characteristics (including foreign ownership, R&D and technological capabilities, advertising, firm size, skill intensity and capital intensity).

The results from selected studies on China and other developing countries can be highlighted.<sup>3</sup> A study by Zhao and Li (1997) tested the

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<sup>2</sup> More recent applications include Pakistan by Romijn (1999), Mauritius by Wignaraja (2002), and China by Guan and Ma (2003).

<sup>3</sup> Similar studies include Wilmore (1992) on Brazil, Kumar and Siddharthan (1994) on India, Wignaraja (2002) on Mauritius, Bhaduri and Ray (2004) on India, and Rasiiah (2006) on South Africa.

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relationship between R&D and export propensity in manufacturing firms in China and found R&D and firm size to be positive and significant determinants. Capital intensity was also significant but with a negative sign. A study of Chinese firms by Guan and Ma (2003) reported that firm-level export performance is positively associated with an index of innovative capability and firm size. More recently, Du and Girma (2007) report that foreign ownership, access to finance and product innovation were found to be positively associated with the propensity to export in firms in China.

In an early study of Indian engineering and chemicals firms, Lall (1986) found evidence for technological determinants of enterprise exporting. Foreign equity was found to be significant in chemicals, licences were highly significant in engineering, and R&D was significant in both industries (but with opposite signs). Rasiah (2003) examined the influence of ownership, R&D expenditure, age and skills in determining exports in electronics firms in Malaysia and Thailand. All four variables had positive signs and were significant. Correa et al. (2007) report that R&D, firm size and foreign ownership are positively associated with exporting behaviour in firms in Ecuador. Finally, Wignaraja (2008) found that geographical location, human capital, size, ownership and a technology index were significant and positively associated with firm-level export performance in Sri Lanka. Thus, econometric studies have generally confirmed the importance of the theoretical determinants of comparative advantage as well as technological capabilities at firm-level in developing countries.

## 2.2 Hypotheses

Building on the econometric literature on firm-level exporting discussed above, this paper estimates separate functions on the probability of exporting for clothing firms in China and Sri Lanka:

$$Y = \beta X + \varepsilon, \quad (1)$$

where  $Y$  is the vector denoting the probability of exporting at firm-level,  $X$  is the matrix of explanatory variables,  $\beta$  is the matrix of coefficients, and  $\varepsilon$  is the matrix of error terms. The dependent variable of the model,  $Y$ , is a binary variable taking the value of one if the firm is an exporter and zero if the firm is a non-exporter.

The hypotheses and explanatory variables in  $X$  in equation (1) are described below.

## *Foreign ownership*

From existing empirical studies, the share of foreign equity (FOR) is expected to have a positive influence on the probability of exporting (Lall, 1986; Wilmore, 1992; Rasiah, 2003; Correa et al., 2007; Du and Girma, 2007). There are two a priori reasons. First, access to the marketing connections and know-how of their parent companies as well as accumulated learning experience of producing for export make foreign affiliates better placed to tap international markets than domestic firms.<sup>4</sup> Second, foreign firms tend to be larger than domestic firms and therefore better placed to reap economies of scale in production, R&D and marketing. A large firm will be better able to exploit such scale economies and enjoy greater efficiency in production, enabling it to export more.

## *Technological capabilities*

We expect technological capabilities to be positively associated with the probability of exporting. Case studies and econometric work indicates that the learning process in enterprises is not just a simple function of years of production experience but of more conscious investments in creating skills and information to operate imported technological efficiently (see Westphal et al., 1990; Ernst et al., 1998; Rasiah, 2003, 2006; Wignaraja, 2002, 2008; Guan and Ma, 2003). Such investments would include search, training and engineering activities. In the tradition of Westphal et al. (1990), a firm-level technology index (TI) has been developed to represent technological capabilities. The TI used here is a simple production capability based variant of indices based on the Lall (1992) taxonomy of technological capabilities. It was constructed by ranking a clothing firm's competence across a series of technical functions and the results were normalized to give a value between 0 and 1 (see appendix 1 for details of the TI).

## *Foreign buyers*

Marketing and information links, and associated learning processes are an under-studied area in the econometric literature on firm-level exporting. New developing country export firms in consumer goods industries rarely engage in independent export marketing efforts including advertising. Instead, case studies suggest that they typically

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<sup>4</sup> See Dunning (1993) for a discussion of the ownership advantages of transnationals.

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manufacture to orders from buyers from industrial countries (see Rhee, 1990; Keesing and Lall, 1992). Buyers' help (or that of technical consultants) is indispensable in showing new and potential exporters how to meet the price, quality and delivery requirements of demanding export markets. Equipment and technical assistance are frequently provided by buyers to purchase new equipment and improve technological capabilities (including quality management, control inventory and product designs). Accordingly, the presence of a marketing relationship with a leading buyer of output is considered to be positively associated with the probability of exporting. A dummy variable (BUYER) – which takes a value of 1 when a marketing relationship with a buyer is present – is used to represent such a relationship.

### *Age*

As firms with experience are regarded as enjoying greater experimental and tacit knowledge, age is considered to be positively associated with the probability of exporting and the building capabilities (Rasiah, 2003). Age is represented by the absolute age of the firm in number of years (AGE).

### *Capital*

For capital-poor developing countries, the Heckscher-Ohlin trade theory predicts a negative relationship between capital intensity and exports and a positive relationship between capital intensity and imports. Some econometric studies (e.g. Wilmore, 1992; Zhao and Li, 1997) have confirmed the predicted negative relationship between capital intensity and the probability of exporting at firm-level. Accordingly, trade theory may be useful in predicting whether or not a firm will export. Capital is difficult to measure and the proxy used by empirical studies depends on data availability. Capital is represented by fixed assets capital per employee (CAP).

### *Skill adjusted wages*

In skill-poor developing countries, the Heckscher-Ohlin trade theory predicts a negative sign for skill intensity in export functions and empirical evidence at firm-level verifies this prediction (Wilmore, 1992; Bhavani and Tendulkar, 2001). Skill intensity is represented by



skill-adjusted wages (WAGE).<sup>5</sup> For a given level of material intensity, the lower the wage share, the lower is the (skill adjusted) wage rate in relation to labour productivity, the more likely a firm has a comparative advantage in exporting. Thus, skill-adjusted wages are expected to have, ceteris paribus, a negative association with the probability of exporting.

### 3. Data and empirical findings

#### 3.1 Data and t-test

The data used come from the World Bank Investment Climate Surveys, conducted in 2003 for China and 2004 for Sri Lanka.<sup>6</sup> These surveys provide a representative sample of the population of clothing firms in both countries by selecting firms on a largely random basis using a stratified simple random sample design. Summary descriptive statistics for 353 clothing firms in China and 205 firms in Sri Lanka are provided in table A1. The Chinese sample includes 59 foreign-owned firms while the Sri Lankan sample includes 47 foreign-owned firms. Apart from ownership, these samples cover a wide range of market-orientation, size, age groups and technology levels.

Table 1 reports t-test results on mean values for a variety of firm characteristics. The comparison considers clothing exporters and non-exporters. Exporters are defined as continuing and new exporters in China in 2003 and Sri Lanka in 2004. Non-exporters are defined as the rest of the firms.

There is a significant difference in foreign equity between exporters and non-exporters in China and Sri Lanka. This is probably the most striking difference between exporters and non-exporters. On average, exporters in China have 4.8 times more foreign equity than non-exporters while exporters in Sri Lanka have 6.1 times more foreign equity.

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<sup>5</sup> Bhavani and Tendulkar (2001), among others, argue that it is not just cheap labour (a low wage rate per worker) that results in a comparative cost advantage but a low wage in relation to productivity of that labour. The skill adjusted wage rate in relation to productivity at firm-level is defined as follows:  $W/S = (W/E) / (S/E)$  where  $W$  = the wage bill,  $S$  = value of sales and  $E$  = number of employees.

<sup>6</sup> Private contractors conduct these surveys on behalf of the World Bank. The Sri Lanka survey was conducted in collaboration with the Asian Development Bank. See [www.enterprisesurveys.org](http://www.enterprisesurveys.org) for details of the China and Sri Lanka surveys.

Technology differences (as indicated by the technology index, TI) between exporters and non-exporters are also significant in both countries. Interestingly, the TI gap between Chinese exporters and non-exporters is somewhat narrower than that between Sri Lankan exporters and non-exporters. The value of TI for Chinese exporters is 0.47 compared with 0.43 for non-exporters. Meanwhile, the TI value for Sri Lankan exporters is 0.50 compared with 0.40 for non-exporters.

**Table 1. Mean characteristics of clothing exporters and non-exporters in China in 2003 and Sri Lanka in 2004**

Characteristics	China			Sri Lanka		
	Exporters (n=130)	Non-Exporters (n=223)	t-values	Exporters (n=119)	Non-Exporters (n=86)	t-values
Foreign equity, %	22.91	4.80	6.02***	28.77	4.72	4.85***
Technology Index (0 to 1)	0.47	0.43	2.13**	0.50	0.40	3.17***
Age of firm, number of years	12.83	16.79	-2.64***	16.99	23.18	-2.80***
Capacity utilization, %	82.12	69.43	4.81***	80.40	70.41	3.91***
Fixed assets per employee, US\$	4.63	8.83	-0.84	2.91	3.10	-0.14
Wage bill, % sales	12.22	23.60	-4.00***	25.34	50.65	-4.67***
No. of permanent employees	471	245	3.38***	683	96	5.81***

Source: author's analysis.

t-values for two-sample t test with equal variance: mean(exporter) – mean(non-exporters); \*\*\* significant at 1% level, \*\* at 5% level, and \* at 10% level.

Exporters are younger than non-exporters in both countries. The average age for an exporter in China is just under 13 years while that for a Sri Lankan exporter is 17 years. Non-exporters are 16.8 years and 23.2 years, respectively.

Looking at capacity utilization, once again we observe significant differences between exporters and non-exporters. Capacity utilization levels in exporters are at least 10 percentage points higher than non-exporters in both countries.

The wage bill as a percentage of sales and firm size are two additional characteristics that differ between exporters and non-exporters.

The Chinese and Sri Lankan samples reproduce some of the stylized facts reported by the literature on exporting. The stylized facts are consistent with the studies reported in section 2. By applying the t-tests, which are a useful descriptive device, we can establish that exporters have higher foreign ownership, are technologically more sophisticated and have higher capacity utilization levels. These differences alone do

not shed much light on causation. Hence, we develop a regression model below.

### 3.2 Econometric analysis

A general to specific modelling approach was adopted for econometric testing. Initially, the general model (with all the explanatory variables mentioned in section 2) was estimated. Then a specific model or reduced form was estimated with only the significant variables. Table 2 shows the estimated Probit models. Estimated equations (1) and (3) report the general models for Chinese and Sri Lankan firms while equations (2) and (4) show the reduced form models with only the significant variables.

The results of equation (2) for Chinese clothing firms can be considered following diagnostic testing.<sup>7</sup> The pseudo  $R^2$  in equation (2) is acceptable for a cross-section model. Of the six original independent variables in equation (1), five are significant (three at the 1% level) and have the expected sign.

The findings underline the critical link between three complementary factors and the probability of exporting in clothing firms in China. First, FOR is positive and significant (1% level) which indicates that foreign ownership is associated with the probability of exporting in Chinese firms. The explanation seems to lie in a combination of access to marketing connections and know-how of their parent companies, accumulated learning experience of producing for export, and economies of scale linked to firm size. Second, TI is significant (10% level) and positive. This emphasizes that investments in creating the requisite technological capabilities to operate imported technology efficiently is linked to the probability of exporting. Third, BUYER is significant (1% level) and with the correct sign. This suggests that a marketing relationship with a foreign buyer of output increases the probability of exporting at firm-level. Finally, the control variables suggested by trade theory – CAP (at the 10% level) and WAGE (1% level) are also significant and with the expected negative sign. Accordingly, the predictions of the Heckscher-Ohlin trade theory receive support from firm level analysis in the case of China.

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<sup>7</sup> Since the dataset contains firms of all sizes, different ownership structure, export orientation, among others, the Probit estimation used the robust standard errors to account for mild heteroskedasticity that is expected in the dataset. Furthermore, correlation analysis indicated no large correlations between any of the independent variables.



The results for the Sri Lankan clothing firms are similar, indicating that certain factors are closely associated with the probability of exporting at firm level. The pseudo  $R^2$  in equation (4) is better than equation (2) and four of the independent variables are significant in the reduced form equation. The three complementary factors are significant and with the correct sign. While TI is significant at the 10% level, FOR and BUYER are significant at the 1% level. Furthermore, WAGE has the expected negative sign and is also significant (5% level).

**Table 2. Probit estimates of export behavior of garments firm**  
Binary Variable: Exporter (1) and Non-exporter (0)

Independent Variables	China		Sri Lanka	
	(1)	(2)	(3)	(4)
FOR	0.0158 (5.29)***	0.0158 (5.37)***	0.0103 (2.75)***	0.0103 (2.71)***
TI	0.7942 (1.82)*	0.7958 (1.82)*	1.0175 (1.92)*	0.9572 (1.91)*
BUYER	0.5224 (2.61)***	0.5223 (2.61)***	1.4547 (5.81)***	1.5533 (6.48)***
AGE	-0.0010 (-0.15)		-0.0057 (-0.93)	
CAP	-0.0070 (-1.92)*	-0.0070 (-1.92)*	-0.0000 (-0.17)	
WAGE	-0.0263 (-4.76)***	-0.0265 (-4.90)***	-0.0127 (-2.25)**	-1.3140 (-2.40)**
Constant	-0.7169 (-2.50)**	-0.7297 (-2.62)***	-0.5417 (-1.56)	-0.6436 (-2.17)**
<i>n</i>	314	314	171	180
<i>Wald <math>\chi^2</math></i>	62.86***	62.88***	54.59***	57.28***
<i>Pseudo R<sup>2</sup></i>	0.17	0.17	0.38	0.39
<i>Log pseudo likelihood</i>	-172.09	-172.11	-70.93	-73.57

Source: Author's analysis.

z values are in parentheses; \*\*\* significant at 1% level, \*\* at 5% level, and \* at 10% level. Coefficients were estimated using robust standard errors.

#### 4. Conclusion

The paper uses a rich microeconomic dataset to explore the determinants of a firm's decision of whether or not to export in clothing

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firms in China and Sri Lanka. It emphasizes that several factors must be taken into account to explain the decision to export at firm level. Firm-level export functions were estimated using a Probit model for Chinese and Sri Lankan clothing firms with proxies for foreign ownership, technological capabilities, learning from buyers and standard control variables (capital intensity, skill adjusted wages and firm age). As a part of the exploratory data analysis, t-tests were also conducted on exporters and non-exporters. Another interesting aspect of the research was the inclusion of a technology index to represent technological capabilities and a dummy variable to capture learning from buyers. To the best of our knowledge, this is one of the first econometric studies to test the influence of these two variables along with foreign ownership and other control variables.

The econometric results indicate that foreign ownership, the acquisition of technological capabilities and learning from buyers are positive and significantly correlated with the probability of exporting in clothing firms in China and Sri Lanka. The role of technological and marketing factors in the decision to export at firm-level is thus underlined by the econometric results. First, access to the marketing connections and know-how of parent companies as well as accumulated experience of production makes foreign affiliates better placed to tap international markets than local firms. Second, conscious investments in skills and information to use imported technologies efficiently give firms a competitive advantage in exporting. Third, buyers help is indispensable in showing potential exporters how to meet the demanding requirements of export markets.

Furthermore, skill adjusted wages – a control variable suggested by trade theory – is significant and with the expected negative sign in both Chinese and Sri Lankan firms. Meanwhile, fixed assets per employee (a proxy for capital intensity) has a negative correlation with the probability of exporting in China but not in Sri Lanka. These last two results indicate that the predictions of the Heckscher-Ohlin trade theory also receive some support at firm-level in China and Sri Lanka.

Comparative econometric research on firm-level exporting behaviour using large samples is a relatively new development in the literature, stimulated by the availability of large enterprise survey datasets and methodological developments (e.g. the technology index). Nonetheless, as this paper and others highlight, it provides a powerful means to verify and extend the findings of detailed enterprise case studies on innovation and learning processes in developing countries.

## Appendix 1. The Technology Index (TI) for Chinese and Sri Lankan firms

The Lall (1992) taxonomy of technological capabilities provides a comprehensive matrix of technical functions required for a developing country firm to set up, operate and transfer imported technology efficiently. Lall groups these functions under the three sets of capabilities - investment, production and linkages. The Lall taxonomy of technological capabilities has been successfully used by case study research to assess levels of firm-level technological development in developing countries (for a selection see Lall, 1987; Lall and Wignaraja, 1998; Wignaraja, 1998; Romijn, 1999). Subsequently, a technology index based on the Lall taxonomy (or its variants) has been developed for econometric testing of the relationship between technological capabilities and exports in several developing countries (see, for instance, Westphal et al., 1990; Romijn, 1999; Wignaraja 1998, 2002, 2008).

The application of the Lall (1992) taxonomy in this study was influenced by data availability on technical firms performed by firms in the 2003 Investment Climate Surveys of China and Sri Lanka. Five technical functions were common to both the Chinese and Sri Lankan samples. Hence, the TI used here was based on firms' competence in the following – (i) search for technology, (ii) ISO quality certification, (iii) process adaptation, (iv) minor adaptation of products, and (v) introduction of new products. A firm is given a score of 1 for each technical function it undertakes and the result is normalized to give a value between 0 and 1. This figure can be interpreted as the overall capability score for a firm.

**Table A1. Summary descriptive statistics for clothing firms in China and Sri Lanka**

Characteristics	China			Sri Lanka		
	<i>obs</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>obs</i>	<i>Mean</i>	<i>Std. Dev.</i>
Exports to sales ratio, %	350	27.89	41.89	205	49.51	46.89
Fixed assets per employee, US\$	351	7.27	45.07	195	2.98	9.00
Wage bill, % sales	315	19.30	25.01	194	35.22	38.59
No. of years since establishment	253	15.33	13.68	218	19.38	15.63
Foreign equity, %	353	11.47	28.55	218	18.89	36.89
Technology Index (0 to 1)	353	0.45	0.17	204	0.45	0.22
No. of permanent employees	352	328	614	204	435	764

Source: Author's analysis.

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# Ownership structure and new product development in transnational corporations in China \*

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This paper examines the relationship between the ownership structure and new product development (NPD) at the affiliates of transnational corporations in China. Seven research hypotheses are tested on a panel data set covering 10,000 manufacturing firms with foreign involvement for the period 1998–2001. The results from probit and tobit models show that contractual joint ventures, equity joint ventures and joint stock enterprises are better organizational forms than wholly owned enterprises for increasing both the probability and intensity of NPD. We also find that ventures with OECD participation are more likely to be involved in NPD than those with participation by “overseas” Chinese TNCs.

**Key words:** TNCs, ownership structure, new product development, China

## 1. Introduction

Foreign affiliates of transnational corporations (TNCs) often succeed in developing new products and technologies faster than local firms, thus exerting competitive pressure and forcing local firms to imitate or innovate. This is one important reason why many developing countries are eager to attract foreign direct investment (FDI). Although a large number of studies have been carried out on the behaviour of TNCs, relatively little is known about the relationship between organizational and ownership arrangements of foreign affiliates and new product development (NPD) in the host country.

Since its adoption of economic reform and opening up to the outside world in the late 1970s, China has been enjoying remarkable economic growth. It is now among the world’s top exporters and largest hosts of FDI, and as a result, China is sometimes labelled as the factory of the world. However, as Nolan (2005) argues, it is perhaps more accurate to describe China as “the workshop

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for the world”, rather than “the workshop of the world”. For example, about 60% of China’s industrial exports are undertaken by affiliates of foreign TNCs during the period 1998–2004 (China Customs, 2005), and a large proportion of the remainder consist of industrial products that are either OEM manufactures or low value-added, low technology, non-branded goods for global firms. Nolan (2005) also observes that, while some leading TNCs are rapidly building their research bases in China, indigenous Chinese firms spend negligible amounts on R&D. Chinese firms seem to be still relying on the cheap labour force, pursuing what Porter (1980) refers to as cost leadership rather than differentiation strategy. Thus, foreign affiliates seem to be playing an important role in R&D and resulting NPD in China.

Foreign affiliates in China show a very diverse spectrum of organizational forms and ownership arrangements. It is interesting and important to examine how these organizational and ownership arrangements are associated with NPD activities in these firms.

This paper attempts to synthesize the relevant FDI and NPD literature to study the linkage between the ownership structure of FDI and NPD activities. We examine NPD in terms of both the probability of a firm being a new product developer and the intensity of NPD activities at that firm. Probit and tobit techniques are used respectively to test the research hypotheses on a large panel data set consisting of more than 10,000 firms with foreign involvement in seven industries in China for the period 1998–2001.

The rest of this paper is organized as follows. The next section reviews the literature from which relevant hypotheses are developed. Section 3 describes the data, empirical models, variable measurements and estimation methods. Then, section 4 discusses the empirical results. Finally, section 5 summarizes the findings and discusses policy implications.

## **2. Literature review and hypothesis formation**

### **2.1 Firm organization and NPD**

It is widely recognized that innovation, technology enhancement and resulting NPD contribute significantly to business competitiveness (Cooper and Kleinschmidt, 1988; Johne and Snelson, 1990; Page, 1993; Littler et al., 1995; Collins, 2001; Martínez and Pérez, 2003; Ayag, 2005; Hamel and Prahalad, 2005; Mudambi et al., 2007; Christensen



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et al., 2008). Accordingly, there has been tremendous interest in this subject (Danneels and Kleinschmidt, 2001), although the existing NPD literature tends to concentrate more on issues regarding firms operating within their home markets rather than TNCs' affiliates. One important stream of research in this area is the analysis of success factors for NPD (Montoya-Weiss and Calantone, 1994; Cooper and Kleinschmidt, 1995; Sun and Wing, 2005; Jin and Li, 2007).

In the NPD literature, a large number of factors have been identified as being critical for new product success. Cooper and Kleinschmidt (1995) identify the following four determinants of new product success: (1) organizational factors, such as the use of a cross-functional team, a positive culture and climate for NPD in general, such as teamwork, product champions and autonomy; (2) new product process activities, such as market orientation and predevelopment preparations; (3) new product strategy which specifies the development focus and formalizes the necessary organizational structure; and (4) senior management's involvement and corporate commitment. The relevance of these factors has been confirmed in various empirical studies, including for market orientation (Atuahene-Gima, 1995, 1996; Mishra et al., 1996), NPD climate, expertise and management involvement (Souder and Song, 1998), and marketing and technological fit of new products (Danneels and Kleinschmidt, 2001).

An organizational factors that has received considerable attention is inter-firm alliances (e.g. Li and Atuahence-Gima, 2002). Inter-firm alliances are thought to help firms develop new technology and improve technical skills (Cohen and Levinthal, 1990; Eisenhardt and Schoonhoven, 1996); gain access to the complementary resources required to develop and market new products, reduce new product risks and establish long-term market positions in unstable environments (Ozer, 1999); learn new management skills (Kraatz, 1998; Ahuja, 2000); and develop innovative products (Grenadier and Weiss, 1997).

Pursuing this line of resource-based reasoning, Hamel et al. (1989) argue that "it takes so much money to develop new products and to penetrate new markets that few companies can go it alone in every situation". Thus, for industry giants and ambitious start-ups alike, strategic partnerships have become central to competitive success in fast-changing global markets (Doz et al., 1998). Teece (1992) also contends that "when high technology activities are at issue, contractual agreements, alliances and joint ventures are likely to be superior to full-scale internal organization". This is because product innovation involves

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a whole range of development and profitable commercialization of new technology, and one important approach to competitive innovation is “competing through collaboration” (Doz et al., 1998). Competitive renewal depends on building new process capabilities and winning new product and technology battles. Collaboration can be a low-cost strategy for doing both (Hamel et al., 1989). The ideas of Hamel et al. (1989), Teece (1992) and Doz et al. (1998) on inter-firm alliances for product innovation can be readily applied to the analysis of the relationship between foreign ownership structure and NPD.

Large TNCs with vast resources tend to succeed in developing new products and technologies faster than local firms, and hence they are an important source of technological change, especially in developing countries (de Mello, 1997; Li et al., 2001; Wang et al., 2004; Wei and Liu, 2006). FDI literature also examines the relationship between organizational arrangements of FDI and affiliate performance, measured by simple outcome-based financial indications such as profitability (Pan et al., 1999), survival based appraisal (Pan and Chi, 1999), and multi-dimensional measurements such as “satisfaction with performance” (Brouthers et al., 2000). However, to the best of our knowledge, little systematic empirical research has been undertaken on the relationship between organizational and ownership arrangements of FDI and NPD. In this study, we aim to fill this gap in the literature.

There are a number of organizational arrangements for foreign involvement in China: contractual joint ventures (CJVs); equity joint ventures (EJVs) or joint stock companies (JSC)<sup>1</sup> with Chinese companies; and wholly foreign-owned enterprises (WFOEs). A CJV is a non-equity based form of strategic alliance, and an EJV is an equity form of a

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<sup>1</sup> An EJV is a limited liability company where resource commitment, profit distribution, risk sharing, and the control and management are based on equity shares between foreign and Chinese partners. In a CJV, each party’s rights and obligations are set out in the contract, which may not be in proportion to the party’s investment. A JSC may be established by means of promotion or public offer. This is equity based, with the minimum registered capital requirement for its establishment of \$3.6 million, and the amount of foreign ownership of the company should exceed 25%. Obviously, a common feature of EJVs, CJVs, or JSCs is that they are all JVs as foreign investors only partially own the enterprises. However, these different types of JVs are involved in different ways of ownership and control strategies. Ownership and control are normally determined by equity shares in EJVs and JSCs but by contracts in CJVs. Moreover, an EJV normally involves a very limited number of partners, while a JSC may be owned by a number of people, although the equity share of the foreign partner(s) must be higher than 25% (*Source*: NPC, 1979, 1986, 1988; MOFTEC, 1995; Wei and Liu, 2001)

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strategic alliance. A JSC is a limited liability company with issued share capital and was not approved until 1995. These alternative ownership arrangements represent different alliance strategies and have different implications for NPD. Given the technical capabilities, a foreign firm forming strategic alliances with local firms in the host country gains access to complementary strategic resources and will be more likely to succeed in NPD than a foreign firm that just “goes it alone”. Thus, JVs should be in a better position than WFOEs in terms of NPD.

This line of analysis in the NPD literature is consistent with transaction cost theory in FDI literature. Hennart (1991) suggests that parent firms will choose JVs when they need complementary intermediate inputs whose purchase on the market would entail high transaction costs, and which would be costly to obtain through replication or full acquisition. Put another way, through forming alliances, a firm creates or gains access to resources and capabilities which complement its existing core competencies and captures the technological and marketing synergies offered by the partner firm in the host country (Dunning, 2001). As NPD often requires complementary R&D, manufacturing and marketing skills from other firms, JVs should be superior to WFOEs.

Combining the ideas from the resource-based theory and transaction cost theory, the following hypothesis can be formulated:

*H1: An EJV/CJV/JSC has higher capability to develop new products than a WFOE.*

The success of NPD activities partly depends on the qualities and complementarities of the strategic resources offered by foreign and local partners. As mentioned earlier, NPD requires a range of knowledge about appropriate technologies, effective manufacturing and marketing. As a consequence, companies, foreign or local, that possess better technological, manufacturing or managerial capabilities tend to make a more significant contribution to NPD.

