

Impact of Changing Production Location on Foreign Direct Investment

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Abstract

It has been one of the best established facts about foreign direct investment (FDI) that it originates predominantly from advanced countries and goes predominantly to advanced countries. From this point of view, in the 1980s and early 1990s, globalization involved predominantly the Triad countries rather than the entire globe. Over the last decade however, multinational companies have been playing a major role in the integration of a number of developing and transition countries in the world economy. The case of China is being extensively discussed, but multinational enterprises have also played an important role in the integration of the new member states of the European Union into the world economy.

FDI to developing countries has increased steadily over the 1990s and has been driving the recovery of world FDI since 2004. As a result, flows of FDI to developing countries represent an increasing share of world flows. The shift of multinational activities towards low-income countries could be consistent with different motivations and in particular with both access to dynamic markets and access to low-cost production capabilities. The paper argues that the balance between these two traditional motivations for FDI has been changing. It discusses more precisely the hypothesis of an increasing role of global production networks and relocation of production facilities as a driver for FDI.

Part 1 describes the evolution of FDI and its geographical distribution over the last two decades. It relates FDI flows to China and the new members of the EU with multinational strategies and the evolution of the industrial exports of these countries. Part 2 reviews the literature on the determinants of FDI and discusses the distinction between *horizontal* and *vertical* FDI. It argues that vertical FDI and relocation of production have become stronger drivers of foreign investment. This second part also underscores the increasing diversity of activities conducted by multinationals abroad. It shows in particular that FDI in distribution and R&D activities respond to different factors of attraction than FDI in manufacturing. Part 3 draws on these theoretical and empirical results to discuss the future evolution of FDI and its sector and country distribution.

Introduction

Since the 1980s, multinational enterprises have been playing a major role in the process of globalization. Multinational enterprises have in particular been major actors in the rapid integration of emerging countries in the world economy. The case of China is being extensively discussed, but multinational enterprises have also played an important role in the integration of the new member states of the European Union into the world economy for example. Multinationals' strategies have a direct impact on the dynamics and distribution of FDI. Foreign direct investment (FDI) has increased particularly rapidly at the end of the 1980s and again at the end of the 1990s. FDI to developing countries has increased steadily over the 1990s and has decreased less than FDI to developed countries in 2001-2003. Since 2004, FDI to developing countries is driving the recovery of world FDI. As a result, flows of FDI to developing countries are close to the historical high of 2000 and represent an increasing share of world flows. Besides, FDI has become the largest type of capital inflow for developing countries.

What are the determinants of this historical shift in attractiveness for FDI between developed and developing countries ? Is it a short term trend, or the result of long term underlying determinants ? Is it a return to the situation predicted by theory, where FDI flows to high-return capital-poor countries ? Are the different advanced economies in the same situation ? In particular, is EU enlargement generating specific dynamics for FDI to the New Member States (NMS) ? And is the U.S. increasingly more attractive than the 'old' EU members ?

In order to answer these questions, this paper examines the quantitative and qualitative evolution of FDI and multinational companies' operations. Part 1 describes the evolution of FDI and its geographical distribution over the last two decades. It sets the hypothesis discussed in the rest of the paper of an increasing role of offshoring and relocation of production on the redistribution of FDI in favor of developing countries. Part 2 reviews the literature on the determinants of FDI and discusses the distinction between horizontal and vertical FDI. It assesses the results of empirical studies on the extent of vertical FDI and the role of relocation of production as a driver of investment flows. This second part also underscores the diversity of activities conducted by multinationals abroad. It shows in particular that FDI in distribution and R&D activities respond to different factors of attraction than manufacturing. Part 3 draws on these theoretical and empirical results to discuss the future evolution of FDI and its sector and country distribution.

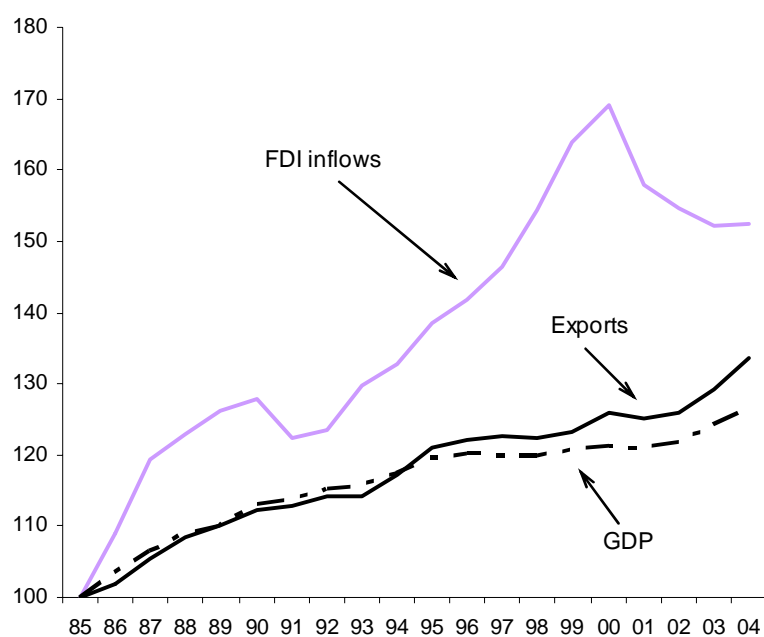
1. Is there a historical shift in the location of world FDI ?

Over the last 20 years FDI has been a major factor of globalization. It has increased dramatically and its share in world GDP is more than three times as high as two decades ago (2.1). Since the late 1980s, developing countries have become a more frequent destination of FDI. This first part relates this trend to the increasing share of developing countries in manufacturing trade (2.2).

1.1 FDI drives globalization

FDI grew dramatically in the last 15 years of the XXth century, far outpacing the growth of trade and income (Figure 1). This contrasts with the previous fifteen years; between 1970 and 1985, when the average growth rates of world GDP, exports and FDI were following closer trends – respectively 3.1%, 5.2 and 4.2%. As a result, the expansion of multinational enterprises (MNEs) has been a major driver of globalization since the 1980s. A substantial share of world trade is intra-firm and the sales of foreign subsidiaries are in many cases much larger than trade flows.¹

Figure 1a. FDI, exports and GDP growth, 1985 = 100

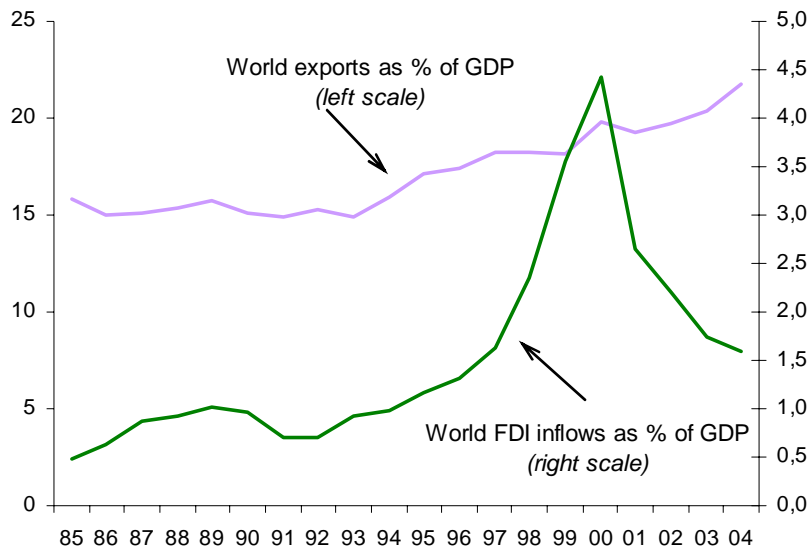


Source: data in log, UNCTAD and WTO

As a complement, figure 1b shows that the ratio of FDI to GDP has been increasing more than 3 times over the last twenty years, while the ratio of exports to GDP increased by only a third.

¹ Sales of manufacturing products of U.S. subsidiaries in the EU are about 3.8 times larger than EU imports from the U.S. and sales of EU subsidiaries in the U.S. are 3.6 times larger than EU exports to the U.S. (Barba Navaretti and Venables 2004).

