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Contents

Strategic heterogeneity in the global mining industry *

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The mining industry is global in the sense that its largest companies come from a number of countries, including developing countries. The global nature of the industry raises the question as to whether such a geographically diverse set of firms make similar strategic choices, and what the consequences of these choices are for both firms and nations. In this study, we examine a sample of the twenty-six largest mining firms in the world in order to determine whether they adopt similar strategies. We find a relatively high degree of strategic homogeneity among the world's leading mining firms, but the presence of firms from developing countries contributes to heterogeneity. We also find that homogeneity is not necessarily associated with higher returns. Paradoxically, firms from developing countries contribute to strategic heterogeneity because they are less diversified, but they are also more profitable. At the same time, the industry continues to consolidate through a series of cross-border mergers and acquisitions. The continuing consolidation of the mining industry worldwide has the potential to further reduce strategic heterogeneity and increase the relative bargaining power of transnational corporations (TNCs). At the same time, the pressures for strategic homogeneity are likely to result in more cross-border acquisitions by mining companies from developing countries.

Key words: corporate strategy, mining, strategic heterogeneity, globalization, emerging markets

1. Introduction

The global mining industry is characterized by the fact that its largest companies come from a number of countries, both developed and developing.[1] This is, perhaps, not surprising given that economically viable mineral and metal ore deposits are distributed worldwide. As indicated in table 1, as of

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1 We refer to the global mining industry because we examine the largest mining firms in the world. In this context, we do not use the term global to refer to the strategies of *individual* firms, which may in fact be regional, as defined by Rugman (2005).

Table 1. Major Global Mining Companies, Ranked by Sales (2003)

Company	Sales 2003 US$ Millions	Net Income 2003 US$ Millions	Country	Historical Date	Metal/Mineral Interests
Alcoa Inc. (Alcoa)	21,504.0	938.0	United States	1894	bauxite, specialty chemicals, and coal
Anglo American plc (Anglo)	18,637.0	1,592.0	United Kingdom	1917	gold, platinum, copper, zinc, nickel, diamonds, aggregates, and coal
BHP Billiton (BHP)	15,608.0	1,900.0	Australia	1885	bauxite, base metals, petroleum, and coal
Alcan Inc.(Alcan)	13, 640.0	167.0	Canada	1902	bauxite and specialty chemicals
Rio Tinto Group (Rio)	9,228.0	1,508	Australia	1873	bauxite, copper, gold, iron ore, diamonds, industrial minerals, coal, and uranium
Companhia Vale do Rio Doce (CVRD)*	5,350.0	1,548	Brazil	1942	bauxite, copper, nickel, iron ore, kaolin, and potash
Mining and Metallurgical Company Norilsk Nickel (Norilsk)*	5,196.0	861.0	Russia	1935	gold, platinum, copper, nickel, palladium, and natural gas
Noranda Inc. (Noranda)	4,657.0	34.0	Canada	1922	bauxite, copper, zinc, and nickel
Phelps Dodge Corporation (Phelps Dodge)	4,142.7	94.8	United States	1834	copper and molybdenum
Codelco (Corporación Nacional del Cobre de Chile)*	3,781.8	89.2	Chile	1976	copper and molybdenum
Xstrata plc (Xstrata)	3,481.6	277.0	Switzerland	2001	copper, zinc, and coal
Mitsui Mining and Smelting Co. (Mitsui)	3,159.1	25.7	Japan	1950	zinc and lead
Newmont Mining Corporation	3,157.8	475.5	United States	1921	gold, copper, and zinc
Sumitomo Metal Mining Co. (Sumitomo)	2,964.1	(9.8)	Japan	1590	gold, silver, platinum, copper, zinc, nickel, and lead
Inco Limited (Inco)	2,474.0	137.0	Canada	1915	gold, silver, copper, nickel, and cobalt
Grupo Mexico, S.A. de C.C. (Grupo Mexico)*	2,456.3	(125.0)	Mexico		copper, zinc, silver, and gold
WMC Resources Ltd. (WMC)	2,258.2	184.8	Australia	1933	nickel, copper, molybdenum, gold, phosphate fertilizers, and uranium
Freeport-McMoRan Copper and Gold Inc. (Freeport-McMoRan)**	2,212,2	181.7	United States/ Indonesia	1967	copper, gold, and silver
Falconbridge Limited (Falconbridge)	2,083.5	194.4	Canada	1928	copper, zinc, nickel, cobalt, and ferronickel
Barrick Gold Corporation (Barrick)	2,035.0	200.0	Canada	1983	gold, silver, and copper
AK "ALROSA" (Alrosa)*	1,939.8	330.3	Russia	1992	diamonds
Teck Cominco Limited (Teck)	1,861.5	115.1	Canada	1906	gold, copper, zinc, lead, indium, and germanium
Dowa Mining Co. (Dowa)	1,844.4	(21.9)	Japan	1884	gold, silver, platinum, palladium, rhodium, and copper
Placer Dome Inc.(Placer)	1,763.0	229.0	Canada	1910	gold, silver, and copper
Impala Platinum Holdings Inc. (Implats)*	1,581.0	457.3	South Africa	~ 1970s	platinum, nickel, copper, and cobalt
Lonmin plc (Lonmin)***	1,298.0	123.3	United Kingdom/ South Africa	1909	platinum, palladium, and rhodium

Source: Annual Reports, SEC Filings, Company Websites.

* Indicates a firm headquartered in an emerging or transition economy. Of these companies, Alrosa and Codelco are state-owned, while Norlisk and CVRD were privatized in the late 1990s.

** Freeport-McMoRan, while based in the United States derives almost all of its revenues from Indonesian operations.

***Lonmin, while based in the U.K, derives almost all of its revenues from South African operations.

2003, the 26 largest mining companies in the world came from ten different countries, of which five were developing countries. These five countries accounted for six of the largest twenty-six firms. At the same time, several firms whose headquarters were in developed countries essentially conducted all of their operations in developing countries.

As part of the natural resource sector, the mining industry has occupied a prominent role in both the development and international business literature. The natural resource sector, and mining in particular, was the background for perhaps the best-known model of relations between transnational corporations (TNCs) and host country governments, Vernon's (1971) obsolescing bargain model (OBM). In its original formulation, the OBM posited that the risk associated with natural resources, and the lack of skills and technology in the host country require that host countries offer substantial incentives to TNCs. The initial bargain therefore favours the TNC. However, once the TNC has incurred the sunk cost of exploration and extraction, relative bargaining power shifts to the host country government which use the TNC (sunk) assets as hostages to extract resource rents, including expropriation of assets (Vernon, 1971; Moran, 1974).[2] Although the OBM has been questioned over the years, its relevance has recently re-surfaced as commodity and oil prices have increased, with some evidence of increased tensions between TNCs and host countries (Gould and Winters, 2007; Sauvant, 2007).

The mining industry is also part of the "curse of natural resources" literature, which suggests that reliance on natural resources has adverse consequences for economic growth and development (Sachs and Warner, 1995, 1997, 2001). While there are many explanations for the resource curse phenomenon, much of the recent literature has focused on the impact that natural resource wealth has on political institutions and government policy. In particular, it is often argued that the availability of resource rents can encourage corruption, rent-seeking and weak governance by entrenched elites (Kronenberg, 2004; Stijns, 2006; Gould and Winters, 2007). These same factors could also contribute to increased political risk associated with threats to renegotiate contracts (Jakobsen, 2006).

In this article, we analyze strategic choices made by the world's largest mining firms. We do so from the perspective of the literature on strategic heterogeneity, that is, the degree to which a firm's strategy

[2] Recent surveys of the literature are found in Eden *et al.* (2005) and Jakobsen (2006).

matches or deviates from the strategies of competitors. This is of particular interest in the mining industry where the question arises as to whether such a geographically diverse set of firms make similar strategic choices, and whether these choices affect corporate performance. To our knowledge, such an analysis has not been undertaken for the mining industry.

In the literature review, we identify two broad schools of thought regarding how much strategic heterogeneity to expect in a given industry. One group of scholars holds that strategy is generic and largely determined by the environment, thus resulting in *more* strategic homogeneity (Seth and Thomas, 1994; DiMaggio and Powell, 1983; Dobbin and Baum,2005). Proponents of the alternative view argue that strategy is unique and emanates from the skills or activities in which the firm excels, thus resulting in strategic heterogeneity (Geroski, 1991; Nelson, 1994).

Intra-industry firm heterogeneity studies have not attracted the interest of many researchers. Indeed, Capasso, Dagnino and Lanza (2005) observe that the concept of strategic heterogeneity is frequently overlooked or assumed to be a given in strategy research. Although some researchers have considered intra-industry heterogeneity from the perspective of firms in a single industry, they have done so in the context of one country. For example, Hatten and Schendel (1977) have studied market conduct as a source of intra-industry heterogeneity among firms in the United States brewing industry; Insead and Collins (2001), the evolution of intra-industry firm heterogeneity in the American telephone industry; Ferrier and Lee (2002), the degree to which a firm's sequence of competitive actions influenced stock market returns among a sample of United States firms; and D'Este (2005), the extent to which a firm's knowledge base affected intra-industry heterogeneity among Spanish pharmaceutical firms. The present research adds to this body of literature as it examines strategic heterogeneity among the major firms in a single industry from a multi-country perspective.

We argue that in the mining industry, forces exist for both strategic heterogeneity and strategic homogeneity. On the one hand, basic industry characteristics would suggest little heterogeneity: standardized technology, historically slow growth, little or no product differentiation, and international exchange-based pricing for many of its products. However, the diverse origins of industry competitors suggest that some degree of strategic heterogeneity may be observed because firm strategies (and performance) may be influenced by institutional

factors and local capabilities in their country of origin (Wan, 2005). We suggest that this is particularly true of firms from developing countries.[3]

Our results do in fact suggest that most large firms in the mining industry are converging on a common strategy that involves relatively high levels of product and geographic diversification. In addition to the implications for firm performance, the increased size and global presence of these firms raises questions regarding the balance of power between TNCs and developing host countries. At the same time, we find that large mining firms from developing countries have, for the most part, not followed the same strategies, and this raises questions regarding their future strategies.

The article is organized as follows. The next section reviews the literature on strategic heterogeneity. Second, the application of that literature to the mining industry is discussed. Then follows a description of the data and methodology, after which the results are reported. The article concludes with a discussion of the results and conclusions, with attention given to implications for strategic management, developing countries and avenues for future research.

2. Review of the literature

In this section, the basic theoretical underpinnings of the two dominant positions on strategic heterogeneity and prior studies that have considered the relationship between strategic variety and performance are examined.

2.1 Strategic homogeneity

Four theoretical explanations suggesting why the strategic behaviours of firms should be the same have been advanced. The first is drawn from the perfect competition model in neoclassical economics where homogeneity among firms in all aspects of production, except for scale, is assumed (Seth and Thomas, 1994). Given the standard set of assumptions about the environment in which the firm operates (many firms, identical products and technology, free entry and exit), the only

[3] We focus on home country institutional differences as sources of strategic heterogeneity, but note that host country differences can matter as well. Indeed, it is argued that strategic choices can be the result of the interaction between advantages built on home country characteristics and advantages required by host country characteristics (Erdener and Shapiro, 2005; Buckley *et al.*, 2007).

choice left to the firm is to set an appropriate output quantity based on market price (Dobbin and Baum, 2005).

Industrial organization theory provides a second explanation. The basic tenet of this theory is that the structure of an industry dictates the conduct of the industry's buyers and sellers, which in turn determines the economic performance of the industry. Known as the Structure-Conduct-Performance (SCP) paradigm, the theory proposes that firms operating within the same market structure and facing the same basic conditions of supply and demand should realize the same economic results. Under these conditions, each firm, when faced with the same set of circumstances, makes an independent decision that is similar to that of other firms (Seth and Thomas, 1994).

Institutional theory suggests a third explanation. DiMaggio and Powell (1983) have argued that the interconnectedness of organizations facing similar environmental conditions results in the organizations becoming more similar over time in terms of their organizational structures, practices and strategic behaviours – a phenomenon known as organizational isomorphism. Most industries are characterized by ambiguity and uncertainty, two states which lead to hesitancy regarding the appropriate strategic response. As a consequence, organizations create norms of strategic behaviours, which tend to diffuse across an industry as (a) the strategies of successful firms are imitated by less successful firms, and (b) organizations learn about the norms through industry associations and their network of relationships (Deephouse, 1996). Firms that choose to adopt strategies which are radically different from those of their competitors are subject to legitimacy challenges which restrict their ability to acquire resources (Deephouse, 1999), a circumstance that reinforces the need to conform.[4]

Finally, strategic conformity can be explained using efficiency theory; that is, efficient strategies tend to diffuse across organizations (Dobbin and Baum, 2005). For the past two decades, according to Porter (1996), firms have been continuously benchmarking their activities against the activities of their competitors and adopting the technologies and management techniques of their rivals to improve operational effectiveness. The more firms benchmark each other, the more alike they become, the result being strategic convergence.

[4] A variety of this argument rooted in the industrial organization literature is found in Knickerbocker (1973) where rivals imitate strategic location decisions.

2.2 Strategic heterogeneity

Three theoretical explanations, drawn from the fields of organizational ecology, evolutionary economics and the resource-based view of the firm, have been suggested for why the strategic behaviours of firms might be different (Durand, 2001). Organizational ecology theory, the first of these explanations, is built on two concepts: a population and a niche. A population is a collection of organizations with a common form; a niche is a collection of resources that can sustain a population (Geroski, 2001). Based on the characteristics they hold in common, organizations that share a common form share a similar set of survival risks and a similar set of strategic patterns (Freeman, 1995). Further, an organization exists in a resource space, or niche, where securing the resources needed to survive is a fundamental strategic issue. Firms that choose to be different by pursuing a niche strategy different from that of their competitors will face less competition for resources (Deephouse, 1999). The organizational heterogeneity that emerges reflects the fact that the environment favours some strategies and some resource allocations over others (Cockburn, Henderson and Stern, 2000).

In evolutionary economics theory, strategic variability among firms is to be expected. Organizational routines[5], especially those associated with the ability to generate and gain from innovation, differentiate one firm from another (Nelson, 1994). These differences in routines are a result of the diverse decision-making strategies employed by the firm over time and are a source of durable, inimitable, differences among firms. When a new technology or innovation emerges, individual firms develop different strategies with respect to the technology, and some of these strategies will prove to be more acceptable to the marketplace than others (Nelson, 1994). The organizational heterogeneity that emerges reflects the fact that the marketplace selects certain strategies, companies and new technologies over others (Nelson, 1994).

The resource-based view (RBV) of the firm emphasizes that a firm is a heterogeneous bundle of resources (Wernerfelt, 1984; Grant, 1991), which can lead to different strategies. The basic premise of the resource-based view of the firm is that the resources and capabilities of the firm which are valuable, rare, inimitable and non-substitutable (Barney, 1991) and for which the firm is organized to exploit (Grant, 1991) create a uniqueness that allows the firm to appropriate rents

[5] Organizational routines are the processes used by firms as part of their normal business activities (Nelson, 1994).

inaccessible to their competitors (Mahoney and Pandian, 1992). This view of the firm rests on two assumptions: 1) firms within an industry may possess strategically different skills and capabilities, and 2) these differences can persist (Rumelt, Schendel and Teece, 1994). Firms with strategically different skills and capabilities can be expected to exploit these advantages by implementing firm specific strategies that differ from those of their rivals.

In summary, each of the three perspectives on strategic heterogeneity focuses on uniqueness among firms. For organizational ecologists, uniqueness arises from a niche strategy that protects a firm against selection; for evolutionary economists, innovation is the means by which firms create uniqueness; and for the RBV of the firm theorists, the idiosyncratic capabilities and competencies of the firm create uniqueness.

2.3 Strategic groups

Strategic group scholars have suggested that firms within an industry converge to a limited number of strategic positions (Short *et al.*, 2007). Strategic groups are viewed as groups or subsets of firms within an industry pursuing similar strategies and having similar resources (Hatten and Hatten, 1987). While individual firms may differ in their strategies, such differences are not significant enough to prevent sorting the firms into homogenous groups (Thomas and Venkatraman, 1988). The notion of strategic groups was first introduced within the context of the industrial organization model which, as noted above, argues for strategic homogeneity (Hatten and Hatten, 1987). Thus, strategic groups allow for homogeneity within groups, but heterogeneity across them.

Strategic heterogeneity theorists also make use of the concept of strategic groups, but unlike the industrial organization theorists who group firms that resemble each other on the basis of structures, practices and behaviours, strategic heterogeneity theorists group firms with similar resources and competencies (Houthoofd and Heene, 2002). There is considerable debate as to how strategic groups are to be identified (Short *et al.*, 2007), and even whether they exist at all. Resource-based theorists, for example, consider each firm's control over resources and strategy development to be unique and, therefore, argue that strategic groups cannot exist (Houthoofd and Heene, 2002; Parnall, 2002). Recent evidence provided by Short *et al.* (2007) suggests that both firm and strategic group effects are important for performance, although the former is more important.

2.4 Strategic variety and performance

The precise relationship among strategic differentiation, competition and resulting performance has not been conclusively demonstrated (Deephouse, 1999). Miles, Snow and Sharfman (1993) found in their analysis of 12 industries that those industries with the greatest strategic variability were the most profitable. Cool and Dierickx (1993) found that over time, as the strategies pursued by firms within the same industry became more diverse, the average profitability of the entire industry fell. Gimeno and Woo (1996) in their study of the airline industry found that rivalry increased and financial performance (measured as revenue per passenger mile) declined when firms pursued similar strategies. Miller and Chen (1995) and Chen and Hambrick (1995) noted that non-conformity was associated with declines in performance. Dooley, Fowler and Miller (1996) found in their study of 61 manufacturing industries that very high levels of either heterogeneity or homogeneity are more likely to be associated with industry profitability. However, Deephouse (1999) in his study of commercial banks showed that moderately differentiated firms perform better than either highly conforming or highly differentiated firms. Gonzalez-Fidalgo and Ventura-Victoria (2005) surveyed a sample of Spanish manufacturing industries and found, like Dooley *et al.* (1996), that industries benefited from either high strategic homogeneity or high strategic heterogeneity.

When the analysis of performance differences moves from the level of the industry to that of the strategic group, there is evidence that strategic heterogeneity *within* the group gives rise to performance differences.[6] McNamara, Deephouse and Luce (2002), in their study of strategic groups in the commercial banking industry, found that within a group, the secondary firms (firms that are loosely aligned with one another) outperform both the primary firms (firms that are tightly aligned with one another), as well as the solitary firms (firms that are pursuing unique strategies). This recent work is in keeping with the findings of earlier researchers (Lawless, Bergh and Wilsted, 1989; Cool and Schendel, 1988) who also noted within group performance differences. Lawless, Bergh and Wilsted (1989) found that the relationship between strategic group membership and performance among manufacturing firms was influenced by the characteristics of the individual firms; Cool

[6] In the analysis of strategic groups, firms are sorted into groups based on both strategic choices and resources, but it is nevertheless true that individual firms within the group will still differ somewhat in their strategies (Thomas and Venkatraman, 1988; McNamara, Deephouse and Luce, 2002).

and Schendel (1988) showed that in the United States pharmaceutical industry, historical differences among group members may result in performance differences.

This review suggests that at the level of the industry, high or low levels of strategic heterogeneity may give rise to higher levels of performance, whereas, at the level of the firm, strategic heterogeneity among firms gives rise to performance differences.

3. Strategic heterogeneity in the mining industry

Based on the literature surveyed above, one could argue that the mining industry should demonstrate little strategic heterogeneity for a number of reasons. First, mining is a mature industry, and strategic heterogeneity has been found to decline as an industry matures (Miles, Snow and Sharfman, 1993). Second, the top ranking mining firms sell similar products mostly in the same markets as their competitors, suggesting there ought not to be significant differences in the strategies and behaviours of similar firms in different countries (Lindell and Karagozoglu, 1997). Third, while mining assets can be depleted, the core activities of mining (drilling, blasting, mucking, hauling, crushing, milling and refining) are stable. This stability puts mining on what McGahan (2004) called the *creative change trajectory* where change occurs when core assets are under threat, but core activities, including relationships with customers and suppliers, are generally stable. Fourth, Seth and Thomas (1994) have argued that industries with relatively simple group structures and high concentration are characterized by relatively homogenous firms. While the organizational form of mining companies can be fairly complex because of diverse jurisdictions in which they operate, mining companies at the level of the business unit are relatively straightforward. For example, Alcoa Inc., the largest mining company in the world, has five major business segments: engineered products, flat rolled products, primary metals, consumer packaging and alumina/chemicals. In addition, the mining industry is becoming increasingly more concentrated (PriceWaterhouseCoopers, 2005), the second criterion of Seth and Thomas (1994) for an industry with little heterogeneity.

However, such arguments ignore the fact that the largest mining companies originate in so many different countries, with different socio-economic environments and different resources. This suggests that some strategic heterogeneity might be expected, particularly for companies

from developing countries, where market and other institutions are weak, resulting in strategies that are designed to overcome market and institutional failures (Khanna and Palepu, 1997; Kock and Guillen, 2005; Wan, 2005).

In developed economies, with well-functioning external markets, the access by firms to critical resources, particularly capital, labour, and complementary assets, is achieved primarily through market-based transactions. These markets are supported by a governance infrastructure that protects property rights, including an independent judiciary, an efficient and relatively corruption-free government, and a transparent regulatory framework (Globerman and Shapiro, 2002). The reliance on external markets also provides incentives to enhance productivity and be internationally competitive.

On the other hand, in economies where external markets are not efficient, where property rights protection is weak, where contract enforcement is difficult and where corruption is widespread, firm scope, ownership and strategies may be driven by the need to fill the voids created by market failures and missing institutions (Khanna and Palepu, 1997). In particular, many of the largest and most successful companies in emerging markets are either family- or state-owned, and many belong to larger business groups (Khanna and Palepu, 1997; Morck, Wolfenzohn and Yeung, 2005). Although these firms can be large and successful at home, they may lack the resources and governance capabilities required to compete abroad (Globerman and Shapiro, 2006). Thus, both family- and state-owned firms in emerging markets may follow strategies that focus on their domestic markets and that reflect family- or state-defined priorities (Morck, Wolfenzon and Yeung, 2005; Hoskinson *et al.*, 2005; Globerman and Shapiro, 2006).[7]

For example, family firms may rely on personal networks rather than contracts as the governance mechanism for transactions. To the extent that the competitive success of family-owned firms derives largely from network connections in the home country, they may be disinclined to invest abroad where different firm-specific advantages are pre-requisites for competitive success (Erdener and Shapiro, 2005). In addition, they may under-invest in resources required to compete

[7] On the other hand, there is evidence that domestic market failures, particularly in capital markets, may provide firms with access to subsidized finance which can lead them to invest abroad (Buckley *et al.*, 2007). In addition, resource firms may be seen as an instrument of a domestic industrial policy and encouraged by the state to invest abroad.

abroad such as external managers and R&D in order to protect sunk investments in "relationships". Likewise, state ownership leads to a substitution away from efficiency considerations as motivators of investment decisions in favour of other objectives, including access to resources. More generally, Hoskisson *et al.* (2005) suggest that government controlled business groups are the least likely to refocus in a way that promotes international competitiveness.

In summary, the nature of the business environment and the corporate governance features of emerging country firms suggest that they may follow distinctive strategies that are different from those of their global competitors from developed market economies. At the same time, the nature of the industry suggests that most mining firms may follow relatively homogenous strategies, while the theories that focus on firm heterogeneity would suggest otherwise. In the empirical section that follows, we examine the degree to which one can observe patterns of strategic heterogeneity (homogeneity) among the world's top ranking mining firms, and if heterogeneity is observed, if it relates to whether the firm originates in an emerging or transition economy. Finally, we ask whether any strategic differences are reflected in differential performance.

4. The data and the methodology

4.1 Data Sources

Company websites, annual reports, press releases, and United States Security and Exchange Commission (SEC) filings were used to obtain data on the mining companies examined in this study. Other researchers have used company annual reports as a data source, recognizing that company annual reports and SEC filings, in spite of their known limitations, are often the only consistent source of comparable data (Bansal, 2005; Ferrier, 2001; Olusoga, Mokwa and Noble, 1995). All of the firms included in the study published annual reports, and over half had SEC filings. The Hoovers website (www.hoovers.com) had comparable financial information for all of the firms.

4.2 Selection of mining firms

A preliminary list of large mining firms was compiled from a report produced by PriceWaterhouseCoopers on the largest mining companies in the world (2005) and from a list of attendees at BMO

Nesbitt Burns' 2005 Global Resources Conference whose attendees represented the world's leading mining companies (BMO Nesbitt Burns, 2005). In order to be included in the study, the firm had to have over $1 billion in revenues in 2003 (as reported on the Hoovers' website), have what is known as "hard rock" mining[8] operations, and have mineral/metal interests. 26 firms met these criteria (see table 1). 14 of the firms were from the Americas, four from Europe and Africa, and eight from Asia and the Pacific. 11 of the firms were predominantly base metal producers, six were predominantly precious metal producers, two were base metal and precious metal producers, six were base metal producers with aluminum interests, and one was a diamond producer.[9] Two of the firms were state-owned, and both were from emerging markets. These 26 firms represented over 80% of the market capitalization for mining in 2003.

4.3 Methodology

Characterizing the Strategies

The most common measures of corporate strategy are market diversification, product diversification, firm size, research and development (R&D) intensity, and capital intensity (Lee and Habte-Gioris, 2004). Four of these measures were selected for this study. The first two, geographic scope and product scope, were based on measures (described below) widely used by other researchers (Denis, Denis and Yost, 2002; Stabell and Fjeldstad, 1998; Hitt, Hoskisson and Kim, 1997; Dooley *et al.*, 1996; Olusoga, Mokwa and Noble, 1995; Miles *et al.*, 1993; Capon, Farley and Hoenig, 1990). Geographic scope is often defined as the percentage of firm sales per region, a measure employed here. An alternative measure of geographic scope, the number of countries in which the firms had business interests per region (i.e., where the firm had its producing assets as well as its exploration

[8] Hard rock mining refers to the extraction of minerals or metals from the earth by means of open pits or underground rooms or stopes (Answers.Com, 2005).

[9] Because metallic elements are often found together in nature, for example, silver and lead are often found together as are copper and gold, many firms are both base metal and precious metal producers. If the firm described itself or was known as a base metal producer (Teck Cominco Ltd. for example), it was classified as such even if it also produced precious metals. Similarly, if a firm described itself or was known as a precious metal producer (Barrick Gold Corporation, for example), it was classified as such even if it also had some base metal production. Freeport McMoran Copper and Gold Inc., a firm which produced both a base metal and a precious metal, was classified as a base metal producer as the bulk of its revenue came from copper.

assets), was included along with the more traditional measure, because geographic sales data only capture the destination of the product not the full geographic scope of a mining firm's activities.[10] Product scope was defined as the percentage of sales per line of business.[11] These three measures were based on 2003 firm data and were calculated as Herfindahl indices[12]. The calculations were as follows:

(a) Geographic scope

Measure 1: $\Sigma (n_{ij} / n_i)^2$,

where n_{ij} is the number of countries in region j in which firm i operates, and n_i is the total number of countries in which firm i operates.[13]

Measure 2: $\Sigma (s_{ij} / s_i)^2$,

where s_{ij} is the value of sales in region j by firm i, and s_i is the total sales of firm i.

(b) Product scope: $\Sigma (s_{ik} / s_i)^2$,

where s_{ik} is the value of sales in line of business k by firm i, and s_i is the total sales of firm i.[14]

In addition to these measures of corporate strategy (i.e. geographic and product scope), we employed two additional ratios, similar to those used by other researchers, as measures of strategic variety (Dooley *et*

[10] The use of a counting methodology, used here in the count of countries, is well established in the literature (Capon *et al.*, 1990). We use five regions, the same as Rugman and Verbeke (2004): North America, South America, Europe, Africa, Asia/ Pacific.

[11] Mining firms typically segment their business either by mineral/metal interest (e.g., coal, copper, gold), or by activity (e.g., smelting/refining, engineered products, freight handling). These define the product scope of the firm.

[12] The Herfindahl index, a measure of industry concentration calculated as the sum of the squares of the market shares of each individual firm, has been used by other researchers as a weighted measure of diversification (Wan and Hoskisson, 2003).

[13] For example, Alcoa operates in 41 countries and all 5 regions (6 in North America; 7 in South America; 15 in Europe; 4 in Africa; and 9 in Asia Pacific). The share in each region was squared, and the sum is the measure of geographic diversification for Alcoa (which equals 0.24).

[14] For example, Alcoa reports six business units with the following share of sales: alumina & chemicals (12%); primary metals (24%); flat rolled products (20%); engineered products (22%); packaging and consumer (12%); other (10%). Its product scope measure is 0.18.

al., 1996): (a) the ratio exploration plus R&D expenditures to sales, and (b) the dollar value of plant, property and equipment to employee (each measured for 2003). The first ratio (exploration/R&D intensity) was suggested by the work of Porter (1979), who argued that expenditures on R&D as a percentage of sales were a competitive decision variable, reflecting differences in the competitive strategies of firms. More recently, Short *et al.* (2007) use R&D to reflect the ability of a firm to find and pursue new opportunities. In our case, we created a combined ratio of exploration expenditures and R&D to reflect the nature of the mining industry. This ratio combined exploration expenditures (mining assets are depleting assets that must be replaced, and the level of exploration expenditures is a way of measuring the firm's investment in this activity) with R&D expenditures because some of the firms reported these two expenditures as one, and the two expenditures were highly correlated. Of the 26 firms, six did not report exploration or R&D expenditures as a separate line item in their financial statements; for those that did, 11 reported one of the elements, and nine reported both.

Finally, we employed a measure of capital intensity, plant and equipment expenditures per worker. Capital intensity is a key competitive factor measuring the firm's commitment to the industry (Miles *et al.*, 1993; Short *et al.*, 2007). In addition, this variable has been shown to positively affect firm performance (Capon *et al.*, 1990).

Measure of performance

Accounting profitability (ROA), calculated as the ratio of operating income, or earnings before interest and taxes (EBIT), to total assets, was chosen as the measure of performance for several reasons: (a) it represents a return on invested capital; (b) it captures operating performance, revenue growth, and market share; and (c) it reflects current and historic management capabilities (McGahan, 1999). Operating profit (the earnings measure used in calculating accounting profitability) is also considered appropriate in cross-country studies because of the differing tax rules and capital structures of firms from different countries (Wan and Hoskisson, 2003). Data for the years 2002 through 2004 were used to calculate a three year average operating profit. The 2002 results reflected the position of the firms prior to the year in which the strategy observations were made; the 2004 results the position of the firms one year after the observations were made. A three year average was used in recognition of the fact that the strategic

decisions reflected in the performance of the firms in the current period were made in the past.

Data analyses

Several methods were used to analyze the data. Descriptive statistics (minimum, maximum, mean, and standard deviation) and Pearson correlations were calculated for the strategic measures. Cluster analysis (using a within group clustering technique) was used to identify homogeneous subgroups, and scatter plots were produced to identify the outlier firms (defined here as plus or minus one standard deviation of the mean). Cluster analysis, in spite of its limitations[15], is a valuable and important technique (Ketchen Jr. and Shook, 1996, p. 455) that continues to be used by strategy researchers for sorting observations into groups (Short *et al.*, 2007). To address certain of the limitations associated with the technique, the variables included in the analysis were established measures of strategy; they were standardized as part of the analysis, and none was highly correlated. An analysis of the outlier firms was included, because, as argued by Aharoni (1993), much can be learned from an examination of the particularly successful or unsuccessful organizations in a population of firms.

5. Results

We first examine the question of whether patterns of heterogeneity could be observed among the world's top ranking mining firms. Table 2 characterizes the cohort of firms based on the measures of strategy identified above. For geographic scope, the mean of the country measure of geographic scope was 0.43 (standard deviation 0.23), with a range from 0.22 to 1.00. A score of 0.22 represents high geographic diversification, whereas a score of 1.0 represents no diversification. 17(65%) of the firms had a Herfindahl index of between 0.22 and 0.39. In order to obtain a score in this range, the firm had to be active in three or more regions of the world. The five top ranking firms (with scores in the 0.22 to 0.27 range) had a presence in countries in all five regions. Three firms were active in just one country and all were from developing countries (the Chilean firm, Codelco; the Russian firm, Alrosa; and the South African firm, Implats). In addition, Codelco and Alrosa are state-owned. The mean of the sales measure of geographic

[15] Cluster analysis does not have a test statistic that can be used to confirm between group differences, and is more reliable in large samples.

Table 2. Means, Standard Deviations, and Correlations

Variable	N	Range	Mean	Standard Deviation	1 (a)	1 (b)	2	3	4
1. Geographic Scope									
(a) Country	26	0.22 to 1	0.43	0.23	--				
(b) Sales	24	0.28 – 0.85	0.46	0.16		--			
2. Product Scope	26	0.16 to 1	0.55	0.33	0.422*	0.026	--		
3. Exploration / R & D Intensity	22	0.003 to 0.079	0.019	0.019	- 0.228	0.203	0.484*	--	
4. Capital Intensity	22	0.031 to 0.975 (US$ Millions)	0.336 (US$ Millions)	0.249	- 0.295	-0.273	-0.089	-0.192	--

Sources: Annual Reports, SEC Filings, Company Websites
* Correlation is significant at the 0.05 level of significance (two tailed test)

scope was 0.46 (standard deviation 0.16), with a range from 0.28 to 0.85. Based on this measure, fewer firms (11 or 45%) had a Herfindahl index of between 0.22 and 0.39 (the dominant category on the country measure of geographic scope), suggesting sales scope was less diverse than country scope.

In terms of product scope, the mean was 0.55 (standard deviation 0.33), with a range from 0.16 to 1.00 (a score of 0.16 represents high product diversification; a score of 1.0, no diversification). Nine firms had scores in the range of 0.1 to 0.2, suggesting they were well diversified by line of business, and eight firms had scores in the range of 0.9 to 1.00, suggesting limited diversification.

For the combined exploration/R&D intensity measure, the mean was 0.019 (standard deviation 0.019), indicating the top ranking mining firms expended approximately 2% of their sales revenue on exploration/R&D activities in 2003. This result is below the mean of 3.3% for non-manufacturing firms (Ho and Ong, 2005). The range of expenditure was from less than 1% to 8%. The two Canadian gold producers (Barrick and Placer) were at the upper range; these firms spent between 7% and 8% of their revenues on exploration/R&D activities in 2003.[16] Although it might be expected that a higher percentage of sales would involve activities that included exploration, this behaviour was not observed, possibly reflecting the fact that the major mining

[16] It is possible that exploration and R&D expenditures are not completely matters of strategic choice, but are dictated by the nature of the resource. For example, gold is found in irregular veins relative to coal, and thus may require higher exploration costs and more sophisticated technology. We are indebted to an anonymous referee for this point.

firms depend on the junior mining firms to do much of the industry's exploration work (MacDonald, 2002). Some firms also use their joint venture partners for exploration, with Lonmin being one example. In addition, PriceWaterhouseCoopers (2005) has noted that the ratio of exploration to acquisition spend has been declining among the major mining companies, because acquired reserves are more certain than those that have yet to be found.