There are two main types of foreign investors in China: “overseas” Chinese investors typically from Hong Kong (China), Macao (China) and Taiwan Province of China (denoted hereafter as HMT) and investors from the rest of the world, mainly from the OECD countries (denoted hereafter as OECD). HMT investors contributed more than 60% of the total number of FDI projects and nearly 60% of the total value of FDI inflows in China during the period 1998–2004 (National Bureau of Statistics of China, 2005). Although they contributed less than those from HMT in terms of the number of projects and value of investment,

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OECD TNCs are usually believed to have higher technological and manufacturing capabilities (Yeung, 1997; Buckley et al., 2002; Wei and Liu, 2006). Thus, OECD investors tend to have a higher propensity to develop new products than HMT investors.

The capabilities and resources possessed by local firms also play an important role in NPD. Indigenous firms typically have better knowledge of local conditions regarding the availability of resources and skills of employees (e.g. Beamish, 1988; Wei et al., 2008). With the superior knowledge of local markets, consumer preferences and business practices, local partners can help TNCs, for example, in adopting technologies suitable for local conditions (Blomstrom and Sjöholm, 1999). This knowledge of local conditions and practices forms part of the set of complementary assets as defined in Teece (1992). In addition, in many cases, local partners can provide complementary technologies necessary for NPD. In recent years, strategic alliances – particularly those geared towards innovatory activities – have become an important component of corporate strategy. A firm may expand production and sales abroad in order not only to exploit its technology assets, but also to gain new resources to develop these assets (Caves, 1996). Several recent studies have shown that TNCs from all countries are increasingly reaching beyond their national boundaries to create or gain access to resources and capabilities that complement their existing core competencies (Dunning, 2001). Thus, the possession of complementary technologies and assets by local partners can contribute to the success of NPD.

For a JV, local Chinese partners can be categorized into four types: state-owned enterprises (SOEs), collectively owned enterprises (COEs), legal persons (LPs) and individual persons (IPs). SOEs are traditionally larger than COEs, and have long been supported by government policies for NPD. The legal person system arose from the recent corporatization of Chinese enterprises, especially large SOEs. In essence, what legal persons represent are limited liability corporations and these firms usually have both ample resources and incentives for product and process innovation. IPs are natural persons (i.e. single individuals) and were not allowed to form JVs with foreign investors until recently. Resources committed by IPs, in fact, are relatively small. Therefore, SOEs and LPs are expected to have more resources, technological and manufacturing capabilities than COEs and IPs. In JV-type organizations, capital participation by SOEs and LPs should be more positively associated with NPD than capital participation by COEs and IPs.

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Therefore, our second and third hypotheses are as follows:

*H2: OECD investors are more likely to conduct NPD than HMT investors.*

*H3: Capital participation by SOEs and LPs plays a more important role than capital participation by COEs and IPs in the NPD of JVs.*

## **2.2 Firm resources and NPD**

While the focus of this study is on the impact of foreign ownership on NPD, some other factors which are thought to have important influences on innovative capabilities are also included in our estimation models as control variables. As mentioned earlier, NPD involves the development and commercialization of new technology. Therefore, the stock of technological knowledge is an important factor in NPD. The higher the knowledge stock, the higher the firm's NPD capability. Therefore, the fourth hypothesis in this study is as follows:

*H4: The firm's stock of technological knowledge is positively related to NPD.*

Another possible factor is firm size. Schumpeter (1942) argues that large firm size is necessary to promote innovation for three reasons: only large firms can afford the cost of R&D programmes; large diversified firms can absorb failures by innovating across broad technological fronts; and firms need a degree of market control to reap the rewards of innovation. Since then, there have been a large number of studies on the relationship between firm size and NPD activities, but the results are inconclusive. This is perhaps because, as Teece (1992) argues, in some circumstances, cooperative agreements enable smaller firms to emulate many of the functional aspects of large integrated enterprises without encountering the problems associated with large size. This implies that firm size may not be important for NPD.

Although evidence is mixed, firm size has traditionally been considered as a possible determinant of NPD because large firm size often allows access to a wide range of strategic resources. Accordingly, the fifth hypothesis is:



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*H5: Firm size is positively related to NPD.*

Location may be another factor that affects NPD, i.e. whether the firm is located in an urban or rural area. It is suggested that urban areas are characterized by high population density and a high concentration of professional and technical expertise. These are important strategic resources for NPD. The so-called urban or regional hierarchy model argues that urban environments have strong positive effects on product innovation (Roper, 2001).

In China, industrial and commercial activities have been concentrated in the coastal areas in recent decades. These regions have much better industrial bases and infrastructure and more qualified technical and managerial personnel than the inner regions. In addition, the Government of China has, until recently, actively encouraged inflows FDI to the coastal areas through preferential development policies. At the end of 2000, approximately 87% of the cumulative FDI was located in the coastal areas (Wei and Liu, 2001). The concentration of FDI and local industrial and commercial activities should provide agglomeration advantages in the coastal areas. Following the urban or regional model, we have the following hypothesis:

*H6: Foreign-invested firms located in the coastal areas will perform better than those in the inner areas in terms of NPD.*

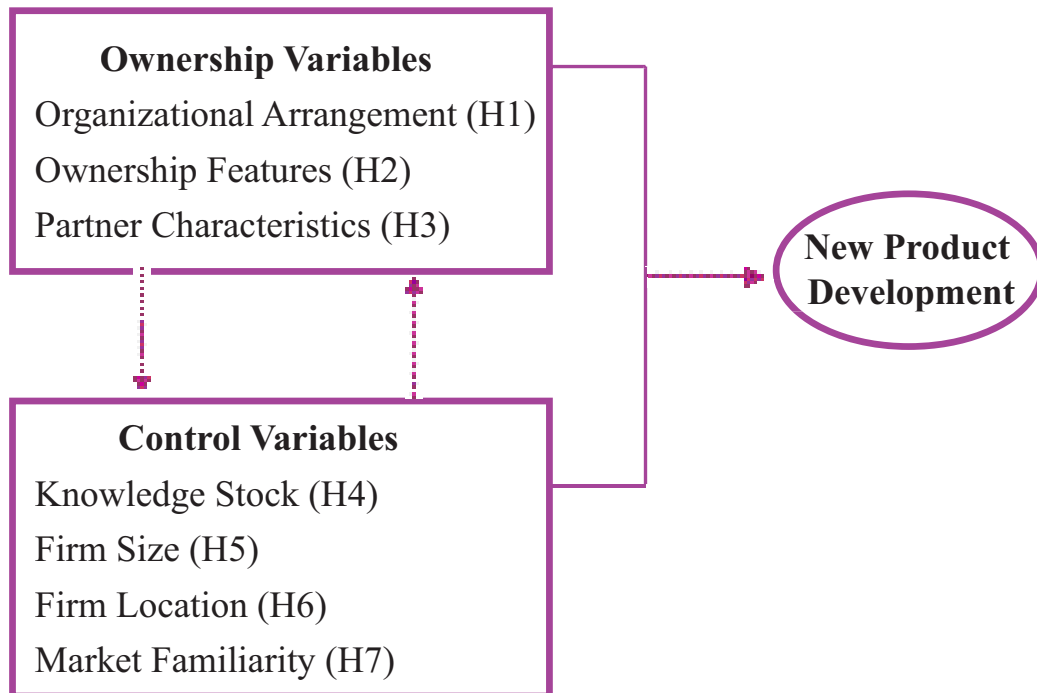
Another factor of interest is the linkage between the age of an affiliate in the host country and its NPD activities. Little discussion on this issue is found in the existing literature. On the one hand, it is likely that the longer an affiliate stays in the host country, the more familiar it becomes with the local market, and the more knowledge (including local knowledge) it can accumulate for NPD. We formulate the following hypothesis:

*H7: The longer an affiliate stays in the host country, the more likely it becomes a new product developer.*

The seven hypotheses can be represented in the following conceptual framework for our empirical investigation (figure 1). The relationship between foreign ownership structure and NPD is examined in three dimensions (H1–H3): the organizational forms (CJV, EJV, JSC and WFOE), the ownership characteristics (HMT and non-HMT investors) and the local Chinese partner features (SOE, COE, LP and IP). The resource variables discussed in H4–H7 are the control

variables. NPD is also believed to be influenced by the knowledge stock (H4), firm size (H5), firm location (H6) and market familiarity (H7). It should also be noted that some ownership and control variables may be related. For instance, if a foreign investor decides to choose JSC as the organizational arrangement, then this JSC must be relatively large as there is a minimum registered capital requirement of \$3.6 million for such a company (MOFTEC, 1995).

**Figure 1. Analytical Framework**



### 3. Econometric models, data and methodology

To test the seven hypotheses contained in the analytical framework, the following three empirical models are established:

$$NPD_i = \alpha_0 + \alpha_1 ORD_i + \alpha_2 FOD_i + \alpha_3 KLG_i + \alpha_4 FS_i + \alpha_5 OT_i + \sum_{j=1}^6 \alpha_{6j} IDD_{ij} + \alpha_7 RGD_i + u_{1i} \quad (1)$$

$$NPD_i = \beta_0 + \beta_1 LCR_i + \beta_2 FCR_i + \beta_3 KLG_i + \beta_4 FS_i + \beta_5 OT_i + \sum_{j=1}^6 \beta_{6j} IDD_{ij} + \beta_7 RGD_i + u_{2i} \quad (2)$$

$$NPD_i = \gamma_0 + \gamma_1 LCR_i + \gamma_2 HMTR_i + \gamma_3 KLG_i + \gamma_4 FS_i + \gamma_5 OT_i + \sum_{j=1}^6 \gamma_{6j} IDD_{ij} + \gamma_7 RGD_i + u_{3i} \quad (3)$$

Table 1 presents the definitions of the variables.

In equation (1),  $NPD_i$  is an indicator of NPD for firm  $i$ . NPD can be measured by various methods. For example, Cooper and Kleinschmidt

(1995) use ten different measures, including success rate, percent of sales, profitability relative to spending, technical success rating, sales impact, profit impact, success in meeting sales objectives, success in meeting profit objectives, profitability relative to competitors, and overall success. Given the nature of the current study and data availability, the percentage of sales represented by new products<sup>2</sup> introduced during the previous three years is adopted here.

**Table 1. Variable definitions**

<b><i>Dependent variable</i></b>	
NPD: two measures	
- probability of NPD	Binary variable (=1 if a firm carries out NPD, otherwise = 0.)
- intensity of NPD	Percentage of company sales represented by new products
<b><i>Independent variables</i></b>	
ORD	Organization dummy with four categories: WFOE, CJV, EJV and JSC.
FOD	Foreign dummy with two categories: OECD firm and HMT firm.
KLK	Knowledge variable: measured by a firm's R&D spending.
FS	Firm size
- FS1	Firm's total investment (i.e., the gross total of a firm's assets)
- FS2	Firm's total employment
OT	Firm's operating time: the time length of a firm has operated in China.
IDD	Industry dummy with seven categories: food processing and manufacturing, garment, machinery, pharmaceuticals, transport equipment, electrical goods and electronic goods.
RGD	Region dummy with two categories: coastal areas and inner areas.
LCR	Local capital ratios in a CJV, EJV or JSC.
FCR	Foreign capital ratio.

Source: Authors.

Following Roper (2001), we adopt two dummy variables to proxy for the *probability* and the *intensity* of NPD in foreign-invested firms in China. The probability that a foreign-invested firm would introduce new

<sup>2</sup> Although the wording varies slightly, there is a widely adopted official definition of a new product in China. For instance, the State Economic and Trade Commission (1997) and the Ministry of Science and Technology (2004), the central governmental organizations responsible for NPD, define that a new product is either a genuinely new product which is developed and manufactured using new technological principles and/or new design conception, or a significantly improved product whose functions have been substantially improved and/or expanded due to a breakthrough or significant improvement in the structure, materials or manufacturing technique. A new product must contribute to improvement in economic efficiency. A new product needs approval by the government authorities.



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products is observed as the binary variable indicating that such a firm did ( $NPD = 1$ ) or did not ( $NPD = 0$ ) carry out NPD. The intensity (i.e. the actual percentage of company sales represented by new products) shows the ability of firm  $i$  to conduct NPD. The variable,  $NPD$ , will take on a positive value if this measure of ability is positive, and will take on a value of zero if this measure of ability is zero or negative.

$ORD_i$  is an organization dummy with four categories: wholly foreign-owned enterprises (WFOE), contractual joint ventures (CJV), equity joint ventures (EJV) and joint stock enterprises (JSC). WFOE is treated as the base category in this study.

$FOD_i$  is a “foreign” dummy with two categories. It is equal to 1 if firm  $i$  is an OECD firm, and equal to 0 if it is an HMT firm.

$KLGI_i$  is a knowledge variable and is measured by the ratio of intangible assets to total assets. Technological knowledge is one element of the set of intangible assets that can serve as a source of competitive advantage (Barney, 1991; Isobe et al., 2000). Ideally, a measure of R&D should be used to represent technological knowledge. However, the data used in this study contain no information on R&D, but instead include the total value of intangible assets, which we use as a proxy for R&D. The stock of knowledge that the firm possesses is measured by the ratio of intangible assets to total assets of firm  $i$ , and this follows the practice in other studies (see, for example, Liu et al., 2000). It must be noted, however, that intangible assets are a very rough proxy for knowledge stock since the term is usually defined to include unwritten-off goodwill, issue expenses, trade-marks and the value of publication rights and brands, among others. It is clear that not all the items covered by intangible assets directly contribute to the accumulation of relevant knowledge.

$FS_i$  is firm size. In this study, two alternative measures are used to test the robustness of the models. Total investment (i.e., the gross total of a firm’s assets), denoted as FS1 and total employment denoted as FS2.

$OT_i$  is the operating time (i.e. the length of time in years) of foreign-invested firm  $i$  in China.

While our research question is about the characteristics of firms in determining the rate/extent of NPD, industrial and regional factors, such as the nature of industries (e.g. technology-intensity, export-oriented or import-substituting, stage of development) and the market structure firms face, are expected to affect NPD. Ideally, these variables should

be incorporated into our model. However, given our research focus and data limitations, we use the following two dummies to control for these industrial and regional variations. Specifically,  $IDD$  is an industry dummy with seven categories: food processing and manufacturing (base category), garment, machinery, pharmaceuticals, transport equipment, electrical goods, and electronic goods. Finally,  $RGD_i$  is a region dummy with 1 representing the coastal areas and 0 the inner areas to capture the stage of development.

As discussed in the preceding section,  $ORD_i$ ,  $FOD_i$ ,  $KLGI$ ,  $FS_i$ ,  $OT_i$  and  $RGD_i$  are expected to have a positive impact on product innovation.

In equation (2),  $LCR_i$  represents the share of local capital in a CJV, EJV or JSC, indicating the degree of local participation in NPD. Local capital may be contributed by a state enterprise (SER), a collective enterprise (CER), a legal person (LPR) or an individual person (IPR). In most cases, there is only one local partner in a CJV or EJV. As mentioned before, the SER and LPR are expected to contribute more positively than the CER and LPR.

$FCR_i$  is the foreign capital ratio. As discussed in the literature review, a positive relationship between  $NPD_i$  and  $FCR_i$  is expected.

In each foreign-invested firm, the shares of capital contributed by the local Chinese partner ( $LCR_i$ ), the OECD investor ( $FCR_i$ ) and the HMT investor (notated as  $HMTR_i$ ) sum to 1. In the case of a WFOE,  $LCR_i$  is 0 and  $FCR_i$  (or  $HMTR_i$ ) is 1. Given that  $HMTR_i = 1 - LCR_i - FCR_i$ , we can easily derive that  $\gamma_2$ , the coefficient on in (3), is equal to  $-\beta_2$ . In addition,  $\gamma_3$  to  $\gamma_7$  in (3) are equal to  $\beta_3$  to  $\beta_7$  in (2), although  $\gamma_0$  and  $\gamma_1$  are not. As the impacts of  $\beta_0$  and  $\beta_1$ , which are of particular interest to us, can be obtained from (2), the estimation of (3) is unnecessary and therefore not performed.

The data used for the current study are drawn from the *Annual Report of Industrial Enterprise Statistics* compiled by the State Statistical Bureau of China, covering more than 10,000 firms with foreign investment in seven industries for the period 1998–2001. Table 2 provides descriptive statistics on NPD by organizational form,

<sup>3</sup> Based on Equation (2) and the relationship that  $FCR_i = (1 - LCR_i - HMTR_i)$ ,  $NPD_i = \beta_0 + \beta_1 LCR_i + \beta_2 (1 - LCR_i - HMTR_i) + \beta_3 KLG_i + \beta_4 FS_i + \beta_5 OT_i + \beta_6 IDD + \beta_7 RGD_i + \beta_8$

ownership structure, industry and region. In terms of organizational form, WFOEs, EJVs, CJVs and JSCs all involve the ownership and control by foreign partners. However, they are different in the degree of control, resource and risk involvement, and management structure, as specified by relevant laws and regulations in China (NPC, 1979, 1986, 1988; MOFTEC, 1995). From the table, we can see that, on average, JSCs had the highest level of NPD, followed by EJVs, CJVs and WFOEs. In terms of ownership structure, table 2 clearly shows that OECD TNCs performed better than HMT TNCs in terms of NPD. Table 2 also indicates that TNCs in pharmaceutical and electronic industries are more active in NPD than those in other industries, and that TNCs in inland China conduct more NPD than those in coastal areas.

**Table 2. Product innovation by ownership structure, industry and region**

	Total no. of firm	Firms carrying out NPD*		Firms' NPD intensity	
		No. of firms	% of firms	Mean	Std. Dev.
<b>Full Sample</b>	<b>10 671</b>	<b>1 561</b>	14.63	<b>0.046</b>	<b>0.191</b>
<b>Organizational Form</b>					
Contractual Joint Venture	973	102	10.48	0.026	0.137
Equity Joint Venture	6 134	1 118	18.23	0.061	0.219
Wholly Foreign-owned Enterprise	3 414	307	8.99	0.022	0.140
Joint-Stock Companies	129	30	23.26	0.083	0.240
<b>Ownership</b>					
HMT	5 519	640	11.60	0.037	0.170
OECD	5 152	921	17.88	0.058	0.215
<b>Industry</b>					
Food Processing	825	87	10.55	0.016	0.095
Garment	2 820	124	4.40	0.014	0.112
Pharmaceuticals	515	170	33.01	0.107	0.318
General Machinery	975	185	18.97	0.055	0.188
Transport Equipment	815	174	21.35	0.073	0.224
Electrical Equipment	1 911	395	20.67	0.082	0.253
Electronics Equipment	1 606	295	18.37	0.065	0.225
<b>Region</b>					
Coastal	8 507	1 063	12.50	0.040	0.182
Inland	2 164	498	23.01	0.068	0.223

Source: Authors.

Notes: \*This includes the firms which carry our NPD for at least one year during the sample period.

The nature of the dependent variable dictates the appropriate estimation method. When the dependent variable is the probability of NPD, probit estimation is appropriate. When the dependent variable is the intensity of NPD, the data are left-censored at zero and the distribution of the sample is a mixture of discrete and continuous distributions. In this case, tobit or censored regression is suitable (Greene, 1997, p. 960).

To properly carry out probit and tobit estimations of equations (1) and (2), specification tests need to be carried out. The results suggest that the distribution is normal but heteroscedasticity is severe. We therefore use robust estimation to adjust the errors for heteroscedasticity. Another possible problem associated with the model is multicollinearity. We conducted several tests to detect multicollinearity. First we examined correlations (continuous variables) and associations (nominal variables) between independent variables and no pair of the independent variables is highly correlated. Further, we use the variance inflation factor (VIF) statistic to detect multicollinearity and the results suggest that there is no multicollinearity.<sup>4</sup>

#### 4. Empirical Results

The estimation results for the seven hypotheses are summarized in table 3. Tables 4 and 6 report the estimation results of probit and tobit models respectively, with tables 5 and 7 providing the corresponding marginal effects.

**Table 3. Estimation results of the hypotheses**

Hypotheses	Results
H1: An EJV/CJV/JSC has higher capabilities to develop new products than a WFOE	Supported
H2: OECD investors are more likely to conduct NPD than overseas Chinese investors from HMT.	Supported
H3: Capital participation by SOEs and LPs plays a more important role than COEs and IPs,	Supported
H4: Stock of knowledge is positively related to NPD.	Inconclusive
H5: Firm size may be positively related to NPD.	Supported
H6: Foreign-invested firms located in the coastal areas are expected to perform better than those in the inner areas in terms of NPD.	Not supported
H7: The longer a affiliate stays in a host country, the more likely the affiliate will be a new product developer.	Not supported

Source: Authors.

The first two columns of table 4 reports the probit estimation results for equation (1), i.e. how the organizational form and ownership structure affect the probability that foreign-invested firms introduce new products. There are two specifications for equation (1). Specification I uses FS1 and specification II uses FS2 as the measure of firm size. The alternative measures are used to test the robustness of the model.

<sup>4</sup> Values of VIF larger than 10 are often regarded as suggesting multicollinearity. The results in this study are all smaller than 5.

To provide some interpretation of the estimated coefficients in table 4, we calculate the marginal effects of the variables on the probability of carrying out NPD. The values are small in magnitude because the likelihood of the firms in the sample carrying out NPD is low (14.63%, as seen in table 1).

**Table 4. Probit results**

	Equation 1		Equation 2	
cjv	0.374*** (0.103)	0.373*** (0.103)		
ejv	0.668*** (0.063)	0.755*** (0.063)		
jsc	0.626*** (0.193)	0.760*** (0.191)		
fod	0.092* (0.048)	0.204*** (0.047)		
ser			1.264*** (0.122)	1.396*** (0.121)
cer			0.736*** (0.121)	0.656*** (0.120)
lpr			1.053*** (0.097)	1.176*** (0.097)
ipr			0.499*** (0.165)	0.415** (0.164)
fcr			0.187*** (0.071)	0.361*** (0.070)
klg	-0.283 (0.462)	0.707 (0.447)	-0.247 (0.464)	0.759* (0.448)
logfs1	0.445*** (0.020)		0.459*** (0.020)	
logfs2		0.473*** (0.025)		0.474*** (0.025)
Operating time	0.000 (0.000)	2.01e-06 (0.000)	0.000 (0.000)	5.58e-07 (0.000)
Garment	-0.082 (0.101)	-0.685*** (0.099)	-0.056 (0.101)	-0.663*** (0.100)
Machinery	1.073*** (0.104)	1.002*** (0.104)	1.054*** (0.104)	0.987*** (0.104)
Pharmacy	1.402*** (0.117)	1.466*** (0.118)	1.385*** (0.118)	1.458*** (0.118)
Transport	0.818*** (0.109)	0.890*** (0.109)	0.821*** (0.109)	0.906*** (0.108)
Electric	1.152*** (0.088)	1.061*** (0.088)	1.134*** (0.088)	1.027*** (0.088)
Telecommunication	0.961*** (0.092)	0.879*** (0.092)	0.951*** (0.092)	0.863*** (0.092)
Coastal	-0.604*** (0.065)	-0.620*** (0.065)	-0.548*** (0.066)	-0.566*** (0.066)
Constant	-7.987*** (0.244)	-5.789*** (0.170)	-8.099*** (0.246)	-5.717*** (0.169)

Source: Authors.

Notes: \*\*\* denotes significant at the level of 1%, \*\* at 5% and \* at 10%.

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From the first two columns of table 4, the coefficients on CJVs, EJVs and JSCs are all positive and statistically significant, showing that they are more likely to be new product developers than WFOEs. This is consistent with the descriptive statistics provided in table 2. More specifically, the marginal effects for CJVs, EJVs and JSCs suggest that the adoption of a CJV, EJV or JSC increases the probability that a foreign affiliate would introduce new products by 0.003 to 0.01 compared to the adoption of a WFOE. This lends support to hypothesis 1. Among the JV-type organizational forms, EJVs and JSCs are better than CJVs in terms of their probability of NPD, and this pattern is not influenced by the change in the measure of firm size, showing the stability of the model. It is not possible to say which form is more conducive to NPD between EJVs and JSCs, because EJVs seem to be slightly superior to JSCs when investment is used as a proxy for firm size, and the reverse is true when total employment is used. These results indicate that partial equity ownership is more appropriate than whole equity ownership or a contractual arrangement for increasing the probability of NPD, and are consistent with Hamel et al. (1989), Teece (1992) and Doz et al. (1998).

Table 4 also shows that OECD TNCs are more likely to introduce new products than HMT TNCs as the coefficients on “fod” are statistically significant in both specifications. As indicated by the marginal coefficients in table 5, OECD ownership increases the probability of NPD by around 0.006 compared with HMT ownership. Thus, hypothesis 2 is supported. Given higher technological and innovative capabilities, OECD TNCs have a higher propensity to become new product developers than HMT firms. Because of the close economic relationship, mainland China already has most goods that HMT firms have to offer. Put another way, it is much less likely that a company operating in HMT would have products that were not known on the Chinese mainland, which is probably another reason why investors from HMT are relatively less product innovative than those from the OECD countries.

The coefficients on KLG in the first two columns of table 4 are statistically insignificant, showing that the stock of knowledge may not be particularly important in increasing the probability that a TNC introduces new products. Of course, the insignificant coefficients on KLG may partly be due to the problem of using intangible assets as a proxy for R&D knowledge stock.

Firm size, measured either by total investment or total employment is always important for increasing the probability of NPD. Thus, hypothesis 5 is supported. The coefficients on the region dummy are



negative and statistically significant, suggesting that a foreign-invested firm's probability of becoming a new product developer is negatively affected by its location in the coastal areas. This result appears somewhat surprising. For this study, we defined the coastal areas to include Shandong, Jiangsu, Zhejiang, Fujian, Guangdong and Shanghai. Although much FDI in China is located in these areas, not all TNCs are proactively involved in NPD. In fact, many TNCs locate their labour-intensive activities in Guangdong, Zhejiang and Fujian Provinces. The majority of the TNCs' R&D centres in China are based in Beijing and Shanghai, as these two cities possess highly qualified human resources, well-developed infrastructure, a wide range of industries and high-tech parks, and mature local scientific communities including top-class universities and research institutes (Li and Zhong, 2003; China S&T Statistics, 2003; Gassma and Han, 2004). Other important cities such as Tianjin and Xi-An have also attracted much foreign R&D and NPD-related investment. Although Shanghai is traditionally included in the coastal areas, Beijing, Tianjin and Xi-An are not. Perhaps a much higher proportion of TNCs in some inner areas are involved in NPD than in some coastal areas, producing a negative coefficient on the region dummy. This result is consistent with the findings in table 2, which shows that, on average, firms in inland China conduct more NPD than those in coastal areas.