Figure 1b. Increasing internationalization, in % of world GDP



Source: UNCTAD and WTO

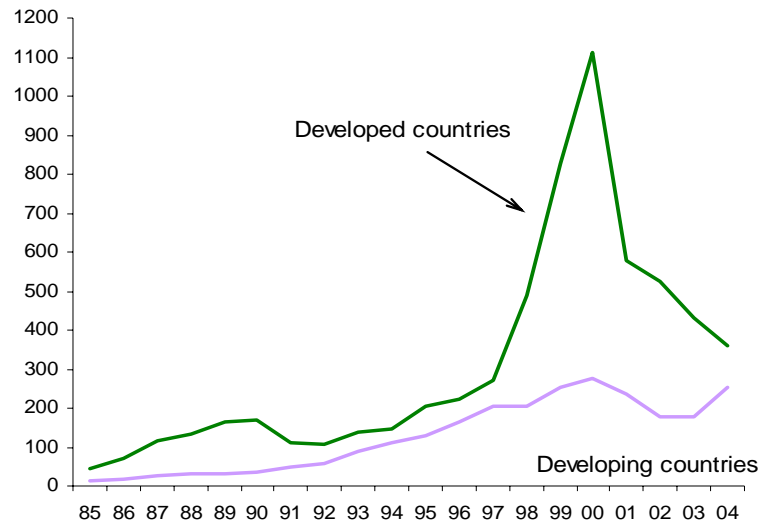
FDI dropped after the burst of the internet bubble at the beginning of the XXIth century, but has been increasing again in 2004. Recovery of FDI flows in 2004 results from the combination of favorable macroeconomic, microeconomic and institutional factors. World economic growth has been recovering in 2002 and 2003 and reached 5.1% in 2004. As in the past, FDI has been stimulated by strong growth in a number of countries. Increased corporate profits and favorable financing conditions have also helped expand FDI. On the contrary, the process of privatization has come to an end in many developing and transition economies and did not stimulate FDI. A number of countries liberalized FDI in real estate, which has been a favorable institutional factor, as the continued growth in international investment agreements (UNCTAD 2005). As a result of steady increases in FDI, it has become the largest component of capital flows to developing countries since the mid-1990s. This contrasts with the latter half of the 1980s and early 1990s, when official flows and FDI were almost the same, and with the mid-1990s, when portfolio investments and FDI were roughly equal.

1.2 From triadization to globalization

It has been one of the best established facts about FDI that it originates predominantly from advanced countries and goes predominantly to advanced countries (Barba Navaretti and Venables 2004). From this point of view, in the 1980s and early 1990s, globalization involved predominantly the Triad countries rather than the entire globe. Over the last decade however, a number of developing and transition economies have been increasingly integrated in global exchange flows.

In 2004, FDI to developed countries totalled \$350 bn and FDI to developing countries \$247 bn (Figure 2a).² Since 2000, FDI to developed countries has been decreasing, while flows to developing countries have been increasing since 2003. As a result, the share of developing countries has reached 41% of world FDI flows.

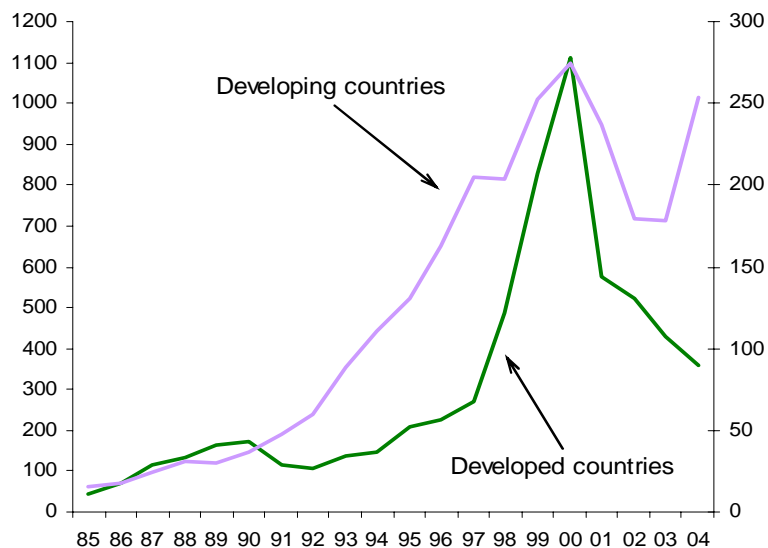
Figure 2a. Evolution of FDI flows by level of development, in \$ bn



Source based on UNCTAD data. *Definition of groups* : NMS and CIS in developing countries, contrary to the reclassification of UNCTAD (2005).

Figure 2b includes two different scales to show more clearly the divergent dynamics for the two groups of countries.

Figure 2b. Evolution of FDI flows by level of development, in \$ bn.



Source based on UNCTAD data. *Definition of groups* as in Figure 2a.

² The sum of the two zones is lower than the world total of \$ 648bn given by UNCTAD (2005) as some flows are not identified. For the country groupings, see Figure 2a.

FDI to developed countries has been more strongly influenced by the new economy bubble in 1998-2000, while FDI to low cost countries seems to be on a more steady growth path. Total inflows to industrialized countries has strongly declined since 2000 and their share of global FDI was down to 58% in 2004. However, this decline may simply reflect a continuation of the marked cyclical pattern that has been present in the past, as illustrated by Figure 3.

Figure 3. Share of inward FDI to advanced countries, % of world total

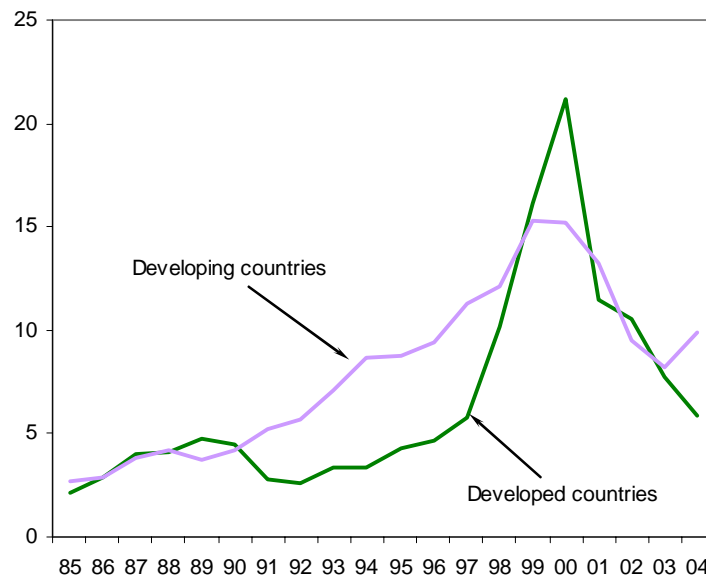


Source: UNCTAD

Alternatively, this decline could be the result of a more fundamental increase of the importance of emerging countries in the world economy. Total inflows to the less developed countries rose 42% to \$247bn, as much as in 1999 and second only to the historic high of 2000. This trend is confirmed by data on the location of affiliates. Developing countries host an increasing share of MNEs' affiliates reaching nearly half of the total in 2004 (UNCTAD 2005). In the case of U.S. MNEs, employment by foreign affiliates remains concentrated in high-income countries, but since the 1990s, it has grown faster in other countries. In 1991-2003, it grew at an average annual rate of 9% in low-income countries, 6% in middle-income countries and 3% in high income countries (Mataloni 2005).

As a result of these increasing flows of FDI to developing countries, since the early 1990s foreign investment has been representing a higher share of GFCF than in developed countries, except for the bubble years (Figure 4). Over the last decade, the share of FDI in the capital formation of developing countries has been above 8% and represents a sizeable share of total investment in quite a number of countries. This is important to the extent that FDI has specific characteristics and a positive impact on the country specialization or productivity in some sectors.

Figure 4. Share of FDI flows in GFCF, in %



Source: UNCTAD

The higher attractiveness of developing countries may be related to a number of factors. FDI tends to occur in waves with different cycles for different countries (Kleinert 2001). In advanced countries, FDI has been driven by M&A waves in the 1980s and the late 1990s. During the 1990s, privatization and M&A also offered new opportunities in Latin American or Eastern and Central European countries. Recently, FDI has been attracted to oil and other natural resources rich countries. Since the 1990s, the combination of trade and FDI liberalization has also opened new opportunities in a number of developing and transition countries. In particular, this context has been favorable to the development of the division of labor within MNE's global production networks. The development of global production networks, in which value added chains are fragmented and allocated to different countries is now well documented.³ Foreign subsidiaries of U.S. firms have become less oriented to supplying local markets and more oriented to exporting, as evidenced by the simultaneous increase of their imports and exports (Hanson *et al.* 2001). Studies on France's intra-firm trade have shown that trade between affiliates from developing countries involve products at different stages of production, while flows between affiliates from advanced countries involve finished products and distribution (Sachwald 2004).

The development of global production networks by MNEs should generate more trade in manufacturing products with low-cost countries. Figure 5 shows that developing countries have indeed substantially increased their share of world exports of manufactures. It further shows that since the Asian crisis, exports and imports of manufactures by developing countries have followed a parallel growth pattern. This may be related to assembly operations by foreign affiliates, as has been demonstrated in the case of China in particular, where processed exports represent 57% of total manufacturing exports (Gaulier *et al.* 2005).

³ See for example, Feenstra (1998), Sturgeon (2002), Fukao *et al.* (2003).