For the capital-intensity measure, the mean was 0.336 (standard deviation 0.242), indicating the top ranking mining firms invested approximately $336,000 per employee in plant, property and equipment in 2003. This result is comparable to that obtained by Dooley, Fowler and Miller (1996) for manufacturing. The range of expenditure per employee ranged from a low of $31,000 for the South African platinum producer, Implats, to a high of $975,000 for the Australian base metal producer, WMC. WMC's investment in plant, property and equipment per employee was more than double the amount of the other mining firms. More than half of WMC's workforce in 2003 was made up of contract employees (WMC Resources Ltd., 2003), and if these employees are included in the calculation, WMC's average capital investment per employee in plant property and equipment is more in keeping with that of other firms.

The strongest correlations were between (a) country geographic scope and product scope (r = 0.422) and (b) product scope and exploration/R&D expense (r = 0.484). The relationship between country geographic scope and product scope is understandable because the geology dictates where mineral/metals are found. For example, according to the Mineral Information Institute (2005), commercially viable gold deposits have been found in a limited number of countries (Australia, Brazil, Canada, China, Russia, South Africa and the United States). The relationship between product scope and exploration/R&D expense is also understandable as certain product lines (e.g. smelting and refining) are more amenable to the application of technology than others, and the reserves for certain commodities (e.g. platinum) are insufficient to meet future demand.

Table 3 presents the results obtained from a hierarchical cluster analysis of the firms based on country geographic scope, product scope, exploration/R&D intensity and capital intensity. Three clusters could be identified from the underlying dendogram (available on request). The first cluster, with the large majority of firms, can be characterized as firms with moderate to high geographic and product scope, as well

as average capital and exploration/R&D intensity. The second cluster of six firms can be characterized as firms with low product and/or low country geographic scope, average exploration/R&D intensity, and average to below average capital intensity. The third cluster of two firms can be characterized as firms with high country geographic scope, low product scope, average capital intensity and high exploration/R&D intensity. Four firms were excluded from the cluster analysis because of missing data points. However, based on their geographic and product scope scores, they fit within the three clusters: Dowa, Grupo and Xstrata in cluster one; Norilsk in cluster two. The results of the cluster analysis provide evidence of strategic homogeneity as well as strategic heterogeneity: homogeneity, in that most firms appear to be pursuing a common strategy, and heterogeneity, in that there are some firms that do not. The cluster analysis using the alternative measure of geographic scope (i.e. the sales measure) produced similar results.

Importantly, the second largest cluster of six firms comprises five firms from developing countries (Alrosa, Codelco, Implats and Lonmin), and Norilsk would also be in this group if only product and geographic scope were considered. The remaining member of the group is Freeport, whose operations are mostly in Indonesia. Of the

Table 3. Cluster Analysis Results

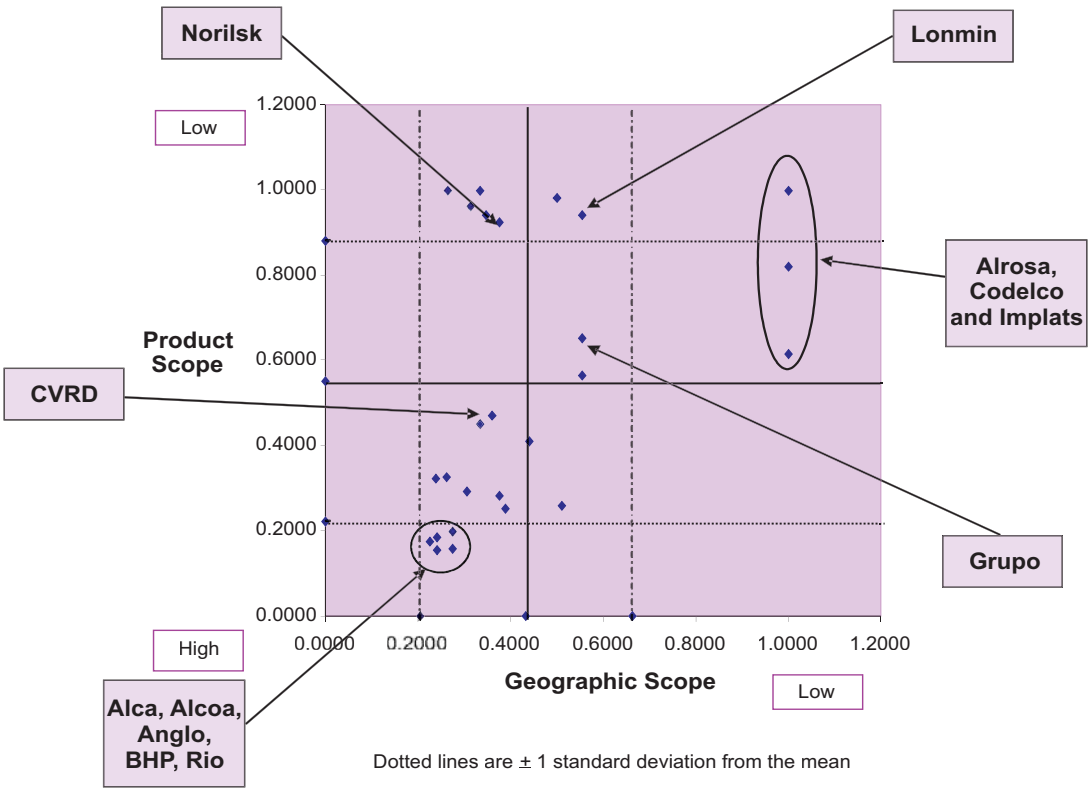
	Characteristics	Firms
Cluster 1	Moderate to high geographic and product scope Average capital and exploration/R&D intensity	Alcan, Alcoa, Anglo, BHP, CVRD, Dowa, Grupo, Falconbridge, Inco, Mitsui, Newmont, Noranda, Phelps, Rio, Sumitomo, Teck, WMC, Xstrata
Cluster 2	Low geographic and product scope Average capital and exploration/R&D intensity	Alrosa, Codelco, Freeport, Implats, Lonmin, Norilsk
Cluster 3	High geographic scope Low product scope Average capital intensity High exploration/R&D intensity	Barrick, Placer

This Table presents results based on a cluster analysis of the strategic data. Cluster analysis was used to identify homogenous subgroups based on country geographic scope, product scope, capital intensity, and exploration/R&D intensity. The underlying dendogram is available from the authors on request. We note that the number of observations is small, and this can make cluster analysis unreliable (Ketchen and Shook, 1996). Five of the six firms from emerging markets (Lonmin, Codelco, Alrosa, Norilsk and Implats) are all in the same cluster. All are above-average in terms of performance. Freeport, whose operations are mostly in Indonesia is also in this group. CVRD is grouped with the major firms from developed markets, and Grupo (omitted for lack of data) would likely fall into this category as well. However, CVRD also outperforms its group.

developing country firms, only CVRD is grouped with the major firms from developed markets, although Grupo would fall into this category as well if only product and geographic diversity were measured. Thus, the presence of firms from emerging markets clearly contributes to strategic heterogeneity.

Because of potential limitations of cluster analysis for such a small sample, we also analysed the data in a more direct fashion. For example, in figure 1 we plot country geographic scope against product scope for each of the firms. The results support the conclusions arrived at using cluster analysis. It is observed that 12 firms are positioned around highly diversified strategies, both in terms of geography and products (lower left quadrant). Of these, only CVRD is from a developing country. Within this group of twelve firms, five (Alcan, Alcoa, Anglo, BHP, and Rio) were particularly highly diversified by product. The high product diversification firms were all base metal producers with other mineral/metal interests. Of the seven firms that followed low diversification strategies (upper right quadrant), five were from developing countries. Three of these firms (Alrosa, Codelco and Implats) stand out by their lack of diversification. We note as well that five firms (Barrick, Inco, Newmont, Norilsk, Placer) were not highly diversified in terms of

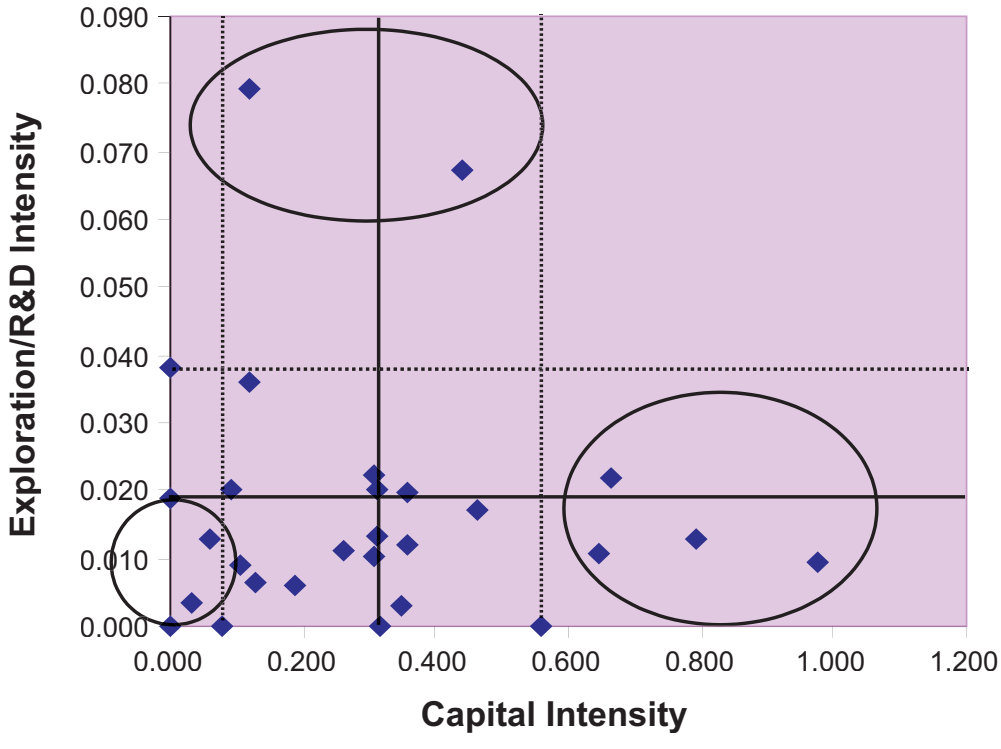
Figure 1. Product/country geographic scope



products in that they had no more than two lines of business, and one line represented more than 90% of their sales revenue.

Figure 2 plots capital intensity against exploration/R&D intensity. All of the firms for which there were data were within one standard deviation of both means, and these variables therefore contribute less to strategic heterogeneity. Two firms, Barrick and Placer, were outside one standard deviation for exploration/R&D intensity; six firms were outside one standard deviation for capital intensity. With all of the firms within one standard deviation of both means, there would appear to be a high degree of conformity with respect to strategic investments. Nevertheless, the fact that some of the firms were able to position themselves differently on one of the dimensions supports the results of the cluster analysis where both homogeneity and heterogeneity were observed. The firms that were positioned differently occupied an outlier position of (a) high investment in exploration and R&D activities (Barrick and Placer) (b) low investment in property, plant, and equipment per employee (Lonmin and Implats), or (c) high investment in property, plant and equipment per employee (Inco, Sumitomo, Rio and WMC). There is no particular evidence that firms from developing countries contribute to heterogeneity in these variables.

Figure 2. Exploration and R&D intensity/capital intensity



Dotted lines are ± 1 standard deviation from the mean

Based on these observations, we find a relatively high degree of commonality of strategic approach for most mining firms, coupled with distinctive patterns of heterogeneity for a minority of firms. Interestingly, the heterogeneous firms cluster at the extremes of product and geographic diversification, and many of these are from developing countries. Thus, it would appear that the presence of firms from developing countries contributes to strategic heterogeneity.

Finally, we asked whether differences in strategic choice were reflected in differential performance. The mean average ROA for the period 2002–2004 was 10% (standard deviation 7%), with a range from 3% to 32%. The results suggest that differences in strategic choice are associated with differences in performance. The average ROA of the firms in Cluster 1, the dominant strategic cluster, was approximately 8%; for the firms in Cluster 2, the first of the non-dominant clusters, approximately 20%; and for the firms in Cluster 3, the second of the non-dominant clusters, 4%. The six firms in Cluster 2 (including Norilsk) were firms with a limited number of lines of business in a limited number of geographic locations.

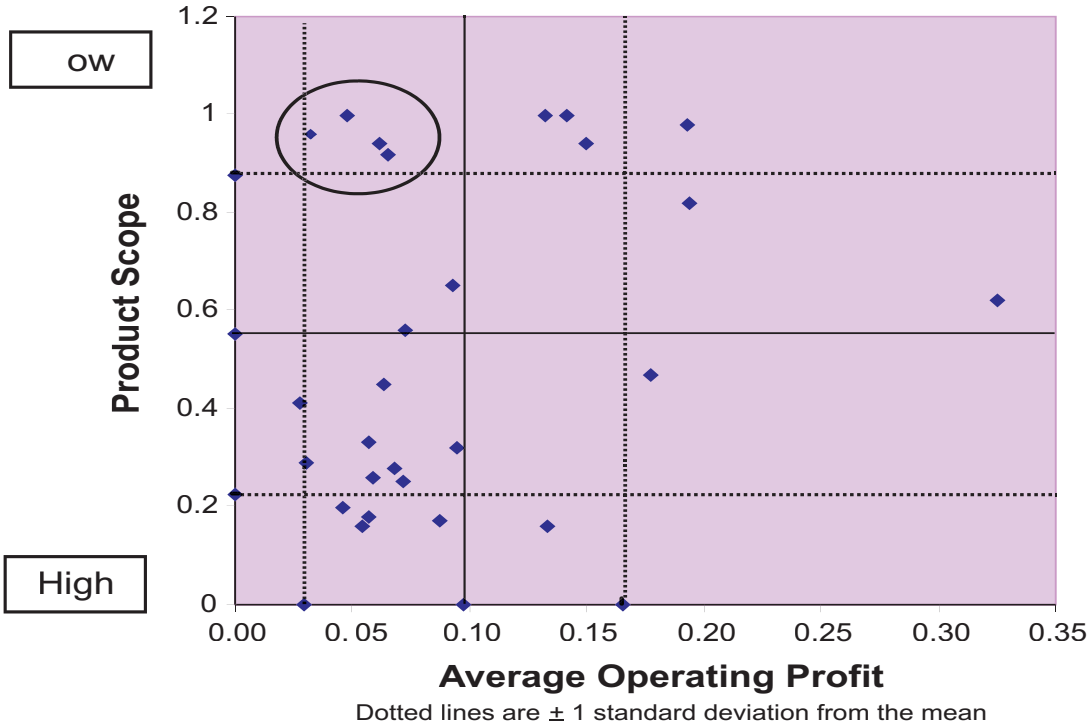
Eight firms in total were able to generate an ROA of more than 10% (the mean for the group), and four were from developing countries (Alrosa, Codelco, Implats and Norilsk). Six of the eight firms were in Cluster 2 and occupied outlier strategic positions related to diversification, either very low country geographic diversification, very low product diversification, or both (Alrosa, Codelco, Implats, Freeport, Lonmin and Norilsk). Only two of the above-average performers were associated with Cluster 1, the dominant strategic group (BHP and CVRD). Thus strategic heterogeneity associated with an outlier position appears to be associated with above-average performance.

That two firms out of fifteen in the same strategic position were able to achieve above-average performance suggests that other strategic factors were contributing to their success. In terms of mining operations, BHP shares a similar strategic position (high geographic and high product diversification) with four other firms (Alcoa, Alcan, Anglo and Rio). However, three of these firms (Alcoa, Anglo and Alcan) have diversified into non-mining lines of business such as packaging and engineered products, and this might explain their below-average performance. The remaining firm, Rio, had significantly fewer assets than BHP in 2003, $41.4 billion for BHP versus $24.7 billion for Rio in 2003 (BHP Billiton, 2003; Rio Tinto plc, 2003), which suggests that scale might be a factor in determining profitability. CVRD's moderate geographic and product diversification position was one adopted by

ten other firms, but here again the other competitors had significantly fewer assets. CVRD had $16.3 billion in assets in 2003 compared to an average of $6.4 billion for the other ten firms (Companhia Vale do Rio Doce , 2003). It would thus appear that a focus on mining at the corporate level and the ability to attain critical size are also important determinants of performance in this industry. It should also be noted that CVRD has recently expanded both its geographic and product scope through its acquisition of Inco.

In order to further examine the question of performance, we plot the three year average operating profit against product scope for each of the firms (figure 3).[17] For the entire sample, there is very little correlation between product diversity and profitability. As noted above, eight firms enjoyed above-average profitability, and four were from emerging markets, all of them below average in product diversity. Interestingly, four firms (Barrick, Newmont, Inco and Placer) were also outliers in terms of product diversification (more than one standard deviation below the average level) yet were not able to generate an above-average operating profit. Placer, Barrick and Newmont produce gold, a

Figure 3. Product scope/average operating income



[17] Product scope was chosen for this comparison for simplicity, but also because all but three of the firms, two of which are state owned, were within one standard deviation of the mean for geographic scope.

commodity that ranked 14th on the Porter-based attractive commodity scale of Garren, Bird and Sutton-Pratt's (2002)[18]. The remaining firm, the nickel producer, Inco, had significantly fewer assets in 2003 than Norilsk, the comparable outlier nickel producer ($10.7 for Inco versus $13.6 billion for Norilsk), and had diversified into nickel products (Inco Limited, 2003; Mining and Metallurgical Company Norilsk Nickel, 2003). This again suggests that occupying an outlier strategic position is not enough to ensure above-average performance; limited diversification outside of mining, size and commodity attractiveness also appear to be important factors.

Based on these observations, we conclude that for the most part, the firms that displayed the most common strategic position did not perform as well as those that displayed an outlier strategy of lower diversification. However, not all of the firms exhibiting an outlier strategy were among the above-average performers, suggesting other factors such as commodity choice, focus, and size among with strategic position were associated with the differential performance.

6. Discussion

The results suggest that even within an industry like mining where products are homogeneous and mature, and where technology is relatively slow-changing and diffused, a certain degree of strategic heterogeneity can be observed. In terms of strategic positioning, the dominant strategy among mining firms was to engage in both product and geographic diversification. These strategies were particularly apparent for firms from developed countries. In terms of strategic investments, we observe that the dominant strategy for most firms was to undertake similar investments in plant, property and equipment per employee and exploration/R&D.

Should these trends continue, the mining firms from developed countries will continue to grow in size and scope. The continuing consolidation in the industry, noted below, suggests that this is already occurring. From the perspective of host countries, this growth suggests a possible shift in bargaining power towards the TNCs, and a potential for deteriorating relations between TNCs and host countries. At the same time, rising commodities prices create more mineral rents, and host countries may well wish to increase their share (Sachs, 2007;

[18] Attractiveness was based on the producers perceived ability to exert power over suppliers and buyers, resist threats from new entrants and substitutes, and to drive demand (Garren *et al.*, 2002).

Sauvant, 2007). In essence, the obsolescing bargaining problem may re-emerge.

Firms from developing countries, including those that are state-owned, contribute to heterogeneity. For the most part, the strategies of these companies were defined by lower levels of diversification, usually some combination of geographic and product diversification. Only one firm (Alrosa) could be clearly identified as pursuing both a very low geographic and a very low product diversification strategy, a strategy that would not be unexpected for a state-owned firm. State-owned enterprises are typically focused on their domestic market, providing these markets with a narrow range of products (Mascarenhas, 1989).

The results also suggest that differences in strategic choice are associated with differences in performance. The six firms in Cluster 2 with above-average profitability were firms with a limited number of lines of business in a limited number of geographic locations, and most were from developing countries. The presence of two state-owned firms from emerging markets in this group is unexpected, given the evidence from previous studies that government-owned firms are less profitable than privately owned firms (Deventer and Malatesta, 2001; Boardman and Vining, 1989). Low production costs may be a factor in the profitability of these two firms, but this seems unlikely given that many of the firms identified in other Clusters also operate in developing countries. Exceptions to the generalization that occupying a non-dominant strategic position is associated with above-average performance also suggest there are other factors besides strategic position associated with the performance of the companies from developing markets, particularly those that are state-owned. One possibility is that the companies are in fact, being subsidized as "national champions", or are more generally being used as instruments of industrial policy.

To the extent that the large mining firms from developing countries, including those that are state-owned, follow the example of CVRD and adopt strategies that are similar to those adopted by firms in developed countries, it is likely that we will see an increase in acquisitions of developed country mining firms by firms from developing countries. To the extent that the acquirers are perceived to be instruments of national policy, these acquisitions may be resisted. In some countries, consideration is already being given to scrutinizing more carefully cross-border acquisitions by state-owned entities.

Although this discussion suggests a possible increase in tensions between TNCs and host countries, and between (developed) host

countries and (developing) home countries, there are more optimistic possibilities. As Sachs (2007) has argued with respect to energy investments, institutional structures are required to enhance co-operation between TNCs and host countries. Among his suggestions are that countries should be fully transparent regarding disclosure of contract terms, perhaps along the lines of the Extractive Industries Transparency Initiative, and that companies should consider adopting standards for corporate social responsibility, perhaps along the lines of the UN Global Compact. Similarly, Kolk and van Tulder (2005) suggest that the voluntary adoption of codes of conduct by TNCs may reflect the need to narrow the bargaining imbalance between TNCs and host countries by creating rules of conduct. In this regard, we note that only eight of our sample companies are signatories to the UN Global Compact, of which seven are from developed countries (the other is CVRD). A slightly larger number (13) are signatories to the Global Reporting Initiative (GRI), of which ten are from developed countries.

Thus, the movement towards international transparency and the adoption of codes of conduct may reduce political risk and limit the potential for an obsolescing bargain. This outcome will in turn foster FDI, which in turn may promote more liberalizing reform (Malesky, 2006). To the extent that inward FDI does in fact promote democratic reform, the obsolescing bargain problem will again be reduced (Jakobsen, 2006).

Our results are also relevant for the strategic choices facing all firms, and in particular those from developing countries. For developing country firms, the issue is whether they should, or can, adopt a conformist strategy of increased product and geographic diversification. The evidence provided in this article is not definitive in this regard. Although firms that pursue niche strategies appear to be more profitable, we have not been able to fully control for other factors that might influence firm profitability.[19] Among other things, it could be the case that firms from developing countries hold entrenched domestic positions that lead to higher profitability (Morck, Wolfenzohn and Yeung, 2005), while at the same time lacking the incentive and capabilities to compete internationally (Globerman and Shapiro, 2006). In this regard, CVRD, the Brazilian company, is instructive since it

[19] For example, platinum, diamonds and iron ore were the three top ranked commodities on Garren, Bird, and Sutton-Pratt's list of attractive commodities (2002), and the four firms that focused on the production of these commodities (Lonmin, Implats, Alrosa and CVRD) were among firms with an above-average ROA. Three are from developing countries.

follows the dominant strategy of diversification, but is also among the most profitable mining firms. Thus, we cannot state with any certainty that the low diversification strategy pursued by these firms is the source of their profitability.

Prior research on the relationship between diversification and performance is not totally helpful in this regard. There is no consensus in the literature regarding the relationship between geographic diversification and firm performance (Goerzen and Beamish, 2003; Hill, Hitt, and Hoskisson, 1992). Similarly, although many studies have shown that diversified firms are valued at a discount relative to single-segment firms and that the degree of industrial diversification has been decreasing over time (Denis *et al.*, 2002), other studies are more equivocal (Hill *et al.*, 1992; Laeven, 2001).

7. Conclusion

The empirical results obtained in this article support the following conclusions. First, within an industry that appears to be homogeneous, a certain degree of heterogeneity can be discerned when the focus of inquiry is on the individual firms. Second, firms from developing countries contribute in large measure to strategic heterogeneity. Third, performance differences appear to be associated with differences in strategic choice, but are also related in some degree to other factors, including the country of origin of the firm. In particular, the fact that developing country firms dominate one strategic cluster, and are more profitable, suggests that one cannot rule out the possibility that country-specific factors are also at work.

In addition, our discussion of these results suggests that the convergence of most developed country firms to a relatively common strategy of both product and geographic diversification may create a bargaining imbalance between TNCs and host countries, and may create conditions favouring an obsolescing bargaining outcome. To the extent that this occurs, tensions between mining TNCs and host countries may increase. Arguably, many of these forces have been augmented by the increasing consolidation in the mining industry which has occurred in the post-sample period. There have been a number of recent high-profile mergers and acquisitions among global mining firms, including BHP Billiton's $9.2 billion takeover of WMC Resources Ltd in 2005, Barrick Gold Corporation's $9.2 billion takeover of Placer Dome Inc. in 2005, and Xstrata's $20 billion takeover of Falconbridge in 2006. Most recently Canada's Inco has been acquired by Companhia Vale do

Rio Doce of Brazil (CVRD) in a $17 billion transaction. In addition, Goldcorp of Canada acquired Glamis Gold of the United States for $7.6 billion, one of the largest cross-border acquisitions of 2007. Once again, CVRD stands as an outlier, with the remaining transactions all occurring between developed country firms. Thus, mining companies from the developed countries continue to consolidate, and this is likely to increase their relative bargaining power. None of the recent major acquisitions by developed country firms has involved a major firm from a developing country.

It appears that these cross-border acquisitions also contribute to the diffusion of relatively common strategic positions for all firms. Deephouse (1999) has suggested that firms need to be as different as their industry will legitimately allow, and it might yet be the case that the mining industry does not allow for much heterogeneity. If the continuing consolidation of the industry world-wide continues to further reduce strategic heterogeneity, such mergers may not generate improved returns to the shareholders.

Similarly, it is not yet clear whether a convergence to common strategies includes those related to the adoption of corporate codes of conduct and corporate social responsibility, and this remains a useful subject for future research. In addition, the issue of whether the adoption of such codes contributes to redressing power imbalances between TNCs and host countries also merits further research.

On the other hand, we have noted the possibility that in future, large mining firms from developing countries will begin to diversify geographically, most likely *via* acquisition. This possibility raises both public policy and strategic management issues. In terms of public policy, acquisitions by developing country mining companies would increase the concern already emerging in developed countries regarding such acquisitions in the energy sector. Such concerns may result in increased scrutiny of inward FDI flows from developed countries. However, it is not at all clear that developing country firms have the capabilities to move abroad in a significant way. Nevertheless, a company such as CVRD has clearly done so, and the factors that account for its success merit closer study.

We have noted the complex relationship among FDI flows, institutional reform, the resource curse and the obsolescing bargain problem. While recent research has tended to indicate that a virtuous cycle is possible, whereby FDI promotes institutional reform, thus both lowering the tendency to renege on *ex ante* agreements and limiting the

possibility of a resource curse, and hence promoting more FDI, more research on this issue is required.

This study has approached the question of strategic heterogeneity from a cross-sectional perspective. Future research should take a longer time frame, with specific emphasis on the effects of cross-border mergers and acquisitions, and the evolution of global mining firms from developing countries. In particular, it would be of interest to better understand the nature of "outlier" strategic positions in developing countries, and in particular, whether such firms will in future be able to compete successfully in global markets.

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Does China rival its neighbouring economies for inward FDI?*

Chengang Wang, Yingqi Wei and Xiaming Liu **

The current research aims to contribute to the debate on whether China competes with its neighbouring economies for inward foreign direct investment (FDI). Our results indicate that China has not diverted inward FDI from other Asian economies as a whole. If we view FDI inflows in the region as part of systemic globalization strategies adopted by transnational corporations, China may in fact have "crowded in" FDI to the rest of Asia. At the level of individual economies, FDI in China is more likely to have had an FDI creation effect in India and the Philippines, but a diversion effect in Indonesia, the Republic of Korea, Malaysia and Taiwan Province of China, as value creation activities performed by China in international production networks appear to be more complementary to those undertaken by the former two economies than the latter four economies. These relative positions may evolve as Asian economies develop and upgrade their industries.

Key words: Asia, China, FDI, competition

1. Introduction

Since the beginning of the 1990s when China became a major recipient of foreign direct investment (FDI), a heated debate has emerged as to whether FDI has been diverted from other Asian economies to China. FDI is a package of capital, technology and managerial skills, and is often viewed as an important source of both direct capital inputs and technology spillovers (Balasubramanyam *et al.*, 1996; Li and Liu, 2005). Developing countries can benefit from FDI, because it not only brings in foreign capital and creates jobs, but also transfers advanced technologies, know-how and managerial skills, which may be amplified through spillover effects. Therefore, whether

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or not China's success in attracting FDI is at the expense of its neighbours bears important policy implications for all economies concerned.

In this debate, the Governments of several Asian countries, such as Singapore and the Republic of Korea, have openly voiced their concerns that the emergence of China has diverted FDI away from their economies (Chantasasawat et al., 2005; Mercereau, 2005). Some scholars, such as Felker (2003), take the diversion proposition for granted in their discussions of policy implications. Similarly, Xing and Wan (2006) carry out an analysis of competition for FDI in Asia on an explicit assumption that China diverts Japanese FDI from other Asian economies. Other arguments for supporting the FDI diversion proposition include the existence of "the wage differential between China and the other East Asian countries" (Kiminami and Kiminami, 1999) and the ranking of China by transnational corporations (TNCs) as one of the ten most promising FDI destinations (McKibbin and Woo, 2003).

However, the proposition regarding a diversion effect is not always consistent with theoretical arguments, and the empirical evidence is mixed. Theoretically, China's rise may create both threats as well as opportunities for its Asian neighbours. China's expansion may "suck in" FDI earmarked for some nearby economies. On the other hand, more FDI in China is likely to lead to increased FDI in its Asian neighbours if these economies are complementary in the context of international production networks (IPNs) established by TNCs, which have been increasingly adopting "systemic globalization" strategies (Ernst, 1997). For instance, PSi Technologies, a United States semiconductor firm, has affiliates in both the Philippines and mainland China. Within its IPN, as much as 85% of its output ends up in China at some stage for assembly (*Economist*, 15 February 2003). This is consistent with findings in Lall and Albaladejo (2004) which indicated that China plays the role of final assembler of intermediate products from other Asian economies.

Furthermore, existing quantitative studies focusing explicitly on whether the rise of China crowds in or out FDI in its neighbours tend to show that China does not rival, and may complement, its Asian neighbours *as a whole*. Eichengreen and Tong (2006) find complementarity between inflows of FDI into China and those into other Asian economies, but substitutability for those into OECD countries. Chantasasawat *et al.* (2005) find that the level of inward

FDI in China is positively related to the levels of inward FDI in eight Asian economies.[1] Zhou and Lall (2005) also detect complementarity between inward FDI in China and those in seven Asian economies[2] for the period 1992–2001. Finally, Mercereau (2005) reports that China has not diverted FDI inflows from countries in Asia, with the exception of Singapore and Myanmar.[3]

This study aims to contribute to the debate by providing further empirical evidence, building on the strengths of existing studies while addressing various problems they suffer from. Specifically, following recent developments of FDI theory, we view inflows of FDI in Asian economies as part of what Ernst (1997) calls "systemic globalization" strategies adopted by TNCs and examine how inward FDI is linked to the levels of development in mainland China and nine other Asian economies.

The rest of this article is organized as follows. The next section provides some background information and reviews previous studies. Section three explains our empirical model, data set and methodology. Section four presents empirical results. Finally, section five summarizes the results and discusses policy implications.

2. Background, theory and previous studies

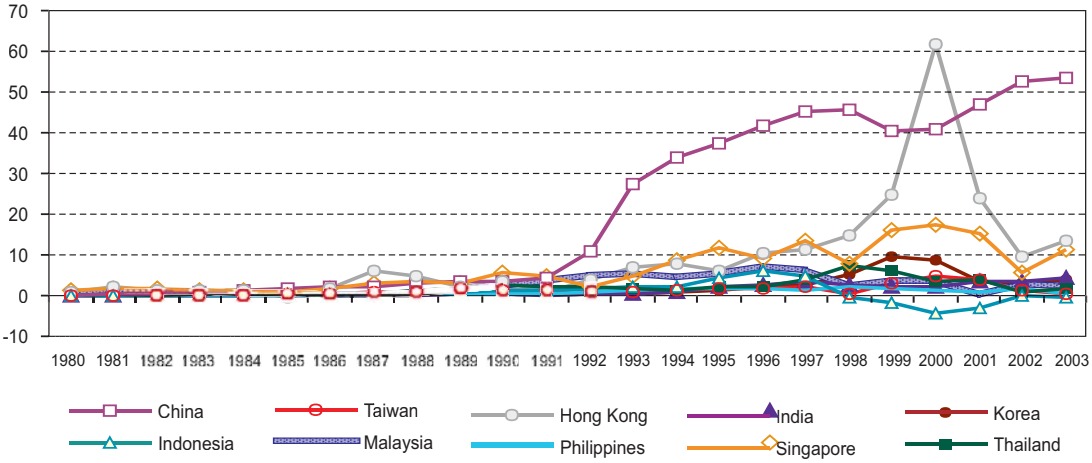
China's decision in 1979 to open up its economy to FDI was a result of a fundamental shift in economic policy. During the 1980s, the policy regarding inward FDI to China changed from the so-called "experimental period" (1979–1983), when a limited amount of FDI was introduced into the four small special economic zones, to the "gradual development period" (1984–1991), when gradually increasing amounts of FDI were attracted to the 14 open coastal cities and three open economic zones (Wei and Liu, 2001). The inflows of FDI to China in the 1980s and early 1990s were comparable to those of Malaysia and Singapore (figure 1).

[1] The eight Asian economies are Hong Kong (China), Indonesia, the Republic of Korea, Malaysia, the Philippines, Singapore, Taiwan Province of China and Thailand.

[2] The seven Asian economies are Indonesia, the Republic of Korea, Malaysia, the Philippines, Singapore, Taiwan Province of China, and Thailand.

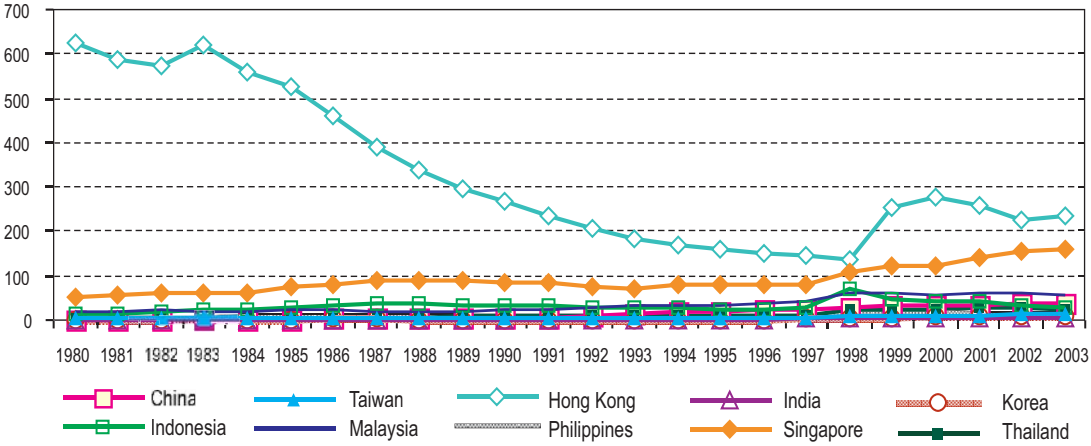
[3] Mercereau's (2005) study includes fourteen Asian economies. In addition to the seven mentioned in footnote 2, they are Bangladesh, India, Myanmar, Papua New Guinea, Sri Lanka and Viet Nam as well as China.