**Table 5. Marginal effects of probit model**

	Equation 1		Equation 2	
cjv	0.0039***	0.0041***		
ejv	0.0044***	0.0053***		
jsc	0.0105	0.0161		
fod	0.0060*	0.0015***		
ser			0.0084***	0.0099***
cer			0.0049***	0.0047***
lpr			0.0070***	0.0083***
ipr			0.0033***	0.0029**
fcr			0.0012***	0.0026***
klg	-0.0019	0.0050	-0.0016	0.0054
Logfs1	0.0029***		0.0031***	
logfs2		0.0033***		0.0034***
Operating time	0.0000	0.0000	0.0000	0.0000
garment	0.0005	-0.0034***	-0.0004***	-0.0034***
machinery	0.0285***	0.0252***	0.0271***	0.0245***
pharmacy	0.0621***	0.0721***	0.0598***	0.0716***
transport	0.0161***	0.0199***	0.0161***	0.0209***
electric	0.0273***	0.0235***	0.0262***	0.0220***
telecommunication	0.01967***	0.0168***	0.0190***	0.0164***
coastal	0.0074***	-0.0080***	-0.0063***	-0.0070***

Source: Authors.

Notes: \*\*\* denotes significance at the level of 1%, \*\* at 5% and \* at 10%.

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From table 4, the coefficients on operating time are statistically insignificant. This implies that hypothesis 7 is not supported. As discussed earlier, the counter argument to this hypothesis is that an established affiliate may no longer have strong incentives for NPD if there is a strong demand for its products. Our research suggests that the probability of a foreign affiliate becoming a new product developer is not influenced by how long it stays in that market.

The third and fourth columns of table 4 present the probit estimation results for equation (2), i.e. how local and foreign capital participation affects the probability that TNCs introduce new products. The positive and significant coefficients on *ser*, *cer*, *lpr* and *ipr* suggest that any form of local capital participation enhances the probability of NPD. Specifically, capital participation by state-owned enterprise (*ser*) produces the most important role in terms of its magnitude, followed by legal persons (*lpr*), collectively owned enterprises (*cer*) and finally individual persons (*ipr*). One very important finding from the third and fourth columns of table 4 is that capital participation by OECD investors significantly increases the probability that TNCs introduce new products in China.

From table 5, the marginal coefficients indicate that capital involvement by OECD investors is associated with a 0.006 rise in the probability of their firms being new product developers. As mentioned earlier, given the model specification, the coefficient on Chinese capital participation by HMT investors (HMTR) has the same magnitude but the opposite sign as that on capital participation by OECD investors (FCR). Thus, overseas Chinese capital participation is associated with a fall in the probability of their firms being new product developers.

The coefficient on the stock of knowledge is not significant in column 3, and is significant at the 10% level only in column 4 of table 4. Thus, the results are mixed on the role of knowledge stock in the probability of NPD in foreign-invested firms. As explained before, we believe that the insignificance of this variable in some cases may be due to measurement problems.

In addition, as in columns 1 and 2, the results from columns 3 and 4 of table 4 indicate that firm size increases the probability of NPD, while operating time has no impact on it. Furthermore, the coastal location seems to affect negatively the probability of foreign-invested firms being new product developers.



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Overall, the main messages from the probit estimations in tables 4 and 5 are as follows. First, a TNC is more likely to be a new product developer if its equity is jointly rather than wholly owned, and if its partner is an OECD rather than an HMT investor. Second, the best Chinese partner for a TNC to be a new product developer is an SOE, followed by an LP, a COE and finally an IP.

Table 6 provides the tobit regression results for equation (1), i.e. how NPD intensity of a foreign-invested firm is affected by the organizational form and ownership structure. The positive and highly significant coefficients on CJVs, EJVs and JSCs suggest that NPD intensity in the JV-type firms is higher than WFOEs. In addition, there is clear evidence that OECD investors have a higher NPD intensity than HMT ones. Firm size, whether it is measured by total investment or employment, has a significantly positive impact on the extent of NPD activity. The coastal location negatively affects the extent of a foreign-invested firm's NPD activity. In addition, operating time is statistically insignificant. These results are consistent with those from the corresponding probit models in table 4, although the former is concerned with NPD intensity and the latter with NPD probability.

One difference between the tobit and probit estimation results is that, in the second column of table 6, the stock of knowledge is statistically significant for NPD intensity while it is not the case for NPD probability in the second column in table 4. Of course, we must bear in mind that intangible assets are a very rough proxy for knowledge stock, and the use of a better proxy such as R&D would probably offer more accurate empirical results.

The third and fourth columns of table 6 report the tobit results for equation (2), that is, how local and foreign capital participation affects the NPD intensity in foreign-invested firms. Similar to the results for the probit model (tables 4 and 5), the results from table 6 indicate that capital participation by state-owned enterprises (SER), legal persons (LPR) and collectively owned enterprises increases the extent of NPD activity in CJVs, EJVs or JSCs. Capital participation by individual persons produces a significantly positive impact in one (column 4) of the two estimations (columns 3 and 4). In addition, firm size, measured by either total investment or employment, has a significant positive effect on the intensity, and there seems to be a significant difference in average NPD intensity between the coastal and inner areas.

The significant coefficients on FCR indicate that capital participation by an OECD rather than an HMT investor is a significant

determinant of the firm's NPD intensity. Finally, the coefficient on *klg* is significant in the fourth column only. All these results are qualitatively the same as those obtained from the probit model, and the explanations of the probit results largely apply to the tobit results.

**Table 6. Tobit results**

	Equation 1		Equation 2	
<i>cjv</i>	0.010** (0.005)	0.010** (0.005)		
<i>ejv</i>	0.027*** (0.003)	0.030*** (0.003)		
<i>jsc</i>	0.020* (0.011)	0.025** (0.011)		
<i>fod</i>	0.007*** (0.002)	0.011*** (0.002)		
<i>ser</i>			0.043*** (0.007)	0.049*** (0.007)
<i>cer</i>			0.021*** (0.006)	0.018*** (0.006)
<i>lpr</i>			0.037*** (0.005)	0.041*** (0.005)
<i>ipr</i>			0.015* (0.008)	0.010 (0.008)
<i>fcr</i>			0.007** (0.003)	0.013*** (0.003)
<i>klg</i>	0.028 (0.025)	0.068*** (0.025)	0.029 (0.025)	0.069*** (0.025)
<i>logfs1</i>	0.022*** (0.001)		0.022*** (0.001)	
<i>logfs2</i>		0.016*** (0.001)		0.016*** (0.001)
Operating time	4.12e-06 (0.000)	4.33e-06 (0.000)	3.16e-06 (0.000)	3.64e-06 (0.000)
Garment	0.027*** (0.005)	0.001 (0.005)	0.027*** (0.005)	0.001 (0.005)
Machinery	0.044*** (0.006)	0.041*** (0.006)	0.044*** (0.006)	0.041*** (0.006)
Pharmacy	0.080*** (0.008)	0.084*** (0.008)	0.081*** (0.008)	0.085*** (0.008)
Transport	0.044*** (0.006)	0.048*** (0.006)	0.044*** (0.006)	0.049*** (0.006)
Electric	0.073*** (0.005)	0.069*** (0.005)	0.072*** (0.005)	0.068*** (0.005)
Telecommunication	0.056*** (0.005)	0.052*** (0.005)	0.055*** (0.005)	0.052*** (0.005)
Coastal	-0.021*** (0.004)	-0.022*** (0.004)	-0.020*** (0.004)	-0.021*** (0.004)
Constant	-0.220*** (0.013)	-0.078*** (0.009)	-0.219*** (0.013)	-0.071*** (0.009)

Source: Authors.

Notes: \*\*\* denotes significance at the level of 1%, \*\* at 5% and \* at 10%.

Table 7 reports the marginal effects of the estimations provided in table 6. Again, we find that the values are small, which is not surprising because the average NPD intensity in the sample is 0.046 only (see table 1). The largest marginal effect in the table is from the variable “pharmacy”, followed by electric, telecommunication, SER, LPR, machinery, and EJV. These results are consistent with the discussions above.

**Table 7. Marginal effects of Tobit model**

	Equation 1		Equation 2	
cjv	0.0104***	0.0098*		
ejv	0.0270***	0.0298***		
jsc	0.0195	0.0254*		
fod	0.0069***	0.0109***		
ser			0.0432***	0.0485***
cer			0.0212***	0.0184***
lpr			0.0374***	0.0405***
ipr			0.0147*	0.0103
fer			0.0072**	0.0129***
klg	0.0282	0.0676***	0.0288	0.0686***
Logfs1	0.0217***		0.0222***	
logfs2		0.0164***		0.0164***
Operating time	0.0000	0.0000	0.0000	0.0000
Garment	0.0269***	0.0009	0.0274***	0.0009
Machinery	0.0439***	0.0412***	0.0439***	0.0414***
Pharmacy	0.0804***	0.0842***	0.0806***	0.0849***
Transport	0.0437***	0.0479***	0.0443***	0.0487***
Electric	0.0728***	0.0695***	0.0716***	0.0676***
Telecommunication	0.0556***	0.0524***	0.0549***	0.0516***
Coastal	-0.0211***	-0.0219***	-0.0204***	-0.0214***

Source: Authors.

Notes: \*\*\* denotes significance at the level of 1%, \*\* at 5% and \* at 10%.

## 5. Conclusions

We believe this paper is one of the first systematic empirical studies of the relationship between foreign ownership structure and NPD. Seven hypotheses are derived from the literature and tested on a large firm-level panel data set. As NPD is examined in terms of both probability and intensity, the probit and tobit models are applied respectively.

The results summarized in table 3 show that contractual, and especially equity joint ventures and joint stock enterprises, are better organizational forms than wholly owned enterprises in terms of the probability of NPD. We argue that this is because strategic alliances typically provide access to complementary resources and enhance

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successful NPD. OECD investors play a more important role than investors from HMT in raising both the probability and intensity of NPD, because the former generally have higher innovative capabilities than the latter and because it is much less likely that a company operating in HMT would have a portfolio of products that were not known on the Chinese mainland. Capital participation by SOEs and LPs plays a more important role than capital participation by COEs and IPs, because the former generally possess higher R&D and manufacturing capabilities. In addition, capital participation by OECD investors is positively associated with both the probability and extent of NPD, while capital participation by HMT investors is negatively associated with these two aspects. Firm size is important in enhancing the probability and intensity of NPD, as large firm size often implies that a large amount of strategic resources are available. The above evidence lends clear support to hypotheses 1, 2, 3 and 5.

The test results on hypothesis 4 is inconclusive as the coefficient on knowledge stock is significant in some model specifications while insignificant in others.

Evidence on hypothesis 6 is mixed with no clear results. While an overwhelming proportion of manufacturing FDI is located in the coastal areas, a higher percentage of TNCs in the inner areas are involved in NPD than in the coastal areas, producing a negative coefficient on the region dummy. Finally, there is no evidence to support hypothesis 7 that there is a positive relationship between NPD and the operation time of a foreign-invested firm in China.

We acknowledge that there are several limitations with this study. Firstly, our data set does not allow us to distinguish between a genuinely new product and a significantly improved product. As the relative importance of development activities for these two types of product differs, it is not ideal to lump them together. It would be very useful to conduct a survey to find out how different types of NPD are associated with different ownership and organizational arrangements of TNCs.<sup>5</sup> Furthermore, because of the lack of information on R&D, we have used intangible assets as a proxy for knowledge stock, and this prevents us from a more accurate assessment of the impact of knowledge stock.

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<sup>5</sup> For instance, the survey by Yalcinkaya et al. (2007) distinguishes products that are new to the world, new to the market a firm serves, and new to the firm.

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There are several important policy and managerial implications of the study. First, for the Government of China, international joint ventures (whether they are equity, contractual or joint stock enterprises) rather than WFOEs need to be encouraged in order to promote NPD in China. Knowledge accumulated in these NPD activities are likely to spill over to indigenous Chinese firms so that overall innovative capabilities of Chinese industries will increase. For TNCs, it is essential to develop and strengthen strategic alliances with indigenous firms in host countries so that local strategic resources can be accessed in order to perform NPD activities better.

Second, more FDI from the OECD countries should be particularly encouraged to promote NPD. This is very important in raising both the probability and intensity of introducing new products. However, this does not imply that FDI from HMT should not be welcomed. FDI from HMT investors is still important for the Chinese economy in terms of its contributions to employment and basic manufacturing and marketing knowledge spillovers. Nevertheless, if China aims to speed up its innovation and NPD, TNCs from OECD countries are likely to play a more important role in this process. Technological knowledge about NPD developed in these TNCs can not only directly benefit their affiliates in their NPD, but also spill over to indigenous firms, raising the overall innovative capabilities of that country.

Third, the finding that the coefficient on the stock of knowledge is not always significant suggests that possessing knowledge stock on its own does not lead to successful NPD. Perhaps this is because an appropriate business environment and incentives for NPD are not yet in place. Thus, Chinese policy makers may, for example, need to consider strengthening intellectual property right protection so that firms, whether foreign or local, would have strong incentives to conduct NPD and innovatory activities in general.

Fourth, as large firm size appears to help NPD, there is perhaps a case for encouraging mergers and acquisitions to promote innovation. A large proportion of firms in Chinese manufacturing are too small to benefit from scale economies; an example is that there are as many as 126 car manufacturers (not including car component manufacturers) (National Statistic Bureau, 2002). By increasing the size, firms would have more resources available for NPD.

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# The impact of FDI inflows on R&D investment by medium- and high-tech firms in India in the post-reform period \*

Vinish Kathuria \*\*

As a result of the 1991 liberalization, many transnational corporations have set up affiliates in India, which in turn have prompted domestic firms to seek new technology to compete with them. The reforms have also made technology imports cheaper and easier. Domestic firms, instead of undertaking their own R&D, can purchase technologies or license them from abroad. The present study analyses the effects of FDI inflows on the innovation strategies of firms in the medium- and high-tech industries. The paper differs from the existing literature in two ways. First, it takes into account those firms that reported zero R&D expenditures in their annual report but had in-house R&D units. Second, it uses actual FDI inflows instead of approvals. The probit and tobit models show that in the initial period after 1991, increased FDI inflows had a negative impact on domestic R&D, whereas in the later period, the impact was not significant.

**Key words:** foreign direct investment, R&D, liberalization, India.

## 1. Introduction

The role of technology in fostering economic growth is well acknowledged. Evidence suggests that only those countries that aggressively promote technological efforts of their domestic firms can sustain growth in the long run. An important factor influencing R&D activity in an economy is

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the inflows of foreign direct investment (FDI), which is an important conduit of cross-border technology diffusion.<sup>1</sup>

For developing and transition economies, FDI is particularly important as it induces faster economic restructuring and promotes better corporate governance in addition to facilitating the acquisition of new technology. The 1991 reform in India with respect to FDI was intended to achieve such transformations. Since the introduction of the reform, the inflows of FDI into the country have steadily increased, resulting in many transnational corporations (TNCs) setting up affiliates in India. In order to compete with these foreign affiliates, domestic firms have had to innovate or adopt new technologies.<sup>2</sup>

As the reforms have also made the import of technology cheaper and easier, domestic firms now have more options in formulating their technology strategies. Instead of expending resources on R&D, they can buy or license new technologies from abroad. The declining or near stagnant R&D to GNP ratio in the 1990s on the one hand, and rising technology import intensity and FDI inflows on the other, as illustrated in figure 1, suggest a trend of increasing reliance on technologies from abroad. A recent study by Basant (2000) found that R&D expenditure in real terms fell in 12 out of 28 industries in the 1990s. Even in those industries where R&D expenditures rose, the R&D to sales ratios either remained static or declined.

Given that a competitive domestic manufacturing sector is indispensable for the growth of the economy, such reliance on foreign technology may not be viable in the long run. Relying on imported technology is unlikely to foster the competitiveness of the domestic manufacturing sector. Moreover, with the world moving towards a stronger intellectual property rights regime, it is important that Indian firms are able to develop their own technologies. In-house R&D efforts are even more important in medium- and high-tech industries, such as automobiles, biotechnology, chemicals and electronics.

Against this backdrop, this study investigates the effect of FDI inflows on the R&D activities of domestic firms in the medium- and high-tech industries in the post-reform period. The study analyses the

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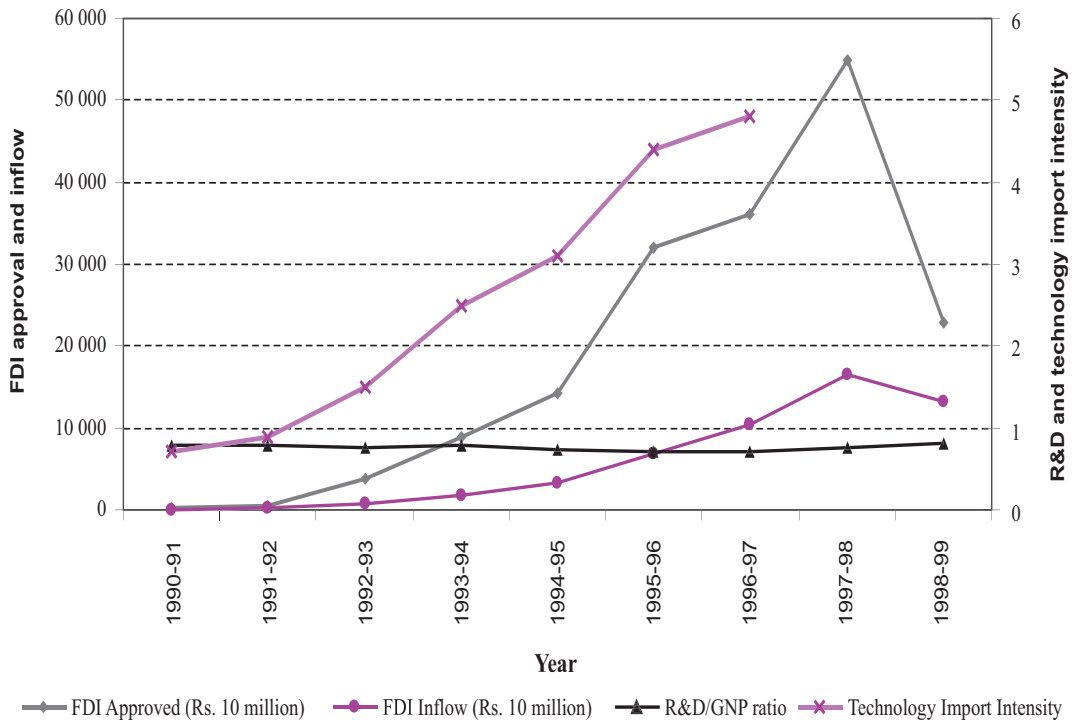
<sup>1</sup> According to Damijan *et al.* (2003), technology transfers via FDI can take four different routes: demonstration-imitation effects, competition effects, foreign linkage effects and training effects.

<sup>2</sup> These options are under the assumption that the two groups of firms differ only with regard to technology. Any productivity difference across the two groups is also attributed to these technological differences.



relationship between FDI and the decision of the firms to invest in R&D in the post-1991 period.

**Figure 1. FDI Approvals, inflow, R&D and Technology Import Intensity in the 1990s in India**



Source: Banga (2005); Research and Development Statistics, DST (2003); SIA (2002); and Rao, Murthy and Ranganathan (1999).

Notes: \$1 = 40 rupees (approx.). Technology import intensity (Import of technology to total sales) is for the manufacturing sector and not for the whole economy.

The paper contributes to the existing literature in two ways. First, a number of studies on the issue (e.g. Kumar and Saqib, 1996; Pradhan, 2003; Kumar and Aggarwal, 2005) used R&D expenditures as the indicator of firms' R&D efforts. However, reported R&D expenditures may not accurately represent the firms' R&D efforts since firms in India are not obliged to report R&D expenditures if the amount is below 1% of their total sales (Kumar and Aggarwal, 2005). The present study addresses this problem by considering not only R&D expenditures, but also whether a firm has a Department of Science and Technology (DST) recognized in-house R&D unit. The DST, by granting several fiscal incentives and other support measures, has encouraged firms to establish their own in-house R&D units. The extent of the problem is evident from the fact that among the 65 firms with a DST recognized in-house R&D unit in our sample of 190 firms, only 20 reported expenditures on R&D in 1996.

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The second contribution of the paper is the use of actual FDI inflows. Some studies, due to the lack of data, used FDI approvals instead of actual FDI inflows. Evidence suggests that only one-fifth to one-fourth of approvals are actually implemented in India (Rao et al., 1999; SIA, 2002). This discrepancy is not a problem if all industries receive actual investment in the same proportion in relation to approved FDI, but this is not the case. The data show that during the period from August 1991 to December 2002, the metallurgy industry received only 6.5% of approved FDI, whereas the chemicals industry received nearly 37% of approved FDI (SIA, 2002). Thus, FDI approvals are not a reflection of the true extent and distribution of FDI inflows.

The analysis carried out with more appropriate data shows that the relationship between FDI and domestic R&D has undergone a change, with a negative impact clearly evident in the initial period after the reform, in contrast to previous studies.

The remaining paper is organized as follows. Section 2 gives a synoptic view of the debate on the relationship between FDI and R&D investment. Section 3 reviews the literature on the issue. This is followed by the description of the methodology in section 4. Section 5 discusses the variables in the model. Section 6 gives the results and section 7 concludes.

## **2. FDI and R&D investment – a debate**

The effect of FDI/technology import on in-house R&D efforts has been the subject of an intense debate. One view given by Blumenthal (1976), Lall (1989) and Mowery and Oxley (1995), among others, suggests that technology import complements in-house R&D efforts. An opposite view, enunciated by authors such as Pillai (1979) and Mytelka (1987) argues that technology import reduces the likelihood of firms in developing countries to undertake their own technological efforts.

A number of arguments have been put forward in the literature suggesting that inflows of FDI increase R&D undertaken in the host economy. Since factor intensities and raw materials available in a developing host country are not the same as those in the developed countries where much of FDI originates,<sup>3</sup> the technologies of investing TNCs may not suit local conditions (Katrak, 1985; Cassiman and Veugelers, 2003; Tomiura, 2003). Hence, some adaptive R&D needs be

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<sup>3</sup> The data indicate that nearly two-third of FDI originates from the six developed countries (Kathuria, 2000).

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undertaken to modify such technologies to suit local conditions (Nelson, 2004). As for domestic firms, the entry of foreign firms is likely to intensify competition of the domestic market (Caves, 1974). To remain competitive, local firms need to invest in R&D to improve the quality of their products and reduce costs. Moreover, some local firms may undertake R&D activities so as to enhance their absorptive capacity in order to benefit fully from the spillover effects of FDI (Kathuria, 2001, 2002).

However, arguments have also been put forward to suggest that inflows of FDI reduce R&D efforts in the host economy. Foreign affiliates would have access to the technology of their parent firms, and perhaps the only way domestic firms in a developing country can compete is by acquiring similar technologies. This can be achieved either by investing in their own R&D or buying technologies from foreign firms. Given financial and capacity constraints, R&D is likely to become the less favoured option as it involves uncertainty, risk and a gestation lag (Lall, 1992; Katrak, 1985, 1990). Thus, firms may opt for the purchase of technologies from abroad. Moreover, in the context of India, economic reforms also made the import of technology easier and cheaper. Not only have the laws governing such import and commercial licensing been relaxed and the duty structure rationalized, but also efforts have been made to simplify the procedures involved in acquiring technologies from abroad.

The post-liberalization period has witnessed the establishment of a number of foreign affiliates in R&D intensive industries, such as the electrical, electronics and pharmaceuticals industries. Having access to the centralized research labs of their parent firms, these affiliates may not have the need to carry out much R&D, apart from adapting products to the local market, which is likely to involve relatively small expenditures.

### **3. Brief review of the literature**

A number of studies for India and other countries have examined the relationship between R&D and the two primary means of acquiring foreign technology, namely FDI and technology import.<sup>4</sup> Studies on this issue can be grouped into three categories: those that have found a complementary relationship; those that have found substitutable relationship; and those in which researchers could not establish any relationship.

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<sup>4</sup> Cohen (1995) has an exhaustive review of these studies.

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A large number of studies carried out on India, Brazil and China have found a complementary relationship between technology import and R&D. For India, these include industry-level analyses by Katrak (1985) and Deolalikar and Evenson (1993), and firm-level analyses by Katrak (1989), Siddharthan (1988, 1992), Kumar and Saqib (1996), Aggarwal (2000) and Kumar and Aggarwal (2005). In addition, there are sector-specific studies that have also found a complementary relationship, including Katrak (1990) for the electrical and industrial machinery industries and Pradhan (2003) for the pharmaceutical industry, among others. In the context of other economies, Braga and Wilmore (1992) for Brazil, Bertschek (1995) for Germany, and Zhao (1995) and Hu et al. (2005) for China also found a weak but positive relationship between technology import and R&D.

On the other hand, studies by Kumar (1987), Fikkert (1993), Basant and Fikkert (1996) for India, Veuglers and van den Houte (1990) for Belgium, Lee (1996) for the Republic of Korea, Chuang and Lin (1999) for Taiwan Province of China and Fan and Hu (2006) for China, among others, found a substitution effect of technology import on domestic R&D.

However, some studies, including Kumar and Saqib (1996), Katrak (1997), have found neither a substitutable nor complementary relationship between technology import and R&D.

A major limitation of the earlier studies, such as Katrak (1985) and Deolalikar and Evenson (1989), is the use of industry level data. Since R&D decision is taken at the firm level and is affected by various firm specific attributes, firm-level data are more appropriate. Although Kumar and Saqib (1996) used firm-level data and partly overcame the limitations of previous studies, the data covered only the pre-liberalization period and also suffered from the problem of R&D data discussed earlier. The study by Basant and Fikkert (1996) and Kumar and Aggarwal (2005) used firm level data in a panel framework. However, these studies did not address the problem concerning R&D data either.<sup>5</sup>

To date, apart from two, all the studies for India have used data from the pre-liberalization period.<sup>6</sup> As the policy focus in the pre-reform period was on import substitution and the FDI policy was also selective

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<sup>5</sup> Also, the decisions to purchase technology or conduct R&D are undertaken simultaneously. Thus, estimates of these studies are subject to the problem of simultaneity making conclusions invalid (Basant, 1993).

<sup>6</sup> Even the studies, which have used post-liberalization data, have defined liberalization very loosely – by dummy or considering only later years as liberalized.

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in nature, post-liberalization data may give different results, especially since the focus has now shifted from adaptive to assimilating R&D. Also, the FDI policy has changed from being selective to generally promoting inflows of FDI. Hence, an analysis using post-liberalization data and accounting for those firms spending an amount below the threshold level but having a DST-recognized in-house R&D unit may perhaps shed more light on the relationship.

## 4. Model Formulation

### 4.1 Hypothesis

The liberalization process has affected domestic firms' investment decision in two ways: by making technology import cheaper and easier and by forcing Indian firms to continuously upgrade their technology to compete with foreign firms and with each other. Since firms have now easier access to technologies from abroad than in the past and given the uncertainty involved in R&D, firms are more likely to opt for the former route. The present study examines the following hypothesis: increased FDI has led to a reduction in R&D investment in the Indian manufacturing sector.

### 4.2 Model

The decision for the firms can be considered as binary: either to invest in R&D or not to invest in R&D. In this case, a model which allows the use of a discrete dependent variable is required. The probit model is a non-linear statistical model that achieves the objective of relating the choice probability to explanatory factors.

Two series of data on R&D can be used as the dependent variable in a probit model. In the first Probit regression, the dependent variable takes value 1 if the firm had a DST recognized in-house R&D unit or reports any R&D expenditure and 0 otherwise. In the second probit regression, the dependent variable takes the value 1 if the firm reported any R&D expenditures and 0 otherwise. The explanatory variables are continuous variables that may affect the decision of the firm. Thus, the general model is represented as follows:

$$RD = \alpha + \beta_1 x_{ik} + u,$$

where  $\alpha$  and  $\beta_1$  are unknown parameters and  $u$  is the residual.  $RD$  is an unobserved latent variable as discussed above.