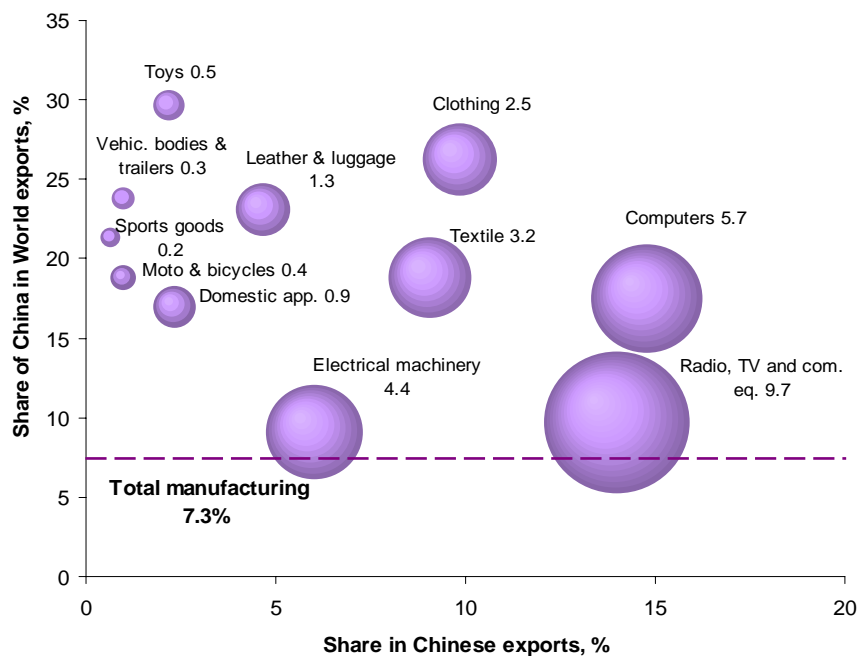
Figure 5. Share of developing countries in world trade of manufactures, in % of total flows



Source: COMTRADE

Figure 6 shows that China has taken a sizeable share in world exports not only of traditional labor-intensive products such as clothing or toys, but also of computers and a number of electronic goods. These sectors represent a larger share of world trade than textile and clothing and have been driving the increasing share of China in world trade. Chinese exports in these sectors depend more on assembly operations by multinationals than exports in the traditional labor-intensive industries such as textile and clothing. The share of exports under the “processing” regime in total exports is 30% in textile and clothing, but reach 96% for computers.⁴

Figure 6. Sector distribution of Chinese manufacturing exports, in %



Remark : bubbles indicate the share of each sector in world manufacturing exports, in %.
Source: IFRI Trade Database

⁴ Imports of components for further processing and exports benefit from the “processing” regime and are identified in Chinese trade data (Gaulier *et al.* 2005).

The case of China is remarkable and focuses international attention, but is not isolated. The new member countries of the European Union have experienced a similar FDI driven evolution of their specialization, especially in electronics, telecommunication equipment and automobile (Radosevic and Sachwald 2005). For example, multinationals are responsible for nearly 100% of Hungarian exports of computers and local value added is low.

The shift of multinational activities towards low-income countries could be consistent with different motivations and in particular with both access to dynamic markets and access to low-cost production capabilities. This paper discusses whether the balance between these two traditional motivations for FDI has been changing. It examines more precisely the hypothesis of an increasing role of global production networks and relocation of production facilities as a driver for FDI.

2. Evolution of the determinants of FDI

Since the 1960s, the modern theory of the multinational enterprise has moved away from viewing FDI as simply part of the theory of capital flows and toward viewing multinationals as firms that exploit knowledge-based firm-specific assets in multiple markets.⁵ The implications of the two approaches are quite different. The more traditional financial view predicts investment flowing primarily from capital-rich to capital-poor countries in order to take advantage of higher rates of return in less developed countries. The more recent view predicts that multinational firms will be headquartered in skilled-abundant countries and may invest in both capital-rich and capital-poor countries. Within this broad perspective, different “models” of the multinational enterprise have been characterized, based the identification of the main determinant for their investment in a given country. This section discusses the recent empirical evidence on the evolution of the determinants of FDI (2.1) before turning to the specific drivers of FDI to low-cost countries (2.2).

2.1 Recent evidence on the determinants of FDI

Even if the multinational firm goes abroad to exploit its knowledge-based specific assets in multiple markets, the determinants of its investment may differ according to both its specific profile and the characteristics of the host country. Students of multinationals have distinguished two types of FDI. Multinationals conduct *horizontal* FDI when they duplicate the same (horizontal) process of production in a foreign country, in order to better access host-country markets. They conduct *vertical* FDI when they organize a vertical division of labor between the home and host country, in order to exploit factor endowment differences. They may for example concentrate the production of a particular product or component in one foreign location and export back to the home country. The distinction between horizontal and vertical FDI corresponds to the traditional distinction between the *market access* and the *resource access* motivations for

⁵ The seminal contributions from Hymer (1960) and Vernon (1966) have strongly influenced the theory of the multinational company, including in particular the framework developed by John Dunning (1981).

foreign investment. In the past, access to resources focused on natural resources, while since the 1970s, the focus has shifted to access to low cost labor.

Recently, the *Knowledge-capital model* of foreign direct investment has been proposed as a synthesis, which encompasses horizontal and vertical FDI as special cases. In this model, vertical FDI appear when the relative endowments in skilled-labor are very different between the home and host countries. Differences in factor prices induce a fragmentation of the value chain, with headquarters located in the skilled-labor-abundant country and production in the unskilled-labor-abundant country. The incentive is however strongest when the home country is small: the model incorporates increasing returns to scale in the production of the good for which there are headquarter firm-level fixed costs, so that, due to trade costs, firms from a large home country have weaker incentives to serve the home market from a foreign affiliate.⁶

The distinction between horizontal and vertical FDI has of course important implications on the reasons why firms invest abroad and where they locate their foreign units of production. Table 1 summarizes the theoretical predictions with respect to the impact of firm, industry and country characteristics on horizontal and vertical FDI flows.

Table 1. Theoretical predictions on the determinants of Horizontal vs. Vertical FDI

Determinants	Prediction of the impact on FDI flows, by type of investment	
	Horizontal	Vertical
<i>Characteristics of firms and industries</i>		
Firm-level economies of scale and scope	+	+
Plant-level economies of scale	-	?
Product-specific trade costs	+	-
Difference in factor intensity between stages of production	Not relevant	+
<i>Characteristics of home and host countries</i>		
Size of the host country market	+	No predicted impact
Trade costs between home and host countries (distance, trade barriers...)	+	-
Factor cost differentials between home and host countries	? (+)	+

Source: modified version of table 2.3 from Barba-Navaretti and Venables (2004).

Some determinants stimulate both horizontal and vertical FDI. Firm-level economies of scale in particular, which make it profitable to exploit firm-specific assets like innovation capabilities in different locations. This comes as no surprise since such assets have been recognized as a basic condition for the very existence of multinationals. Most other factors have a different impact on horizontal and vertical FDI. This is the case in

⁶ For a more complete presentation of the model see Braconier *et al.* (2005).

particular of the size of the host market as a large market is a major driver for horizontal FDI, but has no reason to influence vertical cost-based FDI. Trade costs should have opposite effects on horizontal and vertical FDI: trade barriers tend to stimulate investment to access protected markets, while long distance or high transportation costs increase the overall cost of vertical division of labor between countries.

Factor cost differential is considered as one distinctive determinant of vertical FDI. Low labor costs can obviously attract investment in labor-intensive activities and thus stimulate vertical FDI from advanced countries. Traditionally, horizontal FDI was on the contrary considered insensitive to costs, because market access was considered the main driver of investment. Actually, horizontal FDI may also be influenced by cost differentials. According to the product cycle theory of FDI (Vernon 1966), horizontal FDI in lower cost countries occurs when the technology becomes relatively more labor intensive and prices more affordable for local markets. Recent data on delocalization also suggest that restructuring within Europe may be influenced by relative labor costs.⁷ These considerations suggest that horizontal FDI will not occur between countries with very large differences in factor endowments, but that cost differentials may nevertheless influence the choice of location between similar countries .

There is also some uncertainty with respect to the impact of plant level economies of scale. Firms should logically refrain from locating sub-optimal scale plants abroad. Hence the hypothesis of a negative impact of plant economies of scale on horizontal FDI. But the actual decision of the firm then depends on the size of the local market, which may not be limited to the host country market. In particular, countries belonging to some regionally integrated market, like the EU or NAFTA, may serve as export-platforms. The possibility to export easily to neighboring countries has more often been underlined in the case of vertical FDI, for which no positive or negative impact of plant economies of scale is predicted (table 1).