Inward FDI to China surged in the 1990s after the then Chinese leader Deng Xiaoping launched a new wave of economic reforms in early 1992. Realized FDI increased from $4 billion in 1991 to $41 billion in 2000 (figure 1), and FDI stock as a percentage of GDP increased from 6.7% to 32.2% in the same period (figure 2). In response to the rapid increase in inward FDI, China's economy expanded quickly, with the average annual growth rate reaching over 8% over the period. On the other hand, as indicated in table 1, the inward FDI performance indices of Indonesia, Malaysia, the Philippines, Singapore and Thailand in the 1990s were all lower than those in the 1980s, and these economies further suffered the Asian financial crisis in the late 1990s. Against this background, concerns have been raised by government officials of some economies in the region that China has been "sucking in" FDI that would have been earmarked for other Asian economies, and



that this FDI diversion has had a negative impact on their economic development.

Figure 1. FDI inflows in Asian economies



(Billions of dollars)

Source: UNCTAD FDI Statistics.

Table 1. FDI performance index and potential index

	Inward FDI Performance Index			Inward FDI Potential Index		
	1988-1990	1998-2000	2001-2003	1988-1990	1998-2000	2000-2002
China	1.0	1.2	2	0.18	0.25	0.27
Taiwan Province of China	0.9	0.3	0.4	0.31	0.37	0.38
Hong Kong	5.3	6.1	4.8	0.35	0.42	0.41
India	0.1	0.2	0.4	0.12	0.15	0.16
The Republic of Korea	NA	NA	NA	NA	NA	NA
Indonesia	0.8	-0.5	-0.3	0.18	0.18	0.16
Malaysia	4.4	1.3	1.1	0.21	0.30	0.29
Philippines	1.7	0.7	0.7	0.11	0.21	0.21
Singapore	13.6	4.7	6.0	0.40	0.48	0.47
Thailand	2.6	1.4	0.9	0.18	0.22	0.22

Source: UNCTAD FDI Statistics and *World Investment Report*.

Note: FDI performance index is put forward by UNCTAD as an instrument to compare the relative performance of countries in attracting FDI. The index is the ratio of an economy's share of global inward FDI to its share of global GDP.

Figure 2. FDI stock as % of GDP
(Per cent)

Source: UNCTAD FDI Statistics.

The diversion hypothesis is, however, not fully supported for both conceptual and empirical reasons. Recent developments of FDI theory suggest that an increase in inward FDI in a country does not necessarily divert FDI from other countries. As observed by Ernst (1997), leading TNCs have progressively shifted their international strategies towards systemic globalization, which is characterized by international dispersal and integration of potentially all elements of the value chain. In this process, not only manufacturing, but marketing, financing, logistics, design, training, procurement and even R&D functions may be located abroad and coordinated by home country based headquarters (Felker, 2003). To reap the full benefits of systemic globalization, TNCs tend to locate their value-added activities according to industrial structure or specification of host economies involved. Thus, inward FDI in one economy may create inward FDI in another if it creates more opportunities for IPN, or if it raises demand for raw materials, resources and intermediate inputs. Ianchovichina and Walmsley (2005) argue that investment liberalization in China facilitates TNCs' rationalization of their production processes within East Asia, and China's neighbours may receive FDI flows that complement those into China. Of course, if economies specialize in segments of IPN in which China has a

comparative advantage, then there may be FDI diversion as TNCs may have to make a location choice.

In this regard, Roland-Holst and Weiss (2005) argue that the basic problem of the diversion hypothesis is its assumption of fixed global supply of foreign capital for a region in any year. Thus, under this assumption, competition for inward FDI is a "zero-sum game" where the success of one country is achieved at the expense of others, and increased inflows of FDI in China imply reduced inflows of FDI in other economies. However, there is no evidence to suggest that the supply of FDI is fixed.

The FDI diversion hypothesis has also been challenged from an empirical perspective. Using two comprehensive survey data sets for 1995 and 1999, Belderbos and Zou (2006) argue that FDI, divestment and relocation of Japanese electronics firms in Asia are related to these firms' strategy to reconfigure their Asian production networks (APN) in response to changes in firm competitiveness, regional integration and local investment environments. The growing attractiveness of China for inward FDI has not been accompanied by a reduction in employment in Japanese affiliates in ASEAN economies. Using intra-regional trade data, Lall and Albaladejo (2004) and Lall *et al.* (2004) confirm the existence of APN based on the deepening of international division of labour, and China's role in APN is at the end of production processes, assembling intermediate products from other Asian economies.

In recent literature, we have identified four notable econometric studies on the diversion hypothesis: Eichengreen and Tong (2006), Chantasasawat *et al.* (2005), Mercereau (2005) and Zhou and Lall (2005). All four studies have their specific strengths and weaknesses. All adopt a similar approach, i.e. incorporating a variable representing the "China effect" in an FDI determinant equation or a set of FDI determinant equations. But they differ in the measurement of the China effect, the estimation technique and the control variables.

Chantasasawat *et al.* (2005) and Zhou and Lall (2005) use what Mercereau (2005) calls a standard equation with an indicator of FDI flows to China added to the regressors, and with the dependent variable being gross FDI usually expressed in logarithmic terms. Mercereau (2005) argues that such a logarithmic specification is inappropriate because it estimates the impact of China in terms of the rate of change rather than the level of FDI flows. We agree that the coefficients need to be interpreted carefully but a logarithmic specification is widely accepted in econometric analysis as few economic relationships are

linear. A logarithmic specification can also reduce the severity of autocorrelation, heteroscadesticity and outlier problems.

Mercereau (2005) suggests that nominal FDI in China is nonstationary and hence needs to be scaled by the following factors to take into consideration both average and country-specific crowding out: the combined GDP of other countries in the region and total FDI to the region. One potential problem with the first factor is the assumption that FDI "…diversion from country *i* is proportional to the size of its economy relative to the region" (Mercereau, 2005, page 5). As indicated in figure 2, the relative size of inward FDI to GDP varies substantially across the economies in the region. The second factor mentioned by Mercereau (2005) is very similar to the share measure used in Chantasasawat *et al.* (2005) and it is based on – in our view – an unrealistic assumption that the amount of FDI designated for the region is fixed, i.e. the increased receipts of FDI by China is at the expense of other economies.

As for estimation techniques, Eichengreen and Tong (2006) employ a gravity model using bilateral FDI data for 29 sources and 60 recipients for the period 1988–2003. Chantasasawat *et al.* (2005) and Zhou and Lall (2005) estimate random effects and fixed effects models respectively to investigate the China effect on Asian economies. Finally, Mercereau (2005) uses both a fixed effects model and the dynamic panel approach. The strength of Chantasasawat *et al.* (2005) is its proposition that inflows of FDI in China and other Asian economies are simultaneously determined. This approach considers the location determinant of FDI in the context of IPN/APN. TNCs may increase their profitability by reaping the benefit of cost reductions from location economies and specialization. For example, they may invest in assembly plants in China and in raw material processing in the Philippines based on the comparative advantages of these two economies. Similarly, they may also choose between Taiwan Province of China and the Republic of Korea for their R&D activities. Thus, whether inflows of FDI in China are complementary to or substitutable for those in other Asian economies may be simultaneously determined.

All four studies use different sets of control variables. There may be problems associated with the selection of control variables by Eichengreen and Tong (2006), as well as Zhou and Lall (2005) and to a lesser extent with Chantasasawat *et al.* (2005). Although we agree with the research position of controlling standard determinants of FDI in Asian economies and of adding a variable to capture the China effect,

most variables included in Eichengreen and Tong (2006) are important factors affecting trade rather than FDI. It is widely accepted that the relatively low costs of Chinese labour lure certain TNCs away from other Asian economies to China, but this important variable is not included in Eichengreen and Tong (2006) and Zhou and Lall (2005). Instead, they both employ GDP per capita as one of the explanatory variables. Eichengreen and Tong (2006) and Mercereau (2005) use GDP per capita to capture labour costs, while Zhou and Lall (2005) consider GDP per capita as an indicator of the sophistication of markets. We use the approach of Zhou and Lall (2005) in our study. In Chantasasawat *et al.* (2005), the wage rate is included to capture labour costs. However, their measure is the average wage rate without adjusting for the productivity effect. This is problematic, as low wage rates may simply reflect the effect of the poor quality of labour. Hence a more appropriate determinant of FDI is the productivity-adjusted wage rate, i.e. the real effective wage rate.

There are other econometric problems with Zhou and Lall (2005). First, all regression results have a very high R^2, but in most cases, only one or two variables are statistically significant. In one case, only one variable is statistically significant. This is a typical symptom of multicollinearity, but it has not been addressed by the authors. In addition, from the paper, it appears that the variables are measured at current prices, which is also problematic since it implies that inflation is not taken into account.

To empirically determine whether China crowds in or out FDI inflows in other Asian economies, the current study employs a broadly similar approach to the four studies mentioned above with the five special features as described in section 1. We rely on the theoretical discussion in Balasubramanyam and Mahambare (2003) and research findings from Chakrabarti (2001) in selecting FDI determinants used as control variables. Balasubramanyam and Mahambare (2003) argue that the following locational factors are likely to have important effects on FDI inflows: (1) market-related factors such as GDP or GDP per capita (alternatively, GNP or GNP per capita); (2) economic growth related factors such as GDP growth rates; (3) resource endowments of host countries, including natural and human resources; (4) infrastructure facilities, including transportation and communication networks; (5) macroeconomic stability proxied by stable exchange rates and low rates of inflation; (6) political stability in host countries; (7) a stable and transparent policy framework towards FDI; (8) a distortion-free foreign trade regime; and (9) fiscal and monetary incentives in the form

of tax concessions. Chakrabarti (2001) uses extreme bound analysis to examine a range of determinants of FDI and finds that the most robust variable is GDP per capita, followed by openness to trade, wage, net export, growth rate, tax and exchange rates.

Total GDP is often regarded as an important market-related factor for attracting inward FDI. However, Root and Ahmed (1979) argue that total GDP is a relatively poor indicator of the market potential for foreign firms, particularly in many developing countries, since it reflects the size of the population rather than the income level. Instead, GDP per capita may be a better proxy for market potential or attractiveness. Chakarabati (2001) demonstrates that GDP per capita is a more robust variable than total GDP. Hence, the market-related factor in this study is measured by GDP per capita.

The degree of openness positively affects FDI inflows. In the case of efficiency-seeking FDI, for example, it is often the case that foreign affiliates need to import machinery and intermediate inputs to the host economy in order to undertake production for export. Thus, the ease at which foreign affiliates in the host economy can import and export goods is an important determinant of FDI inflows and this is captured by trade openness, i.e. the ratio of trade to GDP.

Wage rates should have an impact on the location of production. Wages are an important part of total costs in labour-intensive manufacturing. As one way of obtaining potential advantages over their competitors, firms undertake FDI to make use of more abundant supplies of low-cost labour in other economies. The standardization of production processes allows highly detailed international division of labour according to the most desirable combination of inputs. This gives firms the opportunity to manage production units across countries to exploit international differences in wage rates. However, wage rates in certain host locations may be low due to lower skill levels of the workforce. Hence, as a determinant of FDI, we use productivity-adjusted wage rates. It is widely accepted that human capital is essential for attracting – and benefiting from – FDI (Borensztein *et al.*, 1998). From the TNC's perspective, local availability of human capital is essential for adapting existing technologies and developing new ones. Thus, the more human capital a country has, the more attractive a country is to foreign investors.

There are several channels through which the exchange rate affects FDI. But most importantly, devaluation of the currency tends to improve the competitiveness of the host economy – at least in the

short run – thus increasing its attractiveness to efficiency- or resource-seeking FDI.

Firms view uncertainty or country risks unfavourably. Political, economic and social instability in the host country and the unfriendly attitude of the host country's government increases uncertainty and thus would have a negative impact on FDI inflows.

3. Empirical model, data and methodology

In the light of the above discussion in previous, we propose the following model for estimation:

$$LFDI_{it} = \alpha_i + \beta_1 LRW_{it} + \beta_2 LGDPP_{it} + \beta_3 HC_{it} + \beta_4 OPEN_{it} + \beta_5 ER_{it} + \beta_6 CR_{it} + \beta_7 LFDS_{it-1} + \beta_8 LFDIC_1 + \varepsilon_{it} \quad , \quad (1)$$

where subscripts *t* and *i* are indices for the year and host economy respectively. *LFDI* denotes the logarithm of FDI inflows; *LRW* is the logarithm of real effective wage rates; *LGDPP* is the logarithm of economy *i*'s GDP per capita, *HC* is human capital; *OPEN* is openness to trade; *ER* is economy *i*'s currency against China's currency the yuan; *CR* is country risk ratings; *LFDS* is the logarithm of FDI stock, which is included to capture the agglomeration effect suggested by Markusen (1991), i.e. the countries with more FDI stock a year ago tend to attract more FDI inflows during current year. *LFDIC* measures the effects of FDI in China. The variable measurement and data sources are listed in the appendix. Variables, FDI flow, FDI stock, real effective wage rates and GDP per capita are measured in constant dollar prices with 2000 as the base year.

In contrast to Eichengreen and Tong (2006), Chantasasawat *et al.* (2005) and Zhou and Lall (2005), but similar to Mercereau (2005), our sample includes India as well as another eight Asian economies, i.e. Hong Kong (China), Indonesia, the Republic of Korea, Malaysia, the Philippines, Singapore, Taiwan Province of China and Thailand. In recent years, India has emerged, alongside China, as an important economic power as well as FDI recipient. The degree of competition and cooperation between China and India is another heated debate in the literature. Other Asian economies are excluded from this study because of the lack of data and the fact that they are relatively unimportant as recipients of FDI.

Data are available for each included economy annually for the period 1980–2003. We exclude data prior to 1980 because FDI in China was virtually zero for those years. The correlation matrices of FDI in these ten Asian economies indicate that, historically, FDI in China from various sources is either positively correlated or uncorrelated with FDI in each of the other Asian economies. The question is whether these apparent correlations still hold once we control for the domestic drivers of FDI.

As part of the data analysis the order of integration of variables is examined first in order to avoid possible spurious regression. It is well-documented in econometric literature that some popular univariate unit root tests, such as the augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests, have low power against the stationary alternative when the time series is short (Maddala and Kim, 1998). More recently, researchers tend to favour panel data unit root tests because extra information can be gained by using this type of data. It is often argued that panel data unit root tests are more powerful because of increased sample size and the inclusion of heterogeneous cross-sectional information which is not available in univariate tests. We use the panel data unit root tests advocated by Maddala and Wu (MW) (1999) and Im *et al.* (IPS) (2003).[4] Both MW and IPS tests specify the null hypothesis of the unit root and test a heterogeneous alternative in which at least one series in the panel is stationary. Maddala and Wu (1999) show that the MW test is more powerful than the IPS test. However, both tests give us consistent results, as indicated in the next section.

Before presenting the empirical results, it is in order to mention three technical notes regarding the estimation of the model and the use of variables.

First, we pool the data and then estimate the system of equations simultaneously, using the seemingly unrelated regression (SUR) approach. This is based on the assumption that there exist common (but unmeasured) influences on FDI in different economies and these induce contemporaneous correlation among the error terms of the individuals. Economy-specific fixed effects are included to control for factors that vary by economy but are not included in the model, for example, culture, institution and policy effects.

[4] For a survey, see Maddala and Kim, 1998; the 1999 supplement of *Oxford Bulletin of Economics and Statistics* (volume 16, issue 1, pp. 603–767); and Baltagi, 2001.

Second, to test the possible effects of FDI diversion or FDI creation due to China's FDI inflows, we estimate a model in which a variable capturing the effects of China's FDI inflow is introduced to act as an explanatory variable along with locational factors of the host economy. We first assume that FDI in China has the same effect on FDI in all other Asian economies. Then, we relax this assumption of common coefficient to see whether the effect of FDI in China varies across economies. Eichengreen and Tong (2006), Chantasasawat *et al.* (2005) and Zhou and Lall (2005) assess the China effect on other Asian economies as a whole, but this aggregate picture hides the story for individual economies.

Finally, we use four different variants of the model to examine the China effect. The variations of the first three models concern the measurement of the China effect. The fourth variant adopts different estimation techniques. One way of measuring the China effect is to use China's aggregate FDI inflows directly. Zhou and Lall (2005) argue that "absolute FDI inflows would give a distorted picture as it would be dominated by the size of the economy, a particular problem when comparing relative small countries with a giant like China". They choose to use FDI per capita instead. However, FDI per capita may also give a distorted picture, as this measure is significantly influenced by the size of population. Our strategy here is therefore to use both measures to see whether the same conclusion is reached. We also make use of inflows of FDI into China, excluding those from Hong Kong (China), since there is a suspicion that a large amount of FDI from Hong Kong is actually "round-tripping" investment. Aggregate FDI data with Hong Kong as a source economy may exaggerate the impact of China as a magnet of FDI. The fourth variant takes into account the possible endogeneity of China's FDI inflows. FDI inflows in China and those in other Asian economies may influence each other. To solve the problem, we adopt the two-stage least square approach. In the first step, we pool all economies together including China to estimate the system of equations using SUR and find the predicated values of China's FDI inflows, which are then used in the second stage.

4. Empirical Results

Table 2 presents the descriptive statistics and panel data unit root test results for the variables for ten economies for the period 1980–2003. Because all variables exhibit a clear trend, the panel data unit root tests have included an intercept and a trend. The results of IPS and MW panel unit root tests suggest that the null hypothesis of a unit

Table 2. Panel data unit root test

	LFDI	LGDPP	LRW	HC	OPEN	ER	CR	LFDS	LFDIC
Descriptive Statistics									
Mean	7.487	7.713	-1.560	83.897	79.294	40.982	1.123	10.070	9.315
Median	7.721	7.604	-1.391	87.550	4.387	39.800	0.782	9.698	9.347
Maximum	11.034	10.152	-0.156	98.100	1239.672	81.600	3.702	13.228	10.863
Minimum	0.000	5.154	-3.774	41.000	0.170	12.200	0.125	7.482	5.182
Std. Dev.	1.912	1.450	0.666	13.184	201.242	14.839	0.906	1.499	1.511
Panel Data Unit Root Tests									
IPS Statistics	-2.391	1.771	-0.233	2.181	-1.003	3.277	0.564	0.225	
p-value	0.008	0.962	0.408	0.985	0.158	1.000	0.714	0.589	
MW Statistics	41.359	17.486	27.629	20.485	23.955	3.901	13.676	17.037	
p-value	0.003	0.621	0.119	0.428	0.244	1.000	0.847	0.651	
Order of integration	I(0)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	
Correlation Coefficient Matrix									
LFDI	1.000	0.251	0.002	0.142	-0.484	-0.391	0.285	0.417	0.337
LGDPP	0.251	1.000	0.378	0.634	-0.187	-0.674	0.792	0.381	0.224
LRW	0.002	0.378	1.000	0.168	-0.376	-0.381	0.204	-0.243	-0.409
HC	0.142	0.634	0.168	1.000	0.048	-0.245	0.383	0.284	0.277
OPEN	-0.484	-0.187	-0.376	0.048	1.000	0.366	-0.213	0.181	0.022
ER	-0.391	-0.674	-0.381	-0.245	0.366	1.000	-0.557	-0.188	0.031
CR	0.285	0.792	0.204	0.383	-0.213	-0.557	1.000	0.448	0.120
LFDS	0.417	0.381	-0.243	0.284	0.181	-0.188	0.448	1.000	0.353
LFDIC	0.337	0.224	-0.409	0.277	0.022	0.031	0.120	0.353	1.000

Source: authors' analysis.

root can be rejected at the conventional significance levels only for the dependent variable, *LFDI*. In other words, all potential explanatory variables are non-stationary. More specifically, *LGDPP*, *LRW*, *HC*, *OPEN*, *ER*, *CR* and *LFDIS* are I(1) (integrated of order one). We also examine the variable, TELE, which measures the infrastructure of the country and it is I(2) (integrated of order two). Following this result, we do not include *TELE* in our estimations as it would otherwise make cointegration impossible. When all I(1) variables are included in the regressions, panel data cointegration tests suggest that the variables are cointegrated.

Table 3 presents the estimation results. Specification (I) uses the whole set of panel data and include all potential determinants of FDI except FDI in China as an explanatory variable. Results from specification (I) suggest that locational factors (GDP per capita, real effective wage rate, human capital, openness, exchange rate, country risk and previous year's FDI stock) account for a large part of inter-economy variation in FDI. The results confirm that our choice of the determinants of FDI is appropriate.

Specifications (II) – (IV) estimate inflows of FDI to nine Asian economies, excluding China but including FDI in China as an explanatory variable, along with all potential determinants of FDI. For the purpose of comparison, specification (II) uses FDI in China; specification (III) uses FDI inflows in China excluding those from Hong Kong; and specification (IV) uses predicted FDI in China obtained from the estimation of specification (I). Specification (V) estimates inflows of FDI to ten Asian economies including China simultaneously, but in the equation for China, FDI in China and the exchange rate are excluded from the right-hand side. The results of specifications (II), (III) and (V) show that, when the endogeneity of China's inward FDI in relation to inward FDI in other economies is not considered, FDI in China turns out to have a "neutral" effect after the appropriate FDI determinants are controlled. However, the results from specification (IV) show that, when it is considered, FDI in China has a positive effect on FDI in other Asian economies. That is, FDI in China has "crowded in" FDI to Asian economies.

Table 3. Panel regression, 1980–2003
(Dependent variable: log of FDI inflows)

	(I)	(II)[a]	(III)[b]	(IV)[c]	(V)[a]
LGDPP	0.694***	0.068	0.099	-0.107	0.605***
	(0.238)	(0.203)	(0.198)	(0.221)	(0.232)
LRW	-0.332***	-0.185***	-0.185***	-0.184***	-0.328***
	(0.080)	(0.071)	(0.069)	(0.072)	(0.081)
HC	0.040*	0.028	0.024	-0.010	0.042
	(0.022)	(0.035)	(0.036)	(0.038)	(0.028)
OPEN	0.333**	0.345*	0.368*	0.253*	0.236
	(0.167)	(0.184)	(0.192)	(0.148)	(0.187)
ER	-0.009***	-0.009***	-0.009***	-0.009***	-0.009***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
CR	-0.022***	-0.033***	-0.034***	-0.031***	-0.023***
	(0.008)	(0.008)	(0.008)	(0.009)	(0.009)
LFDIS(-1)	0.203*	0.197	0.182	0.135	0.225**
	(0.111)	(0.121)	(0.122)	(0.136)	(0.111)
LFDIC		0.137	0.114	0.432**	0.010
		(0.095)	(0.080)	(0.205)	(0.051)
Country dummies	Yes	Yes	Yes	yes	Yes
R^2	0.692	0.651	0.650	0.676	
Test for country dummies	F(9,223)= 18.157***	F(8,199)= 14.448***	F(8,199)= 15.089***	F(8,199)= 13.929***	$\chi^2(10)$= 171.584***
No. of Countries	10	9	9	9	10

Source: authors' analysis.

Notes: ***, **, * indicate significance level at 1%, 5% and 10%, respectively. Figures in parentheses are standard errors.

[a] LFDIC = Log of China's FDI inflows

[b] LFDIC = Log of FDI inflows in China excluding FDI inflows from Hong Kong

[c] LFDIC = Log of FDI inflows in China predicated from Model (I)

The basic message from table 3 is that China does not appear to compete with its Asian neighbouring economies as a whole for inward FDI. If we view inflows of FDI in Asian economies as part of systemic globalization strategies adopted by TNCs, the results from specification (IV) is more appropriate, i.e. FDI in China is significantly complementary with FDI in other Asian economies as a whole. China has different comparative advantage *vis-à-vis* other Asian economies in general, and China and other Asian economies are largely in the complementary segments of the IPN/APN.

Table 4. Panel regression, 1980−2003
(Dependent variable: log of FDI inflows)

	(VI)[a]	(VII)[b]	(VIII)[c]	(IX)[a]
LGDPP	2.518***	2.397***	2.474***	2.830***
	(0.468)	(0.426)	(0.390)	(0.387)
LRW	0.061	0.134	0.556**	-0.194
	(0.137)	(0.146)	(0.236)	(0.141)
HC	-0.035	-0.025	-0.006	-0.023
	(0.041)	(0.037)	(0.036)	(0.034)
OPEN	0.491**	0.820***	0.715***	0.375*
	(0.251)	(0.277)	(0.143)	(0.213)
ER	-0.009***	-0.010***	-0.009***	-0.010***
	(0.001)	(0.001)	(0.001)	(0.001)
CR	0.007	0.012	0.032***	0.006
	(0.010)	(0.011)	(0.013)	(0.009)
LFDIS(-1)	-0.080	-0.159	0.147	-0.126
	(0.175)	(0.169)	(0.181)	(0.175)
LFDIC*Hong Kong	-0.006	-0.106	-0.031	0.050
	(0.151)	(0.101)	(0.275)	(0.254)
LFDIC*India	0.437**	0.409***	0.914***	0.277*
	(0.185)	(0.162)	(0.329)	(0.163)
LFDIC*Indonesia	-0.230*	-0.194*	-0.376	-0.434**
	(0.130)	(0.108)	(0.318)	(0.220)
LFDIC*South Korea	-0.509***	-0.356***	-0.758***	-0.638***
	(0.163)	(0.116)	(0.185)	(0.116)
LFDIC*Malaysia	-0.174*	-0.213***	-0.675***	-0.303***
	(0.099)	(0.080)	(0.220)	(0.113)
LFDIC*Philippines	0.829***	0.610**	1.139***	0.666***
	(0.295)	(0.249)	(0.419)	(0.188)
LFDIC*Singapore	0.102	0.153	-0.132	0.097
	(0.113)	(0.104)	(0.214)	(0.087)
LFDIC*Thailand	-0.100	-0.058	-0.298	-0.207***
	(0.074)	(0.056)	(0.183)	(0.083)
LFDIC*Taiwan	-0.686***	-0.480***	-1.131***	-0.865***
	(0.147)	(0.124)	(0.324)	(0.143)
R^2	0.709	0.705	0.707	
Test for country dummies	F(8, 191)= 10.753***	F(8, 191)= 11.879***	F(8, 191)= 11.584***	$\chi^2(10)$= 127.172***
No. of Countries	9	9	9	10

Source: authors' analysis.

Notes: ***, **, * indicate significance level at 1%, 5% and 10%, respectively. Figures in parentheses are standard errors.

[a] LFDIC = Log of China's FDI inflows

[b] LFDIC = Log of FDI inflows in China excluding FDI inflows from Hong Kong

[c] LFDIC = Log of FDI inflows in China predicated from model (I) in table 3.

The question then is whether FDI in China has the same impact on FDI in all other Asian economies under study, i.e. how FDI in China affects that in other Asian economies on an individual basis. Table 4 presents the results of the estimation when the coefficient representing the China effect is allowed to vary across economies. Specifications (VI) – (VIII) use different measures of FDI in China. Specification (VI) uses FDI in China, specification (VII) uses inflows of FDI in China excluding those from Hong Kong (China) and specification (VIII) uses predicated FDI in China obtained from the estimation of specification (I) in table 3. Specification (IX) estimates ten Asian economies including China simultaneously, excluding the exchange rate from the equation for FDI in China. Specifications (VI) to (IX) provide quite consistent results: there has been significant crowding in of FDI in India and the Philippines by FDI in China, but crowding-out of FDI in Indonesia, the Republic of Korea, Malaysia and Taiwan Province of China. A significant substitution effect between China and Thailand is identified by specification (IX) only. In addition, FDI in China has no significant effect on Hong Kong and Singapore. Again, if we accept the view that FDI in China and in the other Asian economies may influence each other, then the results of specification (VIII) are the most appropriate, although they are very similar to those from the other specifications.

The results show that China seems to complement some Asian economies while competing with others, presumably on the basis of their comparative advantages within the IPN. China appears to complement two relatively low-income economies but, at the same time, to compete with three other low-income economies. China appears to compete with two of the four relatively high-income (newly-industrialized) economies. In other words, the China effect does not appear to depend on the income level.

What are the relative competitive positions of India and the Philippines which make inflows of FDI to China complementary to inflows to these economies? As discussed in Balasubramanyam and Mahambare (2003), the composition of FDI in India in general is substantially different from China. A substantial proportion of FDI in India is located in the high-tech end of the spectrum and in services, whereas investment in China is mostly located in the low-tech end of the spectrum, often in assembly manufacturing. In India, more than 50% of FDI inflows in the reform period (1991–2000) were in services, such as call centres, insurance, database management, medical transcript processing and financial services, and the rest were in fuels, electrical, telecommunications, transportation, chemicals and food processing

industries (Sahoo and Mathiyazhagan, 2003). In contrast, 59% of FDI inflows in China from 1979 to 1998 were in manufacturing and only 3.8% in services (Wei and Liu, 2001, p. 28). Within manufacturing, large amounts of FDI were attracted to textiles, garments, electronics and transportation equipment.

This difference in sectoral distribution may reflect differences in factor endowments, the stage of industrialization and local market conditions in India and China. India has a large low-cost and skilled labour base, and has first mover and agglomeration advantages in services. As indicated in UNCTAD (2004), India is the preferred destination for offshoring of a wide range of services. The growing technological capabilities of Indian firms and their rising exports, particularly in information technology (IT) services, are driving the FDI growth. FDI in services and most of the manufacturing industries in India seem to be complementary to the large part of manufacturing FDI in China within the IPN/APN. For example, as discussed by Patibandla (2007), in the IT industry, even though China has a large domestic market with six million PCs sold and about 16 million people subscribing to the Internet in 2000, China has never attracted much FDI in the software industry, probably because of weak intellectual property protection and under-developed industrial clusters. On the other hand, China does attract a large amount of FDI (about $6 billion) in production of hardware. In contrast, India has attracted a larger amount of FDI into the software industry. Almost all large United States and European IT firms have a presence in India, including Texas Instruments, Microsoft and Apple. In this connection, Engardio (2005) notes, "… multinationals are having their goods built in *China* with software and circuitry designed in *India*. As interactive design technology makes it easier to perfect virtual 3-D prototypes of everything from telecom routers to turbine generators on PCs, the distance between *India's* low-cost laboratories and *China's* low-cost factories shrinks by the month". It suggests some complementarity between inward FDI in the Chinese computer industry and inward FDI in the Indian software industry.

The Philippines has a relatively large services sector (53.2% of GDP) and a small manufacturing sector (31.9% of GDP). There are not enough data available to verify whether FDI inflows are consistent with the economic structure of the country. However, there are two indirect pieces of evidence to support the view that inflows of FDI in the Philippines are complementary to those in China. First, Lall and Albaladejo (2004) conducted an exercise to analyze the degree of threat posed by China to Asian economies using trade data over the 1990s

and found that the Philippines has only 5.8% (and decreasing) of its exports in categories in which China has an increasing world market share. Abola and Manzano (2004) also suggest that the Philippines and China are more complementary than competitive in the world market. Trade data reflect countries' respective comparative advantages which play an important role in attracting FDI. For example, PSi Technologies continued its expansion in the Philippines and one important reason is that many Filipino workers speak at least basic English (*Economist*, 15 February 2003). It is likely that FDI has helped the boom of the electronics industry in China. However, as mentioned in the introduction of this paper, 85% of PSi Technologies' output ends up in China at some stage for final assembly of mobile phones, computers and other appliances. Therefore, "the boom in China, far from destroying the local electronics industry [in the Philippines] through cheap competition, is helping to keep it afloat amid a global downturn" (*idem*).

Secondly, as shown in UNCTAD (2004), due to a highly skilled workforce in accounting, software writing, architectural services, telemarketing and graphic design, and its cultural affinity to the United States and American-style English speakers, the Philippines has already become an attractive country for offshoring of business processes. AIG, Caltex, Procter & Gamble and HSBC all operate the largest shared service or call centres in the country. Foreign companies have in this way created many new jobs for college graduates and boosted the country's exports of services. Such FDI again seems to be complementary with the FDI in manufacturing in China within the IPN/APN.

There are different reasons for the existence of competition effects between China and Indonesia, the Republic of Korea, Malaysia and Taiwan Province of China. Tiwari *et al.* (2003) argue that Indonesia is at the lowest level of economic development in the ASEAN countries and most FDI has been targeted to take advantage of cheap labour and local resources. As a result, FDI in Indonesia had previously been centred in basic metal sectors (43.4% of total FDI inflow in 1980), followed by textiles. However, Indonesia began to attract FDI in electronics and the share of this industry in total FDI was 45.5% in 1994. Dhanani and Hasnain (2002) also show that after liberalization in 1985, new foreign firms entered mainly export-oriented and labour-intensive industries. By 1997, foreign firms were playing significant roles in three industries: textiles, chemicals, and fabricated metal and machinery (19–30% of the total each). As much of FDI in China is in the textile, general metal and machinery and electronics industries, it seems that Indonesia and China are seen by TNCs as two alternative locations for their value creation

activities in these industries. Therefore, there appears to be competition for FDI in these industries between the two economies.

Malaysia is one of the most developed economies in South-East Asia and its technological capabilities are also superior to other ASEAN countries apart from Singapore. The electronics and electric industries are major recipients of FDI inflows. However, Malaysia also has some lower-cost labour and natural resources such as rubber. Between 1988 and 1999, in addition to large inflows to the electronics and electrical industry, much FDI went to machinery, textiles, food processing, wood as well as rubber industries (Ramasamy, 2003). It appears that Malaysia is competing for FDI mainly in the electronics industry and to a lesser extent the machinery and textile industries.

The Republic of Korea and Taiwan Province of China are two of the four mature Asian newly industrialized economies (NIEs). It is generally thought that China has a strong advantage in low-tech products while the Republic of Korea and Taiwan Province of China, as well as Singapore, are better-placed in terms of technological capabilities (Lall and Albaladejo, 2004). Therefore, Ianchovichina and Walmsley (2005) argue that there is more scope for export specialization in China *vis-à-vis* the NIEs than *vis-à-vis* the developing East Asian economies. However, both Lall and Albaladejo (2004) and Ianchovichina and Walmsley (2005) observe that China's advantages are not confined to cheap labour, but it is upgrading its industrial capabilities rapidly.