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The probit model explains only the probability of a firm reporting R&D. Therefore, the hypothesis is also tested using R&D intensity as the dependent variable. Since many firms had zero R&D expenditure, the intensity of R&D among R&D reporting firms has to be analysed using a censored regression model. For this purpose, a tobit model can be used.<sup>7</sup> R&D intensity, defined as the ratio of R&D expenditures to total sales, is taken as the dependent variable. The tobit model can be written as:

$$RDI = \alpha + \beta_1 x_{ik} + u,$$

where RDI is the R&D intensity. In the case of the ptobit and tobit models, the coefficients do not give the marginal effects. The marginal effects are obtained by multiplying the coefficients the probability density function for probit model and with the probability that the observation is uncensored for tobit model (Greene, 2003).

The analysis is carried out for two different time periods, one immediately after the 1991 reforms (when the reforms had just begun and hence would not have had much impact) and one in the late 1990s (when the effects of liberalization had presumably become pervasive). A cohort of firms that were in operation in both of these time periods are used for the analysis so that the precise effect of liberalization on these firms can be investigated.

## 5. Variables and data

### 5.1 Explanatory variables

The firm's decision on R&D efforts are influenced by resource availability, alternative sources of acquiring technology, growth strategy of the firm and the prevailing market conditions, among others. The present section discusses these factors and their influence on the R&D investment decision of the firms.

#### *Size*

Since R&D activities are costly, risky and unpredictable (Lall, 1992; Katrak, 1990), firms with larger financial and other resources

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<sup>7</sup> The important reason for estimating a Tobit model is the fact that for a large number of firms the dependent variable R&D intensity takes on the value of zero and hence simple OLS estimation will yield biased estimate.



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would have an advantage. Firm size is thus presumed to be positively related to firms' R&D activity. A counter-argument is that larger firms may be less affected by market competition and, accordingly, will have less incentive or need for technological improvements (Katrak, 1990). Empirical studies have found mixed results on the nature of this relationship. Studies by Braga and Willmore (1991) and Tomiura (2003) found firm size had a positive impact on R&D activity of the firm, whereas Katrak (1985) found a less than proportionate increase in R&D expenditures in relation to firm size.

A group of studies have found a non-linear relationship between firm size and R&D effort. Siddharthan (1988) found a U-shape relationship. Kumar and Saqib (1996) found an inverted U-shape relationship between firm size and the probability of undertaking R&D activity, although the relationship is linear when R&D intensity of the firm is accounted for. Kumar and Aggarwal (2005) and Pradhan (2003) found a horizontal S-shaped and an inverted U-shaped relationship respectively. Given that the reforms introduced in the 1990s increased the overall competition, the present study expects firm size, measured as the natural logarithm of the gross assets of the firm, to have a positive effect on the probability of undertaking R&D.<sup>8</sup>

### *Export orientation*

Competing in the international market is likely to require technologically advanced quality products, which forces export-oriented firms to invest in R&D. The theory of industrial organization also suggests that outward orientation of a firm is possible only when it possesses some advantages, and R&D is an important channel of accumulating such advantages. Thus, firms serving international markets – through export or having production bases abroad – are likely to undertake R&D activity. Export also allows firms to exploit economies of scale, thus increasing the return on R&D investment (Zimmerman, 1987; Katrak, 1990).

A number of empirical studies confirm this link between forays into the international market and the firm's propensity and ability to undertake R&D (Braga and Willmore, 1991; Kumar and Saqib, 1996; Pradhan, 2003; Kumar and Aggarwal, 2005). In the present case, this variable is measured as the ratio of exports to total sales in percentage terms, and it is expected to have a positive effect on R&D investment

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<sup>8</sup> Using log also takes care of non-linearity in the relationship.

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### *Extent of vertical integration*

A more vertically integrated firm, which undertakes a greater part of value-adding activities in the value chain, is thought to have more opportunities to introduce innovation. Hence, the variable is expected to have a positive effect. Kumar and Saqib (1996) found a positive relationship between the extent of value addition and the R&D investment decision of a firm. The present study measures variable by the ratio of total value added by the firm to the sales turnover in percentage terms.

### *Import of technology*

With respect to the import of technology, two opposing factors interact. It is well recognized that imported technologies typically need to be remodelled and reconfigured to suit the local conditions. Hence some adaptive R&D is usually undertaken for the purpose (Lall, 1983; Nelson, 2004). The need for adaptive R&D increases if the technology is from a country which is higher on the technological ladder. Given that OECD countries account for a substantial portion of India's technology import, it is likely that firms need to undertake adaptive R&D. On the other hand, as discussed in section 2, increases in expenditures on imported technology may result in reduced outlays for R&D. Furthermore, more technology import may create a "dependence culture", thereby dampening the in-house efforts (Katrak, 1990). Empirical evidence suggests a positive impact of technology import on R&D (Lall, 1983; Katrak, 1985; Sidharthan, 1988; Deolalikar and Evenson, 1989; Kumar and Aggarwal, 2005). The royalty payments as a proportion of sales is used to construct the variable.

### *Foreign ownership*

Evidence suggests that firms with foreign equity participation are less likely to invest in R&D as they have access to the research labs of their parent firms. Hence foreign affiliates are expected to have less investment in R&D than firms without foreign equity participation (see Kumar and Saqib, 1996; Kumar and Aggarwal, 2005 for evidence). Many studies on the internationalization of innovative activities also suggest that TNCs tend to conduct little R&D outside their home country, especially in countries with a significant technology-gap (see for example, Patel and Pavitt, 1995; Patel and Vega, 1999; Tomiura, 2003 among others). However, it is also noted that foreign collaboration brings more technology from abroad that needs to be adapted to suit local conditions. Hence, these firms have to engage in adaptive R&D. This would imply a positive relationship between foreign equity share

and R&D investment. A study by Amsden (2001) on East Asian and Latin American countries found that the greater the foreign ownership is, the smaller the depth and breadth of R&D activities are (except in the case of Singapore).

### *Concentration in the industry*

Given the nature of R&D investment, a degree of monopoly power is needed to recoup the cost. However, in a concentrated market, the incentive to invest in R&D declines while a competitive industry exerts pressure on the firm to invest more in R&D (Katrak, 1990). In this study, it is assumed that market power has a negative influence on the probability of a firm undertaking R&D. The variable in the present analysis is measured by the Herfindahl index (H-index).

### *FDI*

The variable FDI measures the actual inflows of FDI into the industry to which the firm belongs. It is noted that there is always a lag between actual inflows and the start of the production. Therefore, the present study uses cumulative FDI upto the previous year of the periods under analysis.

Table 1 summarizes the explanatory variables with their probable impact on the probability of investing in R&D. The expected signs are the same for the regression using R&D intensity as the dependent variable. Thus the econometric model to be estimated is:

$$RD \text{ (or RDI)} = \beta_1 + \beta_2 * FDI_{t-1} + \beta_3 * \ln(\text{Size}) + \beta_4 * \text{Export Intensity} + \beta_5 * \text{H-index} + \beta_6 * \text{Foreign Share} + \beta_7 * \text{Vertical Integration} + \beta_8 * \text{Royalty} + u,$$

where RD = 1 if the firm has a DST recognized in-house R&D unit or reports R&D expenditures, and RD=0 otherwise in the probit estimation. In the tobit estimation, RDI = R&D intensity.

**Table 1. Summary of explanatory variables**

Variable (1)	Description (2)	Expected Sign (3)
FDI	FDI Inflows into the industry	-
Industry Concentration	H-index	-
Import of technology	Royalty payments as a proportion of sales	?
Size	Logarithm of gross assets of firm	+
Foreign Share	Extent of foreign equity participation in the firm	?
Export orientation	Exports as a proportion of sales	+
Vertical Integration	Total value added by firm as a proportion of sales	+

Source: Author.

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## 5.2 Data

The firm-level data used in the analysis are collected from the Capitaline database of Capital Market. The Capitaline database is compiled from the audited annual reports of nearly 10,000 firms listed on the Bombay Stock Exchange. Since the analysis is concerned with the liberalization period, all those firms which were incorporated after 1991 are omitted. Services sector firms such as banking and trading firms are taken out from the data set as the analysis is concerned with only the manufacturing sector. Firms belonging to industries which were heavily regulated to protect small-scale producers (e.g. the leather industry and the tobacco industry) are also excluded from the analysis.

Data are collected for two time periods: the period 1994–1996, which is the period immediately after the 1991 liberalization<sup>9</sup>; and the period 1999–2001, which is the period when the effects of liberalization are expected to have been absorbed.<sup>10</sup> However, data are not available uniformly for all the firms for all the years, thereby restricting the analysis to only two years, 1996 and 2001, which are used to carry out a comparative cross sectional analysis. Those industries having less than five firms are also excluded.<sup>11</sup> Firms belonging to the public sector are also excluded as the motive of undertaking R&D and the general behaviour of such firms are presumably different from private manufacturing firms.

On examination of R&D figures, it is found that in many industries such as fertilizer, cement and steel, only a few firms have invested in R&D and even those had a negligible R&D intensity i.e., below 0.1%. Incidentally, these industries are also classified as non-R&D intensive by

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<sup>9</sup> Ideally we should have taken the financial year 1992/1993 as the first year of our study, but the data are not available prior to 1994/1995.

<sup>10</sup> A two year period is selected because some of the variables like sales, exports (even R&D investment) show wide variations year to year. For the period 1994–1996, the averages of the two consecutive financial years 1994/1995 and 1995/1996 are taken, and similarly for the period 1999–2001, the averages of 1999/2000 and 2000/2001 are taken.

<sup>11</sup> The cut-off was to facilitate computation of a variable accounting for the competitiveness effect. There were a few industries in the data set which had fewer than five firms and for which data for both 1996 and 2001 were available. Since the data set is for those firms listed in the Bombay Stock Exchange, the small number of firms is not necessarily because these industries are highly oligopolistic; rather, a large number of firms are either not listed in the stock exchange or are not included in the Capitaline database.

the DST (2003).<sup>12</sup> Thus, FDI is not expected to have a major impact on the R&D decision in these industries. Firms belonging to these industries are thus removed from the analysis. The final dataset which is used for the analysis has 190 firms belonging to seven medium- and high-tech industries,<sup>13</sup> the distribution of which are given in table 2. Of these 190 firms, nearly one-third are foreign affiliates (i.e. firms in which a foreign firm controls more than 10% of its equity). Columns 3 and 4 of the table give the distribution of foreign-owned firms for the two periods.

As can be seen from the table, there has been an increase in the number of firms having foreign ownership over the years., which is not surprising given increased foreign investment in the country.

**Table 2. Distribution of firms across industries**

	Industry (1)	No. of Firms (2)	Foreign affiliates, 1996 (3)	Foreign affiliates, 2001 (4)
1	Auto Ancillaries	34	13 (38.2%)	21 (61.8%)
2	Chemicals	47	11 (23.4%)	10 (21.3%)
3	Electric equipment	15	8 (53.3%)	6 (40.0%)
4	Electronic components	19	5 (26.3%)	8 (42.1%)
5	Engineering	40	14 (35.0%)	17 (42.5%)
6	Petrochemical	9	2 (22.2%)	1 (11.1%)
7	Pharmaceuticals	26	7 (26.9%)	6 (23.1%)
	<b>Total</b>	<b>190</b>	<b>60 (31.6%)</b>	<b>69 (36.3%)</b>

Source: Author's compilation

Note: Figures in parentheses are their percentage in the total in each industry.

### 5.3 Sample characteristics

Table 3 gives R&D intensity by these two categories of firms in the two time periods. From the table, an interesting pattern emerges with respect to R&D investment. Though a larger number of firms – both foreign affiliates and domestic firms – invested in R&D in the later period, the R&D intensities of these two categories of firms evolved

<sup>12</sup> The DST uses two indices – R&D expenditure as percentage of sales turnover; and the number of personnel employed in R&D per thousand employees to classify the industries into three categories – high-, medium- and low-tech industries. For 1996–1997, the value of two indices for the three categories are 1.68 and 54, 0.67 and 25; and 0.31 and 8 respectively (DST, 1999).

<sup>13</sup> The classification of the industries follows the one as used by capitaline. However, this classification does not match the ones used by CMIE (Centre for Monitoring Indian Economy) and SIA (Secretariat for Industrial Assistance) from where H-index and FDI data have been collected respectively. Hence, suitable assumptions have been made to match the three industry classifications.

differently over time. The R&D intensity of foreign firms increased whereas that of domestic firms fell. This is contrary to the widely held perception that foreign firms do not undertake much R&D as they have access to their parent firms' R&D labs. The data show that, of the total 190 firms, 65 had DST recognized in-house R&D units. But not all of them reported R&D expenditures in 1996; in fact, of these 65 firms, only 20 did. In 2001, there is a dramatic increase in reported R&D activity; of the 65 firms, 61 reported expenditures on R&D. Perhaps, increased competition may have induced them to spend more on R&D.

**Table 3. R&D intensity of foreign affiliates and domestic firms**

Year	Foreign affiliates undertaking R&D (No.) (1)	Domestic firms undertaking R&D (No.) (2)	R&D intensity of foreign affiliates (3)	R&D intensity of domestic firms (4)
1996	11 (18.3%)	23 (17.7%)	0.115	0.714
2001	28 (40.6%)	39 (32.23%)	0.543	0.38

Source: Author.

Note: Figures in parentheses give percentage of R&D intensive firms to total firms in the category, where R&D intensive firms are those which have incurred expenditure on R&D in 1996 or 2001.

Table 4 gives the average size and export behaviour of firms that undertook R&D and those that did not. The comparison indicates that the average size of firms undertaking R&D is nearly twice as big as those that did not undertake any R&D (columns 3 and 4). Moreover, the size of the former has increased proportionately more over the period. The table also indicates that the export intensity of both groups increased with R&D intensive firms showing a larger increase.

**Table 4. Size differences and export intensity of two categories of firms**

Year	Firms with R&D expenditures (No.) (1)	Firms without R&D expenditures (No.) (2)	Gross assets of firms with R&D expenditures (10 million rupees) (3)	Gross assets of firms without R&D expenditures (10 million rupees) (4)	Export intensity of firms with R&D expenditures (%) (5)	Export intensity of firms without R&D expenditures (%) (6)
1996	34	156	94.44 (146.72)	50.46 (88.55)	6.63 (7.48)	10.55 (17.95)
2001	67	123	157.01 (205.48)	79.3 (146.48)	11.64 (15.34)	11.84 (19.65)

Source: Author.

Note: Non-R&D intensive firms are those which have not incurred any expenditure on R&D in 1996 or 2001. Figures in parentheses give the standard deviation for the indicator.

Table 5 gives the descriptive statistics of the various firm specific variables used in the analysis. From the table, it can be seen that in the five year period, R&D intensity, raw material imports, royalty paid, extent



of vertical integration, export intensity and size of the firms increased. It is interesting to note that the average industrial concentration in the sample industries has declined over the period (row 7). With respect to R&D (row 1), not only the average intensity increased but also the spread diminished.

**Table 5. Descriptive statistics of the explanatory variables**  
(No. of obs. = 190)

SNo.	Variable	1996	2001
1	R&D intensity	0.525 (3.77)	0.676 (1.437)
2	Export intensity	9.85 (16.62)	11.79 (18.20)
3	Foreign share	11.08 (17.98)	15.17 (21.53)
4	Raw material import (Millions of rupees) rrup)	73.7 (391.5)	657.3 (1289.9)
5	Royalty (Millions of rupees)	2.34 (11.5)	3.86 (15.56)
6	Value added (i%)	28.79 (13.1)	37.69 (16.36)
7	H-index	0.222 (0.155)	0.108 (0.058)
8	Size (Millions of rupees)	583.3 (1023.5)	1067.0 (1731.5)

Source: Author.

Note: Figures in parentheses are the standard deviations.

## 6. Results and findings

Before proceeding to report the results, it needs to be mentioned that the present study could not run a tobit regression for the initial period, as many firms did not report spending on R&D despite having in-house R&D units. The data show that there were 40 such firms in 1996, which had a DST recognized in-house R&D unit, yet did not report any R&D expenditure. In contrast, in 2001 this number fell to only four.

Table 6 gives the results of the probit regression for the year 1996. The FDI data used for the analysis of this period are cumulative FDI inflows from July 1991 to March 1995. The marginal effects are given in column 3. The results indicate that the size of the firm (row 2) has a positive and significant impact on the probability of investment in R&D. This implies larger firms have a greater probability of conducting R&D. The negative impact of market concentration (row 3) on the probability implies that the absence of competitive pressure in the market acts as a disincentive for investing in R&D. Though the vertical integration (row 7) has come up with the right sign, it is not statistically significant. Royalty paid (row 6) has a positive sign, but it is not statistically significant. Interestingly, foreign ownership does not appear to have an impact on

the R&D decision of the firm (row 4). The export intensity variable (row 5) also has a negative sign but is not statistically significant.

The variable in focus, FDI, has a negative sign as expected and it is statistically significant (row 1). This implies that the increased inflow of FDI after 1991 liberalization negatively affected the propensity to invest in R&D in the earlier years after 1991.

Since one contribution of this paper is to investigate the potential problem associated with the use of R&D expenditure data, the above analysis is repeated by using the dependent variable which takes the value of one if the firm reported R&D expenditures and zero otherwise. Column 4 reports the results. The sign and significance of most of the controlling variables remain same. However, with respect to FDI inflows (row 1), the results change completely. The variable becomes not only insignificant but also positive. Thus, the use of different measures of R&D has an important implication for econometric analysis.

**Table 6. Probit estimation for 1996**

Variable (1)	Dependent variable = presence of a DST recognized R&D unit or reported R&D expenditure (2)	Marginal effect (3)	Dependent variable = reported R&D expenditures (4)
1 FDI Inflow <sub>1995</sub>	- 0.42* (0.156)	-0.165* (0.061)	0.026 (0.177)
2 Size	0.86* (0.19)	0.33* (0.074)	0.61* (0.224)
3 H-index	-1.28* (0.66)	-0.50* (1.94)	-0.152 (0.75)
4 Foreign share	-0.0003 (0.006)	-0.0001 (0.002)	-0.003 (0.007)
5 Export intensity	-0.002 (0.006)	-0.0007 (0.0024)	-0.017 (0.011)
6 Royalty payments	0.097 (0.13)	0.038 (0.05)	0.062 (0.093)
7 Value added	0.002 (0.008)	0.001 (0.003)	0.015* (0.009)
8 Constant	2.65* (1.40)		-2.33 (1.65)
N	190		190
Prob > $\chi^2$	0.00		0.033
Pseudo R <sup>2</sup>	0.15		0.086
LR( $\chi^2$ )	38.12		15.28

Source: Author.

Notes: \* Indicates significance at the 10% level. Figures in parenthesis give standard errors.

Columns 2 to 4 of table 7 present the results of the probit estimation for the year 2001. The FDI data used for these regressions are cumulative FDI inflows during the period 1996–2000. Column 4 of the table reports results of the probit estimation using reported R&D expenditures as the dependent variable. Since, of the 65 firms with a DST recognized R&D

unit, 61 firms reported R&D investment in 2001, the bias should be minimal. The results confirms this; the coefficient of the variable, FDI Inflow (row 1), has the same sign in both of the probit estimations. The variable is still negative, but it has lost its significance.

**Table 7. Probit and tobit estimations for 2001**

Variable (1)	Dependent variable = presence of a DST recognized R&D unit (2)	Marginal effect (3)	Dependent variable = presence of reported R&D expenditures (4)	Tobit estimation (5)
1 FDI Inflow <sub>2000</sub>	- 0.158 (0.167)	- 0.063 (0.067)	-0.038 (0.167)	-0.44 (0.34)
2 Size	0.81* (0.18)	0.32* (0.07)	0.71* (0.178)	0.87* (0.35)
3 H-index	-2.43 (2.16)	-0.97 (0.86)	-0.14 (2.12)	-4.62 (4.48)
4 Foreign share	0.0015 (0.005)	0.0006 (0.002)	-0.0001 (0.005)	-0.0007 (0.0105)
5 Export intensity	0.007 (0.006)	0.0028 (0.002)	-0.003 (0.0057)	0.0138 (0.011)
6 Royalty payments	0.123 (0.23)	0.05 (0.092)	0.014 (0.22)	0.37 (0.437)
7 Value added	0.007 (0.006)	0.003 (0.0025)	0.007 (0.006)	0.019 (0.012)
8 Constant	0.21 (1.74)		-1.33 (1.74)	2.32 (3.48)
N	190		190	190
Prob > $\chi^2$	0.00		0.000	0.0015
Pseudo R <sup>2</sup>	0.15		0.133	0.0437
LR( $\chi^2$ )	38.82		34.74	23.28

Source: Author.

Notes: \* Indicates significance at the 10% level. Figures in parenthesis give standard errors.

With respect to other variables, only size (row 2) significantly impacts the probability of undertaking R&D (column 3). A larger firm is more likely to invest in R&D. The negative impact of market concentration on the probability implies that the absence of competitive pressure in the market acts as a disincentive for investing in R&D. Export intensity and vertical integration have come up with the expected sign but are not statistically significant.

In order to examine which factors affected the R&D intensity of the firms, a tobit model is estimated (column 5). The significance and the sign of the coefficients are the same as the results of the probit estimations.

Based on these results, it can be concluded that immediately after 1991 liberalization, increased FDI inflows negatively affected the R&D propensity of firms, but subsequently the negative impact of FDI inflows diminished.

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## 7. Interpretation and conclusions

This study analysed the impact of increased FDI flows on the R&D investment of manufacturing firms in medium- and high tech-industries in India. FDI and the intrinsic competition with foreign firms can conceivably induce more R&D by Indian companies in their effort to maintain parity, or it could undermine R&D if these firms succumb to the competition. Alternatively, easier access to imported technology than in the past could result in Indian firms resorting to importing technologies rather than investing in R&D, especially given the costs and uncertainties involved. The present study hypothesized that increased FDI in India has resulted in a reduction in R&D by manufacturing firms. This was tested for two time periods, 1994–1996 (just after foreign entry regulations were relaxed) and 1999–2001 (after a second period of reforms in 1997). The analysis covered seven industries, including pharmaceuticals, automotive components and electrical equipment.

The analysis shows that in the first period, 1994--1996, the inflow of FDI had a negative impact on R&D investment by Indian manufacturing firms, but no significant effect in 1999--2001. One possible explanation for the divergent results in the two time periods could be the expectation of firms with respect to the reforms. At the beginning, the reforms could have caught the firms off-guard, thereby affecting their R&D investment. The second round of reforms, which started around 1997, increased the pace and scope of inward investment. The reforms comprising of opening-up of many sectors reserved for the government and increasing the upper limit for foreign equity could have given clearer signals to domestic firms that the liberalization measures and the accompanying enhanced competition were now irreversible. This irreversibility and nature of reforms could have forced firms to adjust their behaviour accordingly.

With regard to firm characteristics, size was an important determinant of R&D activities of domestic firms in both time periods and the probability of a firm undertaking R&D increased with its size. Industry concentration as measured by the H-index was significant only in the first time period and had a negative impact on the probability of undertaking R&D. This implies that firms belonging to a less competitive industry had less incentive to invest in R&D.

The results and conclusions in this paper are statistically robust, but need to be qualified. In particular, the study only covers firms listed on the stock exchange and those in R&D intensive industries. There is

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thus scope to extend the analysis to take non-stock market and non-R&D intensive firms into account, as well as to examine other issues which arose, such as differences in R&D intensity and behaviour between foreign and domestic firms.

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# RESEARCH NOTES

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## **Missing the GO in AGOA? Growth and constraints of foreign direct investment in the Kenyan clothing industry**

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This research note presents findings from a small-scale survey of foreign affiliates in the Kenyan clothing industry. While a sizeable clothing manufacturing industry has re-emerged in Kenya as a result of the African Growth and Opportunity Act of the United States, the findings highlight the constraints on the growth of the industry and the development of local backward linkages. Despite the diverse growth aspirations expressed by the foreign-owned clothing manufacturers in Kenya, “growth and opportunity” appear to be missing in the industry. The characteristics of the parent transnational corporations and the shortcomings of the government in Kenya have constrained the generation of significant benefits from foreign direct investment in this industry.

### **1. Introduction**

The opportunities for industrial upgrading and local economic development in Sub-Saharan African (SSA) nations may conceivably have expanded markedly with the enactment of the African Growth and Opportunity Act (AGOA) of the United States, which, under certain conditions, allows preferential United States market access to SSA producers. In this research note, we assess the growth and development impacts of the recent foreign participation in the clothing industry in Kenya. After the decline of Kenya’s largely indigenous and local-market oriented clothing industry that had developed before the 1980s, the industry has recently re-emerged as an export-oriented, foreign-owned industry as a direct result of the AGOA. Despite a sizeable industry, which employed 37,000 workers at its high point in 2003 (McCormick et al., 2006), the opportunities for industry growth, upgrading and wider economic development impacts in Kenya remain elusive.

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Although there have been a number of studies on FDI in Kenya – notably Langdon (1981) and UNCTAD (2006) – the subject remains relatively under-researched. For the clothing industry in Kenya, a number of studies have been undertaken following its re-birth in recent years (Ikiara and Ndirangu, 2003; McCormick et al., 2006). The findings presented here add to these studies by considering more explicitly the FDI component of the industry and its wider impacts.

The (re-)growth of the clothing industry in Kenya with the advent of the AGOA is an interesting case to study when exploring the developmental impacts of FDI. The AGOA is a non-reciprocal trade agreement between the United States and 38 SSA countries, which covers around 7,000 product lines. The original agreement ran from 2000 to 2008 and was subsequently extended to 2015 (Office of the United States Trade Representative, 2007). SSA countries seeking to benefit from export to the United States market under the AGOA are obliged to make progress towards market reform, protection of property rights, maintenance of the rule of law, removal of impediments to United States trade and investment, reducing poverty, policies to combating corruption, and compliance with international standards covering workers rights (McCormick *et al.*, 2006). Twenty-six of the 38 countries in the region are eligible for market access benefits related to clothing manufacture and 17 for hand-made clothing items.

At first glance, FDI in the Kenyan clothing industry presents some *a priori* grounds for optimism with regard to its positive effects on the local economy through participation in global commodity chains (GCCs). Kenya has traditionally been a hub for the East African region (Kaplinsky, 1978, p. 4) in terms of flows of people, goods, services and investment – although a great deal of complacency on the part of the national government has seen Kenya and Nairobi’s role challenged somewhat in recent times in terms of FDI flows (UNCTAD, 2006; Phelps et al., 2007). Moreover, the country has been host to a sizeable clothing industry, the seeds of which were sown by foreign investment under British colonial rule prior to the Second World War. The industry flourished under the import substitution regime instituted with independence. The protected, import substitution-based clothing industry reached its peak in term of employment in the early 1980s. Just as significantly, by this time, a cotton-textile supply industry had developed. The industry subsequently collapsed, but one might expect that the industrial experience and institutional infrastructure from the period offer some advantages in the re-emergence of the clothing industry stimulated by the AGOA. However, the sizeable FDI in the

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Kenyan clothing industry in recent years has failed to generate wider economic impacts. It is a story that underlines some of the difficulties SSA nations face in participating in the international economy.