This discussion suggests that there are only two factors that may clearly distinguish horizontal and vertical FDI, i.e. the size of the host market and the height of trade costs. The effects of factor cost differences appears more difficult to predict. This may be one explanation for the contradictory results from empirical studies on the impact of factor cost or skill differences on FDI.⁸ A number of recent estimates tend to confirm that vertical FDI does not account for a significant amount of world FDI. Barba Navaretti and Venables (2004) nevertheless conclude that the recent literature still suggests that vertical FDI plays a role, and, most likely, an increasing one. Moreover, they consider that due to the difficulties to single out the effects of factor cost differences, the importance of vertical FDI is likely to be underestimated⁹. Actually, two very recent papers, using different empirical approaches, conclude that VFDI is substantial. Braconier *et al.* (2005a) argues that problems with both empirical specification and data may explain the contradictory results of previous work on vertical FDI. They use a large data set and find strong support for the knowledge-capital model, where vertical FDI

⁷ Jobs lost in France because of relocation within the EU are often located in Spain (Aubert and Sillard 2005).

⁸ Buch *et al.* (2005) use a similarity index based on the difference of GDP per capita between the home and host countries as a proxy for similarity in skills and human capital. Other studies use more direct data on skilled and unskilled labor endowment.

⁹ For a discussion of estimation problems, see also Bloningen *et al.* (2003).

generates large affiliate sales when the home country is skilled-labor-abundant and small. They suggest that previous empirical studies did not include observations for which vertical FDI is most likely to occur, i.e. when the home country is not only skill-abundant (like the U.S.), but also small. Braconier *et al.* (2005b) focus on the role of wage cost differentials based on data from both U.S. and Swedish affiliates abroad in the 1980s and 1990s. They find that MNE activities tend to be larger in countries where less-skilled labor is relatively cheap, which they interpret as a strong support for vertical FDI.

Apart from the difficulties to analyze the role played by factor cost differences, one problem has been that most empirical work has used data covering the 1980s and up to the mid-1990s.¹⁰ Data for the late 1990s nevertheless indicate that vertical FDI had become more substantial by the end of the decade. The composition of sales of U.S. affiliates abroad in 1999 indicates that local sales in host country account for 67% of the total.¹¹ This suggests that horizontal FDI would represent two thirds of the total. The share of local sales is lower (59%) in manufacturing, where vertical FDI would have represented more than 40% of the total in 1999. The analysis of intra-firm trade of companies located in France also shows that vertical specialization is one motive for FDI in manufacturing, even if French firms tend to be less involved in international fragmentation of production than American or Japanese firms (Sachwald 2004).

An empirical analysis of German FDI, based on a newly available firm-level data set that includes recent years up to 2001,¹² also suggests that vertical FDI is substantial in manufacturing (Buch *et al.* 2005). The authors conclude that their evidence “is in line with the earlier literature on multinationals firms” since their aggregated data show that the market access motive dominates. They remark that the breakdown of the data by sector reveals important cost-saving motives in some industries but nevertheless do not emphasize the stark difference between manufacturing and service sectors. In their estimates, the gravity-type variables always have the usual impact on the sales of foreign affiliates, i.e. positive for the size of the host country and negative for the distance with the home country. The similarity index,¹³ on the contrary, only has a positive and significant impact on sales of foreign affiliates in services. This impact is particularly strong for finance, construction and whole-sale trade. This suggests that the overall result is actually driven by FDI in the service sectors. The only manufacturing sector for which the similarity index is highly significant is transport equipment, and it takes a highly *negative* value, which indicates vertical FDI in lower-cost countries. As a result, transport equipment exhibits a complex profile, suggesting both horizontal and vertical FDI.¹⁴ The authors do not discuss this interesting result, which may be explained by the recent surge of German FDI in Central and Eastern European countries. Transport equipment is a major sector for German trade and FDI. German carmakers and component companies have first established in Western Europe and the United States,

¹⁰ Braconier *et al.* (2005) is one paper that includes more recent data; their data is for the years 1986, 1990, 1994, 1998.

¹¹ Data from the US Bureau of Economic Analysis quoted by Bloningen (2005).

¹² The database goes back to 1989; time series for individual enterprises are available for 1996-2001.

¹³ The index, based on the difference between the GDP per capita of Germany and that of the host country, takes values between 1 (high similarity) and 0 (low similarity).

¹⁴ The negative impact of the distance variable also suggests vertical FDI.

with some forays more recently in large developing countries. Over the last decade, they have however heavily invested in the new member states (NMS) and have built large production capacities in some of these countries (Sachwald 2005a).

A detailed analysis of carmakers' strategies reveals that their motivation for investment in the NMS have been evolving away from market access towards more complex motives (Radosevic and Sachwald 2005). During the early 1990s strategies were mainly of the *market entry*. Tariff jumping stimulated some FDI, however, liberalization of trade tariffs with the EU has largely removed this motivation. Realization of the NMS as competitive production locations led to *product specialization* strategies. Audi's engine factory in Győr (Hungary), which the carmaker uses to supply the entire European market is an example of this type of restructuring. *Value chain disaggregation and reengineering strategies* are currently the most common in the NMS automotive industry. However, the greatest value creation potential may be realised by *New market creation* type of restructuring, by which firms can offer new products at significantly lower price and penetrate new market segments and countries. Such restructuring has been followed in particular by VW with of Škoda. In summary, carmakers have been using NMS for market access, cost and rationalization of their value chains, and more recently new market creation. German carmakers and component companies are the most heavily invested in NMS and are using these East European locations to lower their overall production costs. NMS nevertheless attract car companies from around the world, including from the U.S. and Asia.

The results of the above mentioned empirical study of German FDI (Buch *et al.* 2005) thus correspond to more qualitative observations of firms' strategies. Overall, recent empirical studies show that the motives for FDI do vary across sectors. Such variations had been identified by previous studies, but the availability of recent data tends to reinforce the results about vertical FDI in some sectors. Next section suggests that such observations should be examined as part of the building up of global networks, in which emerging countries play an increasing role.

2.2 Global networks and the increasing diversity of FDI

The literature has focused a lot of attention on the distinction between horizontal and vertical FDI. Recent observation nevertheless suggest that multinationals have started to conduct complex international strategies that include the assignment of different functions to different countries. This section illustrates this evolution by discussing successively the role of wholesale affiliates and the role foreign R&D centers.

The role of wholesale affiliates in global networks

Based on survey data, Buch *et al.* (2005) indicate that the first motivation for German multinationals to invest abroad is distribution in trade and other service sectors. By contrast, cost savings constitute the main motivation in manufacturing. The role of commercial and wholesale affiliates has been identified by other studies. Hanson *et al.* (2001) remark that in 1998, 21% of foreign sales by U.S. affiliate were in wholesale trade, which suggests that distribution activities such as marketing or after-sales service represent a sizable share of multinationals' global operations.

Table 2 illustrates the stark difference between industrial and wholesale subsidiaries based on a detailed survey of intrafirm trade conducted in France in 1999. It first shows that intrafirm trade represents a substantial share of international exchanges by large firms.¹⁵ It also shows that commercial subsidiaries focus logically on trade for direct sale in foreign countries. Trade by industrial subsidiaries is on the contrary partly motivated by transformation in the host country – both in the case of exports by French groups and imports by foreign groups in France.

Table 2. Distribution of intrafirm trade by French and foreign firms located in France, 1999

	Trade in euro bn		Of which, in %	
	Total trade	Intrafirm trade	For direct sale	For transformation
Exports by French groups, of which by	121.7	61.7	70.3	26.9
- <i>Industrial subsidiaries</i>	<i>109.8</i>	<i>56.9</i>	<i>68.7</i>	<i>28.6</i>
- <i>Commercial subsidiaries</i>	<i>11.9</i>	<i>4.8</i>	<i>91.7</i>	<i>8.3</i>
Exports by foreign groups, of which by	79.5	47.2	56.6	40.9
- <i>Industrial subsidiaries</i>	<i>71.8</i>	<i>43.6</i>	<i>55.0</i>	<i>42.4</i>
- <i>Commercial subsidiaries</i>	<i>7.7</i>	<i>3.3</i>	<i>81.2</i>	<i>15.1</i>
Imports by French groups, of which by	62.5	19.7	49.7	48.7
- <i>Industrial subsidiaries</i>	<i>56.0</i>	<i>17.9</i>	<i>45.8</i>	<i>52.5</i>
- <i>Commercial subsidiaries</i>	<i>6.5</i>	<i>1.8</i>	<i>88.9</i>	<i>11.1</i>
Imports by foreign groups, of which by	105.1	74.3	72.9	26.2
- <i>Industrial subsidiaries</i>	<i>64.3</i>	<i>37.7</i>	<i>49.9</i>	<i>49.1</i>
- <i>Commercial subsidiaries</i>	<i>40.8</i>	<i>36.5</i>	<i>96.2</i>	<i>3.3</i>

Source: SESSI (2003)

Table 2 further indicates that commercial subsidiaries are the major channel of access to the French market by foreign groups: the share of resale by commercial subsidiaries represents 96% of their imports, while resale by industrial subsidiaries only represents 50% of their imports (the value of intra-firm imports is equivalent for both types of foreign subsidiaries, at euro 37bn). To relate to the above discussion, this table suggests that commercial subsidiaries play a crucial role in horizontal FDI, which may overshadow the existence of vertical FDI by industrial subsidiaries.