Export data indicate that the Republic of Korea has a comparative advantage in semiconductors, wireless telecommunications equipment, motor vehicles, computers, steel, ships and petrochemicals, while Taiwan Province of China has an equivalent advantage in computer products and electrical equipment, metals, textiles, plastics and rubber products and chemicals. China has already begun to develop and export some of these products. Between 1990 and 2000, the Republic of Korea increased its share of high-tech products in total exports from 21.6% to 37.1%, while the corresponding share for Taiwan Province of China increased from 25.7% to 46.3%. On the other hand, the share of high-tech products in China's exports increased from 6.9% to 24.4% during the same period. China has been catching up. In the 1980s and 1990s, electronics exports by the Republic of Korea and Taiwan Province of China showed negative growth of -20.0% and -28.4% respectively, while those by China increased at the rate of 6.6% (Felker, 2003). During the 1990s, China substantially gained a larger world market share in high-tech products (from 0.7% to 4.1%), a much greater gain than the Republic of Korea (from 2.8% to 4.5%) and Taiwan Province

of China (from 3.4% to 4.9%) (Lall and Albaladejo, 2004). As Felker (2003) notes, in the second half of the 1990s, China's export profile came to include not only labour-intensive products like textiles, toys, plastic items, and electrical items but also a growing share of own-design and own-brand manufacturing in white goods and consumer electronics, along with aggressive thrusts into high-tech industries such as wafer fabrication. As indicated in UNCTAD (2001, p. 26), Chinese exports of high- and new-technology products rose from $7.7 billion in 1996 to over $37 billion in 2000, with foreign-invested firms accounting for 81% of the total. For this reason, Felker (2003) does not treat China's recent success as the take-off of the latest member of East Asia's "flying geese", but "the cross-wind of an entirely new flock". This indicates that China may be regarded by TNCs as an alternative location for their high-tech activities in the international segmentation of certain production process.

Sensitivity analysis

The potential sensitivity of the empirical results to the choice of an alternative measurement of FDI in China and to the econometric methods has been partly dealt with above. In this subsection, we perform a few more robustness checks. First, as noted above, Zhou and Lall (2005) assert that FDI per capita rather than aggregate FDI should be used. Our results are essentially the same as those in tables 3 and 4.[5] Second, after removing Hong Kong (China) from the sample to avoid the "round-tripping" issue, the results change slightly. The negative coefficients of China's FDI inflows on Indonesia are now only statistically significant in one of the four specifications. On the other hand, the impact of China's FDI inflows on Singapore turns out to be statistically significant in three out of the four specifications. Third, we introduced two time dummies into the regressions. One is to take into account of the possible structural changes in FDI inflows in China. As discussed in section two, China experienced a surge of FDI in 1991. Since then, the shares of FDI from Hong Kong (China), Taiwan Province of China and Macao (China) have decreased and the share of OECD countries has increased. It is widely accepted that FDI from the former group of economies tends to concentrate in labour-intensive low-tech manufacturing, while FDI from the latter group of countries is in capital-intensive high-tech industries. The second time dummy is included to capture the changes in Asian economies due to the 1997 Asian Financial Crisis. The econometric results again are similar to

[5] The results are available upon request.

those in tables 3 and 4. In most cases, the two dummies appear to be insignificant. These results are consistent with Zhou and Lall (2005).

5. Conclusions

The current research builds on existing studies to analyze how FDI in China has affected those in other Asian economies – Hong Kong (China), India, Indonesia, the Republic of Korea, Malaysia, the Philippines, Singapore, Taiwan Province of China and Thailand. We carried out panel data unit root tests, controlled for important determinants of FDI, used different measures of the China effect, and compared whether this effect is different when inflows of FDI in China and the nine Asian economies are assumed to be simultaneously, rather than individually, determined. Our results indicate that locational factors, including market potential, effective wage rates, human capital, openness, exchange rate, country risk, investment environment and agglomeration effects are all important determinants of FDI inflows. Once these factors are controlled for, China does not appear to be competing with its neighbouring economies as a whole for inward FDI. Furthermore, when FDI inflows are viewed as part of systemic globalization, FDI in mainland China is likely to have crowded in FDI in its neighbouring Asian economies as a whole because there seems to be a high degree of overall complementarity between them within the IPN established by TNCs.

We believe that the simultaneous determination approach is more appropriate for the analysis undertaken in this study as it is more consistent with the recent developments of TNCs' global value creation activities and of FDI theory. Following this argument, we have also examined the China effect on the nine economies on an individual basis, and found that there appears to be a significant FDI creation effect on India and the Philippines, but a significant FDI diversion effect on Indonesia, the Republic of Korea, Malaysia and Taiwan Province of China. Although China's main advantages still lie in labour-intensive and low-tech products, they have been rapidly expanding into medium- and high-tech industries. Thus, China may have become an alternative location for FDI not only to relatively under-developed Asian economies such as Indonesia, but also to Asian NIEs like the Republic of Korea and Taiwan Province of China.

Three important policy implications can be derived from the current study. Firstly, the development of China can create opportunities for its neighbouring economies as a whole. This is consistent with the

findings of other studies. Our findings are contrary to the claim by Kiminami and Kiminami (1999) that increased FDI inflows in China have led to fiercer competition among Asian economies for capital and financial resources and may contribute to "a recurrence of the Asian crisis in the 21st century". Secondly, whether the China effect is positive or negative depends on the relative positions of individual economies involved in particular segments of the IPN. These positions evolve as individual economies develop. In this dynamic process, a substituting (complementary) relationship between two economies today may turn to be a complementary (substituting) one tomorrow. If national governments in Asia are able to enhance complementarity of value creation activities in the region when they promote their national economic development, then Asian economies as a whole will gain more from each other's development. Thirdly, as locational factors are also important determinants of FDI inflows, Asian economies, including China, need to continue to pay special attention to the factors under their control to increase their attractiveness as FDI destinations.

It must be noted that the results from this study need to be interpreted with care due to a number of limitations. One is related to the reliability and comparability of data across economies, especially FDI data. Some estimates suggest China's FDI figures may be inflated by as much as 30–50% due to "round-tripping". On the other hand, India's FDI statistics are often believed to be underestimated. Until 2003, the Reserve Bank of India (RBI), the agency responsible for compiling FDI data, didn't follow the standard IMF definition and excluded reinvested earnings, royalty payments, inter-company debt transactions and commercial borrowing by foreign-invested firms. Secondly, though all the economies included in our sample have similar profiles at different periods in time and can reasonably be pooled, they are clearly at different development stages. Hong Kong (China), the Republic of Korea, Singapore and Taiwan Province of China are at relatively higher development stages than Indonesia and Malaysia. Despite these limitations, our study adds to the literature on the ongoing debate, especially in light of its five special features:

(1) We confine our analysis to ten Asian economies: Hong Kong (China), India, Indonesia, the Republic of Korea, Malaysia, the Philippines, Singapore, Taiwan Province of China, Thailand as well as mainland China. As demonstrated by Blonigen and Wang (2005), pooling developing and developed countries in this type of empirical study on FDI may be inappropriate since the underlying factors that determine FDI vary systematically between the two groups of countries.

(2) A system of simultaneous equations is introduced for estimation because FDI inflows in Asia are believed to be part of TNCs' systemic globalization strategies. We examine the "China effect" not only on its neighbours as a whole, but also on individual economies. We then try to provide an explanation as to why the effect is positive for some economies but negative for others.

(3) Important determinants of FDI in the host economy are controlled. In existing studies such as Eichengreen and Tong (2006) and Zhou and Lall (2005), some important determinants of FDI are not controlled for when the impact of China's inward FDI on other economies is investigated, which may have produced biased results.

(4) We perform panel data unit root and cointegration tests to avoid a possible spurious regression problem. It is well established in literature that, when time series data are used, the integration and cointegration issue should be addressed first to avoid spurious regression.

(5) We use different measures of the China effect and several different estimation techniques to see if the results are sensitive to these measures and econometric methods.

The central message from this study is that China does not appear to have competed with other Asian economies as a whole for inward FDI. At the level of the individual economy, it is likely that inward FDI to China has had an FDI creation effect in India and the Philippines, but a diversion effect in Indonesia, the Republic of Korea, Malaysia and Taiwan Province of China because of their comparative advantages in relation to China.

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Appendix

Variable	Measurement and data sources
FDI	The real annual aggregate inflow of FDI is derived from nominal aggregate FDI inflows deflated using the GDP deflator of the host economy. Source: UNCTAD website
FDS	The real aggregate FDI stock is derived from nominal aggregate FDI stock deflated using the GDP deflator of the host economy. Source: UNCTAD website and World Development Indicator (WDI) CD-ROM
GDPP	GDP per capita. It measures market potential. Source: WDI for all economies except Taiwan Province of China whose data are from International Financial Statistics Yearbook
RW	Real effective wage rate measured by the manufacturing wage rate adjusted for productivity. Productivity is measured as GDP per employee. Source: UN Common Database, Yearbook of Labor Statistics, LABORSTA website.
HC	Human capital measured by literacy rate. Illiteracy rate is the percentage of people aged 15 and above who can't, with understanding, read and write a short, simple statement on their everyday life. Literacy rate equals 100 – illiteracy rate. Source: WDI for all economies except Taiwan Province of China whose data are from Taiwan Province of China's official websites.
Openness	Openness is measured using trade to GDP ratio. Source: WDI for all economies except Taiwan Province of China whose data are from International Financial Statistics Yearbook
ER	Exchange rate of the host economy against Chinese Yuan. Source: International Financial Statistical Yearbook.
CR	Country risk. It is defined as 100 - annual country risk ratings. The ratings are scaled from 0 to 100. The higher the rating, the lower the chance of banking default. Source: Institutional Investor.
TELE	Infrastructure. Source: WDI for all economies except Taiwan Province of China whose data are from UN Common Database

The growing importance of United States affiliates of transnational corporations based in the United Kingdom *

Karl C. Alorbi and Sam Agyei-Ampomah **

This article explores the activities of United Kingdom-based transnational corporations (TNCs) and their affiliates in the United States. It extends UNCTAD's transnationality index to derive a "relative importance index" of the United States-based activities of United Kingdom TNCs. The results indicate that for some highly internationalized United Kingdom TNCs, activities in the United States account for a predominant proportion in their overall activities. In some cases, the United States affiliates contribute over 60% of the TNC's revenues, profits and net assets. The policy implications of such concentration of TNCs activities in a single foreign country are discussed.

Key words: foreign direct investment (FDI), transnationality index, relative importance index, internationalization, transnational corporations (TNCs), United Kingdom, United States

1. Introduction

Affiliates of transnational corporation (TNC) are traditionally viewed as mere instruments of their parents (Birkinshaw, 2001). More recent contributions have noted, however, that TNCs' affiliates evolve in both scale and scope over time (Lu *et al.*, 2007; Phene and Almeida, 2003), and that an interplay of affiliate level entrepreneurship and the affiliate's competitive environment could substantially impact on the overall performance of TNCs

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(Birkinshaw *et al.*, 2005). Foreign affiliates learn from the host country environment and contribute substantially to their parent's stock of resources, which, in turn, strengthens the TNC as a whole (Mu *et al.*, 2007).

United Kingdom-based TNCs are among the leading foreign direct investors in the world (UNCTAD, 2005). While their overseas activities have been extensively studied, the relative importance of their foreign affiliates in their corporate networks has not been fully analyzed. This is especially so with regard to United Kingdom TNCs' affiliates in the United States, which constitute the largest networks of foreign affiliates in the host country. Although the wave of investment in the United States by United Kingdom TNCs in the 1980s attracted much scholarly interest, the affiliates' activities in the recent past have not been given due attention even though the scale and scope of their activities have expanded over time.

This exploratory study therefore examines the activities of United Kingdom TNCs' affiliates in the United States in recent years and attempts to gauge the relative importance of these affiliates in the overall activities of their parent TNCs.[1] The article will attempt to answer two main questions: what is the relative importance of United States affiliates in the corporate networks of the United Kingdom TNCs; and what are the main characteristics of these TNCs? This study focuses mostly on the period 1990–2000.

The remainder of this article is divided into four main sections. The following section outlines the activities of United Kingdom TNCs in the United States and some relevant international business literature. The methodologies used to collect and analyse the data are then discussed. This is followed by analysis and discussion of the findings. The final section discusses the policy implications.

2. United Kingdom TNCs and their activity in the United States

United Kingdom TNCs account for the largest proportion of foreign direct investment (FDI) stock in the United States (Anderson and Zeile, 2006; UNCTAD, 2005). The United States has, however, not

[1] This paper reports on a part of findings in a bigger research effort aimed at understanding the activities of United Kingdom TNCs in the United States.

been the most important FDI location for United Kingdom TNCs until very recently. The main geographical focus of United Kingdom FDI up to the late 1960s was its former colonial countries, before they (United Kingdom firms) shifted their attention to Europe in the 1970s. It was not until the late 1980s that the United States emerged as the principal destination of United Kingdom overseas investment.

For the purpose of this study, therefore, three investment "epochs" are identified within the period from the late 1950s to the present. The first period is from the late 1950s up to 1969 when the Commonwealth nations were the preferred FDI destinations for United Kingdom firms. The second epoch is from 1970 to the mid-1980s when Europe took over as the most important FDI location. The third epoch is the period from around 1990 to the present when the United States emerged as the favourite FDI location for United Kingdom TNCs. These three investment epochs will be used in the analysis of the data in section four.

Since this study focuses on the third investment epoch, it is important to understand the characteristics of United Kingdom firms that undertake FDI in the United States. While United Kingdom affiliates in the United States engaged mostly in low-technology, low value-added industries for a long time (Shepherd *et al.*, 1985; Graham and Krugman, 1991), their activities since the 1990s have been shifting increasingly towards high-technology, high-value-adding industries (Lowe, 2000). For example, United Kingdom-based firms accounted for over 50% of European FDI in the computer and electronics industry in 1999 and over 89% of European FDI in the information technology industry in the United States (Lowe, 2000; Howestine, 2001). They have been the most important acquirers of United States firms, and now operate the largest networks of foreign affiliates in the United States. In 2004, for instance, they accounted for 21% of the value-added by foreign affiliates in the United States (Anderson and Zeile, 2006). A study by the United States Bureau of Economic Analysis (Shannon *et al.*, 1999) found that the United Kingdom is the only country whose TNCs have established affiliates in all 52 states of the country. Zeile (1998) observed that foreign affiliates of United Kingdom TNCs are closest in their characteristics to domestic firms. They are also the most United States-oriented in terms of sales and production, thus seemingly more embedded in the host country than their peers from other key investor countries.

A question arises as to why United Kingdom firms came to concentrate their investment in the United States when they had previously focused on the Commonwealth nations in the 1950s and1960s and then on Europe in the 1970s and early 1980s. The importance of the Commonwealth nations could be attributed to the United Kingdom's strategic commitment to its former colonies and the fact that they were politically more stable and safer than alternative investment locations at the time (Stopford and Turner, 1985). In the case of Europe, United Kingdom's entry into the then Common Market opened the doorway to investment opportunities in continental Europe. Interest in Europe, however, waned rapidly because, despite the move toward a common market, considerable non-tariff barriers remained (Shepherd *et al.*, 1985). The fragmented nature of European markets and economic nationalism have been cited as further reasons why Europe fell out of favour, paving the way for increased investment in the United States (Stopford and Turner, 1985).

With regard to the United States, several reasons have been identified in literature as to why it became the most attractive location. These include the unfavourable economic and political climate (including labour unrests) in the United Kingdom compared with the United States at the time (Stopford and Turner, 1985); the size and growth potential of the United States market (Young and Hood, 1980; Shepherd *et al.*, 1985); and the lower cost of capital in the United States (Graham and Krugman, 1991). Furthermore, a desire to narrow the technology gap on part of the TNCs, the potential to achieve higher returns from the United States compared to the United Kingdom and Europe, global strategy motives, and the relative ease of acquisition in the United States played a role (Brown, 2000).

Graham (1978), however, argued that these were not sufficient explanations for the patterns of transatlantic FDI. He asserted that "rivalrous behaviour" induced competition between TNCs based in Europe and those in the United States. An increase in United States FDI in Europe was followed by a response in the form of European FDI in the United States. Indeed, prior to the shift of United Kingdom TNC activities towards the United States, the United Kingdom was often used as the "beachhead" for United States investment in Europe. Since 1962, United States firms have been the leading investors in the United Kingdom (Stopford and Turner, 1985). Graham's "rivalrous behaviour" perspective therefore adds to our understanding of investment by United Kingdom TNCs. It also, to some extent, laid some foundation for a broader understanding of the bi-directional flows of FDI between

similar developed economies, such as the United Kingdom and the United States (Markusen and Venables, 1998).

Studies on the evolving roles of foreign affiliates form another stream of literature that sheds light on recent bilateral flows of FDI between the United Kingdom and the United States. Early literature on cross-border activities of firms views corporate headquarters and foreign affiliates from a centre-periphery perspective. The traditional headquarters serves not only as the "centre of gravity" of the TNC, but also as its most important market and source of revenues. Affiliates, on the other hand, are regarded as the appendages of the parent performing certain roles assigned to them (Birkinshaw, 2001). In essence, therefore, resources and decisions flow in a uni-directional fashion from the parent to foreign affiliates.

More recently, however, a number of studies have argued that foreign affiliates evolve over time and, in the process, contribute to the stock of resources of their parents (Mu *et al.*, 2007; Lu *et al.*, 2007; Birkinshaw *et al.*, 2005). This stream of literature distinguishes foreign affiliates by the role they perform in their corporate networks. Others see the TNC as a differentiated network in which various nodes become specialized over time for the overall benefit of the corporate network (Bartlett and Ghoshal, 1989). From this perspective, resources are expected to flow in a bi-directional fashion. This perspective is important for analysing United Kingdom TNCs since affiliates in the United States account for a large part of corporate activities of some of those TNCs, as shown later in this article.

3. Data and methodology

3.1. Data

In order to pursue the dual objectives of measuring the relative importance of United Kingdom TNCs' affiliates in the United States to their parents and understanding the characteristics of these TNCs, the authors screened data on the largest publicly owned United Kingdom firms to identify TNCs that had affiliates in the United States. The data collection exercise was based on the population of United Kingdom's leading 500 firms (*Financial Times 500*). To take out firms that are not relevant to this study (e.g. purely domestic firms) from the sample, the following screening process was applied. Firms which operate only in the United Kingdom market, those which operate in the financial

industry (even if international), and those owned by foreign firms were removed from the list. Furthermore, those TNCs without geographical breakdowns of relevant data on sales, net assets, and profits are removed from the sample. At the end of the screening process, 163 TNCs (in the 1998 base year) were identified as the sample for this study. Data on sales, net assets and profits of the 163 TNCs were drawn from the Sequencer/Extel database for the period 1990–2000. Data on the date of establishment (for age), and market capitalization (for size) were obtained from the same source. Dates on the initial entry into the United States (for host market experience) and the mode of entry were obtained from annual reports of the TNCs and other published documents.

Since some firms dropped out of the sample for a number of reasons (e.g. acquisition, closure, withdrawal from overseas markets) during the period under study, the total number of firms in the sample varies over the 11-year period. The outcome of the screening exercise is presented in table A1 in the appendix.

3.2. Measuring the degree of internationalization and the relative importance of affiliates

Researchers have measured the degree of firm internationalization using different variables (including sales, assets and profits). Some studies have used data on sales (Rugman, 2005; Rugman and Verbeke, 2004; Dunning and Pearce, 1981). Sullivan (1994) introduced a composite measure comprising five variables – sales, profit, assets, international experience of top managers, and dispersion of operations (see also Curwen and Whalley, 2006).[2]

Ietto-Gilles (1998), building on past contributions, applied two frameworks of internationalization. One is based on the measurement of home versus foreign activities. This is done by finding the average of three ratios as used by UNCTAD (2005) – total assets, sales and employment. The second framework is a measure of the spread of countries in which TNCs operate.

A shortcoming of these approaches is that they treat all foreign affiliates equally without taking into account the economic importance of individual host countries.[3] Putting, for example, affiliates in the

[2] For a criticism of this approach, see Ramaswamy *et al.* (1996).

[3] Exceptions include Curwen and Whalley (2006), Rugman and Verbeke (2004), and the analysis of affiliate spread in Ietto-Gilles (1998).

United States and those in a small developing country in the same basket is likely to result in understating the contribution of affiliates in the larger and strategically important United States. This study therefore builds on the extant literature by going a step further and examining the individual host country contribution in terms of sales, net assets and profit.

For measuring the relative importance of corporate units, Harrigan (1983), for example, suggested that cash flows could be used as an indicator of a business unit's relative importance. Forsgren *et al.* (1999) used accounting profits (based on exports) and employment growth as proxy measures. They argue that even without the possession of tangible resources, the generation of significant revenues will give the affiliate significant "organizational strength" within its corporate network.

The approach adopted in this exercise is based on the *transnationality index*, first introduced in the *World Investment Report* (UNCTAD, 1995), which attempts to measure the share of the TNC's activities located overseas compared with those in the home country. The *transnationality index* is a composite of three ratios – foreign assets to total assets of the TNC, foreign sales to total sales of the TNC and foreign employment to total employment of the TNC. The *transnationality index* is based on the demarcation between home activities on the one hand and all overseas activities on the other (Dunning and McKaig-Berliner, 2002; Rugman and Verbeke, 2004; Rugman, 2005).

For the purpose of this study, the UNCTAD method was extended in three ways. First, instead of bundling together all foreign activities, affiliates' locations were broken down into four key countries and regions – the United Kingdom, the United States, Europe and the rest of the world. Second, while the *transnationality index* uses employment figures, this study, following Ietto-Gilles (1998), used profit before tax. This was done because TNCs do not always report geographical breakdowns of their employment figures. One advantage of using profit instead of employment is that the resulting ratios could proxy for performance measures in some circumstances (see Forsgren *et al.*, 1999). Finally, net assets instead of total assets were used because most of the firms do not report total assets by geographical location. It is important to note, however, that although net assets were used here, total assets would have been a preferred variable, because the use of net assets could underestimate the extent of internationalization.

The extended method was used to calculate the *relative importance index* for each geographical location. A higher *relative importance index* for location A compared with location B in the TNC's network indicates a higher level of importance of location A

4. Findings and discussion

The first issue addressed was the entry mode that the TNCs utilized when they entered the United States market. Data for the entry mode were available for 108 firms in the sample. It was found that 71 TNCs (66%) entered the United States through acquisition while 24 TNCs (22%) used the greenfield entry approach. Joint ventures were used by 11 TNCs (10%) while only two firms relied on licensing as the mode of entry. This finding is consistent with recent studies by the United States Bureau of Economic Analysis (Lowe, 2000; Howestine, 2001), which showed a similar pattern of entry mode choices by United Kingdom TNCs.

The next step in the study was to determine the relative importance of the operating units of the TNCs by geographical location. The 163 TNCs were ranked by the United States affiliate's *relative importance index*. A selected list of firms with over 50% of their activities in the United States in the base year (1998) is presented in table 1.

As can be seen from table 1, for some TNCs, affiliates in the United States dominate their overseas activities. Indeed, some firms such as Hanson and Signet could more appropriately be described as bi-nationals because of the concentration of their activities only in the United States and the United Kingdom, similar to the concept of bi-regional firms in Rugman (2005).

It was noted in section two that in the 1990s, some of the TNCs started to move out of the traditional low value-added, low-technology industries associated with United Kingdom TNCs and into high value-added, high-technology industries through acquisition of United States firms. A selected group of such TNCs are presented in table 2.

Shepherd *et al.* (1985) pointed out that in 1981, only 39% of FDI from the United Kingdom was in technology-intensive industries compared with 65% by United States TNCs. More recently, however, some United Kingdom TNCs acquired strategic assets which transformed them into knowledge-intensive, high-technology TNCs, as in the examples of firms in table 2. From Graham's perspective, it could be argued that some United Kingdom TNCs, after gaining footholds in the

United States market, are now trying to catch up with their transatlantic competitors that dominate high technology industries.

Table 1. Sample of United Kingdom TNCs with over 50% of their activities located in the United States

Sample TNCs	Relative Importance – 1998				
	United States/ North America	United Kingdom	Europe	ROW	Total
BBA	54.3	12.9	30.3	1.9	100
Bunzl	57.6	30.4	5.4	6.7	100
Cookson Group	62.0	14.9	13.4	9.7	100
EMI Group	55.5	-1.3	21.6	24.2	100
Hanson	53.2	46.3	0.0	0.5	100
Invensys	54.1	12.0	20.6	13.3	100
Pearson	52.1	16.1	28.1	4.0	100
PIC International*	77.4	N.A.	10.3	13.3	100
Premier Farnell	61.2	28.9	0.0	9.9	100
Senior	61.9	18.3	17.8	2.0	100
Signet Group	73.5	26.5	0.0	0.0	100
Smith (W.H.) Group	60.4	30.3	12.4	-3.1	100
Tomkins	50.4	35.1	6.2	8.3	100
WPP Group	94.6	4.2	3.8	-2.6	100

Source: The authors' analysis
*PIC combined its United Kingdom and European activities in their reports.

Table 2. A sample of United Kingdom firms that have made acquisition of higher value, higher technology assets in the United States

Company	Previous activity	Activity in 2000
BBA	Transmission belt manufacturer. Basic engineering conglomerate	Aviation services; Advanced textile material technology (medical).
Invensys (formerly Siebe)	Safety and garage equipment manufacturer	Automation and control systems; power systems,
PIC (now acquired)	Stock (pig) breeding	Biotechnology
Tomkins	Buckle and fasteners	Power transmissions, fluid power and systems; building materials
WPP Group	Shopping baskets and domestic wire products	Advertising/Communication

Source: Various company annual reports and company listing particulars.

Turning to the proportion of activities located in the United States, the summary statistics regarding the relative importance of all the 163 firms over the 11-year period are presented in table 3. This shows that the proportion of activities located in the United States by the United Kingdom TNCs generally increased during the 11-year period. Apart from 1991 and 1999 when it dipped a little, the period witnessed a consistent rise in the share of activities in the United States. While affiliates in the United States accounted for only about a fifth of the activities of the firms in the sample at the beginning of the decade, by 2000, this has increased to a third (mean of 32.9). The rapid increase in United States activities could be attributed to the increased levels of United Kingdom acquisition noted by many researchers (UNCTAD, 2005).

Table 3. Summary statistics of the overall relative importance of the United States affiliates to their United Kingdom parents 1990-2000

YEAR	No of firms	Mean	Median	Standard Deviation	Minimum	Maximum
1990	89	19.7	16.7	16.35	-7.1	70.9
1991	110	19.1	18.8	19.16	-96.7	76.7
1992	124	23.2	19.2	20.36	-47.5	109.4
1993	126	24.4	22.1	20.19	-27.2	96.6
1994	139	24.7	22.2	20.00	-18.2	93.1
1995	152	25.6	24.1	20.04	-24.5	81.1
1996	156	27.7	25.0	26.35	-70.2	199.5
1997	162	27.4	28.2	22.34	-69.0	80.2
1998	163	30.0	28.9	27.53	-46.5	265.0
1999	153	27.7	26.6	25.90	-165.2	75.5
2000	135	32.9	29.4	24.24	-15.7	138.8

Source: The authors' analysis.

4.1. The relative importance of activities in the United States

In order to gain a deeper understanding of the pattern of activities, two further exercises were undertaken. The first was the analysis of the relative contributions of the three variables (sales, assets and profits) to the result. This was followed by a "finer mesh" analysis of the *relative importance index*. The relative contributions of the key variables are presented in table A.2 in the appendix. The results show that, overall,

the *relative importance index* is not particularly driven by any one of the three variables. On average, the relative contribution of each the three variables over the period is about a third.

For the "finer mesh" analysis, the TNCs were divided into three groups based on the relative importance of affiliates in the United States. The result for each year was re-categorized into three groups – (1) HIGH (the top 30%), (2) MID (the middle 40%), (3) LOW (the bottom 30%). The summary statistics of this "finer mesh" exercise are presented in table 4.

Table 4. Summary statistics of the relative importance of the United States to the TNCs by group

Year	RI	N	Mean	Median	StDev	Minimum	Maximum
1990	HIGH	27	40.4	40.1	11.04	25.0	70.9
	MID	35	16.6	16.7	3.60	10.4	23.6
	LOW	27	3.0	3.3	4.21	-7.1	8.7
1992	HIGH	37	46.8	44.3	16.34	30.6	109.4
	MID	50	21.1	19.3	5.79	11.7	30.5
	LOW	37	2.5	2.0	9.27	-47.5	11.4
1994	HIGH	42	49.3	46.0	13.99	31.9	93.1
	MID	55	21.9	22.2	5.86	12.1	31.5
	LOW	42	3.8	3.7	5.43	-18.2	11.9
1996	HIGH	47	56.1	49.7	25.41	37.6	199.5
	MID	62	25.1	25.1	8.01	12.6	37.2
	LOW	47	2.8	3.5	11.89	-70.2	12.6
1998	HIGH	49	57.0	51.2	31.94	41.7	265.0
	MID	65	28.2	28.9	7.72	15.9	41.5
	LOW	49	5.4	5.9	9.53	-46.5	15.7
2000	HIGH	41	61.7	57.9	18.72	42.3	138.8
	MID	53	30.1	29.4	6.56	20.3	42.1
	LOW	41	7.9	7.3	7.57	-15.7	20.0

Source: The authors' analysis.

The breakdown in table 4 shows that although there was a general increase in activities in the United States during the decade, it was accounted for mostly by the HIGH group. The 27 United States affiliates in this group contributed 40% of their parent's activities in 1990. This compares with 17% for the MID group and 3% for the LOW

group. By 2000, the proportion of business activities in the United States had increased tremendously. The affiliates in the HIGH group were the dominant contributors to their parents. The 41 United Kingdom TNCs' affiliates in this group (in 2000) contributed about 62% of the overall sales, net assets and profits of their parents, while for the MID group, they contributed almost a third. The LOW group doubled their contribution in 1990 to about 8%.

Of particular interest is the dominant position of the United States affiliates of the TNCs in the HIGH category. From 1995, these United States affiliates alone accounted for more than half of their parent's activities. Although the home country is traditionally viewed by many as the "centre of gravity" of the TNC's activities (Mataloni and Yorgason, 2006), the findings here suggest that a group of highly internationalized United Kingdom TNCs have "defied" this conventional model of business and, instead, concentrated the largest proportion of their activities in the United States.

4.2. Relative importance and firm characteristics

Moving to the *relative importance index* in relation to firm-specific characteristics of age, host-market experience and size, the aim is to determine whether the *relative importance index* is influenced by particular organizational characteristics. To undertake this exercise, the Kruskal-Wallis (Kruskal-Wallis one-way analysis of variance-ANOVA) test was used to assess the hypothesis that the firm-specific characteristics do not affect the *relative importance index*. The Kruskal-Wallis test is very useful when three or more groups are compared on a variable that is measured at an ordinal level, as is the case in this study. The other alternative – the Mann-Whitney test – compares only two groups. The objective here is to look for differences in the population median and to test the significance of such differences. The null hypothesis is that the TNCs are homogenous with regard to the *relative importance index*. The results of the Kruskal-Wallis test are presented in table 5.

Panel A of table 5 presents results for the test of the hypothesis that the *relative importance index* is equal for all years in the sample. The results indicate that the null hypothesis is rejected. Later years (1996–2000) have positive z-values while the earlier years (1990–1995) show negative z-values, indicating that the median values for the later years are higher than the overall median. This suggests that the relative importance of the United States to United Kingdom TNCs has increased significantly during the 1990s. This finding is not surprising.

As noted in section two, this period (1996–2000) falls within the third investment epoch in which the United States emerged as the most preferred destination for United Kingdom FDI.

Table 5. Results of Kruskal-Wallis Test (by age, size, year of operation, and host market experience)

	No. of Companies	Median	Average Rank	Z	H	Significance (p)
Panel A: By Year of Operation (Relative Importance Over Time)						
1990	89	16.7	623.4	-3.12	43.11	0.000
1991	110	18.8	635.1	-3.20		
1992	124	19.2	700.9	-1.67		
1993	126	22.1	726.0	-1.01		
1994	139	22.2	725.4	-1.09		
1995	152	24.1	750.3	-0.40		
1996	156	25.0	775.0	0.33		
1997	162	28.2	811.3	1.45		
1998	163	28.9	832.6	2.12		
1999	153	26.6	822.6	1.75		
2000	135	29.4	888.4	3.48		
Panel B: By Age of TNC (Measured by Date of Incorporation)						
1990 – 2000	62	29.0	797.4	0.71	8.69	0.013
1970 – 1989	263	17.8	687.0	-2.91		
Before 1970	1191	24.1	772.3	2.34		

Table 5 (continued). Results of Kruskal-Wallis Test (by age, size, year of operation and host market experience)

	No. of Companies	Median	Average Rank	Z	H	Significance (p)
Panel C: By United States Experience (Date of United States Entry)						
1990 – 2000	339	21.5	683.2	-3.01	29.20	0.000
1970 – 1989	765	22.2	722.8	-2.05		
Before 1970	385	29.9	843.4	5.22		
Panel D: By Size of TNC (Measured by Market Capitalization)						
LARGE	479	29.0	817.5	4.10	28.28	0.000
MIDIUM	627	22.8	755.5	0.38		
SMALL	394	17.8	661.2	-4.77		

Source: The authors.

Relative importance and age of the TNC

Panel B of table 5 shows the Kruskal-Wallis results for relative importance and the age of the TNC. The null hypothesis is that the *relative importance index* is the same for all firms irrespective of the age of the TNC. To examine the possible effect of the age of the TNC on the *relative importance index*, the TNCs were classified into three groups – firms incorporated after 1990, between 1970 and 1989, and before 1970. As can be seen in the table, most of the TNCs were established before 1970, when the FDI of many United Kingdom TNCs was focused on the Commonwealth countries.

The sample medians for the three groups are 29.0, 17.8 and 24.1. The results indicate that there are significant differences in the *relative importance index* depending on the age of the TNC, though weaker than the other factors tested. The older TNCs (pre-1970 firms) have a high positive z-value, indicating that the median *relative importance index* for that group is higher. On the other hand, the 1970–1989 group of firms has a significantly lower median. Thus, there seems to be a nonlinear relationship between the age of the TNC and the *relative importance index*.

It appears that older TNCs are enjoying the positive "influence" of age. They are likely to control more resources than firms in the younger category because the accumulation of resources and capabilities may take place over time (Birkinshaw and Hood, 1998). Structurally, they are also expected to have fully adjusted to the demands of the United States market through experimentation, exploration and reinforcement of subsequent actions (Nelson and Winter, 1982).

Relative importance and United States market experience

Panel C of table 5 shows the Kruskal-Wallis test results for the *relative importance index* and United States market experience of the TNCs. Here, the null hypothesis is that the *relative importance index* is the same for all firms irrespective of their United States market experience. The sample, as in the case of age, was classified into three groups according to the date of entry in the United States – firms arriving in the United States after 1990, between 1970 and 1989, and before 1970. As can be seen from the table, the majority of TNCs in the sample arrived in the United States between 1979 and 1989.

The medians for the three groups are 21.5, 22.2 and 29.9. The results indicate that there are significant differences in the *relative*

importance index according to the length of operation in the United States. Firms with greater United States experience (entered the United States before 1970) show a high positive z-value. This means that the longer the company has operated in the United States, the larger is the proportion of business activities located in the host country.