In this paper, we trace the missing “GO” (growth and opportunity) in AGOA in the Kenyan clothing industry to the parent company, customer relationship, the uncertainties associated with the AGOA itself, and both general and industry-specific failings of government and associated institutions in Kenya. Significant constraints upon the growth of the Kenyan clothing industry and the development of local supply chains become apparent from the findings.

This paper is organized as follows. In the next section, we provide a brief resume of the theoretical issues motivating the study of FDI in the Kenyan clothing industry. We outline the research method used in section 3. Then, we present empirical findings from our questionnaire survey and interviews. The description of the companies interviewed are reported in section 4 and their plans for further expansion in section 5. Section 6 draws inferences on the constraints the industry faces, and section 7 discusses the absence of backward linkages. Section 8 concludes.

## **2. Growth and growth constraints of FDI**

The contribution of FDI to a host economy partly depends on the evolution of the foreign affiliates over time within their parent organizations. In keeping with early studies documenting the negative aspects of host economies’ dependency on the foreign-owned sector, early analyses of the contribution of FDI to host economies treated employment change at foreign affiliates in terms of growth being “allocated” from the parent companies, perhaps on the basis of product life-cycle considerations (Firm, 1975). In contrast, more recent work within the international business and economic geography literature has concentrated on differences among TNCs according to their resources and capabilities. Along with this perspective has come something of a celebration of the varied contribution of individual affiliates to parent TNCs’ performance. Recognition of the role an affiliate plays (Young et al., 1988) implies different mechanisms of allocation by parent companies and/or competition among affiliates as well as ultimately distinct evolutionary trajectories of individual affiliates (Birkinshaw, 1997, 1999; Fuller and Phelps, 2004; Phelps and Fuller, 2000). The emphasis within this literature is less upon numerical changes in

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employment and more upon *qualitative* changes at affiliates, as reflected in their acquisition or loss of broader capabilities.

The perspective of “allocated growth” that prevailed in the 1970s and early 1980s can be captured and analysed through conventional employment changes associated with the foreign-owned sector (e.g., Stone and Peck, 1996). However, the number of employees alone reveals little about the *qualitative* dimension of employment change. The issues that have become central to the capability perspective of the TNC and its affiliates are more adequately captured through the examination of its growth and constraints. Working in the context of the widespread industrial decline in the United Kingdom, the pioneering work by Massey and Meegan (1982) classified employment change into the categories of “rationalization”, “technological change” and “intensification”. To these categories, Turok (1989) later added “extensive growth”, “stagnation” and “product development”.<sup>1</sup> Four of these categories imply some growth in output although not necessarily in employment, drawing attention to qualitative changes in the nature of activity at manufacturing establishments. Although we do not use these categories of employment change, the research presented below draws on this work when seeking to understand the growth and constraints associated with FDI in the Kenyan clothing industry.

Furthermore, there has been a renewed interest in the specific contributions that host environments make to the possible acquisition (or loss) of capabilities at individual TNC affiliates. Consideration of the host environment’s contribution to affiliates’ position within the parent organization has extended beyond “conventional” location advantages, such as labour costs and accessibility, to identify a role for the broader supporting institutional environment provided by universities, technical institutes and even specific programmes for supplier development or after care that impact positively on affiliates’ capabilities. However, the precise contribution of such host economies’ “institutional capacity” is still open to debate (Fuller and Phelps, 2004). Moreover, questions remain

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<sup>1</sup> Turok (1989, p. 5) defines these components in the following ways. Rationalization involves “a straightforward cut-back in production capacity and may involve complete plant closure”. Technological change involves “changes designed to increase labour productivity with a major new investment and substantial reorganization of production techniques”. Intensification implies “changes intended to increase labour productivity but without large scale new investment or major reorganization of production techniques”. Extensive growth is “the expansion of production through the provision of additional production capacity of the same type as existing techniques”. Product development is the “designing and development of new commodities and the identification of new markets”. Stagnation is a situation “where output and employment are broadly unchanged”.



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over the manner in which such host economy locational advantages and institutional capacities are structured by elements of the international trade and investment regulatory environment such as the AGOA, which forms the context to our discussion in this research note (see also Phelps et al., forthcoming). In the research findings that we present below, we discuss these considerations regarding the contribution of the host environment to the growth and constraints facing FDI in the clothing industry in Kenya.

### **3. Methodology**

This research note draws upon original research carried out in 2004 focusing on the volume manufacture of clothes in Kenya, which has been the preserve of foreign affiliates.<sup>2</sup> The research as a whole was designed to examine the economic impacts of FDI in the clothing industry in Kenya in terms of the characteristics of manufacturing establishments, patterns of assistance received by these establishments from customers, parent companies and agents, local purchasing linkages, other linkages to local institutions (findings on which are reported in Phelps et al., forthcoming) and the plans for growth and constraints identified by foreign-owned establishments which we discuss here.

Our case study makes use of both extensive and intensive research methods (see Sayer and Morgan, 1985). A survey of establishments was conducted, mainly through face-to-face interviews and, in a few instances, through telephone and fax. A survey of all volume clothing manufacturing establishments was thought necessary in order to give a balanced picture of the aggregate economic impacts, growth aspirations and growth constraints facing the industry. The intensive method consisted of a series of tape recorded face-to-face interviews, which, while eliciting information for the above factual survey, also sought to gain greater explanatory insight into these aggregate trends. Quotations from respondents in these interviews are used to illustrate the key findings.

First, extensive empirical research by means of a questionnaire survey was undertaken to gather data on direct and indirect impacts of clothing manufacturing establishments, the ownership and markets, and upstream and downstream relationships, and finally the growth and

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<sup>2</sup> From the Kenyan perspective, craft based indigenous clothing manufacturing, rather than volume manufacturing, may represent a better strategic opportunity for exploiting the opportunities presented through the AGOA (McCormick et al., 2006).

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constraints anticipated by the management at these establishments. A survey of 23(66%) of the 35 identified clothing firms operating in the industry just after its recent high-water mark of 2003 was conducted. The list of 35 clothing manufacturing companies was derived primarily from the Export Processing Zone Authority (EPZA) of Kenya and cross-checked with other available business directories and on location. Some discrepancies between the figures for overseas equity participation in the industry provided by the EPZA and those obtained at interview were noted. Nevertheless, all but two appeared to have substantial equity participation from overseas companies or individuals and hence could be classed as foreign affiliates (see table 1 and further discussion below). Most of these responses were obtained at face-to-face meetings, which, for practical reasons, were therefore skewed towards those establishments operating in and around Nairobi and Mombasa. We can only presume that the general constraints on growth reported here will have been more severe elsewhere than in the two largest and most developed city/region economies of Kenya.

Second, semi-structured interviews with these 23 firms and 25 interviews with government ministries, the investment promotion agency, development banks, industry representative bodies, international organizations and others provided expert opinions on the development impacts of the clothing industry in Kenya. The positions of the interviewees and those who provided factual information as part of the survey varied, although all interviewees were in a senior management position such as general manager, financial director or purchasing director.

In the remainder of this research note. we report on the most relevant part of these interviews.

#### **4. Activities, employment, ownership and markets**

Before considering the constraints on the growth and linkage development of the Kenyan clothing industry, we present a description of FDI in the industry.

##### **4.1 Employment**

The establishments we surveyed covered 23 of the 35 known establishments and 26,642 of the estimated 32,000 employees in 2004 (McCormick et al., 2006). As such, the survey covered a good part of the known private sector actors in the industry at the time (table 1).

**Table 1. Ownership, age and employment of clothing manufacturing companies in Kenya**

Company	Ownership	Date established	Direct production employees 2004	Total employees 2004
Rising Sun EPZ Ltd	Sri Lanka	2002	1,400	1,460
Upan Wasana EPZ Ltd	Sri Lanka	2001	1,650	1,690
Indigo Garments EPZ Ltd	India	2001	1,500	1,580
United Aryan Resources EPZ Ltd	India	2003	2,300	2,350
Storm Apparels (MUB)	Kenya	2004	735	785
Falcon Apparels (MUB)	Kenya	2003	200	225
Protex Kenya EPZ	Taiwan Province of China (90%)/Kenya	2001	1,150	1,200
Apex Apparels	India /Bangladesh	2003	2,156	2,342
Sahara Stitch EPZ	United Arab Emirates (60%) / Kenya	2001	835	850
Sinolink Kenya EPZ	China	2001	1,016	1,100
Ashton Apparels	India (located in the United Arab Emirates)	2001	2,700	2,800
KAPRIC1 Apparels	Hong Kong (China)	2001	1,820	2,000
Birch Investments (Kapric2)	Hong Kong (China)	2001	900	900
Shin Ace Garments	Taiwan Province of China	2003	789	800
Blue-Bird Garments	India (located in the United Arab Emirates)	2002	575	600
Senior Best Garments	China	2002	820	850
Kenya Knit Garments	China /Taiwan Province of china	2001	1,905	1,920
Ancheneyar EPZ	Sri Lanka	2004	500	513
Chandhu EPZ	Kenya/foreign	2004	188	217
Mirage EPZ	India	2002	1,175	1,200
MRC (Nairobi) EPZ Ltd	Sri Lanka	2001	1,270	1,300
Rolex Garments EPZ Ltd	India	2002	897	950
Asia Resources EPZ Ltd	Sri Lanka	2004	683	700
<i>Totals</i>			27,164	28,332

One initial observation that can be made from table 1 is that these factories are large in size, employing several thousand workers. All but two operations employed over 500 people. Our survey also sought the breakdown of the total employment figure into management and direct production components. The numbers of direct production workers are also reported in table 1. The vast majority (96%) of the workers are

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involved in direct production. Despite the labour intensive nature of the industry, there is a sizeable number of white collar workers. However, interviews confirm that many of the key positions are held by expatriates from the home country of the parent TNC.

The majority of direct employment created in these large factories follows a pattern that is also quite familiar in older industrial regions of developed countries. The majority of direct production employees in these large factories are on casual or temporary contracts (see also MIGA, 2006) – with resultant implications not just for the job security for them but also labour relations and the generation of skills in the industry.

## **4.2 Products**

A wide range of goods were produced by the companies surveyed, including sports clothes, shorts, t-shirts, woollen knits, track suits, pyjamas, ladies' tops and trousers – the latter two items being the most common. Two factories visited appeared to have become specialized as they produced denim jeans exclusively. All the respondents noted that the choice of products was dictated by the buying agents, the dealers or the parent companies with the product mix influenced by seasonal demand.

## **4.3 Activities**

Within the wider clothing GCC, there are several distinct stages of production: conception, manufacture and delivery to the consumers. The research sought to identify not only the characteristics of FDI within the Kenyan clothing industry as nodes of activity but also wider upstream and downstream connections within a GCC. The questionnaire solicited information in relations to five stages: design, textile manufacture, garment manufacture, sales and marketing, and eventual packaging. Interviews and site visits provided additional details on important sub-stages involved.

### *Design of garments*

Eighty-three per cent of the respondents did not carry out any garment design at their site. Instead, the end customer, the agent or buyers would specify the designs for the factory to produce a prototype. This would be sent to the customer for approval, after which an order would be placed for the factory to produce in a certain quantity. The

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remaining 17% carried out some design activity but only on a small scale, and these respondents were not significant players in the Kenyan clothing industry.

### *Garment manufacture*

None of the companies surveyed were involved in textile manufacture – they externally procured all the necessary fabrics, mostly imported, either from a buyer-nominated supplier or from the parent company. The majority of these textile suppliers were located in the home economies of the parent TNCs – namely China, Hong Kong (China), Pakistan, Sri Lanka and Taiwan Province of China. The respondents confirmed that imported fabrics was often cheaper than locally-made fabrics.<sup>3</sup>

Two types of manufacturing can be identified. In the first type, companies do not purchase the fabrics; everything is provided for, either by the buyer/agent or the parent company. Their only task is to cut and make (C&M). These companies do not carry out any overseas marketing and have no direct links with their customers. In the second type, companies purchase all the fabrics and negotiate the prices with the customer. They then make the products and ship them to the customer. This is free on board (FOB) manufacture.<sup>4</sup> The profit margins attainable under different types of production vary as do the risks to producers.

### *Cutting, sewing and finishing*

Within clothing manufacture, 100% of the companies carried out cutting, sewing and finishing. Cutting involves laying-out and measuring the fabrics into suitable sizes and then separating these into smaller cloth pieces to be joined up. In the small and medium-sized firms, all cutting appeared to be done manually with virtually no machinery involved. The larger enterprises had some automated operations. A company like Ashton Apparels had several such machines (straight knife cutters, band

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<sup>3</sup> During interviews, company representatives noted that the overriding factor was not the cost, as the orders often came with conditions that fabric must be sourced from a supplier who had been quality certified by the buyer or customer. There are significant risks of an entire order being rejected should a company choose to source its own fabric later found to be sub-standard.

<sup>4</sup> Free on board manufacture – this is an international trade term where the seller is held responsible for delivering goods to a certain port, clearing through export control and loading these onto the ship. Once loaded they become the responsibility of the buyer.

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knife cutters and end-cutter machines). They also employed a spreading machine and a mechanized marker-plotter.

Once cut, the fabrics are passed to the sewing floor. Here, the workers were organized into production lines comprising benches holding sewing machines. The majority of the sewing machines used were standard industrial models, with each factory having a range of single-needle, double-needle and multi-needle machines for different tasks. The most common brands used were Juki and Kansai models imported from Asian manufacturers.

The next stage involves fitting cuffs and collars, making button holes, over-locking, and adding snaps and bar tacks. Some tasks require use of additional machinery and staff training. The more customized garments undergo additional work, such as embroidery and sandblasting. Only about a quarter of the firms surveyed had the machinery to complete complex embroidery work, and some often had to sub-contract this task to other firms.

Once finished, the garments are laundered prior to packing. Most of the companies surveyed had in-house laundry facilities, which involved large, industrial washing machines, tumble driers, water extractors and drying equipment. The garments are then pressed to remove creases and checked for defects prior to bagging and packaging.

### *Packing*

Once passed for quality, the garments are labelled, bagged and packed into boxes, stamped for traceability. By this stage, the products are usually ready to go straight to the shelves of the end customer, some of which are labelled and price tags attached. Once approved and verified by the customs representatives, export authorization is granted and the products are loaded onto ships at Mombasa port bound for the United States.

### *Sales and marketing*

The bulk of the work carried out within Kenyan clothing factories is C&M; for the majority of enterprises, the sales and marketing functions are not conducted within the country. Only two companies reported having a marketing or buying office which directly sought orders overseas. For most firms, sales and marketing was done through their parent company in the home country or arranged by agents or brokers who liaised with the end customer.



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## 4.4 Age

As table 1 confirms, all of the companies surveyed indicated that they had been established after the enactment of the AGOA in 2000. Only one clothing company surveyed indicated that they had existed prior to the AGOA. All of the companies surveyed were involved in clothing manufacture for which the AGOA represented major new export opportunities so that the re-birth of the clothing industry in Kenya has also been one of clothing manufacture rather than textile manufacture. Although as many as 35 textile mills continue to exist in Kenya according to one recent report (MIGA, 2006), these are moribund and uncompetitive as a local source of fabrics.

## 4.5 Ownership and the nature of investments from developing country TNCs

There exists a long history of Asian involvement in the East African economies and Kenya in particular. The roots of Asian involvement in business activities stem from labourers brought in from India to build the Kenya-Uganda railway under British colonial rule in the 1880s. These workers later set up small trade operations which evolved over time into dominant Kenyan enterprises (Himbara, 1993). These Kenyan-Asians have maintained relationships with their country of origin in Asia over generations, and with the recent industrialization of these Asian countries, the relationship has strengthened as it leveraged upon new and expanded corporate networks. Textile manufacturing was one of the earliest modern forms of manufacturing in Kenya, with the first textile plant being set up in the early 1930s by Indian investors. These early efforts were followed by similar investments and, post-1945, Asian merchant capital played a significant role in the diversification of the economy into manufacturing (Swainson, 1978, p. 40). The concentration of new Asian investment into SSA clothing industries, as facilitated by the AGOA, reflects some of these long-standing trade and investment interests as well as the global competitiveness of Asian clothing companies. It is part of a broader engagement of Asia as a major driver of trade and FDI with SSA (Jenkins and Edwards, 2006).

The home economies of the parent TNCs reflect these distinctive Asian trade and investment connections with the ultimate ownership residing in Bangladesh (8%), Hong Kong (China) (4%), India (17%), Singapore (4%), Sri Lanka (13%), Taiwan Province of China (17%) and the United Arab Emirates (17%). The ownership listed above and in table 1 is inferred from the authors' research, but the ultimate ownership

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of those companies is not always clear. Some of the difficulties in establishing the precise ownership status of Kenya-based clothing companies is a reflection of the obscure ownership structure of these firms and the marginal and transient nature of industrialization prompted by the AGOA.<sup>5</sup> The level of foreign equity participation varies. The various secondary sources available in Kenya indicated differing proportions of Kenyan ownership.

Three of the establishments surveyed indicated that they were independently owned (i.e. wholly Kenyan-owned single operation) but noted at interview that they had “sister companies” or related factories operating in various parts of Asia with whom they shared orders, ownership and management links. Here, their identity was given as Kenyan even though they had significant foreign equity participation. These sometimes obscure relations of ownership and control also appear to be partly due to differential tax and incentives status open to domestic and foreign companies.<sup>6</sup> This appears to be indicative of the “paper” rather than real nature of such joint ventures (Bräutigam, 2003, p. 460). It also highlights the contradiction between the expectations of developing countries regarding the potential benefits to be gained from FDI, and the potentially fluid nature of FDI stimulated through international trade and investment agreements.

With few exceptions, most of the new investment in the industry originates from Asian economies such as Hong Kong (China), Singapore and Taiwan Province of China, which might be regarded as the “semi-periphery” of the international economy (Henderson, 1989) by virtue of their role as “first tier” coordinators of GCCs in clothing (Gereffi, 1999). However, the expectations and cultural values these parent companies bring with them from their home countries appear to preclude

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<sup>5</sup> Companies responded to this matter from different perspectives. Some respondents viewed this question as one questioning whether they owned their factories or whether these were owned by a separate, larger company. Yet others viewed the question in terms of their company’s legal position in the country; whether they were registered as a Kenyan or as a foreign company, with the relevant legal liabilities assumed. Other respondents took the question to be one of control; whether they were stable, entities capable of making independent decisions or whether they were a subsidiary controlled through a head office.

<sup>6</sup> In Kenya capital tax rates for resident companies are 30% and 37.5% for subsidiaries of foreign owned companies. There is an incentive here for nominal local business participation to confer lower domestic rates of tax upon what ostensibly is FDI. Against this must be set the incentives offered to FDI such that domestic companies may establish and finance separate firms masquerading under a foreign identity [Interview FDI 12].

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important indirect economic benefits, such as technology transfer (see also Lall, 2005, p. 1007). The nature of FDI by these TNCs appears to be efficiency-seeking in labour-intensive GCCs (UNCTAD, 2007, p. 160).

Other Asian TNCs (from countries such as Bangladesh and India) participating in the Kenyan clothing industry are newly internationalized on the basis of being “second tier” locations within clothing GCCs. Whilst these late-comer Asian TNCs have apparently attained the capacity to remain internationally competitive in the longer term (US-ITC, 2004 cited in Lall, 2005, p. 1015), their FDI in Kenya represents an initial, tentative step towards internationalization, rather than investment that constitutes part of a well-developed internationalization strategy. In a number of cases, the new Kenyan enterprises are run as branch-plants for capacity sub-contracting, with the parent company directly providing all the inputs and materials and managing both the sourcing and marketing ends of the production process. In this regard, it is doubtful that the Kenya-based affiliates could operate profitably without the ownership advantages derived from the parent company’s networks. Instead, there is a case for arguing that the re-birth of the Kenyan clothing industry is a product of the recent expiration of the Multi-Fibre Agreement (MFA) and the preferential treatment granted as part of the AGOA (UNCTAD, 2006, p. 98).

The case of Apex Apparels located in the Athi River EPZ is typical of the vulnerability of the Kenyan clothing industry. Apex Apparels EPZ Ltd. is located within the Athi River EPZ and is one of the larger enterprises in the zone. At the time of the survey in 2004, it employed over 2,000 people. Apex Apparels has its parent company located in Dhaka, Bangladesh. It is one of six factories run by the parent company with the other five being located in the home country. The Kenyan operation is the newest of them, but its orders and marketing of products are handled through the home country. Partly as a result of this pattern, it is 100% reliant on the orders channelled through a particular buyer known to the parent company and sister factories in Bangladesh. The factory forms part of a relatively low-risk strategy of limited internationalization that augments capacity and profits of the parent company. The factory’s existence is highly contingent upon the AGOA agreement and its renegotiation, with an interviewee suggesting that any major deleterious change in this respect would most probably result in complete closure [Interview FDI 8].

The extent to which the Kenyan clothing enterprises are an integral part of their parent companies’ strategic direction is therefore

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questionable. These establishments can hardly be regarded as examples of strategic autonomy and capability sometimes developed at foreign affiliates of TNCs (Birkinshaw, 1999; Phelps and Fuller, 2000), nor are they territorially embedded. Their relationship to the parent company coupled with the terms of the AGOA and the low barriers to entry into the clothing industry mean that these investments are likely to be highly transient [Interview INST 10]. The marginal nature of the Kenyan clothing industry has been confirmed in a more recent study: McCormick et al. (2006) reported that just 22 enterprises remained in the Kenyan clothing industry in 2005.

## **4.6 Markets**

All of the companies produced entirely for the United States retail market. Of the companies that agreed to provide information on their end customers, over 50% were producing for Walmart Stores, the largest retailer in the United States. Other customers for whom the factories were making products included JC Penney, Calvin Klein, Kmart, Target, Levis and Gloria Vanderbilt. These patterns are to be expected given the growth of the industry in connection with the AGOA, however, the strong focus on the United States market, to the exclusion of other destinations, such as the European Union or countries in the regional grouping, COMESA (Common Market for Eastern and Southern Africa), highlights the failure of the industry to diversify its market.

## **4.7 Dependency**

Respondents at the surveyed companies were asked what proportion of their sales was accounted for by their single largest customer. The findings from the 20 companies which responded indicated a very high level of dependency: on average, 64% of sales were destined for the largest customer. Over half of the sales of almost all companies were taken by the largest customer.

Three companies indicated that they were entirely dependent upon a single customer. These companies are among the smallest operations surveyed, but even the largest and most technologically sophisticated of the clothing operations were highly dependent on their largest customer, as the case of Ashton Apparels indicates.

Ashton Apparels Ltd. is one of the largest garment manufacturing firms in Kenya. It is located in Mombasa's Jomu area where it runs three factories. The company has a regional head office in Dubai, the United

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Arab Emirates, and strong links to the ultimate parent company in India. Ashton is one of the very few globally competitive operations in the Kenyan clothing industry. However, despite its size and sophistication, Ashton was, at the time of interview, dependent on orders from a single customer for 60% of the value of its sales [Interview FDI 11].<sup>7</sup>

The entrenched nature of the problems of dependency on a very limited number of customers for orders is an important constraint on the companies' further growth and wider economic development. These foreign affiliates in Kenya are caught between the parent TNC on the upstream side and the powerful customers in the West on the downstream. In the following section, we highlight the lack of spillover effects commonly thought to flow from both upstream and downstream sources.

## 5. Plans for growth

The questionnaire survey asked the companies to outline their future plans for the business in the medium term (3–5 years) with regard to the forms of possible expansion. Table 2 summarizes the results which indicate that the majority of respondents are seeking to expand in more than one way.

**Table 2. Companies planning future business development**

Forms of expansion being considered	Number of respondents (%)
Expansion of output	18 (78)
Installation of new equipment	14 (60)
Producing more expensive garments	12 (52)
Acquire /strengthen design capability	9 (39)
Improve worker skills	19 (82)
Diversify /expand customer base	17 (74)

Source: Authors' survey in 2004.

Since the clothing industry is widely recognized as labour intensive and low technology in nature, it is not surprising that a large proportion (72%) of establishments surveyed should be considering an expansion of output, as this can be achieved through “capital widening” – a quantitative increase using the same production processes, technology and labour skills. It is this form of expansion that has turned out to be the most significant effect of the AGOA on the clothing industry in Kenya.

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<sup>7</sup> Nevertheless, it was reported in 2005 that new investment doubled employment at the factory to 5,000 (EPZA, 2005a, p. 17).



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The AGOA provided significant opportunities for expansion through duty-free access into the lucrative United States clothing market. Initially, this expansion in output has come from the opening of new factories but once established an important form of growth has come from the addition of “more of the same” production processes. Thus, Mirage EPZ planned to add two new production lines utilizing similar machinery [Interview FDI 20]. Kenya Knit garments planned to establish another plant [Interview FDI 21].

More surprising is the large proportion of firms looking to make what might be regarded as forms of expansion which imply “capital deepening” – a *qualitative* change in production processes, technology and skills. Thus, high proportions of surveyed establishments seek to diversify their customer base (74%) and worker skills (82%). To the extent that establishments are seeking to make such qualitative enhancements to their business operations, the figures in table 2 provide grounds for optimism over the future development of the clothing industry in Kenya.

Sixty per cent of surveyed establishments suggested that they wished to introduce new equipment during the period 2004–2009. This is higher, but broadly in line with a figure of 43% of firms surveyed by KIPPRA in 2001 that had changed their machinery since the initial installation (Ikiara and Ndirangu, 2003, p. 62). The prevailing view was that the Kenyan clothing industry was not employing much new technology [Interview INST 22] with the KIPPRA report arguing that “the level of technology upgrading in the T&C sector in the country is low” (Ikiara and Ndirangu, 2003, p. 62). The figure of 60% found in this survey in the relatively short time-scale (3–5 years) involved indicates some further development in the capacity of the sector for technological upgrading. Several companies therefore planned to acquire more advanced technology, such as boilers and specialized embroidery machines [Interview FDI 15], washing facility for woollens [Interview FDI 18], an industrial laundry machine, embroidery machine and sandblasting equipment [Interview FDI 3]. The larger companies which already owned such equipment [Interviews FDI 11 and 14] represented this as a competitive advantage when tendering for orders, as it confirmed their technical competence in fulfilling intricate and detailed orders.

Smaller proportions of surveyed establishments were seeking to make more expensive or sophisticated garments (52%), introduce new equipment (60%) or improve their design capabilities (39%) – something



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that may be largely beyond their reach, given the importance of end customers to this process.

Improving workers skills emerged as a key concern among the firms, with 82% of respondents looking to develop their workers' capabilities. Some of the expected benefits from FDI include transfer of skills and management know-how, which is seen to benefit recipient countries through improved processes, superior standards and the diffusion of knowledge into the domestic economy (Blomstrom and Kokko, 1999). While many companies expressed their intention to raise the skill level, there has been little evidence of this occurring in the industry to date, which raises questions regarding the categories of skills companies intend to develop. The absence of knowledge transfer on the ground may indicate that this was more of an aspiration than a specific target. It also highlights the underlying complexities involved in effecting knowledge transfer. Complex relationships exist between the improvement of skills, on the one hand, and the issues of wages, industrial relations, the expectations of parent companies and the performance of their overseas affiliates in cultural settings quite different from those of their home country, on the other.