Global innovation networks and FDI in R&D

The recent internationalization of R&D has been combined with a diversification of type of foreign R&D units and of their geographical distribution. As a result, a parallel may be drawn between global production networks and global innovation networks, which include R&D units in emerging countries.

¹⁵ Intrafirm trade represented 41% of total French exports and 36% of total imports in 1999 (SESSI 2003).

Internationalization of R&D has been largely driven by internationalization of production; in this perspective the horizontal logic was again dominant. Since the late 1990s, a number of studies have nevertheless emphasized the increasing importance of access to local scientific and technological resources as a motivation for R&D location (Florida 1997, Kuemmerle 1999, Serapio and Dalton 1999). Over the past two decades, multinationals have been selectively tapping into foreign technological resources to augment their innovation capabilities (Almeida 1996, Frost 2001, Iwasa and Odagiri 2004). Relatedly, foreign units have become more integrated into a global R&D strategy (Doz *et al.* 2001, Zedtwitz and Gassmann 2002). These trends are not equally developed across sectors, countries and companies. This diversity confuses the overall picture and calls for a finer identification of the drivers of internationalization of R&D.

Historically, both the supply and demand factors that influence the location of R&D were favorable to centralization in the country of origin. The case of the United States in the 1960s, on which Raymond Vernon (1966) built the theory of the product life cycle, offers a particularly clear illustration of these interactions: the American market was a pioneer for many innovations in the post-war period (demand factor), and the United States possessed the bulk of world technological capacity (supply factor). More generally, the need for interaction between R&D, strategic services and product development units explains why R&D has been centralized in the country of origin.

Table 3 indicates that in the face of this set of centralization forces, the need to adapt to local demand was traditionally the main incentive for the decentralization of development activities. The largest foreign markets would attract such activities, provided adequate local technological capabilities were available. As multinationals matured, factors of decentralization have become more influential. Adaptation to local markets has become relatively more important, and requests for specific adjustments to local conditions from foreign subsidiaries have been heard. Multinationals have thus invested in development or research units in an increasing number of countries. Acquisitions have also played an important role in the sharp increase in the number of foreign R&D units. These acquisitions have often been driven by a desire to buy market share, but a substantial increase of a company's presence in a foreign country could justify keeping the local R&D units, which were then integrated into the multinational's global network.

Table 3. New forces of R&D internationalization *

Factor of:	Characteristics of S&T supply	Characteristics of demand
Centralization in the country of origin	<ul style="list-style-type: none"> • Strong S&T capabilities of the country of origin • Economies of scale in R&D 	<ul style="list-style-type: none"> • Country of origin is a lead market
International dispersion	<ul style="list-style-type: none"> • Attractive centers of excellence abroad • Low cost talent pool; increasing supply of scientists and engineers in emerging countries 	<ul style="list-style-type: none"> • Adaptation to foreign markets and local production conditions • New lead markets abroad

* *The factors of dispersion that appeared in the context of globalization are in bold.*

Source: adapted from Sachwald (2005b)

Table 3 indicates in bold characters the new factors of decentralization that have appeared since the late 1980s. These new factors result from both changes in innovation processes and the gradual adoption of global strategies by companies. On the demand side, in the context of innovation-driven competition, companies have located technological outposts, design centers or technical centers in lead markets, where new practices are emerging (Beise 2004, Doz *et al.* 2001). Yet in some fields, from niches in foodstuffs to the mobile Internet, lead markets are not the countries of origin of incumbent multinationals. Symmetrically, on the supply side, centers of scientific excellence and strong technological resources attract new R&D units. The existence of such skills in foreign countries, notably within innovation clusters, constitutes a factor of international dispersion of R&D, the importance of which has been gradually recognized. In the 1980s, the analysis of technology sourcing was stimulated by the observation of R&D investments in the U.S. by Japanese multinationals. Early studies that used R&D intensity of firms and sectors to identify technology sourcing only partially confirmed this hypothesis.¹⁶ Studies based on patent data and specific surveys have found clearer evidence of technology sourcing by Japanese and European firms in the United States (Almeida 1996, Gerybadze and Reger 1999, Sachwald 2003, Iwasa and Odagiri 2004).

More recently, low cost locations have attracted R&D activities. Since the 1990s, the combination of globalization and the growing role of innovation as a factor of competitiveness have led to major changes in the way companies manage R&D. Innovation has absorbed more resources in most sectors and escalating R&D costs have elicited growing interest in managing and streamlining this activity. This has been particularly true for R&D-intensive sectors such as pharmaceuticals, software and aerospace. Simultaneously, the choice of viable locations for R&D has expanded hugely in the last decade. China and India have large and increasing outputs of scientific graduates, even though the countries still have weak innovative capabilities. Both countries and an increasing number of smaller emerging countries invest in both higher education and R&D facilities. Moreover, access to these new locations has been reinforced after the Internet bubble with plummeting telecommunication costs, which allow easier exchanges with teams in India for example. Numerous multinational companies have set up R&D units in India,¹⁷ a number of which are not related to production units and contribute to the global R&D operations of multinationals.

In 2004, a survey of senior executives of multinational companies asked where they would spend the most on R&D in the next three years (EIU 2004). Companies placed China first (39% of respondents), the U.S. second (29%) and India third (28%). Brazil was in 6th position and the Czech Republic in 10th.¹⁸ According to a similar survey, China, India and Eastern Europe are the first three zones where U.S.-based manufacturing multinationals plan to enter or expand engineering and R&D operations between 2004-2007 (Koudal 2004). Companies generally do not admit doing research in low wage countries just because it is cheaper. They rather emphasize that it offers intellectual resources that are not available in their country of origin. In the EIU survey,

¹⁶ See Kogut and Chang (1991), Hennart and Park (1994), Eun *et al.* (1996).

¹⁷ According to Arun Shourie, former Indian minister for privatization, 150 international companies are doing R&D in India (Wharton 2005).

¹⁸ UK was fourth, Germany fifth, Brazil sixth, Japan seventh, France and Italy eighth (EIU 2004).

70% of executives cite the ability to exploit pools of skilled labour as a key benefit of globalizing R&D (EIU 2004). But a majority (55%) also mention reduced R&D costs as a critical benefit. It seems difficult to disentangle the two arguments of access to large pools of skilled engineers and scientists and access to lower cost R&D. India in particular attracts foreign firms because it offers more intellectual power per dollar spent than industrial countries over a range of R&D activities.

This discussion suggests that traditional factors of dispersion have strengthened, while new factors have appeared. Accumulated scientific and technological capabilities in the country of origin as well as economies of scale in R&D continue to weigh in favor of centralization. Knowledge and innovation processes nevertheless become increasingly polycentric as the potential locations for R&D activities diversify and technology increases the capacity to divide and distribute innovation processes. The discussion also indicates that the motivations for conducting foreign R&D have become more diversified, including monitoring new academic and technological developments, generate innovation in creative locations and reduce overall R&D costs. Some companies also seek to increase the responsiveness and speed of adaptation of their innovation process. This objective drives both foreign R&D in fast growing emerging markets and rationalisation of firms' global R&D activities. As a result, foreign R&D has become more heterogeneous.

Multinationals build up global and flexible innovation networks that include different types of R&D units and organize an international division of innovation processes. Based on the analysis of the main drivers of international dispersion of R&D, three types of R&D units may be identified. The characteristics of the *local development center*, the *global laboratory* and the *global development center* are summarized in Box 1.

Box 1. Three types of foreign R&D units

The local development center

Local development and technological support centers correspond to the traditional motive for locating R&D activities abroad. Since they are dedicated to development, they are by definition destined to exploit the home base technological capabilities. These development units are more numerous and dispersed than research facilities and constitute the overwhelming majority of R&D units abroad (Gerybadze and Reger 1999, Madeuf *et al.* 2000, Zedtwitz and Gassmann 2002). Their location is driven by the geographical distribution of production sites.

As emerging markets are driving global demand, new production sites and local development centers are increasingly located in low-cost countries in particular in Asia and new EU members.

The global research laboratory

Foreign research laboratories contribute to the global innovation process of the multinational firm. These laboratories are *home-base augmenting* R&D units. Foreign research laboratories may be organized as part of a set of complementary laboratories, in which the historical R&D unit in the country of origin has a less central role.

Global research laboratories do not necessarily result from greenfield investment. In the 1990s, the increasing number of such laboratories has been driven by the wave of transnational mergers and acquisitions. M&A are often motivated by market penetration, but the acquired foreign companies may come with valuable R&D capabilities. After a series of acquisitions a multinational typically restructures its R&D operations, but some may then become global laboratories. This has been the

case for example of some US R&D facilities after the wave of acquisitions by European companies in the 1990s. In such cases, the American location is driven both by demand and supply factors. R&D restructuring may on the contrary lead to the closure of foreign laboratories, or their transformation into local development units. Such rationalization may follow intra-EU M&A in particular as the R&D capabilities may be more comparable and are closer to one another.