This is not surprising because it is well established in the literature that TNCs that have long experience in a particular market are more familiar with the institutional and structural/relational barriers of the market, which enables them to minimize the costs associated with their foreignness (Zaheer, 2002). It is also known that prior experience in the host market influences the firm's decision to further commit resources to the market (Johanson and Vahlne, 1977).

Relative importance and the size of the TNCs

Panel D of table 5 shows the Kruskal-Wallis results for the test of significant differences in the *relative importance index* according to the size of the company as measured by the market capitalization. The sample of firms in each year was classified into three groups: the top 30%, labelled as LARGE; the next 40%, MEDIUM; and the last 30%, SMALL. The sample medians for the three different are 29.0, 22.8 and 17.8. The results imply that the null hypothesis can be rejected. Hence, the *relative importance index* is different for the various groups based on size. The results indicate that as a key organizational resource (Wernerfelt, 1984), size becomes a virtuous cycle for the United Kingdom TNCs operating in the United States. Large size means they have more resources to deepen their roots in the geographically larger United States market. It is also likely that the comparatively larger size of the United States host market may have helped the TNCs to grow faster. The economies of scale and scope they enjoy in the United States could not have been possible in the then fragmented European markets of the 1980s. The larger host market therefore provided the platform for the larger United Kingdom TNCs to deepen their involvement in the United States market.[4]

5. Conclusions and policy implications

The findings from this exploratory study indicate that in many respects, one country – the United States – has emerged as the location

[4] This double effect of firm size and host market size was gratefully pointed out by one of the reviewers.

of choice for the largest United Kingdom TNCs. While activities in previous investment phases were more dispersed across many countries, in recent years United Kingdom TNCs have concentrated much of their investment activities in the United States. After several years of increased investment, activities in the United States have grown and now account for a preponderant proportion of their overall activities.

In terms of the entry mode, acquisition has continued to be the preferred mode for United Kingdom TNCs. While some TNCs acquired assets to complement the traditional low value-added, low-technology activities associated with United Kingdom TNCs, others purchased assets which transformed them into high value-added, high-technology firms.

By bringing together the effect of age, market experience and the size of the TNCs (and of the host market), it can be argued that these factors have synergistically influenced United Kingdom TNCs to increase their involvement in the United States host market. Older TNCs and those with longer United States market experience appear to have become *Americanized* to a considerable degree. There is some evidence that the United States is effectively a "second home market" for many United Kingdom TNCs. This may be because profits were reinvested in such a way to create a virtuous cycle of increased involvement in the United States market.

The predominance of activities in the United States in the corporate network of these United Kingdom TNCs is, however, contrary to the conventional conceptualization of TNCs in the literature, which regards the home country as the "centre of gravity" of the firm. The findings in this study suggest that in terms of the location of activities, the "centre of gravity" of these United Kingdom TNCs has shifted to the United States.

This emerging phenomenon could lead to calls on policy-makers in the United Kingdom, and to some extent in the United States, to intervene for nationalistic reasons. For some in the United Kingdom, the location of a higher proportion of activities in the United States might suggest that the tail (United States affiliates) is now wagging the dog (United Kingdom-based parents). From the United States perspective, there might be calls for policy measures to limit the acquisition of high technology United States TNCs by foreign investors.

Among similar developed economies, however, FDI is very often a two-way affair. Indeed, United States TNCs are the leading

investors in the United Kingdom. In 2004, for instance, the United Kingdom accounted for the largest proportion (16%) of United States value-adding activities overseas (Mataloni and Yorgason, 2006). Fears of job or technology losses and hollowing-out are therefore premature in view of the bi-directional flows of FDI between the two countries. Hence, policy prescriptions that undermine healthy "rivalrous behaviour" between the United Kingdom and United States TNCs, as discussed earlier in this article, might backfire and eventually hurt the competitiveness of both economies.

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Appendix

Table A1. The number of TNCs in the database from 1990 to 2000

Year	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
No. of TNCs	135	153	163	162	156	152	139	126	124	110	89

Source: The authors.

Table A2. Relative contribution of sales, net assets and profits to the *relative importance index* of the United States

Year	Sales		Net Assets		Profits	
	Mean	Median	Mean	Median	Mean	Median
2000	0.30	0.31	0.34	0.31	0.31	0.36
1999	0.26	0.31	0.30	0.31	0.36	0.37
1998	0.30	0.31	0.31	0.32	0.34	0.36
1997	0.31	0.30	0.35	0.32	0.34	0.35
1996	0.34	0.32	0.29	0.31	0.36	0.34
1995	0.33	0.31	0.39	0.34	0.28	0.32
1994	0.38	0.33	0.35	0.33	0.27	0.32
1993	0.38	0.34	0.34	0.35	0.27	0.31
1992	0.37	0.32	0.34	0.33	0.28	0.34
1991	0.32	0.32	0.33	0.31	0.30	0.32
1990	0.36	0.33	0.35	0.34	0.29	0.30

Source: The authors.

RESEARCH NOTE

Understanding developed country efforts to promote foreign direct investment to developing countries: the example of the United Kingdom

Dirk Willem te Velde *

Developed countries often suggest that developing countries attract more investment to promote development. In this respect, the Government of the United Kingdom employs home country measures (HCMs) to promote foreign direct investment (FDI) to developing countries. HCMs include support for risk reduction, technical assistance to improve the host country investment climate and home country market access. So far, there has been little analysis of the effectiveness of HCMs. This article categorizes HCMs and then identifies key HCMs utilized by the United Kingdom. It then provides a preliminary analysis of their effectiveness. The article finds that country specific investment-related aid is useful in facilitating FDI (apart from its other functions), but further analysis should examine under what conditions this is most effective, as well as developmentally relevant. However, while political risk insurance has been provided for projects in popular FDI destinations, there is no evidence that it stimulates additional FDI, a finding which is consistent with private sector views discussed. Finally, we argue that there is considerable scope for further research both in finding new and better measures of HCMs and in widening the scope to other countries and understanding broader implications for development.

Key words: foreign direct investment, home country measures, risk insurance, the United Kingdom

1. Introduction

Developed countries often desire that developing countries attract more investment (this was a theme in the G8 Summit under the presidencies of the United Kingdom in 2005 and Germany in 2007). This includes the United Kingdom which wishes to increase foreign direct investment (FDI) in developing countries to promote both development in host countries and improve the competitiveness of United Kingdom firms. In this context, there

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is a need to examine whether and how *home* countries can affect the level of FDI in developing host countries using home country measures (HCMs).[2]

FDI has been rising in importance for developing countries over the past few decades (for data see UNCTAD's annual *World Investment Report*). Private external finance to developing countries has surpassed official aid for some years. In addition to a stable source of external finance, FDI can offer technology, management skills and higher wages. Though FDI has increased substantially, only a small percentage of FDI reaches poorer developing countries. While this is partly because of their smaller market size, the challenge for HCMs is to encourage firms and to create appropriate conditions so that more and better FDI flows into developing countries.

HCMs are much less discussed than other factors affecting FDI, such as host country policies and international agreements. This is surprising as many OECD governments have realized that outward FDI can be beneficial to home country development. The Government of the United Kingdom regards the promotion of FDI as a win-win proposition and has stepped up its efforts to promote FDI to developing countries. As a result, it is no longer a simple task to describe comprehensively HCMs adopted by the United Kingdom. The approach we take in this article is to identify various United Kingdom HCMs and classify them on the basis of how they can affect FDI (supporting host country fundamentals, reducing economic risk, reducing political risk, providing information on investment opportunities and others).

Of course, we should understand that the ultimate goal of United Kingdom aid policy is not the promotion of FDI, but poverty reduction in developing countries. However, aid might help create the conditions for economic development and hence promote investment (both domestic and foreign) in developing countries. In a similar vein, other countries' HCMs might also result in stimulating United Kingdom FDI.

The rest of this paper is organized as follows. We provide a theoretical background in section two, and then quantify trends in United Kingdom HCMs in section three. The effectiveness of HCMs is discussed in section four. Section five concludes and suggests avenues for further research.

[2] This term has been used, for example, in UNCTAD (2001).

2. Theoretical background

There is no generally accepted definition or standard classification of HCMs. Kline (2003) argues that HCMs include laws, regulations, policies and programmes in home countries that affect outflows of FDI. He describes the scope on the basis of several categories, as discussed in more detail in UNCTAD (2001). CUTS (2003) provides a similar list of six categories.

In this article, we define the scope of HCMs on the basis of how HCMs affect motivations for FDI in theory rather than on the basis of the governmental actors who design, and in some cases fund, HCMs. Generally, there are many factors that affect investment in developing countries (Dunning, 1993). First, the general economic environment on the demand side (size and growth prospect of market) and on the supply side (skills, infrastructure, financial and technological development) which make investment projects viable. Second, the regulatory framework within which investment takes place affects investment decisions (e.g. protection of property rights). Third, specific factors can affect particular projects (availability of project finance, technical assistance, provision of specific information etc.). On this basis, we can delineate the following four categories:

a. *Support for economic fundamentals and governance structures in host countries*. Aid can enhance the governance structures and economic fundamentals required for successful investment projects. Some forms of aid are aimed at raising economic growth and reducing poverty through investment in infrastructure, macroeconomic stability, private sector development and human resource development (so-called FDI- or investment-related aid, untied). Increased growth (prospects) and improved fundamentals can make individual projects potentially more profitable in developing countries, helping to attract FDI.[3]

b. *Support for reducing economic and political risks of investment projects*. HCMs may reduce the risks associated with investment in developing countries. We should distinguish between two broad categories of risks, i.e. *economic* and *political* risks (Moran, 2001). *Economic risks* arise from uncertainties in costs and benefits of

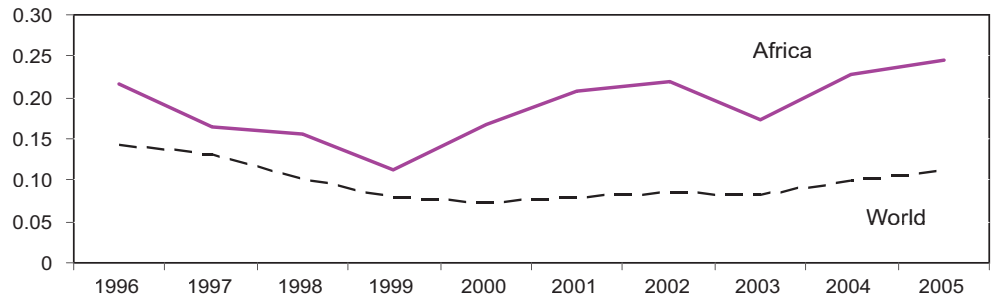
[3] There is a heated, more general debate as to whether aid promotes growth and investment, and if so, under what circumstances (Hansen and Tarp, 2001).

investment projects. Uncertainty can have significant negative effects on investment, especially when it involves large sunk and irreversible costs and there is the option to delay the investment until further information becomes available (Dixit and Pindyck, 1994). Collier and Pattillo (2000) argue that a major impediment to private investment is the perceived high level of (economic) risks. Improved information about projects and demonstration effects may reduce uncertainties for foreign investors who are either new to the country or plan to undertake investment that involves large sunk costs. *Political risks* are defined as "threats to profitability that are the result of forces external to the industry and which involve some sort of government action or inaction" (Moran, 2001). Political risks may also deter investments, particularly in countries that have a history of frequent policy reversals. Political risks are particularly problematic in sensitive industries such as infrastructure, where investment typically involves large sunk costs, especially in countries where the host-country government is weak and may not be able to honour its part of the contract. Political risks are distinguished from economic risks in that the latter are uncertainties that arise from changes in economic conditions, such as costs, demand or the extent of competition in the marketplace. In practice, however, political and economic risks often go hand in hand. Foreign investors can manage political risks in a number of ways. For example, they can purchase financial products to limit losses in the case of large currency fluctuations due to political events (e.g. currency swaps). They can also form partnerships with other firms to share the risks, in which case other parties bear not only political risk but also economic risks. Finally, they can take political risk insurance (i.e. an HCM).

c. *Support for providing information surrounding investment projects.* HCMs can impact on FDI by reducing the information gap in home countries. For instance, investors are often said to suffer from a perception bias. They perceive that many countries are in trouble when in fact only one country in the region is, and thus require an inordinately high rate of return from investment in the region. Investors may not have access to necessary information to spot profitable investment opportunities and it would be too costly to obtain this individually as it cannot be fully appropriated. Public support can be given to overcome information-related market failures, as the collection and dissemination of this information has public goods aspects. One example of such public support is to alert potential investors that profitable opportunities exist in developing countries

particularly in Africa (see figure 1). The provision of information can have spillover effects since investment by one TNC may send positive signals about the host country so that it is followed by investment by other TNCs (the bandwagon effect, Moran, 1998).

Figure 1. Ratio of profits (net of home country taxes) to United Kingdom FDI stock, by area



Source: See appendix.

d. Other policies that affect the viability of investment projects. This category bundles together other HCMs that affect FDI. Trade preferences granted to certain countries might make projects more profitable in those countries, at least temporarily, though not necessarily more efficient. Tax policies concerning, for example, double taxation on foreign affiliates' profits can also affect locational decisions.

An important issue addressed in this paper is whether United Kingdom HCMs are effective and efficient in achieving their goals of promoting FDI and development. The effectiveness and efficiency of HCMs have seldom been studied in great detail (UNCTAD, 2003). Mistry and Olesen (2003) discuss the effects of bilateral and multilateral initiatives on FDI on the basis of three FDI case studies including in Tanzania (Songos-Songos) and Uganda (MCI). Te Velde and Bilal (2003) discuss HCMs in the Cotonou agreement between EU and ACP. But neither of these studies focuses specifically on the provision of HCMs by the United Kingdom.

3. Identifying home country measures provided by the United Kingdom

In this section, we discuss United Kingdom HCMs on the basis of the four categories identified above.

Support for structural economic fundamentals and governance structures

The Department for International Development (DFID) is a major provider of aid and its aid programmes that affect FDI can be seen as HCMs,[4] especially where it is aimed at enhancing economic fundamentals and governance structures. Gross official development assistance (ODA) by the United Kingdom was £3,282 million in 2001/2002, up from £3,007 million in 2000/2001. The total DFID bilateral programme was £1,506.2 million in 2001/2002. This bilateral aid is used in various ways, but among these are programmes that can help stimulate investment, from both local and foreign sources. They include technical assistance and linkages programmes, such as the DFID challenge funds.

The analysis below uses (gross) aid commitments in the OECD Creditor Reporting System (CRS) data to compute aid by the United Kingdom. Following the classification in WTO (2003), we refer to aid in infrastructure, macroeconomic stability, legal and policy frameworks, private sector support and human resource development as FDI or investment-related aid. OECD data permit the use of five digit purpose codes to identify FDI-related aid.

Table 1. United Kingdom (bilateral) aid as reported by OECD CRS, distribution by sector

	1973-1979	1980-1989	1990-1996	1997-2002
Investment related aid	18	25	33	30
Infrastructure	10	13	13	6
Macroeconomic stability	0	8	6	7
Legal and policy frameworks	0	0	2	3
Private sector support	2	3	4	3
Human resource development	6	1	9	11
Other aid	82	75	67	70

Source: OECD CRS database.

Around 30% of United Kingdom bilateral aid is allocated to investment-related areas (table 1), amounting to around £500 million annually, up from 18% in the 1970s. There are big differences among

[4] Excluding those going through multilateral programmes.

recipient countries: Botswana, Central African Republic, Egypt, Ghana, Lesotho, Mauritius, Rwanda, Uganda and South Africa are among African countries that receive an above-average share of investment-related aid. Investment-related aid has shifted away from infrastructure projects towards those supporting macroeconomic stability, legal and policy frameworks and human resource development, which may correspond to a shift towards providing more public goods (as documented in Te Velde *et al*., 2002).

Support for reducing economic and political risks of an investment projects

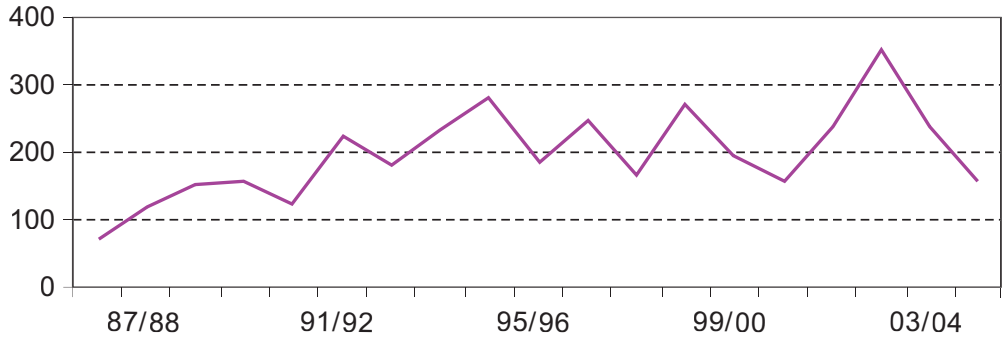
The CDC group (formerly Commonwealth Development Corporation)[5] is an example of a HCM in the United Kingdom which may reduce *economic* risks facing investors in developing countries, either by sharing the risks through loan and equity participation or by demonstrating that profitable projects and viable businesses are possible, thus sending signals to draw in additional private capital.

DFID is the sole shareholder of CDC which has an outstanding loan of £755 million, funded by exchequer advances, built up over time. CDC uses the loan (at zero interest) to support equity investment in developing countries. While additional exchequer advances are no longer provided, it can reinvest repaid loans and equity realization (without paying corporation tax). DFID has set CDC two clear aims. The first is to support the creation and growth of commercially viable private sector businesses in poorer countries of the world. The second is to mobilize third party funds into these countries by demonstrating the feasibility of creating successful ventures.

The CDC Act 1999 requires 70% of its investment to be in poor countries, and aims to make at least 50% of investments in sub-Saharan Africa and South Asia and a minimum of 70% of new investments over a five-year period in poor countries. Figure 2 shows an upward trend in net equity flows until the mid-1990s and a decline afterwards. However, the most recent data indicate a rise once again.

[5] This article analyses investments by CDC before they became a "fund of funds" which means CDC now invests in equity (particularly in other funds) not loans, and outsources a lot of operational work to other funds such as Actis.

Figure 2. CDC's annual net investments, 1987-2005
(Millions of pounds)



Source: CDC investments table 7 British Aid Statistics / Statistics on International Development.

According to CDC's annual report, its portfolio amounted to £805 million in 2002 (£816 million in 2001 and £1,064 million in 2000[6]) including £184 million worth of 24 new (loans and equity) investments. The eight largest investments represented 65% of the total. The 2002 share for new investments in sub-Saharan Africa and South Asia was 35% (69% in 2001) although the five-year average of investment in poor countries was 75%, against the target of 70%. A quarter of CDC's portfolio was in Africa; 36% in Latin America; 21% in Asia-Pacific; and 18% in South Asia. The infrastructure industries, such as power, receive a large share of investment, while the importance of the agricultural sector has declined from 16% of the portfolio in 1972 to 11% in 2002. CDC incurred a substantial loss on its portfolio in agriculture over the 1990s (it is worth only 28% in terms of original investments).

The export credit guarantee department (ECGD) is a separate department whose overseas investment insurance scheme has provided political risk insurance for investors against major adverse political events, namely expropriations, war, restrictions on remittances and breach of contract, since the 1970s.[7] ECGD's insurance exposure to political risk by country and year can be obtained from ECGD annual reports. ECGD overseas investment insurance (maximum liability) amounted to between £150 million and £200 million during the period

[6] See table in the IDC CDC minutes for a country breakdown which is used in this paper.

[7] There are several other risk-insurance schemes in which the Government of the United Kingdom is participating, but since these are mostly multilateral arrangements, we have not included them as HCMs. Such schemes include PPIAF, DEVCO, EAIF ($100mn of donor money; $205 million of private funds) and Guarantco.

1985–1995, but increased dramatically to £797 million (covering investments in 23 countries) in 1999/2000 and £1,009 million in 2001/2002. The United Kingdom recorded the fastest increase in bilateral risk insurance among major industrialized countries over the period 1998–2001. Interestingly, there has been a rapid decline in its exposure to only £239 million in 2006, and ECGD (2006) suggests that this is because many investors have had a rethink over their risk strategies.

In general, TNCs' exposure to risk also varies by home country, because countries are home to different types of TNCs. The type of TNCs can determine the demand for political risk insurance. Some industries have relatively little sunk costs and hence few risks (e.g. a feature of many Dutch TNCs, which have long invested without taking out risk insurance), while other industries are much more risky because they involve large sunk costs and possibly in politically sensitive industries (e.g. the United States oil industry, the German energy and automobile industries, and United Kingdom service industries[8]). As expected, ECGD's cover is used primarily in the infrastructure industries (power, energy and telecommunications) which are most sensitive to political risks in the long-run due to large sunk costs and issues surrounding cost recovery.

ECGD's exposure to investments in low-income countries is small. In 2001, only 6% of exposure was in Africa (down from 20% in 1996), 19% in the Middle East, 25% in Americas, 13% in South Asia, 33% in other Asia and 6% in Europe. In some countries, ECGD's insurance covers a significant share of the total stock of inward FDI from the United Kingdom. ECGD's exposure was worth 10% of the total United Kingdom FDI stock in Indonesia and India in 2000.[9]

Support to provide information surrounding investment projects

The United Kingdom Foreign and Commonwealth Office (FCO) and the United Kingdom Department of Trade and Industry (DTI) have jointly established British Trade International (BTI). BTI has two aims: to raise inward FDI and to raise the competitiveness of United Kingdom

[8] Thames Water was the biggest single user of ECGD political risk insurance for overseas investment in 2002.

[9] The country breakdown for 1996, 1997, 1998 and 2000 based on ECGD annual reports is available from the authors.

firms by promoting overseas sales and investment through the provision of basic information and organization of overseas missions.[10]

BTI provides support to business in terms of information provisions in diplomatic posts. Of the 1,500 staff it employs, nearly 1,200 are posted overseas, with around 80 staff in Africa. The budget of BTI was £92.2 million in 2002/2003, up from £69 million in 1998/1999; around £70 million of this (or 78%) was spent to "promote overseas sales and investment". It was set to rise by a further £10 million over the period 2004–2006. Much of this support is for organizing exhibitions and seminars abroad. Such overseas missions are organized frequently. A BTI survey found that nearly 60% of firms regarded BTI support as useful. However, there are few missions to low-income countries, probably because these are small markets with relatively few commercial opportunities for United Kingdom firms.[11]

Besides supporting BTI, the FCO has set up a "one-stop" programme to provide appropriate information on political risks, but this is a relatively small scale operation. Overseas missions (other than BTI) provide some limited *ad hoc* fora for discussion of political risks surrounding investment opportunities.

Other home country policies that affect the viability of investment projects

There are several other types of HCMs that affect FDI abroad. Trade policy, specially granting trade preferences, is one area. For instance, the African Growth and Opportunity Act (AGOA) trade preferences provided by the United States to certain African countries have stimulated investment in garment assembly. Thus, trade policy can be an important HCM. Since trade policy falls under the competency of the European Union, further examination of EU (not United Kingdom) HCMs would be required.

[10] Firms that are purely exporters without any overseas investment also participate in these missions.

[11] We counted on the United Kingdom trade partners website a total of 3,952 missions over the period 2000–2002; 8.6% of this was to Germany, 11.3% to the United States, but Brazil accounted for just 2.2%, Egypt for 0.9%, Ethiopia for 0.1%, Ghana for 0.5%, India for 2.4%, Mozambique for 0.1%, Nigeria for 0.6%, South Africa for 1.8%, and Uganda for 0.4%.

Bilateral investment treaties (negotiated by the FCO) would not normally be classified as HCMs, but rather as international agreements. Finally, tax incentives for investment abroad constitute a relatively unexplored area. Tax experts argue that the treatment of profits for United Kingdom TNCs is on a par with that in the United States, but is less generous than in countries such as the Netherlands. A full understanding of this type of HCM requires a detailed examination of tax systems in developed countries, and represents another issue for further research.

Table 2 provides a summary of the home country measures provided by the United Kingdom. Of course, these types of measures are mirrored in equivalent policies of other home countries to investment, as well as supranational bodies such as the EU (the measures provided by the European Commission under the Cotonou Partnership Agreement are also given in table 2 by way of comparison).

4. Preliminary analysis of the effectiveness of United Kingdom HCMs

It is important to note at the outset that there are various limitations to quantitative measures of HCMs. It is not possible to obtain simple quantitative measures for some categories, such as the nature of trade preferences and rules of origin, which tend to be framed at a very detailed product level. For other categories, where we have been able to provide some measures, these may not be completely accurate. It is well known that the OECD CRS database is only a crude reflection of aid flows to countries and a more accurate breakdown and classification by activity and by country would be helpful. It would also be helpful to distinguish between aid for technical assistance and aid for infrastructure provision. It would also be valuable to have a more accurate and recent description of public exposure to political risk insurance by country. Furthermore, it would be useful to identify the various sources of information provided or supported by the government to help *new and potential investors* (and not existing exporters). Given these limitations, the analysis below should be seen as preliminary and there is ample scope for further research on measuring and assessing the effectiveness of HCMs.

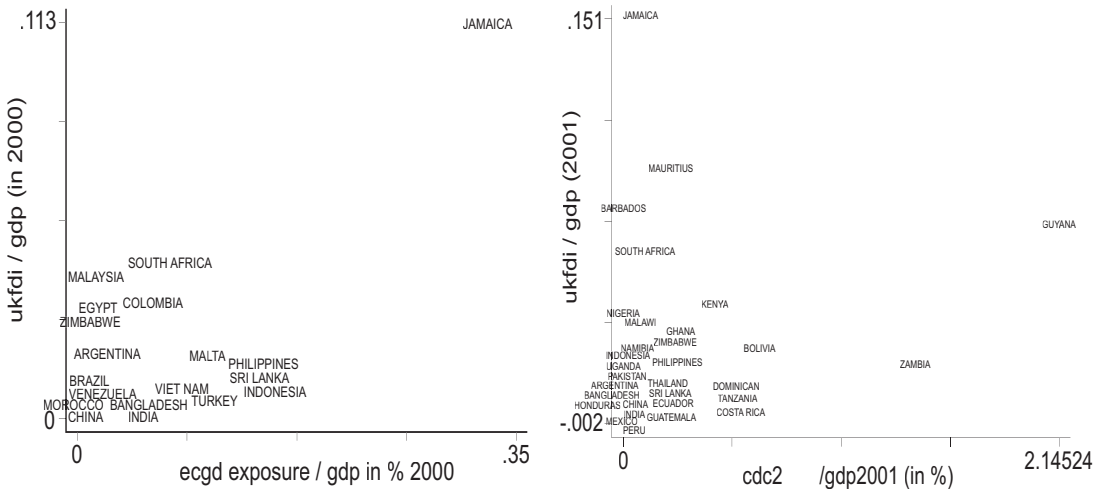
The discussion below focuses on two key questions: 1) is it possible to determine an overall *macro* effect of United Kingdom HCMs on its FDI; and 2) under what *micro* level circumstances are United Kingdom HCMs more effective (e.g. in what industries, or type

of countries, type of HCMs, etc.)? Of course, we should bear in mind that the ultimate goal of United Kingdom aid is not the promotion of FDI but poverty reduction in developing countries. However, aid might help improve the conditions for economic development and various types of investment in those countries.

Macro level

In this analysis, we relate the level of FDI stocks to the level of ECGD exposure and the level of CDC investments (all scaled by GDP). We also relate FDI *flows* to investment-related aid. Figure 3 shows that ECGD's exposure and the stock of United Kingdom FDI are correlated (country observations are denoted by their name), with a correlation coefficient 0.63, and highly significant (with a p-value of 0.01)**.** This does not necessarily imply that one factor causes the other. For instance, ECGD's exposure (in 1997) is not necessarily an indicator of further United Kingdom FDI (changes over the period 1997–2001) as the right panel of figure 3 shows: the correlation coefficient is -0.40 with a p-value of 0.08, i.e. not significant at the 5% level but is at the 10% level. The correlation between the change in the stock of United Kingdom FDI and the change in ECGD's exposure is also not significant. Appendix A confirms the presence of these correlations using econometric estimations.

Figure 3. ECGD exposure and United Kingdom FDI

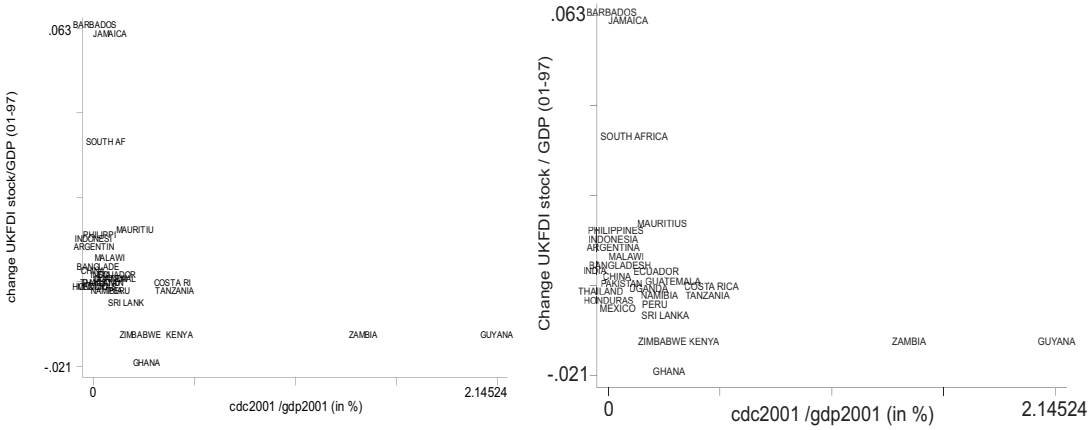


Source: Data appendix.

The right-hand panel of figure 4 indicates that CDC seems less active in those countries where United Kingdom FDI has risen most between 1997 and 2001. So both CDC and ECGD may have been

less active in countries where inflows of United Kingdom FDI were growing fast. On the one hand, one could argue that that is exactly what is required from them – to promote FDI into countries where there has been little – but on the other hand, the demonstration effect of these HCMs on United Kingdom FDI may need to be further examined.[12] The weak association between the ECGD's insurance variable and *additional* FDI is consistent with anecdotal evidence from United Kingdom investors (reviewed below). Some investors cope with risk by diversifying their investment (e.g. big oil companies), while other investors are increasingly making use of insurance offered by the private sector which might be more costly but more flexible. Some investors, especially in the infrastructure industries, remain interested in public insurance. In addition, ECGD (2006, 2007) argues that private investors are rethinking their risk strategies, which has contributed to the sharp decline in demand for political risk insurance it provides (from exposure worth £1 billion during the peak of 2001 down to the £152 million in March 2007 which is below the average over the period 1985–1995) and this decline is expected to continue.

Figure 4. United Kingdom FDI and CDC's portfolio



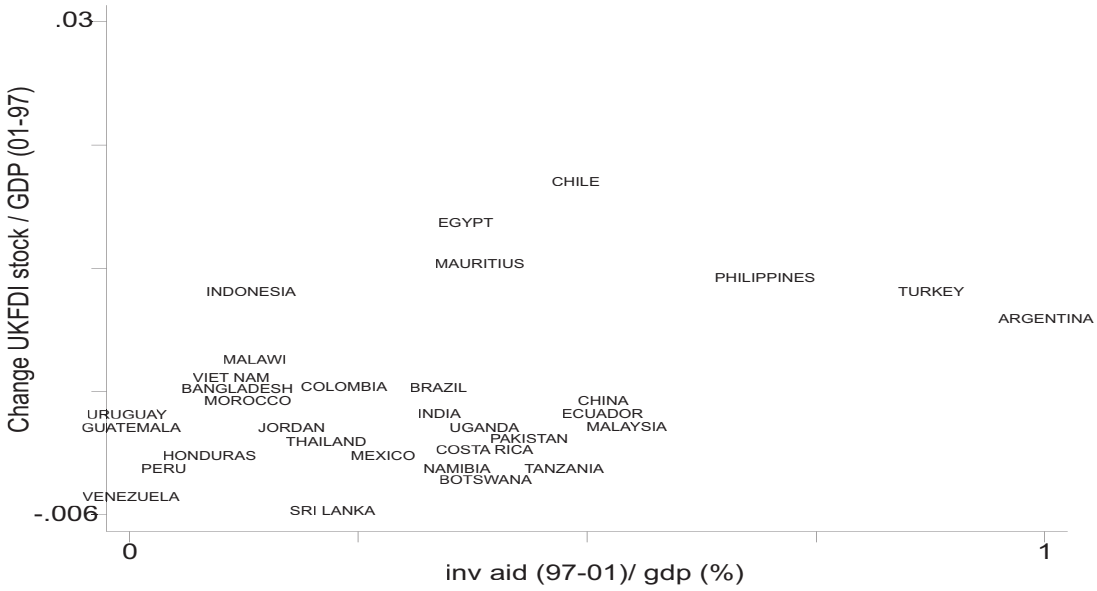
Source: Data appendix.

Figure 5 shows that investment-related aid (scaled by GDP) is positively correlated with the *change* in stock of United Kingdom FDI (scaled by GDP), with a correlation coefficient of 0.41 and a p-value of 0.02. The effect of investment-related aid requires more detailed

[12] It could also be that these HCMs have other effects, directly (e.g. restructuring company) or indirectly (stimulating local and non-United Kingdom foreign investment), which are not measured by United Kingdom FDI.

analyses than has been possible in this paper. For instance, it could be argued that because aid has become more investment-related over time (table 1), the effect on FDI should have increased.

Figure 5. Investment related United Kingdom bilateral aid and United Kingdom FDI



Source: Author's analysis.

Note: Investment related aid relates to the average over 1997-2001. United Kingdom FDI relates to the change in United Kingdom FDI stocks. Both variables are scaled by GDP. We have left out the two outliers Malta (which had rapid negative FDI growth) and Seychelles (which had rapid positive FDI growth).

Micro level

At the micro level, in the absence of detailed research, the picture is more anecdotal and mixed. For instance, the chairman of MSI Cellular, a telephone company operating throughout Africa, said that "CDC was our first investor and their presence helped MSI attract both other developmental finance and private sector money from the likes of Citigroup and AIG", suggesting that in this case, a demonstration effect may have facilitated inflows of private capital (United Kingdom Select Committee on International Development, 2001). On the other hand, in the case of a bank for which ECGD provided political risk insurance when it invested in Algeria and Morocco, the availability of political risk insurance was only a minor factor in the investment decision since this bank was committed to these markets and would have invested there with or without risk insurance. Even in this latter case, we should not disregard the usefulness of risk insurances altogether, e.g. in this

case, risk insurance offered a certain level of comfort, though it was not essential for stimulating *additional* FDI (Te Velde and Bilal, 2003).

Such anecdotal evidence suggests that it is important to consider the conditions under which HCMs are more likely to be effective, not just whether HCMs affect the aggregated FDI. We suggest that the effectiveness of HCMs is likely to depend on a number of factors including the following.