Some limited evidence of skills upgrading in the industry does exist. Certainly, there have been changes in the nature of jobs performed by local workers, with more of them moving into supervisory roles than was previously the case. As indicated by one ministry official, "there is some training occurring and skills development here; there is some evidence that Kenyans are moving up these companies' hierarchies" [Interview INST 4]. In companies like Protex EPZ, Kenyan workers held senior management roles, such as general managers, human resources managers [Interviews FDI 2]. Several companies had Kenyan personnel as their spokespersons, liaising with the press and unions. The majority, however, maintained expatriate staff in senior management and technical roles, especially those of quality inspection, merchandising, finance and some supervisory roles. As one interviewee explained, "the supervisory jobs are done by Asians here, even though locals can do this job at a cheaper rate ... we must have Asian technical supervisors as they are internationally recognized" [Interview FDI 15].

Some basic training programmes take place at the EPZs. According to one company manager, these are organized jointly at cost to the companies involved [Interview FDI 12]. The existence of a labour pool with basic skills can be explained in part by the legacy of the clothing industry under the import substitution policy in the 1980s

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and the existence of a significant number of micro-enterprises. Other training institutions exist, such as the Kenya Textile Training College, Kenya Technical Training Institute and numerous city and village polytechnics, though there is little evidence of direct engagement of the companies with these institutions. More specific skills shortages cited were the lack of skilled workers to maintain machinery and technical specialists [Interview FDI 16].

Some companies have in-house designers (e.g. Upan Wasana), but the ability to come up with new designs independently in the prevailing mode of manufacture to customer designs may be less relevant than the ability to reproduce pre-set designs to exacting standards. The issue of design capability is, in reality, closely linked with the types of garments these companies manufacture. Currently, the products these companies manufacture remain fairly straightforward (t-shirts, trousers, sportswear) and tend to be low priced items in the United States market, although the companies interviewed did express a desire to produce garments that had more specifications, style, sophistication and fashion content as these paid more and improved the investors' margins [Interviews FDI 17 and FDI 2].

The growth aspirations among foreign affiliates in the volume manufacture of clothing in Kenya are broadly formed by two factors. First, the provisions in the AGOA have created opportunities for the Kenyan clothing industry in two rather separate industry segments. A second factor noted earlier is the potentially constraining role of parent companies and customers which have been passive with regard to enabling qualitative forms of growth in the Kenyan clothing industry. This is an issue we report at greater length in Phelps et al. (forthcoming).

## **6. Constraints on the growth of foreign-owned establishments**

Companies were asked to indicate the three major constraints as they saw them affecting their intended plans. To aid analysis, the responses are categorized into broad issues and summarized in table 3.<sup>8</sup>

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<sup>8</sup> Eighteen companies responded to this question, with over half the companies providing more than four responses on the challenges they felt they faced. The responses were not ranked in any order of importance by the companies but they all featured as the most significant challenges their firms were confronted within the medium term.

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**Table 3. Constraints on business growth**

<b>Constraint</b>	<b>Respondents</b>	<b>Percentage</b>
High costs of production	12	67
AGOA uncertainty	11	61
Bureaucracy & inefficiencies	8	44
Industrial unrest	8	44
Poor Infrastructure	7	39
Lack of government support	6	33
Lack of credit /access to finance	6	33
Labour productivity and skills	6	33
Negative media publicity	5	28
Access to global markets /orders	4	22
Lack of local inputs	2	11

Source: Authors' survey in 2004.

## **6.1 High production costs**

Concern over high production costs is widespread across the whole of the manufacturing sector in Kenya and not just within the clothing industry. Numerous representations to the government by industry bodies confirm that the issue of high production costs remains a chronic challenge for the industry, which the government recognizes as affecting national competitiveness (KEPSA, undated). In our survey, 67% of the firms identified production costs as their main challenge, specifically the cost of electricity, water and labour costs.

### *Electricity*

Industrial energy needs in Kenya are met mainly through electricity and industrial oil. Kenya's electricity problems stem from the fact that nearly 60% of total electricity output comes from hydroelectricity; a supply highly vulnerable to weather conditions. The bulk of hydroelectricity is generated through five hydroelectric plants along the Tana River basin at the Kindaruma, Gitaru, Masinga, Kiambere and Kamburu dams, which produce over 400 MW. Another source, geothermal power, is tapped from the Rift Valley, with three plants located at Ol-Karia. In addition to the relatively high costs, electricity supply is often unreliable, resulting in a loss of production and damages to equipment (KEPSA, undated). One recent report estimated that disruptions to power supplies cost Kenyan-based enterprises the equivalent of 10% of their annual sales (World Bank, 2004, p. 63).

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Within the clothing industry, the high costs of electricity places companies at a distinct global disadvantage. According to industry groups, electricity contributes as much as 67% of the cost of an export-oriented finished garment (KEPSA, undated, p. 5).

Kenya's costs of electricity for industry compare poorly with its neighbours, let alone some of its competitor countries in the clothing industry (UNCTAD, 2006). A kilowatt-hour (KW/h) in Kenya costs \$0.10–0.15, compared to \$0.04 in South Africa and \$0.08–0.10 in China. The costs are lower still in other countries: \$0.025 in Egypt, \$0.007 in Malaysia, \$0.02 in Zambia and \$0.023 in Malawi (EPZA Kenya, 2004, KEPSA, undated).

### *Transport costs*

High transportation costs were also noted by the companies surveyed. The transport costs of inputs and finished products comprise a significant part of total production costs, especially for firms located in Nairobi, Athi River and Ruaraka. Their finished products are destined for export through the port of Mombasa located over 400 kilometres away. The majority of inputs are imported. Transportation is mainly along the Nairobi-Mombasa highway, which is in a poor state and there are major delays due to congestion at weighbridges and security problems along certain sections of the road.

The transport infrastructure within the country has been dilapidated through years of neglect (World Bank, 2004; Ikiara and Ndirangu, 2003). The poor state of road and rail infrastructure has been a common concern for industries. In general, the industry perception of transportation infrastructure compares poorly with those in neighbouring East African countries and major competitors in the clothing industry, such as China (World Bank, 2004, p. 60)

Just as importantly, the air and sea port administration and infrastructure are also in a very poor state. No direct flights from Nairobi to the United States are permitted since Jomo Kenyatta airport has not been certified by the United States Federal Air Administration (Office of United States Trade Representative, 2005). As a result, shipment by air has to be routed via third countries. The main sea port in Mombasa has been plagued by congestion and delays in customs administration. The outdated equipment also means that there is a limited capacity to handle cargo for neighbouring inland countries.

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## *Labour costs*

Interviews with firms in the clothing industry confirm that labour costs make up significant components of production costs. The industry lobby group, Kenya Apparel Manufacturers and Exporters Association (KAMEA), part of Kenya Association of Manufacturers (KAM), has identified labour costs as the single most important cost factor in the industry, although it is still the case that the main attraction of Kenya for overseas investors has been comparatively cheap labour [Interview INST 10].

In interviews with firm representatives, concern was raised over the rising labour costs relative to other locations [Interviews FDI 12, FDI 16 and FDI 19]; the firms felt they were paying too much for the workers involved in garment assembly compared to labour costs in their home economies in Asia. These costs are further increased through ad hoc annual decisions on minimum wage levels made by the Government for the entire economy in traditional announcements by the Ministry of Labour during annual national Labour Day celebrations. These, of course, are not productivity-related and have been criticised by the Federation of Kenyan Employers (Omolo and Omitti, 2004). The firms' views on labour costs is strongly contested by local and international NGOs which have led high-profile campaigns against the EPZ sector for poor wages, in addition to poor working conditions, inadequate labour rights and harassment of workers. The labour and human rights activists accuse the EPZ firms of exploitation and sweatshop conditions. These conflicts have led to industrial unrest and mutual suspicion in the sector.

A recent survey of FDI in SSA countries indicated that the garment industry's wages were the lowest among the region's industries (UNIDO, 2006, p. 72). Furthermore, Kenyan labour costs, with the exception of Indonesia, are the lowest of any apparel exporter to the United States (ECATRADE, 2005). Low labour costs have been a key factor in attracting investment to the industry; however, this significant competitive advantage is offset by comparatively low efficiency and productivity levels, as indicated in a recent report on the impacts of the AGOA (Office of United States Trade Representative, 2005, p. 52) with labour productivity having remained stagnant despite wage increases in recent years (World Bank, 2004, p. iv). In Kenya, the clothing industry lacks qualified staff in more technical and skilled positions, such as managers, machine operators, designers and engineers (ECATRADE, 2005, Ikiara and Ndirangu 2003, p. 57) with the poor provision for



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production and technical training to meet industry requirements being a concern (World Bank, 2004, p. iv).

### *Other costs*

The provision of water has not been uniform for industry and is a problem for clothing companies located in Mombasa and Athi River. Various problems identified by the Kenyan private sector include lack of water billing, corruption at water treatment and rates payment, illegal water connections, poor management and destruction or abandonment of generation equipment. Thirty-four per cent of local manufacturers have dug their own boreholes to address the problem, compared to 16% in China and 13% in Uganda (KEPSA, undated).

In interviews, companies identified the cost of water provision as another high cost factor. Firms located in Athi River, for example, experience this problem fairly regularly, as the responsibility for water provision lies with the Mavoko County Council, rather than the EPZA. One firm, Upan Wasana EPZ, had constructed its own boreholes and was located on its own site away from the EPZ zones [Interview FDI 11].

## **6.2 Uncertainty over the renegotiation of the AGOA**

The general uncertainty facing investors in Kenya has had a bearing on industry development in the country. As a recent World Bank investment climate survey reported “uncertainty in the policy regime has ... resulted in outdated plant and equipment, low investment levels, and poor training” (World Bank, 2004, p. 71). A recent UNIDO survey of overseas investor perceptions placed Kenya among a group of countries in which both the value of anticipated investment as well as the share of past investment were among the lowest of SSA nations (UNIDO, 2006, p. 84).

Beyond this, the survey results revealed the more specific but pervasive influence that the AGOA had on the revival and future development of the clothing industry in Kenya. Kenya qualified for AGOA access in January 2001 and experienced a dramatic increase FDI and associated exports in the clothing industry [Interview INST 4].

Under the AGOA Apparel Provision, qualifying countries can export to the United States eligible apparel items made in the SSA countries, produced either from United States yarns and fabrics or from



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regional yarns and fabrics. But in addition, under the Special Rule, yarns and fabrics may be sourced from a designated least developed country, subject to quantitative limits. This third-country sourcing is of particular significance to FDI in the Kenyan clothing industry, as third country fabrics are the main input used. The Special Rule was scheduled to run out in September 2004, but has since been extended.<sup>9</sup>

At the time this field work was carried out, in 2004, negotiations over the extension of the special rule on fabric sourcing were still ongoing, and the outcome was very uncertain. This uncertainty over the policy situation appeared to be stalling any further investment in the industry as stakeholders adopted a “wait and see” position. It was widely agreed that Kenya did not have the capacity to produce enough domestic fabrics to meet the needs of the industry, without further investment or incentives for cotton growing and textile mills [Interviews INST 4 and INST 12]. Sixty-one per cent of the respondents identified the uncertainty over the AGOA’s third country fabrics provision as a major concern to them and a constraint on expansion. Firms interviewed signalled their intention to cease production or relocate their operations to different countries if the provision was not extended [Interviews FDI 12, FDI 4 and FDI 2]. A widely held view was that the lack of timely action by the Government in resolving this situation meant any measures taken would be “too little, too late” [Interviews INST 1, INST 4 and FDI 12].

The investors’ concern over the AGOA’s extension was echoed by government representatives, who explicitly acknowledged that not enough had been done to prepare the industry for the AGOA requirement on domestic inputs. According to the representative at the AGOA desk, “we, the Government, were too relaxed and we have realized too late the need to substitute for third country imports of materials” [Interview INST 4]. It is interesting that while 61% of firm representatives ranked the AGOA and third country fabric sourcing as very significant to their future operations, only two firms specifically highlighted the issue of local inputs as of particular concern. The inconsistency in these results has possible pointers for the poor prospects of upstream linkages with textile mills and cotton ginneries, possibly signalling the short to medium term horizons of footloose capital. This issue of the AGOA overlapped with the concern regarding the end of the MFA in January 2005. China’s expected dominance of the global textile industry in

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<sup>9</sup> Duty-free access to the United States market for clothing produced in lesser developed SSA countries (which includes Kenya) and made from third country yarns was extended until 2012 and limited to 3.5% of all AGOA apparel imports (Office of the United States Trade Representative, 2007) .

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quota-free environment raised serious concerns over the future of SSA exports and the viability of the industry in Kenya.

### **6.3 Bureaucratic inefficiency and corruption**

In Kenya, the term “bureaucracy” has become synonymous with red tape, inefficiency and officious obstruction within public service organizations. Various aspects of bureaucratic inefficiency have been identified in recent surveys as major problems facing the private sector in Kenya (EABC, 2005; World Bank, 2004). These general findings are confirmed in our survey with 44% of company representatives in the survey cited bureaucracy as a significant challenge facing their operations – excessive “red tape” and the widespread incidence of corruption being the main aspects mentioned by the respondents. Additionally, 33% considered the lack of government support as a constraint on their business growth.

The perceived severity of corruption varies depending on the ethnicity and nationality of the businesses involved. In this respect, one recent survey suggests that Asian businesses were seemingly subject to some of the highest costs associated with rent seeking behaviour in Kenya (World Bank, 2004, p. 57). Given the high participation of Asian businesses in the Kenyan clothing industry, it is hardly surprising that our interviews suggested that bureaucratic costs were evident in several areas, such as excessive delays at the port in clearing imports and exports, the amount of red tape involved in obtaining licences and clearances from various authorities, long delays in issuing work permits, and demands for monetary inducements in order to speed up these processes [Interviews FDI 1 and FDI 6]. Additional points identified were inefficient procedures including paper-based port clearance processes and an obstructive attitude from various government officials in dealings with day-to-day issues, such as the problems of water, telephones and security [Interview 12].

For clothing companies, the area where bureaucracy-related problems were experienced most frequently was customs clearance [Interviews FDI 7 and FDI 17]. Frequent delays were experienced at the ports; these mainly resulted from a requirement by the Kenya Revenue Authority for textiles and inputs to undergo 100% verification at the ports. Prior to January 2004, goods destined for EPZ companies were released directly and verifications completed within the EPZ zones. Checks have been re-introduced with resultant delays; a shipment takes up to two weeks to be cleared at the port, with an added cost of \$75

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and \$150 for a 20-foot and 40-foot container's verification respectively (EPZA, 2004, p. 2). The extra costs as well as added delays placed the firms at a disadvantage in view of the geographical distance from key markets.

In Kenya, the issue of bureaucracy is closely interlinked with that of corruption. Kenya's performance in this area has deteriorated steadily; the country continues to rank high among the most corrupt places to do business in the Transparency International Survey.<sup>10</sup>

Recently, efforts have been made by the government to reduce some of the excessive bureaucracy. According to one recent investment climate assessment, the range of business licenses required has reduced from a high of 1,347 licenses to 195 (World Bank, 2006). Additionally, the Kenya Revenue Authority introduced an electronic clearing system – Simba – at the Mombasa port to reduce delays and reduce corruption. It is too early to judge the effect of these changes.

#### **6.4 Industrial unrest and negative media coverage**

Kenya's apparel industry has been characterized by intense industrial unrest; the EPZ factories regularly experience labour disputes. In 2003 and 2004, the firms underwent a series of acrimonious and unplanned strikes, mainly over low wages and disputed working conditions. The unrest was sometimes accompanied by violence, destruction of property at the factories and riots which required the police and anti-riot personnel to move into the EPZ zone factories to control the situation.

These disputes were widely covered in the national and local press and served to focus attention on specific firms. Local and international human rights activists have led high profile campaigns against poor practices in the industry, such as low pay, forced overtime, harassment and sexual exploitation, denial of union representation (KHRC, 2004). Various campaigns were directed at the end customer companies, such as Walmart and Sears in the United States, for complicity in human and labour rights abuse at their subcontractor factories (for example, the

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<sup>10</sup> Government departments clothing industry firms need to deal with include Immigration (for work permits), Customs, which is under the Kenya Revenue Authority (for taxes, duties and clearances), the Kenya Police, and various state corporations such as the investment promotion authorities, and the local authorities (for various licenses, water provision).

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clean-clothes campaign, sweatshop alert). The campaigners demanded that the retailers who hold significant power over these firms put pressure on them to improve working conditions and withhold the placing of orders until improvements are made.

## **6.5 Labour skills and productivity**

The overall view expressed by the management of several firms was that Kenyan workers were not as productive as those in China, which dominates the global clothing industry. This view is echoed in an earlier study which claimed that the average Kenyan worker required five years of extra training before attaining the productivity level in China (Ikiara and Ndirangu, 2003, p. 57). Workers' productivity also lags behind that of workers in several other Asian home countries of parent TNCs with FDI in the Kenyan clothing industry. To reinforce this point, one respondent from a clothing company noted that in Bombay, one person can make two shirts but in Kenya it requires two people to make two shirts [Interview FDI 12]. Another respondent suggested that while Kenyan workers were second only to those in Mauritius in the East African regional context, they were only two-thirds as efficient as those in Bangladesh, India, Pakistan and Sri Lanka [Interview FDI 4].

It is in respect of labour skills and productivity that differences in industry cultures between the home countries of TNCs and Kenya are most pronounced. Arguably, the unmet expectations of TNCs in this respect have further contributed to the potentially transient nature of FDI in the clothing industry.

## **6.6 Other constraints**

The other constraints mentioned by respondents to the survey were few but focused upon financial matters. The ability of firms to raise credit locally, especially for working capital, was constrained by various factors. The most often cited concern was the local interest rates being significantly higher than those available in international markets; local rates range from 17 to 22%, compared to international rates of 5 to 10% [Interviews FDI 1, FDI 3 and FDI 11]. One interviewee noted how "... these rates are too high. Outside, we can get it at 5–6% but here, the rate is 21%. I would not want to borrow any money here ..." [Interview FDI 3].

In general, the bulk of the initial set-up costs and financing requirements were arranged through their parent companies or own

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funds, while supplementary financing, mainly for working capital and local costs, were arranged through local loans. However, some companies reported raising a significant portion of all their financing locally through Kenyan banks. Upan Wasana EPZ raised 100% of its loans locally, Sahara Stitch EPZ between 40–60%, MRC EPZ 60% and United Aryan EPZ raised 10% [Interviews FDI 11, FDI 4, FDI 5 and FDI 16].

High interest rates had a direct impact on the capacity of the firms and the type of orders they could accept; the higher the interest rates, the fewer the number of FOB orders a firm could accept, which meant lower returns and reduced capacity for expansion [Interview FDI 14]. Firms therefore had to accept higher amounts of C&M orders, which had narrower margins, but also entailed less financial risk to the firm. For smaller export processing firms, the issue of access to local finance was a key challenge as it significantly constrained their ability to progress from the sub-contracting stage to direct order processing [Interview FDI 15].

In sum, there are a host of factors that contribute to the high costs facing foreign affiliates in the Kenyan clothing industry. By the same token, it is apparent that there is considerable scope for reducing these costs. Thus, were production costs to come down significantly, the industry would have a good chance of surviving in the competitive post-MFA era; the industry is thought to be able to hold on to its global market share if production costs were reduced by between 20% and 30% to make up for the loss of its quota advantages (World Bank, 2006)

## **7. The absence of local backward integration**

### **7.1 Backward linkages to local cotton textiles suppliers**

The clothing establishments surveyed were asked to estimate the percentage of their total expenditure on textile materials and business services from Kenyan suppliers. Many of the responses actually distinguished between textile materials and other materials, as reported in table 4. The table reports the number of firms, grouped according to the level of local sourcing.

A number of empirical studies have reported the tendency for foreign affiliates in both developed and developing country settings to be associated with generally low levels of local sourcing of materials



and services (Helleiner, 1973; Phelps, 1993). In the few previous studies of FDI in Kenya, similar tendencies for companies to import materials were apparent (Langdon, 1981, p. 34). As such, the figures in table 4 are to be expected. They reflect important constraints on local sourcing by overseas investors and the generally low levels of local sourcing found across foreign affiliates in SSA (UNIDO, 2003, p. 63).

**Table 4. Percentage of materials and business services purchased from Kenyan suppliers**

	0%	1-5%	6-25%	26-50%	51-100%	Average
Textiles	18 (90%)	1 (5%)	1 (5%)	0 (0%)	0 (0%)	0.6%
Other Materials	2 (10%)	11 (55%)	2 (10%)	1 (5%)	4 (20%)	25.05%
Business services	8 (40%)	3 (15%)	3 (15%)	2 (10%)	4 (20%)	25.25%

Source: Authors' survey in 2004.

The first observation that can be made from table 4 is that negligible amounts of textile materials were sourced locally. Only two companies purchased textile materials from Kenyan suppliers, with one company indicating this was mainly for materials for pockets sown into the garments. This underlines some of the paradoxical effects of the AGOA. The AGOA is designed to stimulate investment and industrial upgrading among SSA countries. However, exemptions granted to allow certain countries to source fabrics and materials from third countries has stimulated the growth of a largely foreign-owned clothing industry which is not linked to the local economy.

This is all the more frustrating in the case of Kenya because, as interviewees highlighted, some local suppliers exist as a result of the earlier growth of the cotton and clothing industries under the import substitution strategy [Interviews INST 3 and INST 12]. In 2005, there were 24 registered cotton ginneries in Kenya but only ten of these were operational, producing at about 14% of installed capacity (EPZA, 2005b, p. 5).

### *Investment gaps in the chain*

It was evident from the interviews that policy-makers recognized the desirability of developing the clothing commodity chain further upstream to revive the moribund cotton ginning and textile industry. An interviewee at the EPZA, for example, commented how he wanted "to have the full value chain as it would bring multiplier effects". In



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this regard, he notes that his organization, “the EPZA has gone out to try and attract spinning and weaving companies” [Interview INST 9]. However, progress in developing the chain backwards from garment manufacture into textile manufacture and cotton growing has been slow and uncoordinated as confirmed by another interviewee who commented that “local linkages need to be developed, and it is only coming up very slowly” [Interview INST 17].

However, obstacles exist to the revival of textile manufacturing in Kenya. While there is some cotton cultivation and ginning surviving from the previous period of growth of Kenya’s clothing industry, there is a major problem in attracting both indigenous and foreign investment, specially in textile manufacturing. Referring specifically to the risks associated with the financing of projects involved with textile manufacture in East Africa, an interviewee from the PTA investment bank based in Nairobi observed that “you find, as you go further down the chain, going into the textile industry is a little tricky” [Interview INST 7]. From this representative’s point of view, the attraction and support of investment into spinning and weaving has been problematic. The same interviewee went on to observe that, from experience, investing in this industry was risky, noting specifically that “the PTA bank itself has had problems in other countries with spinning and weaving companies that went into receivership. We’re not sure about the prospects for investment in this” [Interview INST 7].

### *Institutional/government failures*

The apparent lack of local backward linkages can also be attributed to institutional and government failures in the regulation of the industry. The clothing industry in Kenya lost its coordinating structures along with the collapse of the industry in the 1980s (Ikiara and Ndirangu, 2003, p. 3). Among the sources of institutional failures are those “manifested by lack of strong producer associations; weak or inefficient mechanisms for overseeing issues such as production and distribution of quality seed, provision of input to producers on credit, and the quality of inputs such as pesticides; and the virtual collapse of extension services” (Ikiara and Ndirangu, 2003, p. 3).

There is a recognition of the desirability of coordinating garment production with backward segments of the chain, especially cotton growing and ginning, within the government circles. As a representative of the Ministry of Trade and Industry noted on the relationship between government bodies and other stakeholders, “for the whole chain to work, we must work together” [Interview INST 4]. Another interviewee noted

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how “in order to attract investment, we need to restructure the cotton industry. The structure of incentives is wrong at the moment” [Interview INST 1].

Some of these failures stem from the lack of an effective apex institution to coordinate the cotton and clothing industries in Kenya (Ikiara and Ndirangu, 2003) [Interview INST 12]. The Cotton Board of Kenya, which enjoyed some success, such as the introduction of the post-independence import substitution strategy, and could still assume such a role, has been ineffective since the industry’s decline prior to the AGOA. It is due to be replaced under new legislation which has progressed only very slowly through the Kenyan parliament due to the vested interests within the Cotton Board itself [Interview INST 4].

### *Parent companies and customers and local sourcing*

The government’s failings to assist with the development of the industry are also exacerbated by the attitudes of manufacturing enterprises themselves. The same interviewee went on to observe that the clothing companies were not searching for local suppliers of raw materials, possibly in light of the marginal and transient nature of the businesses concerned and the lack of long-term commitment to manufacturing in the country [Interview INST 4].

The specific nature of both the parent companies and customers involved have shaped the characteristics of foreign affiliates in the Kenyan clothing industry. By the same token, the influence of customers and parent companies can shape the wider economic impacts in the form of local purchases of materials and services. Interviewed companies identified a range of constraints on their local sourcing, with several respondents recognizing that the lack of adequate supply, stemming from the collapse of the local cotton and clothing industry was a factor. The cheaper cost and wider variety of imported inputs available helped them address this challenge. In addition, the process of acquiring local raw materials was no easier than importing materials, as it involved the same bureaucratic process [Interview FDI 19].

The economic liberalization affecting the clothing industry and the AGOA itself may have come at a wrong time for the cotton industry (Ikiara and Ndirangu, 2003, p. 13). With the collapse of the local ginneries and textile mills, the industry lost its capacity and key position in relation to the clothing industry that has re-emerged so that shortfalls in raw materials are routinely made up through imports.

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## *The potential for cooperation at the East African regional scale*

With the collapse of domestic cotton cultivation and the textile industry, there has been recognition of the possibility for wider cross-border links to support the clothing industry. Cotton is already imported into Kenya from Uganda and Tanzania. According to one interviewee, “some of the other sources within SSA are expensive, for example, South Africa and Mauritius are expensive. West Africa, however, has a lot of cotton” [Interview INST 4].

With regard to the efforts to revive regional integration and the collapsed East African Cooperation, views were expressed on the desirability of regional supply linkages between Kenya, Tanzania and Uganda. Several interviewees noted the possibility for the clothing industry to work across East Africa on the basis of comparative advantage [Interviews INST 7 and INST 8]. The relatively well-developed Kenyan cotton ginning capacity could be supplied with raw material sourced from Uganda which has a thriving cotton-growing industry. This is echoed by another interviewee who noted that “we are looking at sharing or building more capacity jointly with Uganda, to let them do the cotton side, and then supply to manufacturers in Kenya” [Interview INST 1]. However, concern was also expressed regarding the ability to coordinate such arrangements at the regional level. This is due to the perceived lack of capacity of the governments and industry institutions to deal with the complications inherent in regional negotiations. At least one interviewee with some overview of the matter in East Africa was not optimistic over the prospects of such regional coordination [Interview INST 7].

### **7.2 The sourcing of other material inputs**

A second observation to be made on table 4 is that significant proportions of other material inputs were purchased locally from Kenyan suppliers. Indeed, only two companies surveyed indicated they did not purchase any of these materials locally, while four companies purchased all or virtually all of these materials from Kenyan companies. Overall, one quarter of the expenditures on these other material inputs came from Kenyan suppliers.