In a number of cases firms have nevertheless invested in greenfield global laboratories to reach out for foreign centers of excellence. A number of Japanese and European R&D laboratories are thus located in American high tech clusters, where lead customers, major companies and frontier research are concentrated.¹⁹ Generally, global laboratories are much less pulled by production units and much more by scientific and technological resources. Demand characteristics play a complementary role as global laboratories may benefit from on-the-spot learning in lead markets and adaptation to sophisticated customer needs.

According to a survey of 700 Japanese affiliates in the United-States, in 1998, 137 conducted R&D activities (Iwasa and Odagiri 2004). Among those, 106 (77%) had support laboratories and 31 (23%) research laboratories. This proportion of research laboratories may actually be higher than average as the US are particularly attractive for R&D and as a number of Japanese firms have conducted technology sourcing strategies. On average, the share of global laboratories is probably not higher than 20% of foreign R&D, with sectoral and firm variations. The exact role of global laboratories and their interactions with the home country also vary across and within sectors.

The global development center

Global development centers are in charge of R&D tasks that can be separated and plugged back into the innovation process of the multinational. These new foreign units correspond to the increasing pressure on R&D costs. The cost-efficiency ratio is thus the main determinant of the location of these global development centers. India may be the country where this type of foreign R&D centers is the most developed and some consider that the country could become a global R&D hub (EIU 2004, Wharton 2005). Such centers also exist in the new EU member states and in Russia. New R&D activities are rapidly expanding in China, but the main driver there seem to be foreign production and expanding local markets rather than access to low cost engineers and scientists. Some R&D units may nevertheless combine global and local development activities.

Initially, global development centers correspond to the relocation of a subset of R&D activities from the home country to a lower cost country. They may however upgrade from subcontracting to more autonomous and sophisticated tasks. Their contribution may also not be limited to reducing costs, but can also allow the company to speed up development by involving more human resources or work around the clock. Software development in particular has been benefiting from such arrangements.

Multinationals tend to integrate the three types of R&D units within global networks. Local development centers are the most numerous and the most geographically dispersed. The existence of several global laboratories and the exact role of global development centers vary across sectors and firms. First, technology sourcing varies across sectors; low- and mid-technology sectors tend to keep a relatively more centralized R&D organization than high-tech sectors. Second, the location of global research laboratories depends on the world distribution of frontier research in each sector or scientific field.²⁰ Third, the specific organization of multinationals may also differ within sectors, depending on their country of origin, strategy and international experience.

¹⁹ For data and examples, see Florida (1997), Sachwald (2003), Iwasa et Odagiri (2004), Kaiser and Prange (2004).

²⁰ This feature is developed below with a comparison between the US and Europe.

3. Future Evolution of Country and Sector Distribution of FDI

Economic growth, continuing liberalization of FDI and trade combined with increasing global competition will drive further expansion of multinational activities. This trend is confirmed by surveys for the near future.²¹ In this context, most countries, developed and developing alike, tend to increase their promotion measures to attract FDI. As a result, global and regional competition for FDI will continue to increase.

Multinational activities are still highly concentrated in advanced countries, but recent trends have been more favorable to FDI into developing countries. In 2003, 72% of the world stock of inward FDI was concentrated in developed countries, against 79% in 1990 (UNCTAD 2005). The activities of affiliates of U.S. multinationals are even more concentrated in high-income countries: in 2003, they accounted for 81% of the value added by all foreign affiliates (Mataloni 2005). Their share of employment in total employment by foreign affiliates of U.S. companies has nevertheless been diminishing since the mid-1990s.

According to recent surveys, the positive outlook for global FDI over the next couple of years will be driven by the potential of specific regions and primarily by developing countries. This third part draws on the discussion above to analyze the country and sector distribution of FDI in the future. It argues that low-cost countries seem well placed to attract an increasing share of both horizontal, demand driven FDI and vertical, supply driven, FDI.

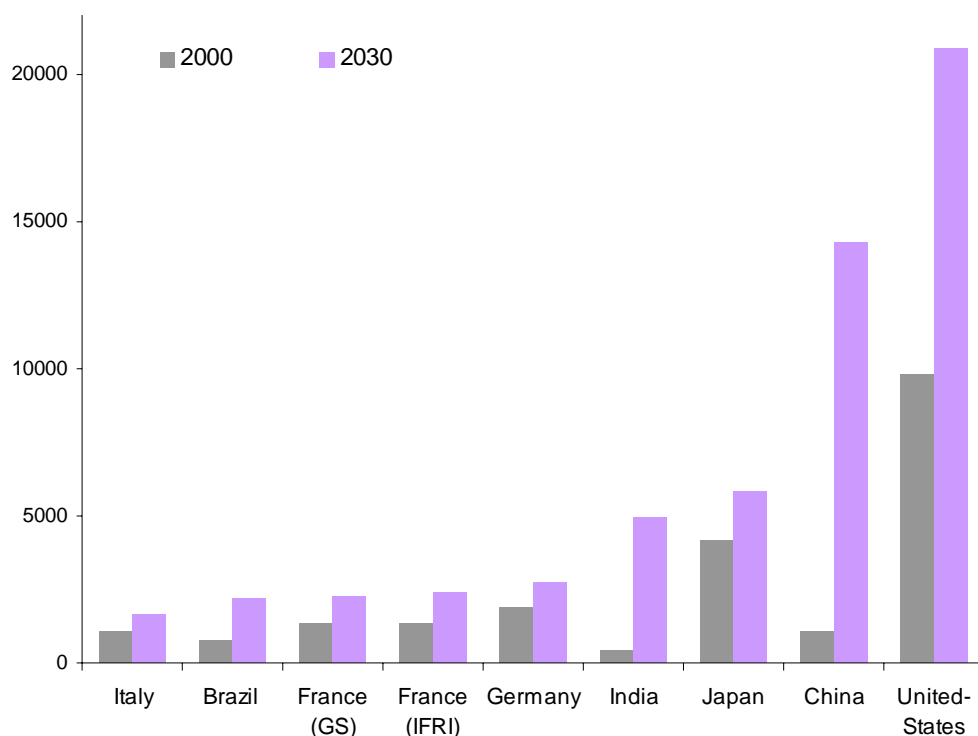
3.1 Demand driven FDI

During the 1980s, economic crisis in a number of emerging countries had resulted in a contraction of FDI to these countries and an increasing share of FDI to developed countries (Figure 3). Since the 1990s, on the contrary, a number of low-cost countries have experienced strong growth and have attracted more FDI. The surge in FDI to advanced countries at the end of the decade was largely due to the M&A wave and short-lived. Since 2000, the previous trend in favour of developing countries has resumed. The growth differential in favour of developing countries that are in a catching-up phase is a long term trend and should continue to attract FDI. Estimates in Figure 7 show that the relative economic size of large emerging countries will substantially increase over the next generation.

The role of growth and economic size as a driver for FDI can be partly related to the large share of services in FDI, both in developed and developing countries. Since the 1990s, FDI in service sectors has been encouraged by liberalization in a number of activities. For the coming years, FDI outlook for services continues to be more positive than for manufacturing or primary sectors. The sectors at the forefront of FDI growth include computing/ICT, utilities, transportation and tourism (UNCTAD 2005).

²¹ Like the survey on FDI prospects by UNCTAD (2005).

Figure 7. Economic size of major countries in 2000 and 2030, in \$ 2000bn



Sources: Goldman Sachs (2003) and Miotti and Sachwald (2004) for France IFRI (\$2424bn in 2030 instead of 2267 for GS).

Figure 8 globally confirms the traditional relationship between growth and FDI, both for the 1990s and for the recent period. The U.S. share of world FDI reached high values at the end of the 1990s and it has bounced back at 15% in 2004.²² For the near future, the demographics and growth perspectives of America are much better than for a number of other industrialized countries. On the contrary, slowdown of growth and structural weaknesses in a number of EU countries hinder the recovery of FDI. Figure 8 shows that the share of France and Germany in world FDI tends to decrease. In the case of Germany, where inward FDI is quite low, the surge in 2000 was related to the M&A wave, and in particular the acquisition of Mannesmann by Vodafone in the context of the new economy bubble.²³ Heavily regulated service sectors also contribute to the lower attractiveness of some European countries (Smarzynska and Sptareanu 2005). Heavy regulation in services and the persistent fragmentation of European markets in service activities thus weigh on the attractiveness of the EU as a whole.