Table 2. Summary of major HCMs provided by the United Kingdom, compared with the EU

Type	United Kingdom		EU – Cotonou	
	Programme	Size and importance	Programme	Size and importance
Support for reducing economic and political risk	CDC group is a partly privatised equity investor and loan provider, with DFID the sole shareholder.	Based on £755 million loan from government, CDC invests between £100 and £200 million annually. Stock of investments was worth around 1£bn in 2002.	Investment Facility of EIB. Financially sustainable fund to stimulate investment and commercially viable business and promote local financial markets. Loans backed by member state guarantees	€2.2bn from EDF + €1.7bn own resources + subsidies. New portfolio (2000-2002) €1.1 billion to global SME loans (32%), energy (28%), other (40%) in ACP public and private sector.
	United Kingdom ECGD (DTI/FCO) has offered political risk insurance for overseas investment since the 1970s.	The maximum overseas investment insurance liability was £1 billion in 2002. Has increased by 58% over 1998-2001. 6% of programmes in Africa.	Investment Facility, EIB	Part of €2.2 billion from EDF (see below) can be used for guarantees, but so far not used
Provision of information opportunities in host countries	United Kingdom Trade Partners / DTI organizes and provides support for trade and investment missions in developing countries. Also BIS.	The United Kingdom Trade Partners supports outward missions to raise competitiveness of United Kingdom companies (£70 million annually) – few missions to small developing countries, e.g. 0.1% in Ethiopia.	PROINVEST to promote investment in ACP companies by strengthening the capacities of private sector intermediaries (IPAs) and professional associations and to support companies to develop partnerships.	Approximately €10 million annually
Support for economic fundamentals governance structures	Various DFID aid programmes, classified as Investment related aid.	Around 30% of United Kingdom bilateral aid (in OECD-CRS) is investment related, worth around £500 million annually.	National and regional indicative programmes; some countries have chose private sector development as one of the priority areas.	€11.3 billion (9th EDF minus contribution to EIB) over five years
	E.g. DFID Challenge Funds have been implemented recently, including BLCF,	The £18 million BLCF over five years, committed £6.1 million for 26 projects by 2002 leveraging £11 million of investment.	E.g. CDE provides technical assistance for companies and intermediaries	CDE has a budget of approximately €20 million annually.
Others	DTI Trade policy on market access; FCO Investment policy; Treasury Tax incentives	Difficult to quantify	Many by individual EU member states. Also, trade policy such as preferences and rules of origin	

Sources: DTI, CDC, ECGD, and Te Velde and Bilal (2003) for the HCMs by EU.

First, the *type of industry* matters as some industries are more likely to be users of certain types of HCMs. Looking at each type of HCM in table 3, It is possible to distinguish between heavy, medium and low-use industries. CDC's equity investments appear to benefit the power and financial industries most. Infrastructure and agriculture are in the middle, while the minerals, oil and gas industries tend not to involve CDC very much, despite being the major industries of United Kingdom FDI in non-OECD countries. TNCs in the oil and gas industries tend to rely on large development finance institutions such as the International Finance Corporation or European Investment Bank, who often finance a relatively small share, but which nevertheless can bring some reassurance and an important "stamp of approval".

Table 3. Which industries are important users of United Kingdom home country measures?

HCM	High-use industries	Medium-use industries	Low-use industries
CDC (%) -2001	Power (30%) Financial Institutions (17%)	Infrastructure (11%) Agribusiness (11%) TMT (11%)	Minerals, oil and gas (7%) Consumer Goods (5%) Healthcare (3%)
OII ECGD (%) - 2002	Power (35%) Water (30%)	Manufacturing (15%) Communications (11%)	Mining (3%) Services (3%) Oil and Gas (3%)
BTI outward mission (number of mission) 2000-2002	Electronics and Hardware (323) Software and computer services (321) Creative and Media (200) Clothing footwear fashion (183) Engineering (171) Agriculture horticulture and fisheries (155)	Environment (153) Construction (149) Giftware (142) Infrastructure (142) Communication (139) Food & drink (138) Leisure and Tourism (132) Education and training (130) Healthcare and Medical (120) Household Goods (104) Oil and Gas (103)	Automotive (81) Textiles (77) Water (77) Power (75) Biotechnology and Pharmaceuticals (72) Chemicals (70) Fire police security (70) Aerospace (56) Business and consumer services (51) Financial Services (48) Paper printing and packaging (30) Marine (24) Aid business (12) Mining (7) Railways (3) Ports and logistics (2) Sports and Leisure infrastructure (2) Airports (1)
United Kingdom FDI stocks in non-OECD countries(%) - 2001	Mining and quarrying (incl. oil and gas (29%) Financial Services (20%) Food products (9%) Chemical products (7%)	Transport and Communications (6%) Textile, wood and printing (4%) Retail trade (4%)	Other man (4%) Metal products (1%) Electricity Gas Water and Construction (2%) Agriculture (0%) IT communications (0%) Transport equipment (1%) Hotels & Restaurants (1%)

Source: DTI, ONS, CDC, ECGD.

The power and water industries are major users of ECGD risk insurance, partly because these industries involve large sunk investment and a long payback period (with revenues in local currency running the risk of devaluation). The oil and gas industries, on the other hand, tend to use political risk insurance less, suggesting that alternative political risk mitigation strategies are being used. Overall, tentatively, the relative importance of political risk insurance will vary by industry.

Second, the *size and age of the firm* also matters, though this may correspond to the TNCs industry to a degree. Large TNCs tend to participate in BTI's overseas missions less, partly because they have their own information gathering systems. Instead, industries with smaller firms, such as electronics, engineering, clothing and agriculture, tend to be the main users of this type of HCM. Participation in overseas missions is more common for industries that account for a smaller share of United Kingdom FDI stocks in non-OECD countries.

Third, the effectiveness of certain HCMs depends on the *motivation of investors*. Export-intensive, efficiency-seeking investment (e.g. textiles and clothing) requires market access, so preferential market access would be a relevant HCM for these investors. Other conditions might include the characteristics of the home and host countries, including size and industrial structure.

5. Conclusions and further research

HCMs include laws, regulations, policies and programmes in home countries that affect outflows of FDI. We defined the scope on the basis of how HCMs can affect FDI in theory. So far, there has been no systematic discussion or quantification of United Kingdom HCMs. We analysed investment-related United Kingdom (bilateral) aid and found that this has increased since the 1970s, both in volumes and in share of total (bilateral) aid, currently at 30%. Investment-related aid has shifted towards providing macroeconomic stability, legal and policy frameworks and human resource development. The shift towards more investment-related aid should have helped to attract investment including FDI to developing countries

Development finance may also help to leverage in private investment. CDC's new investments have declined somewhat since the mid-1990s but increased in recent years. Its portfolio (before it became a "fund of funds") is geared more towards infrastructure projects and less towards agriculture. It has a substantial presence in low-income

countries, including 25% or £250 million in Africa. The ECGD's programme on overseas investment insurance has increased rapidly to £1 billion, faster than in any other major developed country. However, just 6% of the portfolio in 2002 was for Africa, down from some 20% in 1996. Most exposure is in infrastructure industries. The BTI's programme for outward mission has increased, but only few missions reach low-income countries.

With regard to the effectiveness of HCMs in stimulating investment, we argued that aid *flows* are positively correlated with *changes* in United Kingdom FDI stocks over the period 1997–2001 and that the *stock* of ECGD insurance and the stock of CDC investment are positively correlated only with the *level* of United Kingdom FDI stocks. This suggests that investment-related aid has been useful and further work should concentrate on this issue. However, consistent with the recent sharp decline in demand for political risk insurance provided by the public sector, ECGD insurance does not appear to have led to additional FDI. We suggested that the effectiveness of HCMs depends on: the type of HCM; industry; firm characteristics; motive of investment; and home and host country economic conditions. It would be of interest to examine in more detail how investment related (untied) aid can take these conditions into account in order to raise the level of FDI in developing countries.

While this article has provided some insights into United Kingdom HCMs, we should emphasize that these are preliminary results and there is considerable scope for further research. First, there might be scope for improving the quality of existing data. Limitations are primarily related to reporting of aid statistics. Secondly, we still do not have good reviews and measures of trade policy, rules of origin and tax incentives in the context of HCMs. Thirdly, as we have discussed, HCMs aimed at promoting FDI may not necessarily result in meeting development objectives. It would be useful to examine which HCMs are most effective in promoting FDI conducive to development. Fourthly, there is also an important research agenda with respect to investigating the effectiveness of development finance institutions in stimulating investment and development. The results of the preliminary research suggest a positive correlation between the level of development finance and the level of FDI, but this relationship requires further examination, particularly in relation to the discussion of whether development finance stimulates additional investment by the private sector. Finally, we have focused on the efforts in the United Kingdom, but we do not know if

these are representative of HCMs provided by industrialized countries in general or specific to the United Kingdom.

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Data appendix

United Kingdom FDI: Net book value of FDI by United Kingdom enterprises, converted into the United States dollar for 66 countries, Business Monitor MA4 (and data obtained directly from the United Kingdom ONS). Variables are deflated by home GDP deflator from the World Development Indicators, and are in natural logarithm form. Profits net of taxes also from MA4.

GDP_USD	Gross Domestic Product in host countries, constant United States dollars, WDI
PHONES	telephone landlines, # per 1,000 population, WDI
AID	Aid related data taken from the OECD CRS database on www.oecd.org
ECGD	Investment exposure by ECGD from annual report in 1996–1998, 2000
CDC	From DFID statistics and annual CDC reports
RTA	0/1 dummy which denotes a measure of whether a country is party to one of the 7 main regions analysed in te Velde and Bezemer (2006).

Data are available from the author upon request.

Appendix A. An econometric analysis of Home Country Measures

The presence of several observations on HCMs, including ECGD exposure over time (1996-2000), and across countries allows us to perform a simple econometric analysis. An econometric model controls for a number of explanatory variables. Our model is based on the approach in line with Pain (1997); Te Velde and Bezemer (2006) apply the methodology to UK FDI in developing countries. We augment a standard FDI model with an additional variable measuring HCMs. The theoretical overview in the paper suggests that there should be a separate and positive effect of HCMs which we try to measure by:

$$FDI_{ijt} = f(HOME_{ijt}, HOST_{ijt}, HCM_{ijt}, RTA_j) \quad (1)$$

where FDI is the real stock of FDI, *i* is the home country (here UK), *j* is the host country, *t* time. *HOME* country factors can include home country measures. *HOST* country factors include market size, infrastructure (measured by phone lines) and political stability. *RTA* denotes a measure of whether a country is party to one of the main regions analysed in detail in Te Velde and Bezemer (2006). *HCM* is a measure of an HCM.

Table A1 provides the results of regressions that pool United Kingdom FDI for 66 countries over 1996–2000 and use OLS estimation with robust t-statistics. This shows that amongst other variables, (the log of real) ECGD investment exposure is positively and significantly correlated with FDI. If FDI is 10% higher in one country, investment exposure is higher by 1.2%. However, when we use a dynamic error correction model with (lags of log of real) ECGD exposure explaining changes in United Kingdom FDI stocks (table A2), the effect becomes

insignificant. This supports the analysis in the text, suggesting that ECGD's impact on FDI is limited.

Table A1. Explaining United Kingdom FDI, 1996-2000

	Ln (FDI)
Ln (GDP_host)	0.61 (12.5)**
Phonelines per 1000 inhabitants	0.004 (5.0)**
Regional Integration Agreement	0.76 (5.8)**
Political Stability	-0.09 (-0.7)
Ln (ECGD)	0.12 (2.3)**
No of observations	213
R-squared	0.59
Robust standard errors	Yes
Estimation method	OLS

** denotes 5% significance level, t-statistics between parentheses.

Table A2. Dynamic specifications for United Kingdom FDI 1997–2000

	Δ Ln (UK FDI)
$Ln(UK\ FDI)_{-1}$	-0.19 (-4.4)**
$Ln(GDP\_host)_{-1}$	0.17 (3.6)**
$Regional\ Integration\ Agreement_{-1}$	0.21 (2.5)**
$Ln(ECGD)_{-1}$	0.06 (1.4)
$Political\ Risk_{-1}$	-0.00 (-0.0)
ΔLn (GDP_host)	1.32 (0.6)**
No of observations	141
R-squared	0.18
Robust standard errors	Yes
Estimation method	OLS

** denotes 5% significance level, t-statistics between parentheses.

World Investment Report 2007
Transnational Corporations, Extractive Industries and Development

OVERVIEW

WIDESPREAD GROWTH IN FDI

Global FDI flows approach their 2000 peak level …

For the third consecutive year, global FDI inflows rose in 2006 – by 38% – to reach $1,306 billion. This was close to the record level of $1,411 billion reached in 2000, and reflects strong economic performance in many parts of the world. The growth of FDI in 2006 occurred in all three groups of economies: developed countries, developing countries and the transition economies of South-East Europe and the Commonwealth of Independent States (CIS).

The rise in global FDI flows was partly driven by increasing corporate profits worldwide and resulting higher stock prices that raised the value of cross-border mergers and acquisitions (M&As). M&As continued to account for a high share of FDI flows, but greenfield investment also increased, especially in developing and transition economies. As a result of higher corporate profits, reinvested earnings have become an important component of inward FDI: they accounted for an estimated 30% of total inflows worldwide in 2006 and for almost 50% in developing countries alone.

While FDI inflows in developed countries rose by 45% – well over the rate of the previous two years – to reach $857 billion, flows to developing countries and the transition economies attained their highest levels ever: $379 billion (a 21% increase over those in 2005) and $69 billion (a 68% increase) respectively (table 1). The United States regained its position as the leading host country, followed by the United Kingdom and France (figure 1). The largest inflows among developing economies went to China, Hong Kong (China) and Singapore, and among the transition economies to the Russian Federation.

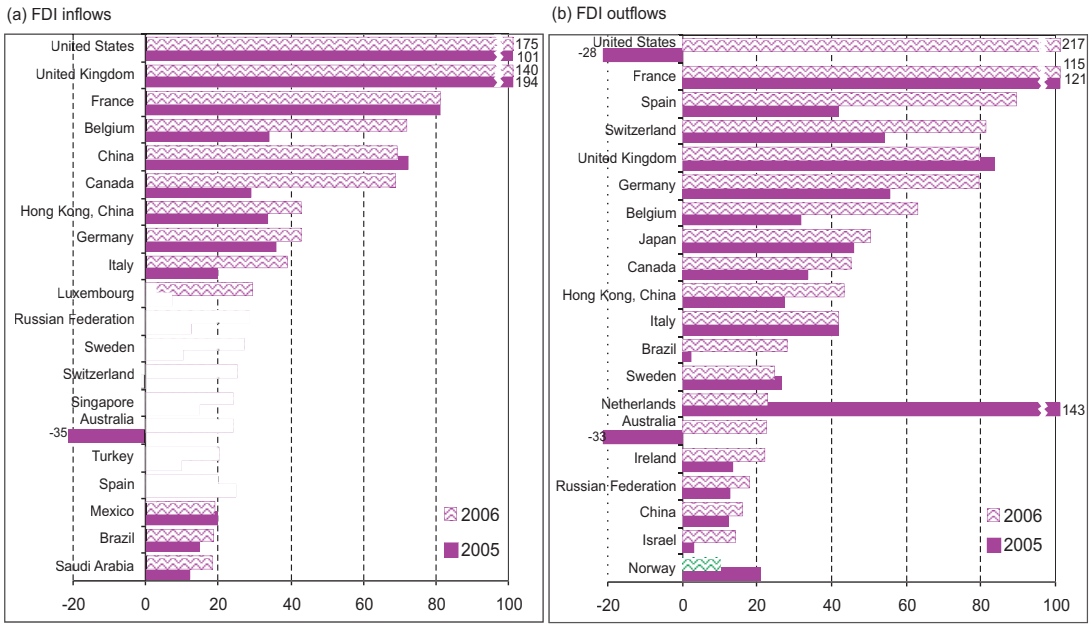
Developed-country TNCs remained the leading sources of FDI, accounting for 84% of global outflows. While there was a rebound of FDI from the United States, almost half of world outflows originated from European Union (EU) countries, notably France, Spain and the United Kingdom in that order. TNCs from developing and transition economies continued their international expansion in 2006, led by Hong Kong (China) in the former

Table 1. FDI flows, by selected region, 1995-2006
(Billions of dollars and per cent)

Region/economy	FDI inflows							FDI outflows						
	1995-2000 (Annual average)	2001	2002	2003	2004	2005	2006	1995-2000 (Annual average)	2001	2002	2003	2004	2005	2006
Developed economies	543.9	609.0	442.3	361.2	418.9	590.3	857.5	638.5	662.2	488.2	504.0	746.0	706.7	1 022.7
Europe	326.2	392.7	314.6	277.1	209.2	495.0	566.4	450.6	454.5	280.0	308.5	394.5	691.2	668.7
European Union	312.9	381.6	307.3	256.7	204.2	486.4	531.0	421.3	435.0	265.7	286.7	359.9	608.8	572.4
Japan	4.6	6.2	9.2	6.3	7.8	2.8	- 6.5	25.1	38.3	32.3	28.8	31.0	45.8	50.3
United States	169.7	159.5	74.5	53.1	135.8	101.0	175.4	125.9	124.9	134.9	129.4	258.0	- 27.7	216.6
Other developed countries	43.3	50.6	44.0	24.6	66.0	- 8.5	122.2	36.9	44.5	40.9	37.3	62.6	- 2.5	87.1
Developing economies	188.0	212.0	166.3	178.7	283.0	314.3	379.1	74.3	80.6	47.9	45.4	117.3	115.9	174.4
Africa	9.0	20.0	13.6	18.7	18.0	29.6	35.5	2.4	- 3.0	0.3	1.3	2.1	2.3	8.2
Latin America and the Caribbean	72.6	78.5	54.3	44.7	94.3	75.5	83.8	21.1	36.5	12.1	21.6	27.8	35.7	49.1
Asia and Oceania	106.3	113.6	98.4	115.3	170.7	209.1	259.8	50.8	47.1	35.4	22.4	87.5	77.8	117.1
Asia	105.8	113.5	98.3	115.0	170.0	208.7	259.4	50.8	47.1	35.4	22.4	87.5	77.7	117.1
West Asia	3.3	7.2	5.6	12.4	20.8	41.6	59.9	0.8	- 1.1	1.5	- 2.3	8.1	13.4	14.1
East Asia	70.7	79.1	67.7	72.7	106.3	116.3	125.8	39.6	26.1	27.6	17.4	62.9	49.8	74.1
China	41.8	46.9	52.7	53.5	60.6	72.4	69.5	2.0	6.9	2.5	2.9	5.5	12.3	16.1
South Asia	3.9	6.4	7.0	5.5	7.6	9.9	22.3	0.2	1.4	1.7	1.9	2.2	2.6	9.8
South-East Asia	27.9	20.7	18.0	24.5	35.2	41.1	51.5	10.2	20.7	4.7	5.3	14.2	11.9	19.1
Oceania	0.5	0.1	0.1	0.3	0.7	0.4	0.3	0.0	0.0	0.0	0.0	0.1	0.1	0.0
South-East Europe and CIS	8.8	11.5	13.4	24.2	40.3	41.2	69.3	2.0	2.7	4.7	10.7	14.0	14.6	18.7
South-East Europe	2.7	4.3	4.3	8.4	13.4	15.1	26.3	0.1	0.1	0.6	0.2	0.2	0.6	0.6
CIS	6.1	7.3	9.1	15.8	26.9	26.0	42.9	1.9	2.5	4.1	10.6	13.8	14.0	18.1
World	740.7	832.6	622.0	564.1	742.1	945.8	1 305.9	714.8	745.5	540.7	560.1	877.3	837.2	1 215.8
Memorandum: percentage share in world FDI flows														
Developed economies	73.4	73.2	71.1	64.0	56.4	62.4	65.7	89.3	88.8	90.3	90.0	85.0	84.4	84.1
Developing economies	25.4	25.5	26.7	31.7	38.1	33.2	29.0	10.4	10.8	8.9	8.1	13.4	13.8	14.3
South-East Europe and CIS	1.2	1.4	2.2	4.3	5.4	4.4	5.3	0.3	0.4	0.9	1.9	1.6	1.7	1.5

Source: UNCTAD, *World Investment Report 2007: Transnational Corporations, Extractive Industries and Development*, annex table B.1 and FDI/TNC database (www.unctad.org/fdistatistics).

Figure 1. Global FDI flows, top 20 economies, 2005, 2006[a]
(Billions of dollars)



Source: UNCTAD, *World Investment Report 2007: Transnational Corporations, Extractive Industries and Development*, annex table B.1 and FDI/TNC database (www.unctad.org/fdistatistics).

[a] Ranked by the magnitude of 2006 FDI flows.

group of economies and the Russian Federation in the latter. Total FDI outflows from these groups of economies reached $193 billion, or 16% of world FDI outflows.

... driven by cross-border M&As with the increasing involvement of private equity funds …

Increased cross-border M&A activity supports the current rise in global FDI. Such transactions rose significantly in 2006, both in value (by 23%, to reach $880 billion) and in number (by 14% to 6,974), approaching the previous M&A peak in 2000. This growth was driven by higher stock market valuations, rising corporate profits and favourable financing conditions. In contrast with the M&A boom of the late 1990s, this time transactions have been predominantly financed by cash and debt, rather than through an exchange of shares. As many as 172 mega deals (i.e. deals worth over $1 billion) were recorded in 2006, accounting for about two thirds of the total value of cross-border M&As.

These transactions were widely spread across regions and sectors. In North America, due to several deals in the mining industry, cross-border M&As almost doubled. In Europe, the United Kingdom was the main target country, while Spanish companies were very active

as acquirers. Cross-border acquisitions by Spanish companies (e.g. Telefónica and Ferrovial) were valued at $78 billion, a record level for that country. Companies from developing and transition economies have also been increasingly engaged in such transactions, the largest in 2006 being the $17 billion acquisition of Inco (Canada) by CVRD of Brazil.

Another noticeable trend in global M&A activity has been the growing importance of private equity funds and other collective investment funds. In 2006, they were involved in cross-border M&As valued at $158 billion, an 18% increase over 2005. A growing appetite for higher yields and ample liquidity in world financial markets helped fuel these acquisitions. Private equity firms are increasingly acquiring large listed companies, in contrast to their former strategy of investing in high-yield, high-risk assets, and they are likely to continue to play a prominent role in M&A transactions. However, this scale of activity may not be sustainable due to a number of factors: competition is intensifying and the asset prices involved in recent acquisitions have increased substantially; there is also a possibility that the favourable fiscal treatment such firms enjoy in some countries may not last. Investments by private equity firms are often more akin to portfolio investment than to FDI, in that they tend to have relatively short time horizons. This has raised some concerns regarding the impact of such investments, in particular as regards the dismantling of the acquired companies and worker layoffs. As cross-border M&As by private equity firms are a relatively recent phenomenon, more research is needed to better understand their impact.

… and resulting in further growth of international production.

The production of goods and services by TNCs outside their home countries grew more rapidly in 2006 than in the previous year. The sales, value added and exports of some 78,000 TNCs and their 780,000 foreign affiliates are estimated to have increased by 18%, 16% and 12% respectively (table 2). They accounted for the equivalent of 10% of world GDP and one third of world exports. China continued to host the largest number of foreign affiliates in the world, while the growth rate of the number of TNCs from developing countries and transition economies over the past 15 years has exceeded that of TNCs from developed countries.

Employment in foreign affiliates of TNCs has increased nearly threefold since 1990, although at a slower pace than FDI stock. Foreign

Table 2. Selected indicators of FDI and international production, 1982-2006

(Billions of dollars and per cent)

Item	Value at current prices (Billions of dollars)				Annual growth rate (Per cent)						
	1982	1990	2005	2006	1986-1990	1991-1995	1996-2000	2003	2004	2005	2006
FDI inflows	59	202	946	1 306	21.7	22.0	40.0	-9.3	31.6	27.4	38.1
FDI outflows	28	230	837	1 216	24.6	17.3	36.4	3.6	56.6	-4.6	45.2
Inward FDI stock	637	1 779	10 048	11 999	16.9	9.4	17.4	20.6	16.9	5.0	19.4
Outward FDI stock	627	1 815	10 579	12 474	17.7	10.6	17.3	18.1	15.6	4.2	17.9
Income on inward FDI	47	76	759	881	10.4	29.2	16.3	37.5	33.2	28.9	16.0
Income on outward FDI	46	120	845	972	18.7	17.4	11.8	38.0	38.4	24.7	15.1
Cross-border M&As [a]	..	151	716	880	25.9[b]	24.0	51.5	-19.7	28.2	88.2	22.9
Sales of foreign affiliates	2 741	6 126	21 394	25 177	19.3	8.8	8.4	26.6	15.0	3.0[c]	17.7[c]
Gross product of foreign affiliates	676	1 501	4 184	4 862	17.0	6.7	7.3	21.1	15.9	6.3[d]	16.2[d]
Total assets of foreign affiliates	2 206	6 036	42 637	51 187	17.7	13.7	19.3	26.0	-1.0	9.3[e]	20.1[e]
Exports of foreign affiliates	688	1 523	4 197	4 707	21.7	8.5	3.3	16.1[f]	20.5[f]	10.7[f]	12.2[f]
Employment of foreign affiliates (in thousands)	21 524	25 103	63 770	72 627	5.3	5.5	11.5	5.7	3.7	16.3[g]	13.9[g]
Memorandum											
GDP (in current prices)	12 002	22 060	44 486	48 293[h]	9.4	5.9	1.3	12.3	12.4	7.7	8.6
Gross fixed capital formation	2 611	5 083	9 115	10 307	11.5	5.5	1.0	12.6	15.5	4.8	13.1
Royalties and licence fee receipts	9	29	123	132	21.1	14.6	8.1	12.4	19.2	9.6	7.2
Exports of goods and non-factor services	2 124	4 329	12 588	14 120	13.9	8.4	3.7	16.1	20.5	10.7	12.2

Source: UNCTAD, *World Investment Report 2007: Transnational Corporations, Extractive Industries and Development*, table I.4.

[a] Data are available only from 1987 onwards.

[b] 1987-1990 only.

[c] Data are based on the following regression result: sales against inward FDI stock (in $ million) for the period 1980-2004: sales=1,853+1.945* inward FDI stock.

[d] Data are based on the following regression result: gross product against inward FDI stock (in $ million) for the period 1982-2004: gross product=679+0.349* inward FDI stock.

[e] Data are based on the following regression result: assets against inward FDI stock (in $ million) for the period 1980-2004: assets= -1,523+4.395* inward FDI stock.

[f] For 1995-1997, data are based on the regression result: exports of foreign affiliates against inward FDI stock (in $ million) for the period 1982-1994: exports=285+0.628*inward FDI stock. For 1998-2006, the share of exports of foreign affiliates in world exports in 1998 (33.3%) was applied to obtain the values.

[g] Based on the following regression result: employment (in thousands) against inward FDI stock (in $ million) for the period 1980-2004: employment=18,021+4.55* inward FDI stock.

[h] Based on data from the IMF, *World Economic Outlook*, April 2007.

affiliates in China had the largest number of employees: 24 million as estimated by the country's Ministry of Commerce. Between 2001 and 2004, employment in foreign affiliates in the United States shrank to 5.1 million, representing a reduction of half a million. In comparison, reflecting the fact that United States firms are by far the largest direct investors abroad, their foreign affiliates created the largest number of jobs (9 million) among foreign-affiliates of all home countries**.** The employment impact of FDI in host economies varied by region, but for a given amount of inward FDI more jobs were created in developing and transition economies than in developed countries.

As in previous years, services accounted for the bulk of world inward FDI stock in 2005 – nearly two thirds – compared with 49% in 1990. Within services, the share of infrastructure-related industries rose in both absolute and relative terms. Manufacturing was the second largest sector, but its share declined from 41% in 1990 to 30% in 2005, while the share of the primary sector was less than 10% of world inward FDI stock. The share of extractive industries in total FDI increased somewhat between 2000 and 2005, having been on the decline since the Second World War. This rebound was fuelled by new investments in mineral exploration and extraction, as well as by a number of large cross-border M&As (see Part Two).

TNCs from emerging economies continue to expand overseas.

While the universe of TNCs is dominated by developed-country firms, the picture is changing. The number of firms from developing economies in the list of the world's 100 largest non-financial TNCs increased from five in 2004 to seven in 2005 (the most recent year for which data are available), in line with the rise of TNCs from the South. Rankings in the list of the world's top 100 TNCs have remained relatively stable, with General Electric, Vodafone and General Motors having the largest foreign assets (see table 3, which lists the top 25 non-financial TNCs). Although the foreign assets of the top 100 TNCs have remained virtually unchanged since 2004, their foreign sales and employment increased by about 10%.

Large TNCs from emerging economies are internationalizing particularly fast. In 2005, the foreign sales and foreign employment of the top 100 TNCs from developing economies increased by 48% and 73% respectively. However, these TNCs are still significantly less transnational in their reach than the world's top 100, with a presence in fewer countries abroad.

Table 3. The world's top 25 non-financial TNCs, ranked by foreign assets, 2005
(Millions of dollars and number of employees)

Ranking by:						Assets		Sales		Employment			No. of affiliates		
Foreign assets	TNI [a]	II [b]	Corporation	Home economy	Industry	Foreign	Total	Foreign	Total	Foreign	Total	TNI [a] (Per cent)	Foreign	Total	II [b]
1	70	42	General Electric	United States	Electrical & electronic equipment	412 692	673 342	59 815	149 702	155 000	316 000	50.1	1184	1527	77.5
2	8	94	Vodafone Group PLC	United Kingdom	Telecommunications	196 396	220 499	39 497	52 428	51 052	61 672	82.4	77	210	36.7
3	85	72	General Motors	United States	Motor vehicles	175 254	476 078	65 288	192 604	194 000	335 000	42.9	91	158	57.6
4	16	61	British Petroleum Company PLC	United Kingdom	Petroleum expl./ref./distr.	161 174	206 914	200 293	253 621	78 100	96 200	79.4	417	602	69.3
5	29	80	Royal Dutch/Shell Group	United Kingdom, Netherlands	Petroleum expl./ref./distr.	151 324	219 516	184 047	306 731	92 000	109 000	71.1	507	964	52.6
6	38	43	ExxonMobil	United States	Petroleum expl./ref./distr.	143 860	208 335	248 402	358 955	52 920	84 000	67.1	256	331	77.3
7	64	95	Toyota Motor Corporation	Japan	Motor vehicles	131 676	244 391	117 721	186 177	107 763	285 977	51.6	141	391	36.1
8	79	56	Ford Motor	United States	Motor vehicles	119 131	269 476	80 325	177 089	160 000	300 000	47.6	201	285	70.5
9	27	55	Total	France	Petroleum expl./ref./distr.	108 098	125 717	132 960	178 300	64 126	112 877	72.5	401	567	70.7
10	94	36	Eléctricité de France	France	Electricity, gas and water	91 478	202 431	26 060	63 578	17 801	161 560	32.4	218	276	79.0
11	73	51	France Télécom	France	Telecommunications	87 186	129 514	25 634	61 071	82 034	203 008	49.9	175	243	72.0
12	51	54	Volkswagen	Germany	Motor vehicles	82 579	157 621	85 896	118 646	165 849	345 214	57.6	199	279	71.3
13	63	74	RWE Group	Germany	Electricity, gas and water	82 569	128 060	23 390	52 081	42 349	85 928	52.9	248	432	57.4
14	53	88	Chevron Corp.	United States	Petroleum expl./ref./distr.	81 225	125 833	99 970	193 641	32 000	59 000	56.8	106	234	45.3
15	77	73	E.ON	Germany	Electricity, gas and water	80 941	149 900	29 148	83 177	45 820	79 947	48.8	367	639	57.4
16	24	52	Suez	France	Electricity, gas and water	78 400	95 085	39 565	51 670	96 741	157 639	73.5	440	613	71.8
17	87	59	Deutsche Telekom AG	Germany	Telecommunications	78 378	151 461	31 659	74 230	75 820	243 695	41.8	266	382	69.6
18	40	47	Siemens AG	Germany	Electrical & electronic equipment	66 854	103 754	64 447	96 002	296 000	461 000	65.3	877	1177	74.5
19	12	70	Honda Motor Company Limited	Japan	Motor vehicles	66 682	89 923	69 791	87 686	126 122	144 785	80.3	141	243	58.0
20	11	17	Hutchison Whampoa	Hong Kong, China	Diversified	61 607	77 018	24 721	31 101	165 590	200 000	80.8	75	83	90.4
21	67	38	Procter & Gamble	United States	Diversified	60 251	135 695	38 760	68 222	69 835	138 000	50.6	269	345	78.0
22	47	37	Sanofi-Aventis	France	Pharmaceuticals	58 999	102 638	18 901	34 013	69 186	97 181	61.4	142	181	78.5
23	89	77	ConocoPhillips	United States	Petroleum expl./ref./distr.	55 906	106 999	48 568	179 442	15 931	35 591	41.4	68	125	54.4
24	60	32	BMW AG	Germany	Motor vehicles	55 308	88 316	44 404	58 105	25 924	105 798	54.5	142	175	81.1
25	49	96	Nissan Motor Company Limited	Japan	Motor vehicles	53 747	97 661	59 771	83 440	89 336	183 356	58.5	54	172	31.4

Source: UNCTAD, *World Investment Report 2007: Transnational Corporations, Extractive Industries and Development*, annex table A.I.13.

[a] TNI, the Transnationlity Index, is calculated as the average of the following three ratios: foreign assets to total assets, foreign sales to total sales and foreign employment to total employment. Ranking is based on the top 100 TNCs.

[b] II, the "Internationalization Index", is calculated as the number of foreign affiliates divided by the number of all affiliates (Note: affiliates counted in this table refer to only majority-owned affiliates). Ranking is based on the top 100 TNCs.

Note: In some companies, foreign investors may hold a minority share of more than 10 per cent.