While machinery and spare parts are almost exclusively imported, several foreign owned companies have begun to source chemicals, dyes and accessories from local Kenyan suppliers. Nineteen of the twenty-three companies surveyed (83%) purchased some or all of their

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packaging materials (boxes, poly-bags) locally, while 52% (12 of 23) purchased threads from Kenyan suppliers. Additionally, some companies also purchased zippers, elastic, washing chemicals and dyes locally. These trimmings and embellishments such as laces, thread interlinings, buttons and zip fasteners are not, however, widely available locally to the standard and quality that meet conditions set by buyers.

The sorts of constraints on local sourcing of inputs identified by the companies surveyed reflect the sorts of cost and quality pressures that are felt routinely in most industries. The influence of customer or parent company policies in dictating the sources of purchased inputs is also something that should not be surprising. It has long been understood that parent company strategies place important constraints on the purchasing autonomy of their branch factories. This is well illustrated in the case of Protex EPZ Kenya.

Protex EPZ is located within the Athi River EPZ and is an affiliate of Protex Taiwan, headquartered in Taipei. As of 2004, it imported 100% of all its textile fabric requirement. The sourcing for this imported fabric was arranged via the broker providing the orders for production. This arrangement limited the ability of the Kenyan operations to source fabrics locally, as it required prior approval from the broker. If any orders failed due to the poor quality of materials or deviation from specifications, the retailer may reject the order at significant costs to both the broker and the firm. Protex EPZ Kenya confirmed that it did purchase some inputs locally, which included dyes and packaging. Additionally, the company also contracted out some of its embroidery requirements to local firms. The company noted that there were various obstacles to their increasing local sourcing. In the case of packaging, there are only four package manufacturing firms. Additionally, production costs in Kenya were high, making their imported equivalents cheaper. The quality of local inputs was also viewed as sub-standard and inconsistent, compared to the more established and efficient producers in Asia, from where Protex EPZ sourced through its parent company in Taiwan Province of China [Interview FDI 2].

### **7.3 Sourcing of business services**

Even if the proportions of material inputs being sourced from Kenyan suppliers are low, we might expect greater use of Kenyan suppliers of business service inputs, not least because of Nairobi's role as the investment hub within the East Africa region. Fifty-seven per cent of companies surveyed purchased some business services locally. Also,

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as table 4 shows, these companies spent, on average, a quarter of their total expenditures on business services with Kenyan suppliers. Financial and business services purchased included the provision of management consulting, auditing and accounting, raising finance, legal as well as banking services. Local auditing and management consulting services were provided by local consultants, including the local offices of internationally recognized firms, such as Deloitte and Touche [Interview FDI 14].

The more well-established companies reported that in order to compete and qualify for larger, higher-margin orders from well-known retailers, they had to meet certain criteria, which included providing audited accounts by recognized firms for five years, in addition to the usual capacity criteria. These services were sometimes provided through their parent companies, but in Nairobi, the need was met by local accountants and consultants [Interview FDI 5].

The surveyed firms reported purchasing various technical business services from local suppliers. These included services such as engineering and technical consulting on issues such as structural layout, process engineering and various internal control systems for efficiency. In addition, some companies sourced part of their computing and IT support requirements locally. However, others sourced their computing systems mainly from their home countries, such as India and Taiwan Province of China, where these services were competitive in terms of cost and technology.

#### **7.4 Other linkages to local institutions**

All the surveyed companies, with the exception of one, had developed links with other local and national organizations within the country – confirming findings of more developed relationships between foreign affiliates and local organizations in Kenya compared to other SSA countries (UNIDO, 2003, p. 64). In addition, all but one of the companies surveyed were members of the industry body, KAM, which lobbied on issues affecting industry interests.

It was clear from interviews that despite the efforts of these associations, the companies felt that policymakers were not attuned to their concerns and provided little support to investors once they established their affiliates in the country. While industry representations through KAMEA were seen as necessary, they were thought to be weak as a means of effecting the real changes required to strengthen



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the clothing industry's future prospects in light of the uncertainty over the AGOA and changes in global trading rules after the MFA's demise. This lack of effective public-private sector dialogue on the industry's strategic direction forced companies to play a waiting game, relying on external players, such as international organizations to rescue the industry (McCormick et al., 2006) [Interviews FDI 12 and INST 1] as the case of Kapric Apparels below illustrates.

Kapric is one of the largest TNCs involved in the clothing industry in Kenya. Kapric's view of its relationship with other public and private institutions is typical of the industry's "wait and see" stance. The company is a member of KAM and its industry arm, KAMEA. Through these forums, Kapric has consistently expressed its concerns over the high cost of doing business in Kenya, including issues over labour costs, inadequacies of infrastructure and the high cost of utility services. It has also been vocal on the lack of support for the industry from the government. The interviewee from Kapric was pessimistic about the ability of the Kenyan clothing industry to respond to the imminent threat of competition from Chinese garment manufacturers and compared the Government of China's concerted approach to supporting the expansion of its clothing industry with that of the Government of Kenya. Kapric's "wait and see" stance – resulting in a halt to further expansion of capacity – is a product of the lack of government support and the uncertainty over the AGOA's future prospects. The interviewee at the company noted, "we are lobbying but the government is very slow. We do not wish to keep banging our heads on the wall, if they do not have the sense to listen. They don't even know what this industry is about" [Interview FDI 12].

The incidence of links between the clothing manufacturers and other local organizations was less widespread. Five of the more established enterprises reported the arrangement to collaborate with government technical institutes, such as the Mombasa Institute of Technology and the National Youth Service. One firm, Ashton Apparels, provided industrial apprenticeships in collaboration with the Directorate of Industrial Training, and it also ran its own training centre for skills development. None of the companies surveyed had any research collaborations with universities in Kenya.

The survey also revealed the lack of collaboration with NGOs. Only two enterprises reported having held joint training sessions with an NGO on HIV/AIDS awareness, and even this was organized through the EPZA. This disengagement is perhaps understandable in light of



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the strained relationship between the industry and NGOs, following the highly vocal role that various NGOs have played against working conditions in the EPZs, and specially in the clothing industry.

## 8. Conclusions

The re-birth of the clothing industry in Kenya following the enactment of the AGOA has been fuelled almost entirely by FDI. The direct employment created has been substantial although it has declined since the high water mark in 2003. Our survey conducted in 2004 revealed a variety of aspirations for growth among foreign affiliates in the Kenyan clothing industry. However, at the time of the survey reported here, a degree of uncertainty hung over the industry due to the renegotiation of third country sourcing provisions in the AGOA.

The failure of the clothing industry to develop backward linkages and stimulate the growth of competitive local cotton and textile industries has left the industry vulnerable to the terms on which the AGOA grants access to the United States market. This uncertainty has been compounded in the case of Kenya by a general failure of the government to create a competitive environment for the clothing industry. Whilst Kenya may enjoy a measure of macroeconomic and political stability, this masks a range of general bureaucratic inefficiencies, poor infrastructure and limited human resources that impact on the competitiveness of the industry. More worryingly, industry-specific policy to coordinate the development of the industry – especially the development of local backward linkages – has been very slow to develop. Remedying such institutional failures remains a challenge to the successful incorporation of SSA economies into GCCs (Gibbon and Ponte, 2005).

To this end, government action is necessary, given the reluctance of the clothing industry itself to generate such backward linkages. It appears that neither the retail customers in the United States nor the TNCs investing in the Kenyan clothing industry have generated meaningful local indirect employment or spillovers (see also Phelps et al., forthcoming). The findings tend to underline a set of important questions regarding the precise nature of impacts of developing country outward FDI on other developing host nations. Developing country outward FDI does appear to differ from that of outward FDI upon host economies (UNCTAD, 2007). Notably, such outward FDI appears to be less a bearer of technology than of production process efficiencies (UNCTAD, 2007, p. 152). In particular, the impact of TNCs from emergent “first tier” coordinating nations (e.g. Hong Kong (China),

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Singapore, Taiwan Province of China) and “second tier” source nations (e.g. Bangladesh, China, India and Sri Lanka) within the international division of labour upon “third tier” locations such as SSA nations is a topic ripe for further study.

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## APPENDIX

### LIST OF INTERVIEW SOURCES

- INST 1     Manager, After Care Services, Investment Promotion Centre, 21 May, 2004
- INST 2     Senior Promotion Officer, Investment Promotion Centre, Nairobi, 17 May, 2004
- INST 3     Senior Manager, Investment Promotion Department, Investment Promotion Centre, Nairobi, 21 May 2004
- INST 4     Industrial Development Officer, AGOA Desk, Ministry of Industry, Nairobi, 19 May 2004
- INST 5     Dep. Secretary General and Finance/Accountant Kenya Textile and Tailors Union, Nairobi 14 June 2004
- INST 7     Portfolio Investment Manager, PTA Bank, Nairobi,
- INST 8     Assistant Resident Country Manager, East African Development Bank, Nairobi 25 May 2004
- INST 9     Manager, Policy Research and Planning and Procurement Officer, Export Processing Zone Authority, Nairobi, 18 May 2004.
- INST 10    Executive Officer, Sector Development Division, Kenya Association of Manufacturers, Nairobi, 21 May 2004
- INST 12    Senior Analyst & Programme Coordinator, KIPPRA, Nairobi, 19 May 2004.
- INST 17    Research and Information Manager, Investment Promotion Centre, Nairobi, 17 May 2004.
- INST 22    Investment Policy Analyst, UNCTAD, Geneva, 28 January 2004
- FDI 1     Director, Storm Apparels Manufacturing Ltd., 21 June 2004
- FDI 2     General Manager, Protex EPZ Ltd., 17 June 2004

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- FDI 3      General Manager, BlueBird EPZ Ltd., 19 July 2004
- FDI 4      Finance Manager, Sahara Stitch EPZ Ltd., 15 July 2004
- FDI 5      Finance Manager, United Aryan EPZ Ltd., 15 July 2004
- FDI 6      Directors, Ancheneyar EPZ Kenya Ltd., 14 July 2004
- FDI 7      Production Manager, Asia Resources EPZ Ltd., 15 July 2004
- FDI 8      Manager, Apex Apparels EPZ Ltd., 15 July 2004
- FDI 10     Accountant, Rising Sun EPZ Ltd., 17 June 2004
- FDI 11     Finance Manager, Upan Wasana EPZ Ltd., 14 July 2004
- FDI 12     Director, KAPRIC and Birch EPZ Ltd., 20 July 2004
- FDI 13     Accountant, Chandhu EPZ Ltd., 19 July 2004
- FDI 14     General Manager, Ashton Apparels EPZ Ltd., 20 July 2004
- FDI 15     Production Manager, Shin Ace Garments, 23 July 2004
- FDI 16     MRC (Nairobi) EPZ Ltd., Human resources Manager, 17 June 2004
- FDI 17     Directors, Falcon Apparels Ltd., 21 June 2004
- FDI 18     Administrator, Senior Best Garments EPZ Ltd., 23 July 2004
- FDI 19     Forwarding Manager, Rolex Garments EPZ, Ltd., 17 June 2004
- FDI 20     Financial Controller, Mirage Fashionwear EPZ Ltd., 15 June 2004
- FDI 21     Manager, Kenya Knit garments EPZ Ltd., 21 July 2004



# A critical assessment of FDI data and policy implications \*

Masataka Fujita \*\*

The quality of the data available for analyzing foreign direct investment (FDI), particularly in developing countries, does not often meet the required standard for the purpose of rigorous policy analysis. Based on the experience of preparing the United Nations' annual report on FDI, the *World Investment Report*, this paper attempts to identify issues and problems in exploring the development dimension of FDI. The first part discusses issues related to the availability of data and the compilation of statistics on FDI and the activities of foreign affiliates. The second part deals with policy implications and the approaches that could be adopted to improve the current situation.

## 1. Introduction

Reliable, accurate, timely and comparable data form the basis of the analysis of foreign direct investment (FDI) and sound policy formulation. International comparison of FDI data, however, requires an agreed definition and measurement of FDI and a harmonized procedure for compiling the data. The expansion of the activities of transnational corporations (TNCs) further underscores the need for reliable data on the magnitude and characteristics of their international investment.

Various data can be used to measure and evaluate TNC activities. The most widely used measure is the balance-of-payments (BOP) statistics on FDI flows and international investment position (IIP) statistics on FDI stocks. Other measures of the magnitude of international investment include data on cross-border mergers and acquisitions (M&As), FDI projects related to

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\* This paper is based on ongoing work by staff in the Investment Analysis Branch (IAB) at UNCTAD on the relationship between the quality of FDI data, analytical rigor and implications for policy formulation and implementation. An earlier version, entitled "How Reliable are FDI Data? Lessons from the World Investment Reports" was presented at the 2007 Pacific Rim Conference, Guanghua School of Management, Peking University, 12 January 2007.

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greenfield and expansion investments,<sup>1</sup> and various non-equity forms of internationalization. Furthermore, to assess the economic impact of FDI, it is necessary to consider operations data measuring the activities of foreign affiliates and their parent companies. UNCTAD has been working on FDI statistics for many years and presenting the data in its publications, the *World Investment Reports* and the *World Investment Directories*, among others.<sup>2</sup> This paper is based on the experience of the problems encountered in preparing these publications.

The lack of reliable statistical information in many countries complicates international comparison and makes impact assessment difficult. Inconsistency in the data collection and reporting methods of many countries also create problems in formulating policies and strategies on FDI. While considerable efforts have been made to harmonize the definition and system for collection and presentation of data on FDI and TNC activities, important discrepancies remain, even among developed countries. The objectives of this paper are to contribute to the understanding of the nature of data and associated problems; to clarify methodologies for the compilation of required statistics; and to identify ways in which the current data situation can be improved.

This paper first presents the main types of data that are used to assess the magnitude and impact of FDI on host and home economies. It also discusses the availability, complexity and main advantages and disadvantages associated with different types of data. Then it draws policy implications and considers approaches that could be taken at the national, regional and international levels to address the current data situation.

## **2. Data on FDI and TNCs' activities**

### **2.1 FDI statistics**

The most widely available information on the international expansion of TNC activities is statistics on FDI flows and stocks. FDI is

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<sup>1</sup> Greenfield investment is investment in new facilities and the establishment of new entities through entry as well as expansion, while the term "M&As" refers to acquisitions of, or mergers with, existing local firms. In a cross-border merger, the assets and operations of two firms belonging to two different companies are combined to establish a new legal entity, and in a cross-border acquisition, the control of assets and operations are transferred from a local to a foreign company, the former becoming an affiliate of the latter.

<sup>2</sup> It has also established a dedicated website on data on FDI flows and stocks as well as activities of TNCs ([www.unctad.org/fdistatistics](http://www.unctad.org/fdistatistics)).

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defined as an investment involving a long-term relationship and reflecting a lasting interest and control by a resident entity in one economy in an enterprise resident in an economy other than that of the investor.<sup>3</sup> FDI entails a significant influence of the investor on the management of the enterprise resident in another economy. This distinguishes FDI from portfolio investment, which is not aimed at acquiring a lasting interest or control over the invested enterprise. For practical reasons, ownership of 10% of ordinary shares or the voting shares in a firm is the benchmark commonly used to determine the existence of a direct investment relationship (IMF, 1993, p. 86; OECD, 1996, para. 8). While somewhat arbitrary, the 10% threshold has been agreed internationally, and countries are recommended to follow this rule. Of course, there are problems in setting such an arbitrary figure as the precise threshold. Nevertheless, this rule offers the advantage of providing an objective criterion for determining whether a cross-border investment should be considered as FDI.

It should be emphasized that FDI is a BOP concept used to measure cross-border financial flows. It does not measure the true extent or use of investment (in building, lands, machinery equipment) by foreign investors, as reflected in the national accounts of the host economy, for instance. Indeed, while the concepts and definitions of BOP and FDI should be consistent with the international guideline – as set out in the IMF's *Balance of Payment Manual* (IMF, 1993)<sup>4</sup> and the OECD's *Benchmark Definition of Foreign Direct Investment* (OECD, 1996) – they offer limited insight on the real economic role played by foreign affiliates in the host economy. For example, foreign affiliates may finance an investment through local borrowing; this investment is not recorded as FDI flows in the BOP. Thus, trends in FDI often differ from other indicators of economic performance. In the case of the United States, comparisons of FDI outflows with capital expenditures of (majority-owned) foreign affiliates show that trends between the two indicators are far from parallel. In certain economies, such as Hong Kong (China) and Singapore, FDI outflows from the United States always exceed

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<sup>3</sup> It should be noted in this context that the country of residence is different from nationality or citizenship.

<sup>4</sup> Two complementary publications have been published by the IMF providing more practical guidance to the understanding of the concepts contained in the *Manual*. The *Balance of Payments Compilation Guide* was published in 1995 to provide more practical direction in the compilation of both BOP and international investment position statistics and the *Balance of Payments Textbook*, published in 1996, was intended as reference material for the BOP courses provided by the IMF. This latter publication also contributes to a better understanding of the BOP issues, providing concrete illustrations and examples.

capital expenditures of United States foreign affiliates; in others, such as Argentina and Brazil, the opposite applies (table 1). The former case demonstrates the fact that FDI flows are a source of corporate finance but do not always translate into actual capital expenditures, and the latter case shows that FDI is only one of funding sources for investment by foreign affiliates.

Not all countries apply the internationally agreed methodology, and different ways of collecting information are still used.<sup>5</sup> Many countries, particularly developing countries, report FDI data compiled for administrative purposes (approving, registering, monitoring investments, granting special incentives etc.), which are not necessarily consistent with the internationally agreed system. For example, data compiled on the basis of the BOP framework are quite different from those compiled for administrative purposes, which are often on approval basis (table 2).

**Table 1. Capital expenditures of United States foreign affiliates<sup>a</sup> and outward FDI flows from the United States, 2001–2004**  
(Millions of dollars)

Economy	2001		2002		2003		2004	
	Capital expenditures <sup>a</sup>	Outward FDI flows	Capital expenditures <sup>a</sup>	Outward FDI flows	Capital expenditures <sup>a</sup>	Outward FDI flows	Capital expenditures <sup>a</sup>	Outward FDI flows
Total world	110 758	124 873	110 275	134 946	109 588	129 352	123 068	257 967
<i>of which:</i>								
Argentina	2 404	- 511	1 029	-1 445	1 042	- 118	1 694	1 091
Brazil	3 335	113	3 364	- 266	2 245	- 290	2 592	1 837
China	1 629	1 912	2 139	875	1 582	1 273	2 781	3 446
Hong Kong, China	514	4 787	507	1 226	669	- 689	741	-
Indonesia	2 253	985	1 599	-	1 190	-		-
Korea, Republic of	712	1 206	670	1 681	718	1 231	1 466	3 598
Malaysia	1 041	17	984	- 609	1 055	416	1 234	-
Mexico	4 936	14 226	4 784	7 656	4 160	3 664	3 675	7 712
Singapore	1 933	5 593	1 275	530	1 267	5 446	1 570	-
Venezuela, Bolivarian Republic of	1 493	461	1 027	150	825	- 462	749	-1 093

Source: United States, Bureau of Economic Analysis; and UNCTAD FDI/TNC database ([www.unctad.org/fdistatistics](http://www.unctad.org/fdistatistics)).

<sup>a</sup> Capital expenditures by majority-owned non-bank foreign affiliates.

<sup>5</sup> For example, according to the 2001 IMF/OECD Survey of Implementation of Methodological Standards for Direct Investment (SIMSDI), some countries such as Chile, Indonesia, Israel, Italy, the Philippines and Turkey use a percentage of ownership other than 10%, and others (e.g. Croatia, the Republic of Korea and the Netherlands) add an additional qualification to this 10% threshold, namely effective voice in management (IMF/OECD, 2003).

**Table 2. Comparison between BOP FDI inflows and approved FDI inflows**  
(Millions of dollars)

Year	China		Indonesia		Korea, Republic of		Malaysia		Singapore	
	Actual data	Approval data	Actual data	Approval data	Actual data	Approval data	Actual data	Approval data	Actual data <sup>a</sup>	Approval data <sup>a</sup>
1996	41 726	73 276	6 194	29 610	2 012	3 203	7 297	6 779	1 469	5 710
1997	45 257	51 003	4 678	33 666	2 641	6 971	6 323	4 078	5 723	5 716
1998	45 463	52 102	- 241	13 635	5 072	8 853	2 714	3 329	840	4 676
1999	40 319	41 223	-1 865	10 894	9 883	15 531	3 895	3 230	5 689	4 742
2000	40 715	62 380	-4 550	16 015	9 002	15 250	3 788	5 223	6 341	5 342
2001	46 878	69 195	-2 978	15 208	4 130	11 286	554	4 976	8 708	5 119
2002	52 743	82 768	145	9 966	3 395	9 093	3 203	3 047	1 016	5 031
2003	53 505	115 070	- 597	14 362	4 384	6 469	2 473	4 116	1 693	4 311
2004	60 630	153 479	1 896	10 422	8 980	12 792	4 624	3 459	2 496	4 886
2005	72 406	189 065	8 337	13 579	7 050	11 564	3 965	4 722	..	5 118
2006	69 468	200 174	5 556	..	4 950	..	6 060	..	..	..

Source: UNCTAD, FDI/TNC database ([www.unctad.org/fdistatistics](http://www.unctad.org/fdistatistics)).

<sup>a</sup> Data refer to the secondary sector only.

### *Three components of FDI*

Even if data are compiled on the BOP basis, not all countries collect data on each of the three components of FDI: equity capital, reinvested earnings and other capital (mainly intra-company loans). One hundred and fourteen out of 129 countries that provided data for the *World Investment Report 2007* included all three components of FDI flows as required by the international guideline (table 3). All countries that reported FDI inflows statistics in the *Report* included, at least, the equity capital component. Some countries are not able to report reinvested earnings, as the collection of these data – usually from company reports or BOP surveys – is more difficult; even in countries where they are available, they are often reported with a significant time lag. Many countries report other capital, but they do not necessarily collect all relevant debt instruments.<sup>6</sup> Among OECD member countries, only 12 countries covered all such instruments (IMF/OECD, 2003). Recording practices may also change over time, leading to structural breaks in time series data on FDI. For example, before 1996, Japanese data on FDI flows excluded reinvested earnings and German data did not cover short-term intra-company loans. Some countries report overall

<sup>6</sup> Such instruments include bonds and money market instruments, long-term loans, short-term loans, financial leases and trade credits.

**Table 3. Availability of FDI flow data, by component, 2006**

Economy reporting all three components of FDI data (114)	Inward flows			Outward flows		
	Economy not reporting part of the components of FDI data			Economy not reporting part of the components of FDI data		
	Equity capital (0)	Reinvested earnings (11)	Other capital (4)	Equity capital (1)	Reinvested earnings (9)	Other capital (6)
Angola; Anguilla; Antigua and Barbuda; Argentina; Armenia; Australia; Austria; Bangladesh <sup>a</sup> ; Barbados <sup>a</sup> ; Belarus; Belgium; Belize <sup>a</sup> ; Benin <sup>a</sup> ; Bolivia <sup>a</sup> ; Bosnia and Herzegovina; Botswana; Brunei Darussalam; Bulgaria; Burkina Faso <sup>a</sup> ; Cambodia; Canada; Cape Verde <sup>a</sup> ; Chile; Costa Rica; Côte d'Ivoire <sup>a</sup> ; Croatia; Cyprus; Czech Republic; Denmark; Dominica; Dominican Republic; Ecuador; El Salvador; Estonia; Fiji; Finland; France; Georgia; Germany; Greece; Grenada; Guatemala; Guinea-Bissau <sup>a</sup> ; Guyana; Honduras; Hong Kong, China; Hungary; Iceland; India; Iran, Islamic Republic of; Ireland; Israel; Italy; Jamaica <sup>a</sup> ; Japan; Kazakhstan; Kyrgyzstan; Latvia; Lithuania; Luxembourg; Macao, China <sup>a</sup> ; Madagascar; Malaysia; Mali <sup>a</sup> ; Malta; Mexico; Moldova, Republic of; Montserrat; Morocco; Mozambique; Namibia; Netherlands Antilles; Netherlands; New Zealand; Niger <sup>a</sup> ; Nigeria; Norway; Pakistan; Panama; Papua New Guinea <sup>a</sup> ; Paraguay; Philippines; Poland; Portugal; Romania; Russian Federation; Saint Kitts and Nevis; Saint Lucia; Saint Vincent and the Grenadines; Senegal <sup>a</sup> ; Seychelles; Sierra Leone <sup>a</sup> ; Slovakia; Slovenia; Solomon Islands; Spain; Sri Lanka; Suriname; Swaziland; Sweden; Switzerland; Taiwan Province of China; Tajikistan; Togo <sup>a</sup> ; Trinidad and Tobago <sup>a</sup> ; Turkey; Uganda; Ukraine <sup>a</sup> ; United Kingdom; United Republic of Tanzania; United States; Uruguay; Vanuatu <sup>a</sup> ; and Venezuela.	Albania; Aruba; Bahamas; Brazil; Kenya; Korea; Republic of; South Africa; Thailand; Togo; Trinidad and Tobago; and Tunisia.	Bahrain; Colombia; Nicaragua; and Peru.	Argentina; Australia; Austria; Barbados <sup>a</sup> ; Belarus <sup>a</sup> ; Belgium; Benin <sup>a</sup> ; Botswana; Bulgaria; Canada; Chile; China <sup>a</sup> ; Costa Rica; Croatia; Cyprus; Czech Republic; Denmark; Estonia; Finland; France; Germany; Greece; Hong Kong, China; Hungary; Iceland; India; Ireland; Israel; Italy; Japan; Kazakhstan; Korea, Republic of; Latvia; Lithuania; Luxembourg; Macao, China <sup>a</sup> ; Malaysia; Mali <sup>a</sup> ; Malta; Mexico; Moldova, Republic of; Namibia; Netherlands; Niger <sup>a</sup> ; Nigeria; Norway; Poland; Portugal; Romania; Russian Federation; Senegal; Slovakia; Slovenia; Spain; Sweden; Switzerland; Taiwan Province of China; Togo <sup>a</sup> ; United Kingdom; United States; Vanuatu <sup>a</sup> ; and Venezuela.	Bangladesh	Albania; Aruba; Brazil; El Salvador; Solomon Islands; South and Turkey; Swaziland; Thailand; and Uruguay.	Armenia; Bahrain; Fiji; Georgia; Seychelles; and Turkey.

Source: UNCTAD, FDI/TNC database ([www.unctad.org/fdistatistics](http://www.unctad.org/fdistatistics)) and information supplemented by IMF BoP June 2007.

Note: Based on 129 economies for inward flows and 79 economies for outflows.

<sup>a</sup> Data refer to 2005.



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figures, but do not provide information on the breakdown of flows into the three components. Finally, some economies do not collect data on FDI at all. This is the case with a number of Caribbean island economies (e.g. Cayman Islands, British Virgin Islands) and many least developed countries (e.g. Afghanistan, Somalia, Samoa). In such cases, investments in these countries reported by major investor economies are usually used as a proxy.<sup>7</sup> Of greater concern is the patchy coverage of FDI statistics by the developing countries that actually compile FDI statistics.

Although progress has been made in recent years, the scope and quality of FDI data in a number of developing countries remain inadequate for the purposes of policy analysis and formulation.