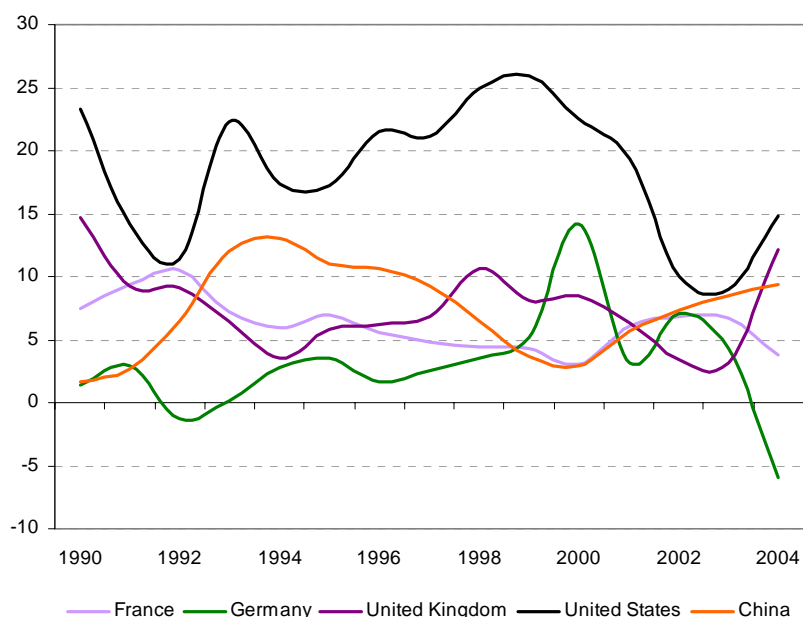
Brighter prospects for FDI to European countries thus depend on the same factors as higher rate of growth. The case of France may be taken as an illustration. Figure 7 includes two different previsions for the size of the French economy in 2030. IFRI's higher prevision is based on slightly more favorable hypotheses than the baseline scenario with respect to working population and the rate of technological progress. But

²² According to the revised data from UNCTAD (2005), FDI to China was not higher than to U.S. in 2003.

²³ In 2000, FDI to Germany was \$198bn and Vodafone acquired Mannesmann for euro178bn.

these hypotheses depend in turn on evolutions in the regulation of both the product and labor markets, as well as higher investments in knowledge.²⁴

Figure 8. Distribution of FDI flows, in % of world total*



*Countries on the figure represent between 32 and 51% of world total depending on the year (34% in 2004).

Source: UNCTAD

Two complementary factors will influence the geographical distribution of world FDI. First cross-border M&A, which account for a high proportion of FDI to developed countries. At the end of the 1990s, the M&A boom in developed countries drove the surge in world FDI. The market for M&A has been low since 2000, but rose in 2004 and 2005 and should keep rising in the near future with a positive impact on FDI to high-income countries, as illustrated by the United-States and the United Kingdom in 2004. In 2004, cross-border acquisitions in the U.K have jumped 85% and inward FDI 286% (UNCTAD 2005). As a result, the share of the U.K in global FDI has bounced from 3.2% in 2003 to 12% in 2004 (Figure 8). In 2004, the acquisition of U.S. businesses has also been driving the increase in FDI (Anderson 2005). In developing countries, the share of greenfield FDI is on the contrary expected to rise as investment driven by privatization is declining and a number of countries, such as India, are actively seeking greenfield investment through regulatory reforms and incentives. Some emerging countries also acquire companies in advanced countries and contribute to FDI inflows. This is the case for example of some Chinese and Indian firms that acquire firms in developed countries to speed up their market access with local brands and commercial networks. Lenovo has acquired the PC business of IBM and TCL the TV activities of Thomson. A number of Indian firms have acquired U.S. small companies in IT services to come closer to their potential clients.

²⁴ Numerous studies have discussed the growth prospects and relevant policies in various European countries. Apart from work by OECD, see Heckman (2002), Sapir *et al.* (2003), Miotti and Sachwald (2004), Sapir (2005). Dosi *et al.* (2005) focus on the scientific and innovation performances and policies.

The second factor, outward FDI from emerging countries, should on the contrary have a positive impact on the share of low-income countries in global FDI. Dynamic growth from a number of developing countries as well as increasing regional trade are likely to stimulate FDI among developing countries. A substantial share of FDI to China for example comes from neighboring emerging countries: in 2004, out of a total of \$61 billion, \$19bn came from Hong Kong and substantial amounts from Korea and Taiwan.²⁵ In the future, India and China could increase their new investments in each other's economies. The most advanced New Members of the EU, such as Hungary or Slovenia, also increasingly invest in the neighbouring countries (Havlik *et al.* 2005).

3.2 Supply driven FDI

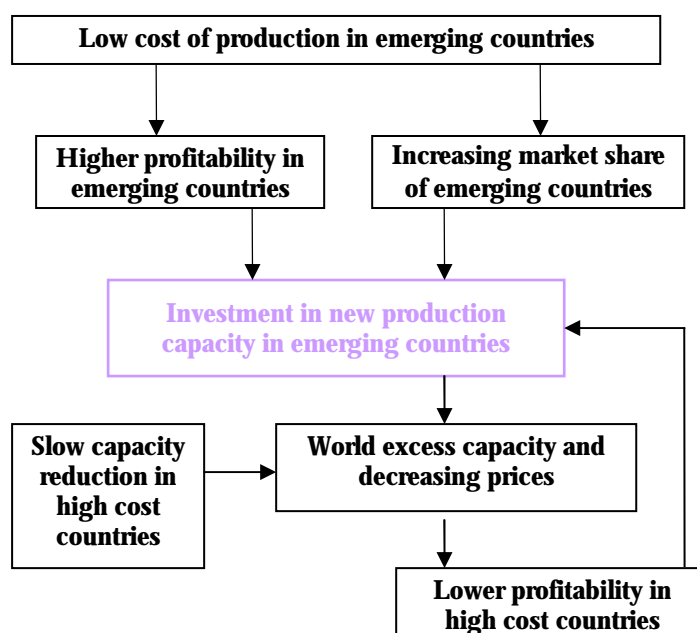
The discussion in section 2 above indicates that vertical FDI (VFDI) is concentrated in manufacturing and constitutes a growing share of total FDI to developing countries. In 2001-2002, the share of manufacturing FDI into developed countries was 18%, while it reached 50% in developing countries (UNCTAD 2005). We have also suggested that VFDI may be underestimated by economic studies as it is a recent phenomenon and a minority share of total FDI. In order to discuss the role of VFDI as a driver for FDI to developing countries, it is nevertheless useful to notice that VFDI is sometimes overestimated in the debates on outsourcing and offshoring to low-wage countries. The distinction between offshoring and outsourcing is important to assess the role of VFDI and its industry distribution.

Global offshoring has been intensifying and constitutes a major force reshaping competition in a number of sectors. A substantial part of offshoring, both in manufacturing and in services, takes place at arms length, through various subcontracting arrangements. In these cases, offshoring does not involve FDI. A detailed study based on individual firm data for France covering the period 1995-2001 has confirmed that offshoring to low-wage countries is concentrated in labor-intensive sectors, such as footwear, leather, textile and household appliances (Aubert et Sillard 2005). The study has further showed that offshoring to low-wage countries is mainly operated through outsourcing rather than FDI. Offshoring, or “delocalization”, seems concentrated in sectors in which high-wage countries have lost their comparative advantage. As illustrated by Figure 9, in a number labor-intensive activities, high-wage countries are losing market share as cost-based competition toughens and production is shifting to low-wage countries. The process takes place mostly in traditional industries such as clothing, but also in some electrical or electronic appliances. In these industries, emerging countries are progressively able to generate local firms that produce for world markets, even if it is first through brands and distribution channels from advanced countries. There are few multinationals in these sectors and when it is the case, their competitive asset is their portfolio of brand names, which allow them to target high-end and luxury markets. The largest such multinationals are LVMH and Christian Dior.²⁶

²⁵ Part of which circulates through offshore banks before arriving in China (UNCTAD 2005).

²⁶ According to UNCTAD classification by foreign assets, they are respectively number 78 and 85.