Table 4. The top 25 non-financial TNCs from developing countries, ranked by foreign assets, 2005
(Millions of dollars and number of employees)

Ranking by:						Assets		Sales		Employment			No. of affiliates		
Foreign assets	TNI [a]	II [b]	Corporation	Home economy	Industry	Foreign	Total	Foreign	Total	Foreign	Total	TNI [a] (Per cent)	Foreign	Total	II [b]
1	19	12	Hutchison Whampoa Limited	Hong Kong, China	Diversified	61 607	77 018	24 721	31 101	165 590	200 000	80.8	75	83	90.4
2	83	33	Petronas - Petroliam Nasional Bhd	Malaysia	Petroleum expl./ref./distr.	26 350	73 203	12 995	44 353	4 016	33 944	25.7	167	234	71.4
3	20	3	Cemex S.A.	Mexico	Non-metalic mineral products	21 793	26 439	12 088	14 961	39 630	52 674	79.5	535	554	96.6
4	30	4	Singtel Ltd.	Singapore	Telecommunications	18 000	20 748	5 556	7 906	8 832	19 500	67.4	99	104	95.2
5	52	17	Samsung Electronics Co., Ltd.	Republic of Korea	Electrical & electronic equipment	17 481	74 834	62 100	79 017	27 664	80 549	45.4	76	86	88.4
6	46	10	LG Corp.	Republic of Korea	Electrical & electronic equipment	16 609	50 611	38 419	60 805	40 689	79 000	49.2	42	46	91.3
7	28	18	Jardine Matheson Holdings Ltd	Hong Kong, China	Diversified	15 770	18 440	8 420	11 929	57 895	110 000	69.6	91	106	85.8
8	90	80	CITIC Group	China	Diversified	14 891	99 059	2 109	8 042	15 915	93 323	19.4	13	49	26.5
9	89	21	Hyundai Motor Company	Republic of Korea	Motor vehicles	13 015	64 688	18 676	58 156	5 038	54 115	20.5	20	24	83.3
10	59	67	Formosa Plastic Group	Taiwan Province of China	Chemicals	12 807	57 910	9 708	37 664	61 626	82 380	40.9	11	30	36.7
11	60	75	China Ocean Shipping (Group) Company	China	Transport and storage	10 657	18 105	8 463	15 227	4 230	69 549	40.2	40	134	29.9
12	84	62	Petróleos de Venezuela	Venezuela	Petroleum expl./ref./distr.	8 534	60 305	32 773	63 736	5 373	49 180	25.5	30	65	46.2
13	98	76	Petroleo Brasileiro S.A. - Petrobras	Brazil	Petroleum expl./ref./distr.	8 290	78 461	3 892	58 403	6 422	53 933	9.7	30	102	29.4
14	73	79	CLP Holdings	Hong Kong, China	Electricity, gas and water	6 039	13 145	1 299	4 977	1 758	6 059	33.7	3	11	27.3
15	37	51	Capitaland Limited	Singapore	Real estate	6 017	10 926	1 984	2 586	7 639	15 444	60.4	64	119	53.8
16	50	66	América Móvil	Mexico	Telecommunications	5 814	21 340	7 708	16 901	23 521	34 650	46.9	13	32	40.6
17	76	63	China State Construction Engineering Corporation	China	Construction	5 578	13 083	3 400	14 338	26 100	119 000	29.4	40	87	46.0
18	64	88	Companhia Vale do Rio Doce	Brazil	Mining & quarrying	5 545	22 569	11 662	15 113	2 937	38 828	36.4	6	41	14.6
19	94	96	Oil And Natural Gas Corporation	India	Petroleum and natural gas	5 459	20 641	1 626	16 798	4 122	34 722	16.0	2	37	5.4
20	42	26	Hon Hai Precision Industries	Taiwan Province of China	Electrical & electronic equipment	5 436	13 972	10 577	27 756	178 007	210 932	53.8	35	44	79.5
21	67	40	Sasol Limited	South Africa	Industrial chemicals	5 368	13 847	5 351	10 947	5 267	30 004	35.1	16	26	61.5
22	99	97	China National Petroleum Corporation	China	Petroleum expl./ref./distr.	5 287	143 767	6 505	85 959	22 000	1 167 129	4.4	5	98	5.1
23	87	50	Teléfonos de México S.A. de C.V.	Mexico	Telecommunications	5 025	23 195	3 553	15 119	15 277	75 484	21.8	29	52	55.8
24	34	11	Flextronics International Ltd.	Singapore	Electrical & electronic equipment	5 009	10 958	6 707	15 288	96 695	99 000	62.4	125	138	90.6
25	69	25	Kia Motors	Republic of Korea	Motor vehicles	4 984	15 851	8 353	20 329	10 296	32 745	34.7	13	16	81.3

Source: UNCTAD, *World Investment Report 2007: Transnational Corporations, Extractive Industries and Development*, annex table A.I.14.

[a] TNI is calculated as the average of the following three ratios: foreign assets to total assets, foreign sales to total sales and foreign employment to total employment. Ranking is based on the top 100 TNCs.

[b] II is calculated as the number of foreign affiliates divided by number of all affiliates (Note: Affiliates counted in this table refer to only majority-owned affiliates).Ranking is based on the top 100 TNCs.

Note: In some companies, foreign investors may hold a minority share of more than 10 per cent.

Asia dominates the list of the 100 largest developing-country TNCs (see table 4 for the top 25 non-financial developing-country TNCs), with 78 firms, followed by 11 each from Africa and Latin America. These TNCs operate in a broader range of industries than the largest TNCs from developed countries. As in previous years, the single most important industry in 2005 was electrical/electronic equipment, especially for a large number of companies from Asia.

The geographical pattern of FDI is changing, with greater South-South FDI flows.

The geographical pattern of FDI is showing signs of change, with new countries emerging as significant host and home economies. The rise of FDI from developing and transition economies and the growth of South-South FDI are important recent trends. Changes are taking place in the pattern of bilateral flows of FDI as well. In 2005, the largest bilateral outward FDI stock was that of the United Kingdom in the United States – at $282 billion (table 5); 20 years earlier, it was the reverse. Whereas bilateral links between selected economies, such

Table 5. FDI home-host partner economies ranked by inward FDI stock of host partner: top 20 pairs, 1985, 1995, 2005
(Billions of dollars)

Rank	Home economy	Host economy	1985	1995	2005
1	United Kingdom	United States	44	116	282
2	Hong Kong, China	China	..	120	242
3	United States	United Kingdom	48	85	234
4	Japan	United States	19	105	190
5	Germany	United States	15	46	184
6	United States	Canada	49	83	177
7	Netherlands	United States	37	65	171
8	China	Hong Kong, China	0.3	28	164
9	British Virgin Islands	Hong Kong, China	..	70	164
10	Canada	United States	17	46	144
11	France	United States	7	36	143
12	Switzerland	United States	11	27	122
13	Luxembourg	United States	0.3	6	117
14	Netherlands	Germany	5	34	111
15	Netherlands	France	10	31	102
16	United Kingdom	France	9	26	96
17	Netherlands	United Kingdom	17	27	93
18	Germany	United Kingdom	3	14	86
19	United States	Netherlands	8	25	84
20	France	United Kingdom	5	13	80

Source: UNCTAD, *World Investment Report 2007: Transnational Corporations, Extractive Industries and Development*, table I.9.

as those between the United States on the one hand and Canada, the Netherlands and the United Kingdom, on the other, dominated the global picture of bilateral FDI relationships in 1985, today, the situation is considerably more multifaceted, reflecting the involvement of many more countries in international production.

With strengthening relationships between countries within the same region, and the emergence of many developing countries as sizeable investor economies, geographical proximity is becoming increasingly important in bilateral FDI relations. For example, in the top 50 pairs of countries with the largest bilateral inward stock, 22 were from Europe in 2005, compared to 17 in 1995. FDI relationships between two economies can be further examined on the basis of the intensity of FDI, which compares the actual volume of bilateral FDI stocks with what would be "expected" on the basis of the share of each economy in global inward and outward FDI. Such a measure shows that the United States has a stronger-than-average FDI intensity with Canada, European countries with each other, and Japan with Asian countries. It also shows that South-South relationships have strengthened over the past decade, especially in the Asian region.

Most policy changes continue to favour FDI, though some restrictions have emerged in certain industries.

Governments continue to adopt measures to facilitate FDI. In 2006, 147 policy changes making host-country environments more favourable to FDI were observed (table 6). Most of them (74%) were introduced by developing countries. They included in particular measures aimed at lowering corporate income taxes (as in Egypt, Ghana and Singapore) and expanding promotional efforts (as in Brazil

Table 6. National regulatory changes, 1992-2006

Item	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Number of countries that introduced changes	43	56	49	63	66	76	60	65	70	71	72	82	103	93	93
Number of regulatory changes	77	100	110	112	114	150	145	139	150	207	246	242	270	205	184
More favorable to FDI	77	99	108	106	98	134	136	130	147	193	234	218	234	164	147
Less favorable to FDI	0	1	2	6	16	16	9	9	3	14	12	24	36	41	37

Source: UNCTAD, *World Investment Report 2007: Transnational Corporations, Extractive Industries and Development*, table I.8.

and India). Further liberalization of specific industries is under way in various countries, such as that relating to professional services (Italy), telecommunications (Botswana and Cape Verde), banking (the Lao People's Democratic Republic and Mali) and energy (Albania and Bulgaria).

In some industries, however, new restrictions on foreign ownership or measures to secure a greater government share in revenues were observed. Such steps were the most common in extractive industries and in industries deemed to be of "strategic" importance. For example, in Algeria, State-owned oil and gas enterprises must now hold a minimum of a 51% stake, and in Bolivia, by signing new contracts TNCs have returned ownership of petroleum reserves to the State oil company. In the Russian Federation, foreign investment is to be restricted in "strategic sectors" such as defence and extractive industries, with only minority stakes permitted in the latter. In Venezuela, nationalizations in the "strategic sectors" of energy and telecommunications are in progress.

The perception that these and other changes might trigger renewed protectionism has led to some concern. However, as in 2005, the trend appears to be confined to a relatively small number of countries, and to specific industries.

The number of international investment agreements (IIAs) has continued to grow, reaching a total of almost 5,500 at the end of 2006: 2,573 bilateral investment treaties, 2,651 double taxation treaties and 241 free trade agreements and economic cooperation arrangements containing investment provisions. The number of preferential trade agreements with investment provisions has almost doubled in the past five years. Developing countries are becoming increasingly important participants in international investment rule-making, partly reflecting growing South-South FDI.

FDI in Africa peaked, as its resources attracted increasing FDI.

At $36 billion in 2006, FDI inflows in Africa were twice their 2004 level. This was due to increased interest in natural resources, improved prospects for corporate profits and a more favourable business climate. The value of cross-border M&A sales reached a record $18 billion, half of which represented purchases by TNCs from developing Asia. Greenfield projects and investments in expansion also grew significantly. Despite this increase, Africa's share in global FDI fell to 2.7% in 2006, compared with 3.1% in 2005, much lower than that

of other developing regions. FDI outflows from Africa also reached a record $8 billion in 2006, up from $2 billion in 2005.

FDI inflows rose in 33 African countries and in all subregions except for Southern Africa. The top 10 host African countries received about 90% of such flows. In eight of them, inflows exceeded $1 billion each. Large cross-border M&As as well as greenfield investments and expansion projects played an important role in the top host countries, particularly Egypt and Nigeria. In Egypt, the leading recipient in the region, inflows exceeded $10 billion, 80% of which were in expansion and greenfield projects in non-oil activities. South Africa witnessed a major decline in inflows due to the sale of a foreign equity stake in a domestic gold-mining company to a local firm, but it generated most of the outflows from Africa. The search for new natural-resource reserves led to increased FDI to African least developed countries (LDCs), amounting to $8 billion, following two consecutive years of decline. As a result, the LDCs accounted for 23% of the FDI inflows to the region – a significant rise over 2005. Of these LDCs, Burundi, Cape Verde, Djibouti, Ethiopia, Gambia, Guinea-Bissau, Madagascar, Somalia and Sudan saw the largest increases in FDI inflows mainly directed at new oil exploration and mining activities.

In 2006, many African countries adopted measures to attract FDI as well as to improve the impact of FDI on their development. Prospects for FDI inflows into Africa remain positive due to persistently high global commodity prices, though some moderation is expected in 2007.

Inflows to South, East and South-East Asia reached $200 billion, and outflows soared …

FDI inflows to South, East and South-East Asia maintained their upward trend in 2006, rising by about 19% to reach a new high of $200 billion. At the subregional level, South and South-East Asia saw a sustained increase in flows, while their growth in East Asia was slower. However, FDI in the latter subregion is shifting towards more knowledge-intensive and high value-added activities.

China and Hong Kong (China) retained their positions as the largest FDI recipients in the region, followed by Singapore and India. Inflows to China fell in 2006 for the first time in seven years. The modest decline (by 4% to $69 billion) was due mainly to reduced investments in financial services. Hong Kong (China) attracted $43 billion in FDI, Singapore $24 billion (a new high), and India $17 billion (an amount

equivalent to the combined inflows to that country of the preceding three years).

FDI outflows from the region as a whole rose by 60% to $103 billion, with higher investments from all subregions and major economies. Outflows from Hong Kong (China), the largest source of FDI in the region, rose by 60% to $43 billion. China consolidated its position as a major investor, and India is rapidly catching up. Their emergence as important sources of FDI is challenging the dominance of the Asian newly industrializing economies (NIEs) in outward FDI from the region. Resource-seeking FDI from China and India continued to increase. In addition, the efforts of Chinese State-owned enterprises and of Indian privately owned conglomerates to acquire strategic assets abroad, as highlighted by the $11 billion acquisition by Tata Steel (India) of Corus Group (United Kingdom and the Netherlands), have led to greater FDI flows from these countries to developed economies.

Rapid economic growth in South, East and South-East Asia should continue to fuel growing market-seeking FDI to the region. The region will also become more attractive to efficiency-seeking FDI, as countries such as China, India, Indonesia and Viet Nam plan to significantly improve their infrastructure. During the first half of 2007, the value of cross-border M&A deals in the region increased by nearly 20% over the corresponding period of 2006. Increased FDI outflows from the region are also expected to continue.

… while FDI inflows into West Asia continued to climb to unprecedented heights.

In 2006, FDI inflows to the 14 economies of West Asia rose by 44%, to an unprecedented $60 billion. Privatization of various services progressed in 2006, and there was an improvement in the general business climate. The region's strong economic growth has encouraged investment, and high oil prices have been attracting increasing amounts of FDI in oil and gas and in related manufacturing industries.

A few mega cross-border M&As and the privatization of financial services made Turkey the largest recipient in West Asia, with inflows of $20 billion. Saudi Arabia was the second largest with $18 billion (an increase of 51% over its 2005 levels), followed by the United Arab Emirates, where the free zones attracted a significant share of its FDI inflows. Services remained the dominant sector for FDI in West Asia, a major proportion of which went to financial services as a result of privatization and liberalization policies of a number of countries in the

region. There were also several major deals in the telecommunications industries in Jordan and Turkey. Efforts by the Gulf countries to diversify their production activities beyond oil-related activities succeeded in attracting greater FDI flows into the manufacturing sector. During the first half of 2007, the value of cross-border M&A sales increased by nearly 3% over the corresponding period of 2006.

FDI outflows from West Asia rose by 5% to reach a new high of $14 billion in 2006, as a result of the high oil prices and the current-account surpluses of the oil-producing countries. Kuwait accounted for the lion's share (89%) of the region's total outward FDI, mainly in the telecommunications industry. The value of cross-border M&As by firms from the region totalled $32 billion, 67% of which involved firms from the United Arab Emirates, the second largest investor from West Asia.

In 2006, FDI inflows to Oceania amounted to $339 million, a decline of 11%, and they remained concentrated in the mining industry. Investments also went to onshore fish-processing activities in Papua New Guinea and the Marshall Islands, and to the tourism industry in some economies such as Fiji and Vanuatu.

Greenfield investments and reinvested earnings boosted FDI in Latin America and the Caribbean, and outflows hit new records.

FDI flows to Latin America and the Caribbean increased by 11%, to $84 billion. If the offshore financial centres are excluded, however, they reached $70 billion in 2006, which was the same level as in 2005. This is in sharp contrast to the soaring FDI outflows, which jumped by 125% to $43 billion (or $49 billion if offshore financial centres are included). Brazil and Mexico remained the leading recipients (with $19 billion each), followed by Chile, the British Virgin Island and Colombia. The stagnation of FDI inflows in the region (excluding the offshore financial centres) hides disparities among different countries: in South America, most of the countries registered strongly positive growth in FDI flows, but this was offset by a significant decline in Colombia and Venezuela. Two features characterized the region's FDI inflows: greenfield investments became more important than cross-border

M&As, and reinvested earnings became an increasingly important component (the largest component in South America alone).

Manufacturing again received the largest share of inflows, and the services sector's share increased slightly. In services, TNCs continued to withdraw from public utilities, mainly from the electricity industry. The primary sector remained attractive due to persistently high commodity prices.

FDI outflows were mainly targeted at extractive industries, followed by resource-based manufacturing and telecommunications. Brazil's outward FDI was the largest in the region, at $28 billion – its highest level ever – exceeding for the first time its inward FDI. This was mainly due to the above-mentioned purchase of Inco (Canadian nickel producers) by the mining company CVRD, the largest transaction ever by a developing-country company. Companies from other countries, especially those from Argentina, Chile, Mexico and Venezuela, are also increasingly seeking to internationalize through FDI.

The trend towards greater State intervention continued in 2006, but unlike the previous year when this occurred mainly in the extractive industries, it extended to other industries such as telecommunications and electricity, in particular in Bolivia and Venezuela. In Venezuela, a deal was negotiated with Verizon, AES and CMS (all United States firms) whereby the three firms agreed to divest their assets to the Government, while the Government of Bolivia is planning to take over Empresa Nacional de Telecomunicaciones (Entel), controlled by Telecom Italia. By contrast, the Government of Colombia is proceeding with a programme of FDI promotion and downsizing of the public sector, including in the extractive industries.

FDI inflows into Latin America and the Caribbean, excluding the offshore financial centres, are expected to rise moderately in 2007, increasingly driven by greenfield investments rather than by cross-border M&As.

FDI flows to South-East Europe and the Commonwealth of Independent States increased for the sixth consecutive year …

FDI inflows into South-East Europe and the CIS grew by 68%, to $69 billion – a significant leap from the inflows of the two previous years. The top five recipient countries (the Russian Federation, Romania, Kazakhstan, Ukraine and Bulgaria in that order) accounted for 82% of

the total inflows. Those to the Russian Federation almost doubled to $28.7 billion, while those to Romania and Bulgaria grew significantly, in anticipation of their accession to the EU on 1 January 2007 and due to a series of privatization deals. FDI outflows from the region increased for the fifth consecutive year, to reach $18.7 billion. Virtually all of this outward FDI reflected the expansion abroad of Russian TNCs, especially some large resource-based firms seeking to become global players and some banks expanding into other CIS countries.

While the services sector was particularly buoyant because of increased cross-border M&As in the banking industry, the primary sector received higher inflows as a result of soaring demand for natural resources. In some natural-resource-based economies of the CIS, such as the Russian Federation, the State continued to increase its control in strategic industries. In countries of South-East Europe, FDI-related policies continue to be in line with their accession or aspirations to accede to the EU, and with their aim to step up the privatization of State-owned enterprises.

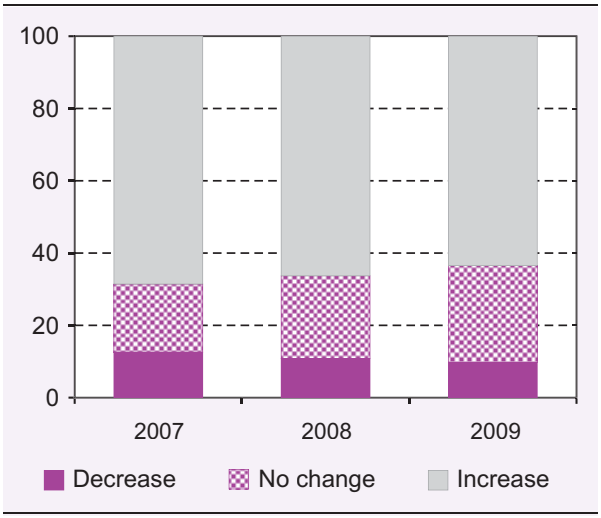
FDI inflows in the region are expected to be particularly buoyant in large economies such as the Russian Federation and Ukraine, as well as in the two new EU members (Bulgaria and Romania).

… while the surge in FDI to developed countries was widespread.

FDI inflows to developed countries surged to $857 billion – 45% higher than in the previous year – reflecting another rise in cross-border M&As. In contrast to the upward trend of the previous FDI cycle at the end of the past decade, the current increase was widespread, across all the developed regions. FDI inflows to the United States rebounded strongly to $175 billion in 2006, with record flows in the chemical industry, while a wave of cross-border M&As in the mining sector caused Canadian inflows to double, to a record of $69 billion. Inward FDI in the 25 EU countries grew by 9%, to reach $531 billion. Declines in FDI flows to Ireland, Spain and the United Kingdom were more than compensated for by increases in Belgium, Italy and Luxembourg, while inflows in the 10 new EU members amounted to $39 billion – their highest level so far. Due to some large sell-offs of foreign affiliates to Japanese companies, FDI inflows to Japan turned negative for the first time since 1989 (-$6.5 billion). The share of foreign investment from developing countries in the total value of cross-border M&A sales was 9% in 2006 compared to 7% 2005, largely as a result of several mega deals.

FDI outflows from developed countries also grew by 45%, to $1 trillion. The United States and five EU countries ranked among the 10 largest outward investor economies in the world. France remained the second largest investor worldwide for the second year in a row ($115 billion), while Spanish companies continued their outward expansion at a rapid pace to reach $90 billion, the largest ever recorded for Spain. FDI outflows from the Netherlands amounted to $23 billion, mainly due to the acquisition of Arcelor (Luxembourg) by Mittal Steel (a company registered in the Netherlands) – the largest deal of the year.

Figure 2. Prospects for global FDI flows in 2007-2009: UNCTAD survey responses
(Per cent of respondents)



Source: UNCTAD, *World Investment Report 2007: Transnational Corporations, Extractive Industries and Development*, figure I.21.

While continuous financial deregulation was the main reason for the significant increase in cross-border M&As in financial services, high commodity prices and consolidation efforts spurred such deals in the mining industry. Many developed countries adopted policies that could, directly or indirectly, increase their attractiveness for FDI,

although some protectionist sentiment remains or is again on the rise in certain developed countries.

The prospects for FDI in developed countries remain bright. Strong economic growth, albeit at a more moderate pace than in 2006, high corporate profits and the upward movement of equity prices are expected to further stimulate cross-border M&As; they had already increased by 66% during the first half of 2007 over the same period in 2006.

Overall, prospects for global FDI flows remain positive.

The upward trend in FDI is expected to continue in 2007 and beyond – albeit at a somewhat slower rate than in 2006. This would be in line with global economic growth, which should remain above its longer term trend, although it might slow down moderately. This forecast is confirmed by the rise in global cross-border M&As to $581 billion in the first half of 2007 – a 54% increase over the corresponding period of 2006 – and by the results of various surveys.

In UNCTAD's *World Investment Prospects Survey,* more than 63% of the responding TNCs expressed optimism that FDI flows would increase over the period 2007-2009 (figure 2). According to the survey, the most attractive FDI destination countries are China and India, while East, South and South-East Asia is considered the most attractive region. This is reinforced by several international organizations and research institutes, as well as by another survey conducted by UNCTAD/WAIPA, in which 76% of the responding CEOs of foreign affiliates expected to continue to increase investments in host economies over the next three years.

However, despite the generally positive prospects, several challenges and risks face the world economy, which may have implications for FDI flows in 2007 and 2008. These include global current-account imbalances causing exchange rate shifts, volatile oil prices, and a potential tightening of financial market conditions. Respondents in the UNCTAD survey also expressed some concerns regarding the possible rise of protectionism and of global threats such as terrorism and war. But they believed that the probability of these types of risks affecting the level of FDI in the short term was relatively low. Nevertheless, these considerations underline the need for caution in assessing future FDI prospects.

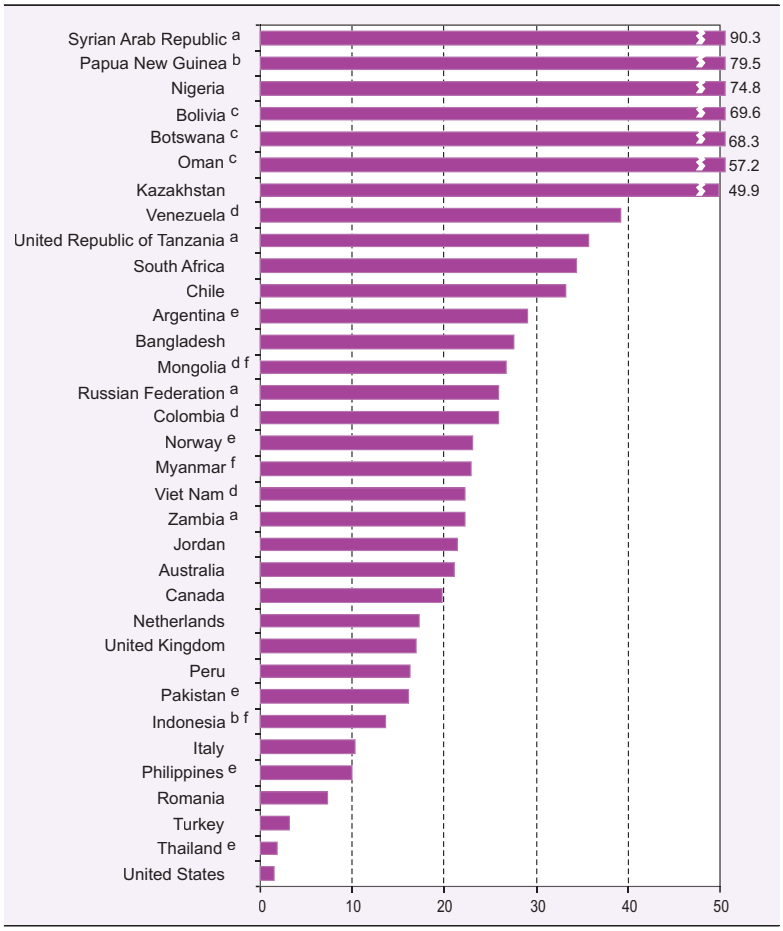
TRANSNATIONAL CORPORATIONS, EXTRACTIVE INDUSTRIES AND DEVELOPMENT

High prices of metals, oil and natural gas have led to increased activity of TNCs in extractive industries.

The involvement of TNCs in extractive industries has had a chequered history. In the early twentieth century, these industries accounted for the largest share of FDI, reflecting the international expansion of firms from the colonial powers. With a growing number of former colonies gaining independence after the Second World War, and the creation of the Organization of the Petroleum Exporting Countries (OPEC), the dominance of these TNCs declined, as did the share of extractive industries in global FDI. From the mid-1970s, in particular, the share of oil, gas and metal mining in world FDI fell steadily as other sectors grew much faster. However, as a result of rising mineral prices, the share of extractive industries in global FDI has recently increased, although it is still much lower than those of services and manufacturing. It is therefore an opportune time for the *WIR07* to revisit the role of TNCs in extractive industries and their impact on development.

Global mineral markets are characterized by an uneven geographical distribution of reserves, production and consumption. Some developing and transition economies are among the main producers and net exporters of various minerals, while developed countries and fast-growing emerging economies are the major consumers and importers. These imbalances sometimes create concerns among importing countries over the security of supply, and concerns among exporting countries over market access. The supply of minerals is essential for economic development: no modern economy can function without adequate, affordable and secure access to these raw materials. TNCs can be important for both host and home countries in this context. For countries that lack the necessary indigenous capabilities for transforming their natural resources into commercial goods, TNCs can bring the needed capital, knowledge and access to markets; for home countries, they can serve as vehicles for securing access to foreign supplies. Indeed, some of the world's largest TNCs are active in extractive industries, and a number of new ones have emerged in resource extraction in the past decade, not least from developing and transition economies. The overseas expansion of TNCs from the South is reflected in FDI data. Between 2000 and 2005, the aggregate share of developed countries in global FDI in extractive industries fell from 99% in 2000 to 95% in 2005.

Figure 3. Share of extractive industries in the inward FDI stock of selected economies, 2005
(Per cent)

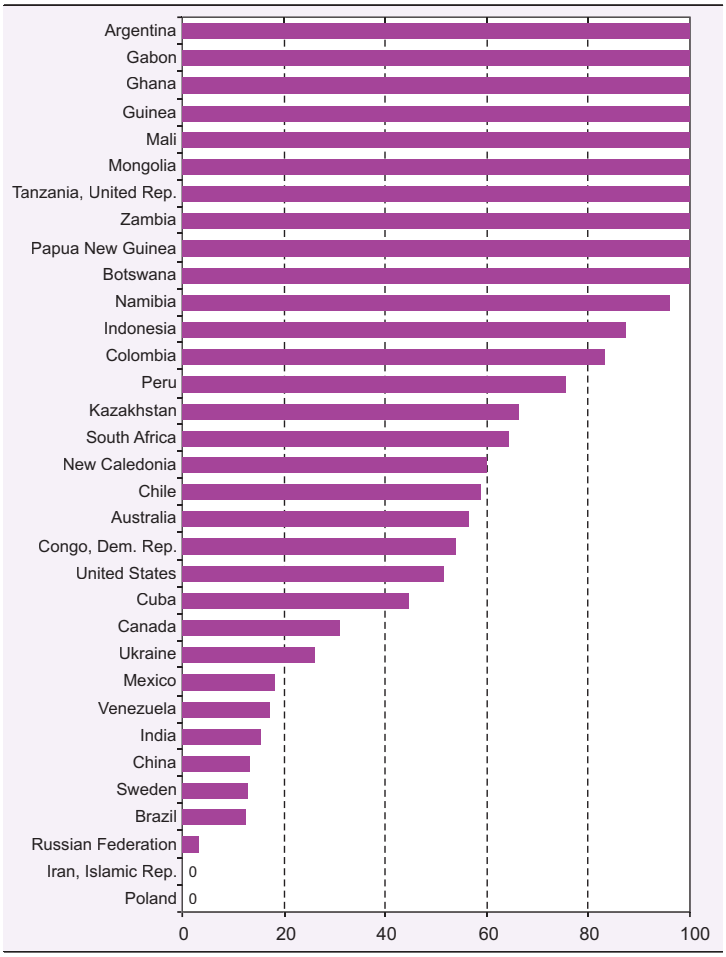


Source: UNCTAD, *World Investment Report 2007: Transnational Corporations, Extractive Industries and Development*, figure IV.3.

[a] 2001.
[b] 1997.
[c] 2003.
[d] 2002.
[e] 2004.
[f] On an approval basis.

Both government policies and TNCs' investment decisions are influenced by the volatility of mineral markets. The current price boom reflects in part a surge in demand for oil, gas and various metallic minerals, especially from some rapidly growing developing economies, notably China. Although by June 2007, prices of commodities such as aluminium, copper, gold and oil remained close to their highest levels in nominal terms, their future trends are difficult to forecast. However, experts agree that the costs of exploiting new mineral deposits are likely to rise, which might keep prices at relatively high levels in the coming years. The high prices have spurred an investment boom in mineral exploration and extraction. For example, global private investment

Figure 4. Foreign affiliates'[a] share in metal mining production[b] of selected host countries with notable deposits of minerals,[c] 2006



Source: UNCTAD, *World Investment Report 2007: Transnational Corporations, Extractive Industries and Development*, figure IV.4.

[a] The share of foreign affiliates includes all firms with foreign ownership of at least 10%.

[b] Measured by value of production.

[c] Including diamonds, and excluding artisanal mining.

in non-ferrous metal exploration rose from $2 billion in 2002 to an estimated $7 billion in 2006, and drilling for oil and gas doubled over the same period, pushing the rig utilization rate up to about 92%.

The relative importance of foreign affiliates in mineral production varies by economy and mineral…

Developed countries still attract the bulk of FDI in extractive industries, partly explained by significant cross-border M&A activity. However, their share in global inward FDI in these industries fell from about 90% in 1990 to 70% in 2005. The share of developing and transition economies as destinations for TNC investments in extractive industries has increased over the past two decades. Between 1990 and

Figure 5. Share of foreign companies in the oil and gas production[a] of selected major oil- and gas-producing economies, 2005
(Per cent)

Source: UNCTAD, *World Investment Report 2007: Transnational Corporations, Extractive Industries and Development*, figure IV.5.

[a] Measured by million barrels of oil equivalent.

Note: Oil and gas production by foreign companies includes extraction carried out by majority foreign-owned firms and attributed to them under PSAs, concessions, joint ventures, or other contractual forms. Foreign company participation through pure service contracts is not included. For each block or field of production worldwide, annual production has been split between the firms involved according to their net percentage share of the output.

2000, their estimated combined stock of inward FDI in those industries more than doubled, and between 2000 and 2005, it increased again by half. Following new mineral discoveries, a number of new FDI recipients have emerged, including LDCs such as Chad, Equatorial Guinea and Mali. During this period, the Russian Federation and other CIS members also became important destinations for FDI in extractive industries.

Table 7. The world's 10 largest metal mining and oil and gas companies, ranked by total production, 2005

Rank	Company name	Home country	State ownership (%)	Share in world production (%)	Number of host economies with production
		Metal mining			
1	BHP Billiton	Australia	-	4.8	7
3	Rio Tinto	United Kingdom	-	4.6	10
2	CVRD	Brazil	12	4.4	-
4	Anglo American	United Kingdom	-	4.3	9
5	Codelco	Chile	100	3.2	-
6	Norilsk Nickel	Russian Federation	-	2.2	1
7	Phelps Dodge	United States	-	2.0	2
8	Grupo México	Mexico	-	1.6	2
9	Newmont Mining	United States	-	1.3	7
10	Freeport McMoran	United States	-	1.3	1
	Top 10			29.7	
		Oil and gas			
1	Saudi Aramco	Saudi Arabia	100	8.8	-
2	Gazprom	Russian Federation	51	7.7	2
3	NIOC	Iran, Islamic Rep.	100	3.9	-
4	ExxonMobil	United States	-	3.7	23
5	Pemex	Mexico	100	3.5	-
6	BP	United Kingdom	-	3.3	19
7	Royal Dutch Shell	United Kingdom / Netherlands	-	3.2	25
8	CNPC	China	100	2.4	14
9	Total	France	-	2.1	27
10	Sonatrach	Algeria	100	1.9	1
	Top 10			40.5	

Source: UNCTAD, based on data from the Raw Materials Group and IHS.

The importance of extractive industries in inward FDI varies by host economy. In all the major country groups, the extractive industries of some countries account for a significant share of the total inward FDI stock: for example, Australia, Canada and Norway among developed countries; Botswana, Nigeria and South Africa in Africa; Bolivia, Chile, Ecuador and Venezuela in Latin America and the Caribbean; and Kazakhstan in South-East Europe and the CIS (figure 3). In a number of low-income, mineral-rich countries, extractive industries account for the bulk of inward FDI; many have few other industries that can attract significant FDI, due to their small domestic markets and weak production capabilities

The relative importance of foreign companies in the production of metallic minerals and diamonds varies considerably by country. Foreign affiliates account for virtually all of the (non-artisanal) production in LDCs such as Guinea, Mali, the United Republic of Tanzania and Zambia, as well as in Argentina, Botswana, Gabon,

Ghana, Mongolia, Namibia and Papua New Guinea (figure 4). In these countries, TNCs generally operate through concessions granted in the form of exploration and mining licences. In another 10 major metal-producing countries, foreign affiliates account for an estimated 50% to 86% of production. By contrast, in the Islamic Republic of Iran, Poland and the Russian Federation their share is negligible.