### *Gross and net flows*

Unlike items in the BOP current account, entries in the financial account (including FDI components) should, in principle, be recorded on a net basis (IMF, 1993, para. 511). This means that divestments, reverse investments (investments by a foreign affiliate in its parent firm), loans given to parent firms by foreign affiliates or repayments of intra-company loans to parent firms should be deducted from new flows of FDI when calculating the overall figure for FDI flows. These transactions should be reflected in both FDI inflows (in the recipient economy) and FDI outflows (in the investor's economy). However, it is unclear to what extent compilers of FDI data actually follow the recommended guidelines. Differing practices in this area represent another source of problems when comparing FDI data across countries. For example, only eight of the 27 OECD countries included in the above-mentioned IMF/OECD survey recorded reverse investment in 2001 (IMF/OECD, 2003, p. 39). Indeed, there are large differences between BOP flows (reported in net terms) and gross flows: in the case of FDI outflows from Japan, the size of divestment (including reverse investment, loans to parents, repayments of intra-company loans to parents) was equivalent to as much as 47% to 72% of gross outward investment (table 4).

### *Disparity between inflows and outflows*

In principle, inward FDI and outward FDI for the world as a whole should balance, but, as a result of differences in the interpretation of the FDI definition and in the compilation and reporting of statistics, they

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<sup>7</sup> For example, UNCTAD uses this methodology in the *World Investment Report*. For details, see "Definitions and sources" in UNCTAD (2007).

rarely do. In 2006, for example, countries reported global FDI outflows of \$1,216 billion, whereas global inward FDI flows were \$1,306 billion (UNCTAD, 2007). In recent years, this imbalance has widened (figure 1). This disparity also reflects difficulties in calculating and recording M&A transactions in BOP statistics. As discussed later, M&As are the primary mode of FDI in some years.<sup>8</sup> As shown in table 5, bilateral discrepancies between FDI as reported by home and host countries can also be significant.

**Table 4. Gross FDI and net FDI flows : case of Japanese FDI outflows, 1997-2006**  
(Billions of dollars )

Year	TOTAL		Of which:									
			Equity			Reinvested earnings			Other capital			
	Net	Gross	Net	Gross	Net	Gross	Net	Gross	Net	Gross	Divestment <sup>a</sup>	
1997	24.2	46.8	22.6	20.1	30.4	10.3	4.9	4.9	-	-0.7	11.5	-12.3
1998	27.3	55.4	28.1	17.4	33.6	16.2	3.2	3.2	-	6.8	18.6	11.9
1999	25.3	88.4	63.1	22.2	62.7	40.5	0.8	0.8	-	2.4	24.9	22.6
2000	29.6	61.3	31.7	28.9	40.2	11.3	-1.7	-1.7	-	2.4	22.8	20.4
2001	35.3	67.3	31.9	25.2	37.7	12.6	6.4	6.4	-	3.8	23.1	19.4
2002	33.8	81.8	48.1	33.2	45.6	20.7	8.6	8.6	-	0.3	27.6	27.4
2003	31.2	108.5	77.3	22.5	37.9	15.3	4.9	4.9	-	3.7	65.7	62.0
2004	32.2	115.0	82.8	21.8	33.2	11.4	6.2	6.2	-	4.2	75.6	71.4
2005	42.8	100.3	57.5	27.1	38.9	11.7	12.4	12.4	-	3.2	49.0	45.8
2006	49.1	116.9	67.8	28.2	49.8	21.7	16.0	16.0	-	4.9	51.0	46.1

Source: UNCTAD, based on the data from Bank of Japan

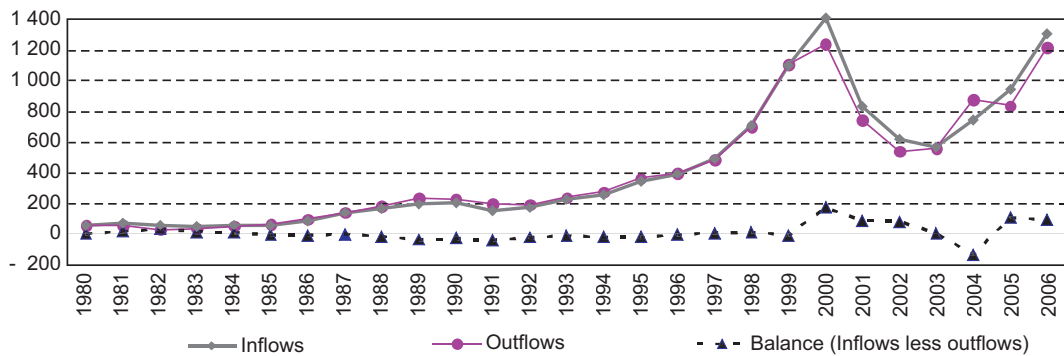
<sup>a</sup> Includes reverse investments, loans given to parent firms from foreign affiliates and repayments of intra-company loans to parent firms

## FDI Stock

FDI flows provide a useful indicator of the trends in international capital flows undertaken by TNCs. In contrast, FDI stock data are an indicator of the overall importance of foreign companies in individual host economies and the world economy as a whole. FDI stocks – estimated at \$12 trillion globally in 2006 (UNCTAD, 2007) – show the value of the share of capital and reserves (including retained profits) in foreign affiliates attributed to the parent firm, plus the net indebtedness of affiliates to the parent firm. Data on FDI stocks are presented in the statistical statement of the international investment position (IIP) of a country, which shows an economy's stock of external financial assets and liabilities at a given point in time. However, some countries report stock

<sup>8</sup> Similarly, growth rates of FDI inflows and outflows do not necessarily move in parallel and sometimes even move in opposite directions (e.g. 1974, 1980, 1981, 1983, 1985 and 2003).

**Figure 1. Imbalance between global FDI inflows and outflows, 1980-2006**  
(Billions of dollars)



Source: UNCTAD, FDI/TNC database ([www.unctad.org/fdistatistics](http://www.unctad.org/fdistatistics)).

data based on accumulated FDI flows. This further compounds existing deficiencies of the original data as it does not account for changes in the value of assets. The recent revision of China's data on FDI inward stock illustrates how different methods of collecting data can influence the outcome: its 2003 FDI stock is now valued at \$228 billion, compared with about \$500 billion before the revision.<sup>9</sup>

Reconciliation of the flow activities in the financial account with the change in stocks made during a defined period is an essential exercise. While the BOP accounts record only transactions, a change of stocks appearing in the IIP can be attributable not only to transactions (financial account flows), but also to valuation changes due to changes in exchange rates and prices, and to other adjustments (such as reclassifications, write-offs, expropriations, unilateral cancellation of debt and measurement errors).

One hundred and two out of some 200 economies covered in the *World Investment Report* reported (inward) FDI stock (UNCTAD, 2007). Even among countries that collect and report stock data, the method of stock valuation differs. For instance, some countries base the valuation on market prices, and others use book values. Such differences make inter-country comparisons more difficult.<sup>10</sup> In this respect, major international organizations – led by the IMF in consultation with ECB,

<sup>9</sup> The revision was made by the China's Ministry of Commerce on the basis of China's own statistical methodology and accounting rules, as well as the following assumptions: FDI inflows into China were mainly greenfield investment that accounted for 95% of total flows, 95% of which was used for fixed assets (UNCTAD, 2005).

<sup>10</sup> For example, the value of FDI inward stock for 2006 in the United States was \$1.8 trillion in book value and \$3.2 trillion in market prices (United States Department of Commerce, 2007).

**Table 5. FDI inflows as reported by host and investing countries, 2005**  
(Millions of dollars)

Economy	Inflows into Brazil		Inflows into China		Inflows into Germany		Inflows into Mexico		Inflows into Morocco		Inflows into Thailand		Inflows into the United States		
	As reported by Brazil	As reported by investing economy	As reported by China	As reported by investing economy	As reported by Germany	As reported by investing economy	As reported by Mexico	As reported by investing economy	As reported by Morocco	As reported by investing economy	As reported by Thailand	As reported by investing economy	As reported by United States	As reported by investing economy	
Australia	926	-3.1		55	122.2						36.8	83.2	-6022	-29580.7	
Austria	6.1	73.4	76.3	139.3	1045.9	1727.4	-0.3	27.4			4.2	6.2	-1033	195.2	
Belgium	685.6		53.8	47.3	-3120.2	5607.4	27.8				85.5		-744	6454.3	
Brazil					68.4								985		
Canada	1435.3		454.1		498.7	128.7	251.2		0.9		22.1		13762	20556.1	
China	7.6	15.1			203.9		4.5	3.6	0.1	0.9	6	4.8	274	231.8	
Czech Republic	0.3	3.5		0.5	31.1	50.7	-0.6	-0.6					1	12.6	
Denmark	239.9	227.6	100.4	287.8	655.4	204.1	81.8	0.8			16.8	24.3	1020	312.2	
Finland	6.6	-47.3	21.7	99.5	421.6	-539.7	17.9	157.9			8.4	-51	434	130.6	
France	1458.4	1111.8	615.1	864.3	-21812.7	3959.6	394.6	267.4	1257.3		35.8	171.6	5291	12337.7	
Germany	1269.3	1150.3	1530	3452.2			341.2	202.7	90.1		172.5	177.8	14622	-5391	
Hong Kong, China	17.4		17948.8	16753.8							238.3	334.3	972	115.7	
Ireland	125.1		97		88.3		5.1				80.6		2564		
Italy	345.7		322		5210.7		29.9		23.7		15.4		781		
Japan	779.1		6529.8	6589	25677.8		73.7	623.9			618.7	2136.6	13889	12338.6	
Korea, Republic of	168		5168.3	2436.7	-252.4	276.2	48.3	72.4			38.4	48.3	707	1133.4	
Luxembourg	139.1		142		878	32					29.1		2402		
Malaysia			361.4	106.9	14653.3	6.1	157.2				28.7	13.2	97	100.1	
Mexico	1661.2				79.6						-40		142		
Morocco					-14.9										
Netherlands	3207.9		1043.6	578.3	8115.7	-732.5	2198		24.1		41.9		5756	4199.6	
New Zealand	48.1				14.9						5.4		-134	-507.7	
Norway	43.2				159.2	-2.8			0.1				2693	5597.7	
Philippines			188.9	44.9	9.9						11.2	0.6	-17	22.1	
Portugal	334.6		4.1	2.8	230.1	19.4	0.8	-5.6	6		0.8		1	113.2	
Singapore	42.3		2204.3		376.8		12				300.6		447		
South Africa	3.7				-12.4								-228		
Spain	1220.4		196.9	152.4	812.1	966	1333.5	2451.7	160.5		6.6		2346	2422.5	
Sweden	32.9		111.5	145.7	1861.7	697.5	29.3	743.5	-0.9		33.7	22.5	-352	-2549.3	
Switzerland	341.5		534.1	685.8	5683.2	6091.5	136.1	84.3	85.1		228.9		4137	13378.8	
Taiwan Province of China	3.7		2151.7		-58.4		7.2				137.4		298		
Thailand	0		95.9		21.1								-1		
United Kingdom	153.3		998.2	998.2	34.5		965	263.6	50.9		58.2	470.9	34323	32576.5	
United States	4644.2		3061.2	1441	-2323	6047	9586.5	7385	24.9		309.8	584			
	19346.5		43356.4	34881.4	33929	24695.2	15701.3	12278	2686.2	1506.5	2302.6	4256.3	99413	74656.8	

Source: UNCTAD FDI/TNC database (www.unctad.org/fdistatistics).

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Eurostat, OECD, UNCTAD and the World Bank – agreed to undertake an internationally coordinated survey of the direct investment position in 2009 in participating countries. When conducted, such a survey would be an important step in improving the collection of FDI stock data.

### *Different approaches to collecting data*

As noted above, countries apply different approaches to collecting FDI flow and stock data. The international transactions reporting system (ITRS), which is a foreign exchange control system operated mostly by central banks, reports international transactions on the basis of forms submitted by enterprises and collected by domestic banks. According to the 2001 IMF/OECD Survey (IMF/OECD, 2003), 25 out of 61 countries use this approach.<sup>11</sup> Typically, the ITRS approach suffers from certain limitations: for instance, a lack of sufficient details on transactions to meet the classification needs of FDI statistics by industry and country; coverage limited to only cash transactions in foreign currencies; exclusion of reinvested earnings; and an absence of information on FDI stock. Enterprise surveys may be seen as an alternative or complementary approach. Other potential sources of FDI-related data include administrative sources such as investment promotion agencies (IPAs), tax revenue offices, security exchange offices and national statistical authorities.

### *Breakdown by country and by industry*

Information on FDI data flows and stocks by country of origin and by industry can be very useful for analytical purposes. Out of 196 countries, for instance, a breakdown of FDI inflows by industry or by country is reported to UNCTAD by 91 and 96 countries respectively in 2006 (table 6). Only a few countries, mainly developed countries, report a complete and detailed breakdown of FDI. The availability of detailed data on outflows as well as inward and outward stocks is even more limited (table 6).

#### *2.2 Data on M&As, greenfield investments and non-equity forms of investment*

TNCs can expand into a foreign location in different ways. The two main forms of market entry are greenfield investments and M&As.<sup>12</sup>

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<sup>11</sup> ITRS provides information regarding the sale or purchase of the currency used in the transaction, the value of the transaction, the country of the non-resident party and the purpose of the transaction. The ITRS measures *individual* cash transactions.

<sup>12</sup> For definition, see footnote 1.

**Table 6. The availability of FDI data from countries providing breakdown by country and by industry, 2006 or latest year available (Number of countries)**

FDI category	Developed countries <sup>a</sup>	Developing countries					World
		Total	Africa	Latin America and the Caribbean	Asia and Oceania	South-East Europe and the CIS	
Inward flows by country breakdown	32	51	12	16	23	13	96
Inward flows by industry breakdown	31	48	10	19	19	12	91
Outward flows by country breakdown	33	16	4	1	11	6	55
Outward flows by industry breakdown	32	11	2	2	7	4	47
Inward stock by country breakdown	32	46	12	11	23	13	91
Inward stock by industry breakdown	30	44	13	11	20	12	86
Outward stocks by country breakdown	32	15	3	3	9	3	50
Outward stocks by industry breakdown	29	12	3	2	7	4	45
Number of countries in region	34	150	53	40	57	12	196

Source: UNCTAD, FDI/TNC database ([www.unctad.org/fdistatistics](http://www.unctad.org/fdistatistics)), based on national sources.

<sup>a</sup> Includes the 10 new member states of the European Union.

A firm may also exert influence over activities outside its home economy by way of non-equity forms of investments. Data on greenfield FDI and M&As are usually not separately identified in the BOP statistics. As to non-equity forms of investments, as long as they do not involve cross-border financial transactions (except for reinvested earnings), they are not reflected in BOP statistics. The limited availability of such data can, to an extent, be overcome by the use of some privately published data as complementary sources for information.

## M&As

During the past two decades or so, cross-border M&As have assumed a growing importance in global FDI flows. Cross-border M&As were a driving factor behind the dramatic growth of FDI in the 1990s, peaking in 2000 (UNCTAD, 2000) and again in 2005-2006 (UNCTAD, 2006 and 2007), particularly among developed countries. Although M&As involve the purchase of existing assets and companies, the accounting books of the target company will remain unchanged (if no additional capital is provided to the target company) as there is only a change of ownership. An M&A transaction needs to be included in the financial account of the BOP, as long as there is an international transaction of capital. This does not necessarily mean, however, a net addition to the capital stock in the host economy.

Data on cross-border M&As are published mainly by investment banks and consulting firms. A problem with these data is the lack of a



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common definition of M&As. Another problem is related to the varying nature of the data collected. For example, M&A data can be compiled on an announcement basis or on a completion basis. Nevertheless, despite these differences, the broad trends presented by various data sources are similar.

Comparisons between FDI and cross-border M&A data are not straightforward. For instance, while FDI data are presented on a net basis, M&A data are expressed as total transaction values of individual deals. In addition, cross-border M&A transactions do not necessarily result in international capital flows across borders (UNCTAD, 2000).<sup>13</sup> M&As undertaken through the exchange of shares present additional difficulties to the compilation of these transactions in BOP statistics.<sup>14</sup>

In recent years, some private companies have also started to provide information on FDI related to greenfield and expansion projects,<sup>15</sup> although these databases typically record *announced* FDI projects. Information is obtained from media, industry organizations, investment promotion agencies and market research companies. These data do not necessarily reflect the actual implementation of projects, and the geographical coverage and other methodological aspects vary according to the source. Nevertheless, FDI project information can complement BOP data on FDI by providing detailed information on the companies, industries and locations involved in the transactions. As with M&A data, greenfield and expansion projects data are hard to compare with BOP data as they do not measure capital flows across borders.

Non-equity forms of investment involve a wide range of TNC activities, in particular subcontracting, contractual arrangements (e.g. offshoring, buy-back arrangements, turn-key arrangements, non-equity joint ventures, product-sharing), strategic alliances, including R&D

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<sup>13</sup> For example, if a German company acquires a company in the United States and finances the deal with funds raised in the United States capital market, no capital will cross the border and no FDI will be registered.

<sup>14</sup> The mode of exchange of shares is frequently used to finance a mega deal as their sheer size makes cash payment virtually impossible. For example, in the case of the 1998 Daimler-Chrysler deal with a transaction value of \$40 billion, there was no direct impact on the BOP of the countries concerned: the inflow of capital (in FDI) that resulted from Daimler's acquisition of Chrysler stock was offset by the outflow of capital recorded in the portfolio investment account that resulted from the distribution to Chrysler shareholders of the stock of the new company, DaimlerChrysler (UNCTAD, 2000).

<sup>15</sup> The OCO Consulting's LOCOMonitor Database and the IBM Business Consulting Services' Global Locations Database are examples.

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contracts, franchising and licensing, which can also contribute to the development of host economy. Non-equity forms are common in the services sector, as well as in some natural-resources-related industries (UNCTAD, 2007, p. 160). While some information on these forms of investment can be obtained from data on royalties and licensing fees provided in the BOP statistics,<sup>16</sup> data on the type of arrangement, value, firms involved and, perhaps more importantly, the extent of these types of TNC activities are not readily available.

### 2.3 Operations data on TNCs' activities

The data discussed above are used to measure the magnitude of FDI, but they do not provide much information about the actual activities undertaken by parent companies and foreign affiliates. Operations data of parent firms and foreign affiliates are required in order to obtain a clearer picture of the importance of TNCs to the host economy. Operations data would include, among others, information on production (sales, value-added), labour (employment, wage rates), trade (exports and imports), innovation activities (R&D expenditures), tax payments. The availability of such information is of particular importance to policymakers for assessing the economic impact of FDI and designing policy measures geared towards maximizing its benefits. At the same time, for home countries, data on the operations of home-based TNCs are important for monitoring the performance of their foreign affiliates and assessing the integration of the country into the global economy through outward investment.

The methodology for compiling statistics on the operations of TNCs is less developed than for measuring FDI flows and stocks. Moreover, relatively few countries collect such data, and it is normally collected through their own enterprise surveys. However, the need for operations data is increasingly acknowledged by both national statistical offices and international organizations. A useful reference document is the *Manual on Statistics of International Trade in Services* (MSITS), which was developed jointly by international bodies, including the IMF, OECD, WTO, the United Nations Statistics Division, the Statistical Office of the European Communities (Eurostat) and UNCTAD (United Nations et al., 2002). It reviews the key issues and definitions involved

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<sup>16</sup> Defined as “receipts and payments of residents and non-residents for: (i) the authorized use of intangible non-produced, non-financial assets and proprietary rights such as trademarks, copyrights, patents, processes, techniques, designs, manufacturing rights, franchises, etc., and (ii) the use, through licensing agreements, of produced originals or prototypes, such as manuscripts, films, etc.” (IMF, 1993, p. 40).

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and makes comprehensive recommendations for the collection of these statistics.

The concepts related to *foreign investment* and *foreign affiliation* (including, for example, the concepts of ownership, residence and valuation) recommended for use in operations statistics are based the System of National Accounts (SNA) and the BOP developed by the United Nations and the IMF, respectively. They have been further elaborated in the MSITS by the organizations referred to above. There is general agreement on all but a few issues. The main issues still under discussion include whether data should be collected only for majority-owned foreign subsidiaries and branches or also for foreign associates, and whether to ascribe ownership of a direct investment enterprise to its immediate foreign owner or ultimate beneficial owner. MSITS recommendations on operational variables are to a large extent based on concepts used in the SNA. The MSITS recommends that countries collect at least the following information on foreign affiliates: number of affiliates, sales, output, employment, value-added, exports and imports.<sup>17</sup>

### 3. Policy implications

The above review of different sources of data related to FDI and TNC activities illustrates the need to apply the existing international guideline for collecting and reporting FDI data. The international guidelines on FDI data compilation also need to be developed further, taking into account recent changes in TNCs' mode of investment and types of activities in an increasingly globalized and liberalized world economy. Both the IMF and the OECD guidelines are currently undergoing revision and are scheduled to be released in 2008, with a new definition and methodology for collecting data. The Direct Investment Technical Expert Group (DITEG) established by the IMF during 2004–2006 and the Benchmark Advisory Group by the OECD since 2006 have provided technical expert advice on the revision of the IMF's BOP manual and the OECD's Benchmark Definition of FDI, respectively. Both groups, of which Eurostat, the ECB and UNCTAD were members, completed the discussion and made recommendations on a number of issues related to FDI statistics on a BOP basis (appendix 1 for some issues). Some unresolved issues (e.g. special purpose entities,

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<sup>17</sup> This is the list of recommended variables in MSITS that “should be based primarily on their usefulness in implementing the GATS and in analysing globalisation phenomena” (United Nations et al., 2002, chapter IV).

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directional principles) continue to be discussed by these international organizations in the context of revising the IMF's BOP manual and the OECD's Benchmark Definition of FDI.

Policymakers and researchers require data, classified by economic activity and geographical location, to understand fully the impact of FDI at both the macro and micro levels. They need to assess not only the amount of FDI they receive, but also whether this is the right kind of FDI, given their development objectives. They have to understand the impact of FDI on individual industries in order to assess to what extent exports are promoted and technology enhanced; which industries and sectors are most affected; what the level of concentration is in individual industries; and how these effects change over time. Adequate information is similarly relevant to governments that are considering entering into tax treaties and investment agreements and wish to evaluate their FDI policy efforts from a development perspective.

The availability of operations data and additional financial data would greatly enhance the ability of policymakers to assess the economic impact of FDI and design appropriate policies. However, such information is even more difficult to obtain than FDI data captured in the BOP framework. It requires additional effort, often through surveys of foreign affiliates and parent firms.

To conclude, the quality of FDI statistics is, to a large extent, determined by the comprehensiveness, timeliness, reliability and international comparability of data. To meet these criteria, official compilers need to be familiar with the methodology in use for producing estimates of FDI activity, and various types of institutional support must be available for properly recording and monitoring such activity. Institutional capacity building in the field of FDI statistics has a twofold dimension: one is methodology-related and the other is organization- or institution-related. The former involves appropriate tools and human resource development, and the latter requires a proper institutional or organizational framework to be in place to enable relevant institutions to compile and process FDI data as well as TNCs' operations data.

There are important institutional bottlenecks to address. Some countries do not have a designated body reporting statistics on FDI and TNC activities. In others, different agencies report different series of FDI statistics. In both cases, human resource development is required. There may, therefore, be a need for specialized technical assistance. UNCTAD, for instance, has been helping some developing countries establish systems of data compilation in line with the international

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guideline. Work on improving data reliability and availability can also be conducted at the regional level. The Association of South-East Asian Nations (ASEAN) provides an interesting illustration of how regional coordination and cooperation can be used in the area of FDI statistics.

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- United States Department of Commerce (2007). “Foreign direct investment in the United States: Details for historical-cost position and related capital and income flows, 2003”, *Survey of Current Business*, September 2006, pp. 33–73.





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## Appendix 1

### Objectives and topics discussed at DITEG meetings, 2004–2005

The main objective of the joint IMF/OECD DITEG was to identify conceptual and methodological issues and to make recommendations to the IMF Committee on Balance of Payments Statistics and the OECD Workshop on International Investment Statistics on the issues suggested by DITEG. These issues were:

1. Valuation of (i) direct investment equity and (ii) branches
2. Direct investment – 10% threshold of voting power/equity ownership, employment
3. Indirect investment – fully consolidates system, United States method, or 50% ownership
4. Mergers and acquisitions
5. Reinvested earnings
6. Bring together all direct investment issues (stocks, flows, income, between affiliates) in an appendix to the BOP Manual.
7. Directional principle
8. Reverse investment – classification
9. SPEs, shell companies, holding companies, off-shore enterprises (units, sectorization, residence, transactions)
10. Rules for identification of branches
11. SPEs
12. Inclusion in direct investment of transactions between non-financial direct investment enterprise (foreign affiliate) and affiliated financial SPE
  - (i) Country identification (Ultimate beneficial owner/ultimate destination and immediate host/investing country)
  - (ii) Geographic classification principles (debtor/creditor or transactor principle)

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13. Round tripping
  14. Permanent debt between affiliated financial intermediaries
  15. Land and buildings owned by non-residents
  16. Use of maturity and full instrument split for direct investment
  17. Multi-territorial enterprises
  18. Application of direct investment to government
  19. Bring together all direct investment related issues (transactions in goods and services, income, financial flows, stocks, between affiliates) as an appendix to the BOP Manual
  20. Define terms more clearly, including: direct investor; affiliated direct investment enterprise; parent company; majority ownership and control; multinational enterprise; loan guarantees; debt forgiveness
  21. Various special cases, including banking activities; (a) transfer pricing between banks; (b) shipping companies; (c) natural resource exploration and construction
  22. Other capital (focusing on short-term instruments)
  23. Inter-company transactions and amounts outstanding with fellow subsidiaries
  24. FDI stock (financial versus economic measurement)
  25. Valuation of real estate
  26. Accounting methods and international accounting standards
  27. Principles for classification by industry (according to direct investor or direct investment enterprise)
  28. Greenfield investments
  29. Extensions of capital
  30. Mutual funds (units, sectorization, residence, transactions)

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# GUIDELINES FOR CONTRIBUTORS

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- C. **Figures** (charts, graphs, illustrations, etc.) should have headers, subheaders, labels and full sources. Footnotes to figures should be preceded by lowercase letters and should appear after the sources. Figures should be numbered consecutively. The position of figures in the text should be indicated as follows:

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- F. **Bibliographical references** in the text should appear as: “John Dunning (1979) reported that ...”, or “This finding has been widely supported in the literature (Cantwell, 1991, p. 19)”. The author(s) should ensure that there is a strict correspondence between names and years appearing in the text and those appearing in the list of references. All citations in the list of references should be complete. Names of journals should not be abbreviated. The following are examples for most citations:

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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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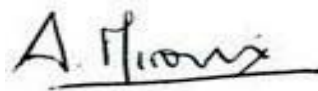
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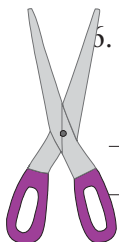
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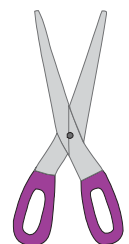
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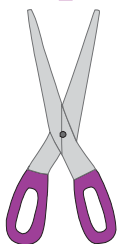
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