In *oil and gas*, foreign affiliates generally account for a lower share of production than in metal mining. In 2005, they were responsible for an estimated 22% of global oil and gas production, with the average share being higher in developed countries (36%) than in developing countries (19%) and transition economies (11%). However, there was wide variation among developing countries. In West Asia, foreign affiliates' output amounted to an average of only 3% of production, whereas the corresponding share in sub-Saharan Africa was 57% on average. Foreign companies accounted for more than half of production in Angola, Argentina, Equatorial Guinea, Indonesia, Sudan and the United Kingdom. On the other hand, no production was attributed to foreign affiliates in, for instance, Kuwait, Mexico and Saudi Arabia (figure 5).

… reflecting a diverse and changing universe of extractive-industry TNCs, with the dominance of privately owned firms in metal mining and of State-owned enterprises in oil and gas.

The relative importance of TNCs in the production of metallic minerals and of oil and gas varies considerably. In *metal mining*, 15 of the 25 leading companies in 2005, ranked by their share in the value of world production, were headquartered in developed countries (see table 7, which lists the top 10 TNCs). Eight others were from developing countries and the two remaining were from the Russian Federation. The top three were BHP Billiton (Australia), Rio Tinto (United Kingdom) and CVRD (Brazil). Three State-owned companies also featured on the list: Codelco (Chile), Alrosa (Russian Federation) and KGHM Polska Miedz (Poland). Following CVRD's acquisition of Inco (Canada), it was estimated to have become the largest metallic mineral producer in the world in 2006 – the first time that a Latin America-based company will have occupied that position. The level of internationalization of these leading companies varies greatly. In 2005, Rio Tinto had mining operations in the largest number (10) of host countries, followed by Anglo American, AngloGold Ashanti and Glencore International. In contrast, large producers like Codelco, CVRD and Debswana (Botswana) had no overseas mining production.

In *oil and gas*, private companies remain the largest corporations in terms of foreign assets. For example, 10 of them were included among the firms on UNCTAD's list of the world's top 100 TNCs (by foreign assets) in 2005. In terms of production, however, TNCs from developed countries no longer rank among the largest companies in the world. In 2005, the world's three largest oil and gas producers were all State-owned enterprises based in developing or transition economies: Saudi Aramco (Saudi Arabia), Gazprom (Russian Federation) and the National Iranian Oil Company. Saudi Aramco's annual production in 2005 was more than double that of the largest privately owned oil and gas producer, ExxonMobil (United States). More than half of the top 50 producers were majority State-owned, 23 had their headquarters in developing countries, 12 in South-East Europe and the CIS, and the remaining 15 in developed countries.

Although State-owned companies based in developing and transition economies control most of the global production of oil and gas, their degree of internationalization is still modest compared with that of the top privately owned oil TNCs. Indeed, none of the top three State-owned producers had significant foreign production in 2005, whereas foreign locations accounted for 70% of the production of the top three privately owned oil majors. However, some companies from developing and transition economies are expanding their overseas interests, and are fast becoming global players. The combined overseas production of CNOOC, CNPC, Sinopec (all China), Lukoil (Russian Federation), ONGC (India), Petrobras (Brazil) and Petronas (Malaysia) exceeded 528 million barrels of oil equivalent in 2005, up from only 22 million barrels 10 years earlier. China's CNPC, Sinopec and CNOOC, and India's Indian Oil Corporation and ONGC Videsh have invested large sums in oil and gas production deals around the world during the past two years. Both CNPC and Petronas are involved in oil and gas production in more than 10 foreign countries. A few State-owned oil TNCs from emerging economies have invested in host countries that developed-country TNCs are less likely to operate in, for a variety of reasons, including sanctions.

In metal mining, the top 10 companies account for a growing share of global production. Following a series of cross-border M&As, the 10 largest metal mining companies in 2006 controlled an estimated 33% of the total value of all non-energy minerals produced globally, compared with 26% in 1995. Concentration levels are even higher for individual metals. In the case of copper, for example, the top 10 companies accounted for 58% of world production in 2005. Conversely, in the oil and gas industry, the level of concentration has remained fairly

stable over the past decade, with the top 10 producers accounting for about 41% of world production.

Varying motives drive the overseas expansion of different TNCs.

The drivers and determinants of investments by extractive-industry TNCs differ between activities, industries and companies. *Natural-resource-seeking* motives dominate FDI and other forms of TNC involvement in upstream (exploration and extraction) activities. A TNC might seek resources to meet its own needs for its downstream refining or manufacturing activities, to sell the minerals directly in host, home or international markets, or to secure the strategic requirements of its home country (as formulated by the country's government) for energy or other minerals. The latter has been a major driver of the recent overseas expansion of State-owned TNCs from Asia, for instance.

Market-seeking motives figure mainly among the drivers of overseas downstream activities. For example, Russian TNCs in extractive industries have invested abroad to enhance control over distribution channels linked to those activities, and Saudi and Kuwaiti State-owned oil companies have partnered with the Chinese firm Sinopec in two separate refining and petrochemical ventures in China. *Efficiency-seeking* motives apply mainly to investments in the processing or early metal manufacturing stage, where TNCs seek to exploit differences in costs of production between countries. *Strategic asset-seeking* motives can be linked especially to the rise of cross-border M&As in various extractive industries and activities: companies may invest to acquire strategic assets in the form of know-how and technology from other companies or from specialized technology providers, or to speed up their rise to global status by accessing the resources, capabilities and markets of the acquired firms.

Access to financial resources is an advantage over domestic firms in host countries, enjoyed by both traditional and new TNCs. International experience with extractive projects may increase the ability of TNCs to borrow or raise funds through stock markets. Financial strength can also be linked to home-country institutional arrangements. State-owned TNCs from some emerging economies benefit from financial backing by their governments, which may enable them to assume greater risks when investing abroad and to pay more for access to mineral resources.

With some important exceptions, proprietary technology is of relatively limited importance as an ownership-specific advantage for

the internationalization of most extractive-industry firms. Technologies used in most metal mining operations and oil and gas extraction are well known today, and can be obtained in the open market. Important exceptions include technologically challenging projects, such as those related to deep offshore drilling, and production of liquefied natural gas and development of unconventional energy sources. However, expertise in managing long-term projects and the associated risks remains critical for successful overseas expansion. Access to markets and to transportation and distribution channels are other potentially important firm-specific advantages, at least in the case of oil and gas.

TNC participation in extractive industries can have significant impacts on host economies …

Mineral endowments provide opportunities for economic development and poverty alleviation in the countries where they are located. Indeed, some of today's developed countries as well as a number of developing countries have successfully leveraged their mineral resources for accelerating their development process. In other cases, however, the impact of extractive activities has been and remains disappointing.

For many mineral-exporting countries, the current commodity price boom has led to improved terms of trade. This applies in particular to many low-income countries, where revenues from mineral exploitation and exports represent a large share of their national income. But natural resource endowments do not translate automatically into development gains for a country, with or without TNC involvement in the extraction process. There are many underlying determinants of the performance of resource-rich countries that are related to the global forces of demand and supply and to policy failures rather than to TNC participation per se. Nevertheless, TNCs can influence the outcome. They may complement domestic investment and boost production by contributing capital, technology and management skills. Such a package of assets is generally needed the most in low-income countries that lack domestic capabilities. On the other hand, reliance on TNCs may also raise concerns associated with unequal bargaining strengths, ownership and control over non-renewable resources, rent-sharing, transfer pricing practices and various environmental and social costs.

Thus TNC involvement in extractive industries may have both positive and negative economic, environmental, social and political impacts on a host country. Considerable efforts to address these issues are necessary for harnessing the earnings from extractive industries to boost development.

… including various economic impacts …

The economic challenge for a host country is threefold: how to add value through extractive activities, how to capture that value locally, and how to make the best use of the revenues generated.

In terms of adding value, the benefits of TNC involvement vary by country. Developing countries that possess sufficient financial resources, engineering expertise and technically competent State-owned oil companies have successfully developed their own capabilities to exploit their natural resources. West Asia is a typical example, where much of the oil and gas extraction is undertaken with known technology and little participation by foreign companies. In many other countries that lack the finance and ability to manage capital-intensive, high-risk and sometimes technologically challenging projects, TNC participation has helped boost their output and exports of minerals.

While there are alternatives to TNCs for accessing funds, such sources may not be available to domestic enterprises in all countries. An advantage of involving TNCs in the financing of a mining project is that it does not generate foreign debt for host-country governments, and such financing comes with a bundle of other assets, such as technology and managerial expertise. For some extraction projects, access to technology and management know-how can indeed be a reason for countries to rely on TNCs. But TNC involvement comes at a price. TNCs may claim a significant share of the revenue generated and repatriate a certain proportion of their profits, thereby affecting the sharing of the value created.

TNC involvement also affects the second part of the economic challenge: capturing the value locally in the form of employment and wages, local procurement, and government revenue in the form of taxes, royalties or dividends. Large-scale mineral extraction generally offers limited employment opportunities, and hence has little impact on employment, at least at the macro level. This applies especially to projects involving TNCs, as these companies tend to use more capital-intensive technologies and processes than domestic enterprises. The scope for backward linkages is generally relatively small in extractive industries. In addition, foreign affiliates are more likely to use foreign suppliers of various inputs. In low-income countries, a lack of qualified suppliers and skills shortages can also reduce the scope for local sourcing as well as downstream processing. Thus the potentially most important direct contribution from mineral extraction is the rise in host-country income, much of which takes the form of government revenue.

The amount of net revenue and income generated for the host country from TNC operations in extractive industries depends both on the extent of the overall value created by their participation, and how that value is shared between the TNC on the one hand, and host-country factors of production and the government on the other. In general, the better the capabilities and competitive strengths of a country's domestic enterprises, the more choice that country has for project financing and implementation. In countries with limited domestic capabilities, relying on TNCs may well be the only viable option to transform dormant resources into commercial products.

The sharing of revenue from a project partly reflects the relative bargaining power of host governments vis-à-vis transnational firms, which influences the terms and conditions they can impose for the participation of the latter. The sharing of revenue is also influenced by TNC conduct, including their accounting practices, financial behaviour, the possible use of transfer pricing and the repatriation of a certain proportion of their profits. Various studies of fiscal regimes suggest that the government's take in revenues generated from oil and gas activities over the lifetime of a project vary between 25% and 90%, and in metal mining between 25% and 60%. However, empirical information on TNCs' tax payments on a country-specific basis is scarce, making enhanced transparency important.

There can also be various potential indirect economic impacts from TNC involvement. First, the entry of TNCs can constitute an important channel for knowledge and technology transfer to developing countries. However, the lack of educated and skilled human resources and of absorptive capacity in general can limit the positive effects on low-income countries of such knowledge transfers. Another potential indirect economic effect is linked to investments in infrastructure. TNC activities in extractive industries are often associated with the development of public utilities (such as electricity and water supplies) and with the building of the transportation infrastructure (roads, railways and ports) needed for extracting, transporting and exporting the minerals and fuels. If the new infrastructure is developed in populated areas, it is likely to provide greater benefits than if developed in more remote areas of a country.

The third part of the economic challenge is not directly linked to TNCs. Ultimately, the overall development impact of the revenue generated is determined by the way in which the revenues generated for the host country are managed, distributed and used by the government, and to what extent they support the development objectives and

needs of both current and future generations. By enabling or boosting production, TNCs may influence the overall economic performance of a host country in terms of its macroeconomic stability, growth and income distribution. Whereas most of these impacts relate to extractive activities in general, the income generated through TNC involvement can help overcome initial hindrances to economic growth (such as low levels of savings and investment) and give it a big push. At the same time, a booming extractive industry, with or without TNC participation, can also have distorting effects, commonly referred to as the "Dutch disease", especially if windfall gains are not managed carefully and in accordance with long-term development strategies. Thus, even if TNC participation contributes to economic growth, for it to generate substantial development gains the benefits obtained need to be wisely used and equitably distributed.

… as well as considerable environmental, social and political impacts.

Extractive activities, regardless of who undertakes them, involve environmental costs. TNCs can play both a negative and a positive role in this context. On the one hand, they may add to environmental degradation in a host country simply by participating in resource extraction where there would otherwise be none. On the other hand, they may reduce adverse environmental consequences by using more advanced technologies in production, and by applying and diffusing higher standards of environmental management than domestic companies, where the latter – including artisanal and small-scale mining – exist. However, the net environmental impact of TNC activities is determined to a significant extent by a host-country's environmental regulations and its institutional capacity to implement them. In recent years, there has been growing environmental awareness among large, established TNCs in both metal mining and oil and gas extraction. While accidents and bad practices undoubtedly still occur, their environmental practices have generally improved over the past decade or so, although these vary by company. For example, TNCs originating from home countries where environmental legislation is at a nascent stage may be relatively less well equipped to manage the environmental consequences of their overseas projects than those from countries with more advanced environmental legislation and standards.

More than in other industries, investment in extractive activities can also have far-reaching social and political consequences; the outcome depends largely on the specific host-country situation. Negative social and political impacts have been observed mainly in

mineral-rich poor countries with weak institutions. Problems are often associated with particular minerals, poor governance frameworks, and weak institutional capacities of host governments to formulate and implement laws and regulations.

Among various social concerns, health and safety in the extractive industries have consistently posed a challenge, particularly in artisanal mining in developing countries. However, problems also exist in some projects operated by major TNCs. Other concerns may arise from the relationship between TNCs and local communities, the influx of migrants to work in TNC-operated projects and related issues. Political problems may stem from disputes over the distribution of the resource revenues, corruption, and even armed conflict or war among different groups seeking to benefit from the revenues generated. TNC participation can introduce higher standards in dealing with various social issues, but it can also add to problems. By their mere presence,

Table 8. Main forms of TNC contracts in the oil and gas industry of selected developing and transition host economies, June 2007

(Number of contracts and percentage share)

	Distribution of foreign TNCs' contracts by main type																							
	Production sharing				Service contract				Concession/joint venture				Other and unspecified				Total				size of contract area			
Host economy	number			%	number			%	number			%	number			%	number			%	(km²)			
Algeria	5			29.22	47			3.6	66			06.0	19			0.9	01			0.001	753			2
Angola	1			21.91	-			-	9			89.08	-			-	01			0.001	04			6
Brazil				-	-			-	98			10.001	-			-	98			0.001	38			2
China	4			74.79	-			-				-	26			2.6	67			0.001	379			2
Equatorial Guinea	0			20.001	-			-				-	-			-	02			0.001	333			1
Indonesia	5	5		10.001	-			-				-	-			-	55			0.001	209			2
Iran, Islamic Republic				-	-6			10.08				-	40			0.02	02			0.001	575			3
Iraq				75.78	15			2.1				-	-			-	08			0.001	52			6
Kazakhstan				97.9	-			-	4			83.09	-			-	39			0.001	855			1
Kuwait				-	-			30.001				-	-			-	03			0.001	02			1
Libyan Arab Jamahiriya	7	0		15.08	-			-	6			25.91	-			-	33			0.001	794			4
Nigeria	1			83.85	-			-	7			50.14	17			0.3	93			0.001	97			5
Qatar	6			20.001	-			-				-	-			-	62			0.001	338			
Russian Federation				51.1	-			-	07			49.89	-			-	57			0.001	343			
Saudi Arabia				-	-			-				-	30.001				03			0.001	650			57
Sudan	4			18.77	-			-				42.22	-			-	81			0.001	077			05
United Arab Emirates				-	-			-				-	-2			10.001	21			0.001	57			3
Uzbekistan	4			18.34	-			-				-	-8			13.65	23			0.001	265			3
Venezuela	9			10.83	-			-	0			20.040	10			0.02	05			0.001	79			5
Viet Nam				10.001	-			-				-	-			-	10			0.001	45			5
Total	87			56.434	24			1.5	500			11.061	51			3.5	276			0.001	760			2
Total excluding OCS	46			51.151	29			1.5	154			9.041	56			4.5	401			0.001	258			2

Source: UNCTAD, *World Investment Report 2007: Transnational Corporations, Extractive Industries and Development*, table IV.3.

they may – directly, indirectly, or unwittingly – support or strengthen the existing order. When mineral deposits are known to exist in weakly governed or authoritarian States, companies need to consider carefully whether or not to operate in those locations.

Governance systems are important for maximizing development gains from resource extraction …

The quality of government policies and institutions is a determining factor for ensuring sustainable development gains from resource extraction, with or without TNC involvement. The management of a mineral-based economy is complex, and requires a well-developed governance system and well-considered national development objectives. In some mineral-rich developing countries, however, government policy-making may be aimed at short-term gains rather than long-term development objectives. Furthermore, the distribution and use of a host country's share of mineral revenues may be determined with little attention to development considerations. In some cases, easy access to revenues from mineral resources can make governments less accountable to their populations, and more inclined to preserve and extend the interests of a small governing elite.

These factors underline the importance of developing a legal system based on the rule of law, as well as an institutional environment in which companies have incentives to invest in productive activities. The quality of the physical infrastructure, education and health care also influences investment decisions. Moreover, proactive policies aimed at using government revenues from extractive industries to achieve development goals are essential for ensuring social cohesion; indeed, large increases in revenues can cause social disruptions and political instability if they are not channelled and managed carefully. Beyond the overall framework, appropriate sectoral institutions and policies are needed, including a legal and administrative framework for the exploration and exploitation of minerals, for health and safety, and for the protection of the environment and the rights of local communities.

In this policy-making process, all relevant stakeholders – governments, civil society, affected communities, indigenous peoples' organizations, labour unions, industry and international organizations – must be given a chance to participate in order to avoid inequitable outcomes. Allocating an acceptable share of the revenues to provincial and other lower levels of government can be a way to mitigate social conflicts in the local areas most directly affected by extractive activities. However, this also requires adequate governance systems and capabilities at the local-government level.

… as are the regulations and contractual forms relating to TNC entry and operations.

The way foreign involvement in extractive industries is governed has changed over time and still varies considerably by country. Approaches range from total prohibition of foreign investment in resource extraction (as in the case of oil in Mexico and Saudi Arabia) to almost complete reliance on TNCs (as in the case of metal mining in Ghana and Mali, or oil and gas extraction in Argentina and Peru). Various national laws, regulations and contracts govern TNC involvement. In addition, many countries have entered into international investment agreements (IIAs) of relevance to the operations and impacts of extractive-industry TNCs.

In the oil and gas industry, TNCs operate under contractual arrangements of various kinds, such as concessions, joint ventures, production-sharing agreements (PSAs) and service contracts (table 8). Overall, as of June 2007, PSAs were the most commonly used form, accounting for more than 50% of all contracts with foreign TNC participation in the main oil- and gas-producing developing economies. They were the main contractual form in countries such as China, Equatorial Guinea, Indonesia, Iraq, the Libyan Arab Jamahiriya, Qatar, Sudan and Viet Nam. Concessions and joint ventures are the next most commonly used contractual forms, and the dominant ones in Algeria, Angola, Brazil, Kazakhstan, the Russian Federation and Venezuela. Service contracts are less common but are important, for example, in the Islamic Republic of Iran and Kuwait.

The effect of a given contract depends on how its contents have been negotiated between the host State and the investor. Royalty and taxation rates are often contractually determined, as are issues related to local content, training, host-government control over key decisions and the extent of participation of a State-owned corporation, where applicable. More recently, contracts have also started to include provisions relating to human rights and environmental issues.

In metal mining, companies obtain concessions in the form of licences, which give them the right to explore for and produce minerals. The conditions for investment are typically set out in a mining code or a mining agreement. Such codes have evolved over time, reflecting changing market conditions and political priorities. Common features of current mining laws include increased security of tenure, open access to historical exploration reports, more streamlined and transparent exploration application procedures, geographically defined exploration areas, provision for dispute resolution and methods for resolving

conflict over land use. A number of countries also stipulate conditions related to the employment of domestic and foreign employees in the metal mining industry.

In both the oil and gas and the metal mining industries, the evolving arrangements reflect an ongoing process through which governments seek to find an appropriate balance between the respective rights and obligations of States and firms. As government revenue is among the most important benefits from mineral extraction, it is not surprising that policymakers devote much attention to finding a mechanism that assures the government an appropriate share in the profits from mineral extraction. As the result of higher mineral prices in the past few years, a number of governments have taken steps to increase their share of the profits generated by amending their fiscal regimes or their contractual relations. Recent regulatory changes in developed, developing as well as transition economies suggest that many governments believed their previous regulations may have been overly generous vis-à-vis foreign investors.

Compared with earlier waves of government policy changes and nationalizations, an added dimension this time is the wider use of IIAs among countries. While such treaties subject these governmental actions to certain international law principles, they cannot ultimately prevent a state from putting an end to a contractual relationship under existing terms. However, IIAs may grant foreign investors the right to claim compensation through international arbitration in case of a dispute. Protection under IIAs therefore mainly becomes relevant in the context of an exit strategy of a foreign investor. The scope of protection granted by such an agreement depends on how the treaty is formulated and its interpretations by arbitration tribunals. Moreover, the outcome of the government policy changes depends partly on the bargaining power of the parties. For those host countries that posses proven and high-value mineral and petroleum deposits, unilateral actions may be a viable approach to capturing a larger share of the benefits from an extractive industry. However, other countries may be in a weaker position to take such actions.

Ensuring greater and more equitable development gains requires shared responsibility among stakeholders, including host and home governments …

In order to derive maximum economic gains from TNC involvement while keeping potential environmental and social costs to a minimum, concerted action by all relevant stakeholders is

required, based on a consensus around coherent policies. A number of recommendations to host-country governments, home-country governments, the international community, civil society and TNCs emerge from the analysis in *WIR07*.

Host-country governments bear the main responsibility for ensuring that the exploitation of their extractive industries yields benefits that support development objectives. Each government should formulate a clear vision as to how the country's oil and mineral resources can contribute to sustainable development. In that respect, an overall development strategy, developed within a governance framework based on the rule of law, is essential for coherent policy formulation and implementation. It should consider all relevant stakeholders – both current and future generations. Governments also need to strengthen their ability and capacity to design and implement appropriate policies. Well-informed governments are in a better position not only to design an appropriate regulatory framework, but also to enter into negotiations with TNCs, where necessary. A clear strategy at both central and subnational levels of government indicating how to manage and use the revenue generated from mineral extraction is essential.

Policymakers need to consider from the outset how to derive long-term and sustainable development gains from the extractive activities of TNCs. It is crucial that the revenue generated from mineral extraction be invested in activities to enhance productive capacities, including human-resource and technology development, with a view to strengthening domestic private sector capabilities. They should also promote backward and forward linkages within the extractive industries and with related industries.

In designing and implementing policies, governments need to bear in mind the cost-benefit relationship, and the fact that mineral markets are volatile. If a country seeks TNC participation in its extractive industries, its business environment should be competitive to attract the desired investments and skills. To reduce the need for unilateral actions by governments, countries may need to develop frameworks that are robust over the different phases of the business cycle, for example by introducing progressive taxation systems for the fiscal treatment of revenues from extractive industries.

Host-country governments should also consider the environmental and social consequences of extraction activities. There have been some encouraging developments in this area in recent years. An increasing number of countries are introducing environmental legislation, often with specific regulations for extractive industries. However, many countries still need to develop the capabilities to implement and

enforce their environmental laws. The protection of the interests and rights of the people that might be affected by resource extraction is first and foremost a government obligation. Nonetheless, it is important for the various relevant stakeholders in a host country to be given the opportunity to influence the decision-making process so as to ensure equitable outcomes. An important factor in this context is the need to enhance transparency. In several countries, information about revenue is still treated as confidential, and foreign investors may be required to sign confidentiality or non-disclosure agreements.

Home-country governments can influence the potential impact of their TNCs' investments on host countries. A number of developed and now also developing countries actively support their firms' overseas expansion, sometimes with a view to securing access to strategically important resources. They should promote responsible behaviour on the part of these TNCs. This is equally important if the home State is also the owner of the company. More home countries can become involved in existing international initiatives related to the extractive industries, such as the Extractive Industry Transparency Initiative, the World Mines Ministers Forum and the Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development. They may also provide the recipient economies with financial and technical assistance for effective policy formulation and for building efficient governance systems.

… the international community, civil society and the TNCs.

The *international community* can also help promote greater development gains from resource extraction. International organizations can facilitate learning opportunities from studying and comparing the positive and negative experiences of different mineral-rich countries. Initiatives at the regional level might be useful. For example, it is worth exploring the scope for regional geological surveys and for establishing regional mining schools in Africa. In addition, the international community can be instrumental in the development of standards and guidelines and in promoting the use and adoption of existing tools to help ensure a more development-friendly outcome of TNC activities in mineral-rich countries, notably in weakly governed or authoritarian States. In very serious instances, the international community may have to explore sanctions as a tool for protecting human rights.

Voluntary initiatives can also be a useful supplement in countries where appropriate legislation or its enforcement is absent. A number

of multi-stakeholder initiatives have been established with the aim of reducing the risk of conflict-related resource extraction and setting standards for corporate behaviour in conflict situations. The most notable ones include the Extractive Industries Transparency Initiative, the Kimberley Process Certification Scheme, the Voluntary Principles on Security and Human Rights and the Global Reporting Initiative. Civil society has played an active role in promoting these initiatives. International as well as local NGOs can contribute expertise on economic and environmental as well as human rights issues; and they can play an important role in monitoring the actions both of governments and companies, drawing attention to any abuse or inappropriate actions. However, it is important for more countries and TNCs in extractive industries to become involved in these initiatives.

When engaging in resource extraction, the role of *TNCs* should be, first and foremost, to contribute to efficient production while, as a minimum, respecting the laws of the host country. When mineral deposits are located in weakly governed or authoritarian States, foreign companies need to consider the implications of investing there or not. While there are no easy choices in this respect, a number of new tools – such as those for compliance assessment developed by the Danish Institute for Human Rights and for risk and impact assessments and screening produced by International Alert – can provide guidance. However, even among the largest enterprises, the number of extractive TNCs that have signed up to relevant international initiatives is still small. A review of the top mining and oil and gas TNCs shows that very few of them are explicitly committed to these initiatives, particularly companies from developing and transition economies. Until more companies participate in them and abide by their commitments, their impact will be limited.

A concerted effort by all stakeholders is necessary to ensure that the vast mineral resources located in some of the world's poorest countries become a force for development. In low-income, mineral-rich countries, TNCs are likely to play an active role in the mineral extraction. The challenge is therefore to develop frameworks that create the proper incentives for local and foreign firms to produce efficiently while at the same time respecting environmental and social requirements that reflect the interests of local communities and society at large. A win-win situation can result if various minerals are produced efficiently and if host countries, with the support of various other stakeholders, can make the revenues generated work more effectively for sustainable development and poverty alleviation.

BOOK REVIEWS

Technological Superpower China

Jon Sigurdson, in collaboration with Jiang Jiang, Xinxin Kong, Yongzhong Wang and Yuli Tang
(Cheltenham, Edward Elgar, 2005), xviii+347 pages

China's economic boom and political ambition have fuelled unprecedented investment in science and technology. Since 1999, the country's spending on research and development (R&D) has trebled, and it has now become the world's second largest R&D investor (in purchasing-power-parity terms).[1] At the same time, China has benefited significantly from the internationalization of R&D by transnational corporations (TNCs), as growing numbers of Western companies open research facilities in cities such as Beijing and Shanghai (UNCTAD, 2005).

Is China about to become the next technology superpower? Is it merely a "workshop of the world" based on the efficient use of foreign technology, or will it be able to become a "global R&D centre"? In their book, *Technological Superpower China*, Jon Sigurdson and collaborators provide some insightful answers to these questions that concern policymakers the world over. The book examines China's technological advance since the early 1980s, its approach to using foreign technology combined with its own manpower, and the integration of its national science and technology programmes with the knowledge and innovation systems of national and international corporations, as well as of various localities. The author makes an informative and persuasive case showing that China has emerged as a major R&D player and a technological competitor to countries such as Japan and the United States. The book is very relevant to the current debates in R&D, FDI and related policy issues, and is recommended to all those interested in an updated presentation of China's technological progress.

China's science and technology development: various perspectives

Who are the main actors behind China's rapid technological advancement? What are the main factors explaining this achievement, and what

[1] OECD, "China will become the world's second highest investor in R&D by end of 2006, finds OECD", press release, 4 December 2006.

are the key areas of strength and challenge for China? Jon Sigurdson addresses these questions by undertaking a comprehensive analysis of the dynamic, multifaceted process of China's science and technology development since the start of its "open door" policy in the late 1970s. According to him, China's technological advances have been based on combining public initiatives and corporate efforts, integrating regional ambitions with national policies, and using foreign technology coupled with its own manpower.

In terms of the relationship between the public and private sectors in the innovation process, China has long suffered from the absence of an innovative enterprise sector – a common weakness of the innovation systems of developing and transition economies.[2] In the first chapter of his book, the author suggests that, until the early 1980s, science and technology remained completely within the government domain, but, nowadays, the corporate sector has taken on a major portion of R&D in China.[3] However, he recognizes that the most research-intensive companies are still either State-owned or maintain close links with the public sector.[4] He argues that government programmes and initiatives remain important, but the private sector is growing in importance in the national innovation system. The first chapter addresses this as well as other general issues regarding China' technological progress and lists the main components of China' innovation system, providing the conceptual background and setting the stage for later discussion.

Chapters two and four discuss government science and technology policies and programmes and the corporate sector's R&D efforts, respectively. Chapter two first takes the reader through a historical sketch of China's science and technology policy and then outlines in detail various national science and technology programmes, mainly those involving the Ministry of Science and Technology. In addition, the chapter examines China's technological and scientific

[2] In developing and transition economies, a major part of R&D is undertaken by universities and government research institutes and is often delinked from the productive sector (UNCTAD, 2005).

[3] The business sector has become the dominant R&D actor in China's innovation system, performing over two thirds of R&D in 2005 (OECD, 2007).

[4] Actually, the rapid increase in business sector R&D in China since the mid-1990s has been the result of the conversion of some public research institutes into business entities (OECD, 2007).

manpower, with a particular emphasis on its producers – the country's universities; it mentions the contribution of students returned from overseas as well. Indeed, various types of returnees have played an important role in technological and commercial advances in China and other developing countries, such as India (see, for example, Saxenian, 2006; Wilsdon and Keeley, 2007), and more research is needed to better assess their contributions. Chapter four describes the reform of China's research institutes since 1978 and analyses the R&D efforts of Chinese enterprises by putting together a number of case studies on companies in the information and communications technology (ICT) industry, such as Lenovo, Huawei Technologies and Putian Group.

The subsequent chapters present some industry case studies: the ICT industry in general and the integrated circuit industry in particular in chapter five, the textiles, electronics, semiconductor, supercomputers, aircraft, biotechnology and pharmaceutical industries in chapter six, and the space programme and the defence industry in chapter seven. Although each chapter has its own focus, there is an overlapping coverage of industries among those chapters. The ICT industry has become China's largest manufacturing industry and hosts the country's most innovative companies. Broadly defined, the industry includes a wide spectrum of sub-industries, including, for instance, computer and peripherals, telecom equipment and integrated circuit. The global industrial and technological context, the national institution and policy environment, and the interaction between foreign and domestic firms have determined the development trajectories of these industries (Liang, 2004). Systematic analyses of their productive and innovative progresses are crucial for understanding China's technological development during the past two decades. In this regard, chapters five and six provide in-depth descriptive analysis with a mix of technological and institutional perspectives, which allows the author to take into account the complexity of the issue and contribute to the literature and current debates.

In any attempt to understand recent and future technological advancement in China, it becomes unavoidable to think about the relationship between regional efforts and national policies, and certainly the regional dimension should not be overlooked. Indeed, over the past two decades, regional initiatives have played an important role in shaping China's new science and technology landscape (OCED, 2007). Taking China's "extraordinary size and diversity" (p. 215) and significant regional diversity into account, chapter eight examines

the country's regional innovation systems. This is followed by a case study on Shanghai in chapter nine. In these two chapters, the role of development zones (especially high technology parks), industrial clusters and universities in the operation of regional innovation systems is highlighted.

From the workshop of the world to a global hub for research and development: the role of foreign direct investment

For the readers of *Transnational Corporations*, an interesting question related to China's technological rise is the role of FDI in this process. In the past two decades or so, TNCs have helped transform China's industrial landscape, making it a "workshop of the world", which has contributed to the performance of the world economy in recent years. TNCs' contribution to China's industrial development cannot be delinked from their technological contribution. As more and more TNCs establish R&D centres in the country, they have helped accelerate the process of China's integration into global innovation networks and its moving up along the value chain (UNCTAD, 2005).

In his book, Jon Sigurdson devotes one chapter to this issue by examining China's technology access through FDI, both inward and outward. In chapter three, the author argues that FDI brings capital, management skills and technologies in a wide spectrum of industries, and attracting FDI by offering access to the Chinese market has lured a large number of TNCs to establish bases for high-technology production. However, he recognizes that the real challenge is to create a local environment that will facilitate a rapid diffusion of technologies and enhance the spillover effects of FDI. Although TNCs' high-technology manufacturing in China is still dominated by final assembly production, the country has seen substantial inflows of FDI in R&D since the early 2000s. Based on case studies on companies such as Motorola, chapter three discusses the impact of foreign R&D on China's innovation system[5] and associated policy challenges. Quoting the *European Competitiveness Report 2004*, the author suggests in the concluding chapter (chapter ten) that China has been successful in selectively attracting FDI in technology-intensive industries in order to benefit from embedded technology and organizational skills. Technological impact of outward FDI is also briefly discussed in the chapter.

[5] R&D spending by foreign affiliates accounted for 24% of total business R&D in China in 2003 (UNCTAD, 2005).

Implications of China's rapid rise as a "technological superpower"

During the past decade, China has dramatically increased the number of students in tertiary education and the funding for R&D, although some indicators such as the number of patent applications still suggest that it is far from reaching its goal of becoming a knowledge-based economy. To shift away from industrial development based on the intensive use of low-skilled labour and natural resources and a low level of innovative capabilities, China has embarked on the implementation of a strategy centred on "independent innovation" (*Zizhu chuangxin*). The country will further increase its level of investment in R&D, and, accordingly, its R&D spending is predicted to rise to 2% of GDP by 2010 and 2.5% by 2020.[6] What are the implications of China's rise as a major R&D player for the rest of world?

In chapter ten, based on a review of recent reactions from the Triad to China's technological rise, Jon Sigurdson argues that the European Union and Japan view the emerging technological power in China from a commercial perspective, which naturally has strong "nationalistic overtones" (p. 300), while the United States considers it as a double-edged sword in the sense that it has not only commercial implications but equally strong strategic consequences. As highlighted in an OECD report, if managed properly, the development of China's innovative capability can give rise to a positive sum game, benefiting not only China but the world at large; however, mismanagement carries the risk of costly tensions (OECD, 2007).

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Geneva, Switzerland

[6] See "China bets big on big science", *Science*, 311, 17 March 2006.

* This review represents the personal opinion of the reviewer and does not necessarily reflect the view of the United Nations.

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Wilsdon, James and James Keeley (2007). *China: the Next Science Superpower?* (London: Demos).

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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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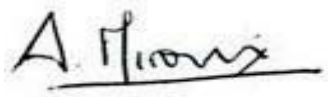

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