Figure 9. Relocation of production capacity to low-cost countries in labor-intensive sectors

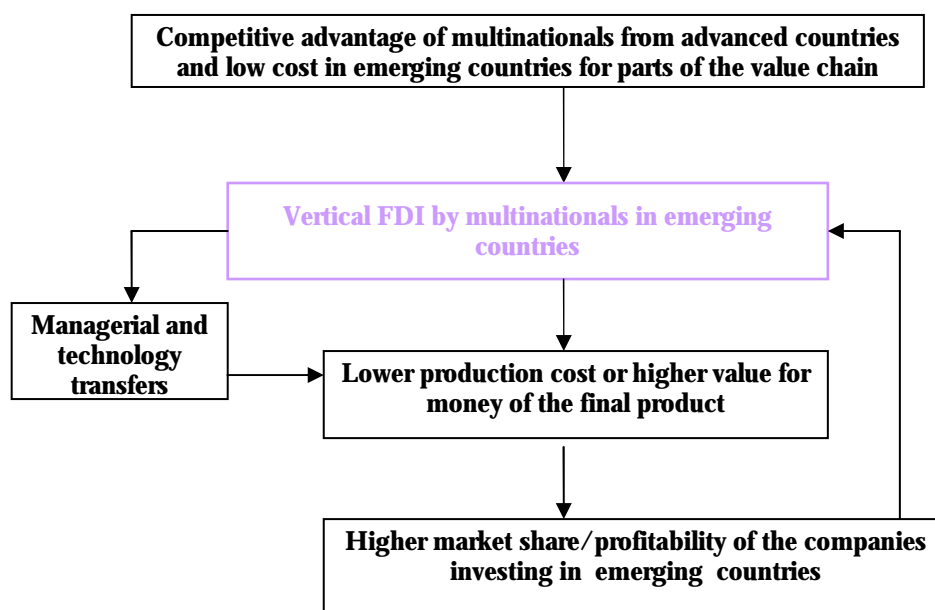


VFDI is rather concentrated in industries in which industrialized countries had strong comparative advantage and where multinationals keep competitive advantages, but where one or several stages of production are nevertheless labor- or resource-intensive.²⁷ These industries include electrical, electronic and telecom equipment in particular.²⁸ The car industry is concerned, mostly on a regional basis as within the EU and NAFTA. Figure 10 illustrates the dynamics of VFDI. It is originally motivated by the wage gap and may be further expanded as low-wage countries build up human resources and infrastructure to support more efficient operations. Skills and productivity tend to be stimulated by technology and know-how transfers from multinationals themselves. FDI is also stimulated by the reduction in transport and communication costs, and by the increasing openness to trade and FDI of the host country, as discussed in part 2 (table 1).

²⁷ See table 1 and the discussion in part 2.

²⁸ They also include the oil industry, which has generated large multinationals; in 2003, there were four oil companies in the 10 largest multinational companies (ranked by foreign assets, UNCTAD 2005).

Figure 10. Vertical FDI to low-cost countries



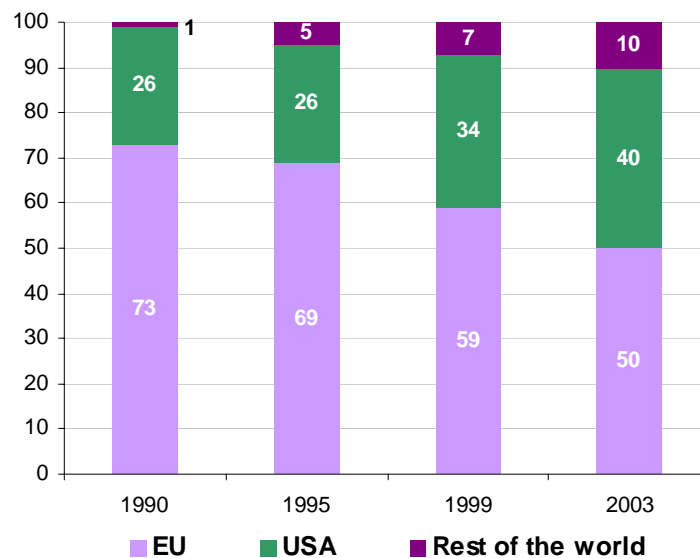
In Europe, the process of enlargement in the 1990s has stimulated both horizontal and vertical FDI; between 1995 and 2004, the stock of FDI in the new member states (NMS) has increased fivefold, nearly twice as fast as the world stock (UNCTAD 2005). Over the most recent period and since enlargement, it seems that VFDI has been particularly dynamic in the automobile industry, including both carmakers and equipment suppliers. As suggested by figure 10, such regional division of labor has strengthened the competitiveness of the multinationals that invested in the new member states (Sachwald and Radosevic 2005). Such a process will continue in different activities, involving smaller firms now that enlargement has taken place and FDI in NMS has become easier and less risky. VFDI in the car industry and in domestic appliances thus contributes to the increasing flows of foreign investment to NMS in 2004 and 2005 (Havlik *et al.* 2005). Besides, export-oriented services are an emerging field for VFDI in NMS. Wages are higher than in Asia, and rapidly increasing in some areas, but the NMS have relatively skilled human resources speaking the different European languages and benefit from geographical proximity with the EU.

Both in Asia and Europe, VFDI will continue to be a driver of global FDI. In both regions, it will drive FDI between low-cost and high-cost countries, but will also contribute to investment among emerging countries. Increasing commodity prices and supply shortages also stimulate investment in exploration and production facilities. This trend should continue to drive FDI, including between emerging countries.

Finally, VFDI is also a driver of FDI in R&D. As discussed above, the most likely hosts here are advanced, high-wage countries. Technology sourcing and vertical FDI in R&D mostly fuel FDI among advanced countries, even if it generates some flows from emerging countries. But VFDI also exist from advanced to low-cost countries for some

technical and development tasks.²⁹ This is the case in particular between EU countries and some NMS, as well as between the United States and India. As discussed above the development of more complex global innovation networks will generate investment in different types of R&D units in different types of countries. In this context, competition to attract FDI in R&D will keep increasing.

Figure 11. Geographical distribution of R&D spending by European pharmaceutical companies, in % of world total



Source: EFPIA

The United States has been a major magnet for such investment so far, including from European countries. In 2000, European firms spent \$ 18.6bn for R&D in the United States, while U.S. firms only spent \$12.9bn for R&D in Europe.³⁰ A number of European countries seem to have lost some of its attractiveness for high-tech and R&D FDI, even if there are of course differences across sectors and countries (Sachwald 2005b). Figure 11 illustrates the case of pharmaceuticals, where Europe used to hold strong market and innovation positions. In 1987-1991, Europe launched 101 new medicines on the world market and the U.S. 54 (EFPIA 2002). In 1997-2001 the positions were reversed, with the U.S. launching more new (84) medicines than Europe (79).

²⁹ See Box 1 for the presentation of the *global development center*.

³⁰ Data on R&D FDI is from NSF (2004). In 2000, the stock of European FDI in the U.S. and American FDI in Europe was of comparable size.

Conclusion

FDI and its geographical distribution respond to both cyclical and structural determinants. This paper has focused on the structural determinants of FDI. It has argued that the development of global production and innovation networks by multinational companies is a structural determinant that influences the distribution of FDI over the long term.

In the context of globalization, the distribution of FDI is influenced by an increasingly diverse set of factors. Firstly, liberalization of trade and investment, combined with lower costs of transport and communication, stimulate the organization and re-organization of global networks in order to optimize cost and efficiency. Secondly, emerging countries represent investment opportunities both because of their increasing market potential and because of their enhanced production capabilities. As a result of these trends, production, distribution and R&D facilities have become more mobile and responsive to the relative attractiveness of countries, not only at the industry level, but also for the different activities along the value chain. Opportunities for FDI have increased, but competition for attracting FDI has also increased.

Since 2001, the post-new economy dynamics have been favorable to a reallocation of FDI to developing countries as profitable opportunities have dried up in a number of advanced countries and new opportunities have come up in low-cost countries. First, horizontal FDI has been attracted by strong growth in emerging countries. Second, vertical FDI has been stimulated by the need to face tougher cost competition on world markets. The paper has argued that in this context, the share of vertical FDI has increased. As vertical FDI develops and as companies organize complex production and innovation networks, it may become more difficult to distinguish vertical and horizontal FDI. A number of countries receive both horizontal and vertical FDI, but the two flows typically go to different sectors. In the case of China, horizontal FDI dominates in the car industry, while vertical FDI dominates in computer assembly. This may change if China becomes a competitive exporter of cars. Such an evolution has already taken place in some Eastern European countries. As recalled in the paper, German carmakers first operated local assembly in CEECs to access local markets, before increasing vertical FDI to lower their production costs. Such complex evolutions may become more common in the future. They could also develop in the context of global innovation networks, where some foreign R&D units may change their role as the local technological capabilities upgrade. Such potential evolutions make predictions about the future allocation of FDI quite difficult.

Besides, the evolution of competitiveness and specialization will influence the geographical distribution of FDI. Advanced countries have to seek new opportunities through continuous innovation, while they relocate part of their production capabilities in low-cost countries. Relocation of production to low-cost countries could thus, paradoxically, reinforce the attractiveness of some advanced countries and fuel future FDI flows in high-tech sectors and services. Such a favorable evolution requires however a strong commitment to innovation and an ability to upgrade the national productive profile.

References

- Almeida, P., 1996, "Knowledge sourcing by foreign multinationals: patent citation analysis in the U.S. semiconductor industry". *Strategic Management Journal*. Vol. 17. 155-165.
- Anderson, T., 2005, "Foreign Direct Investment in the United States. New Investments in 2004", *Survey of Current Business*, June.
- Aubert, P. et P. Sillard, 2005, « Délocalisations et réductions d'effectifs dans l'industrie française », dans *L'économie française*, INSEE.
- Barba Navaretti, G. and A. Venables, 2004, *Multinational Firms in the World Economy*, Princeton University Press.
- Beise, M., 2004, "Lead markets: Country-specific drivers of the global diffusion of innovations", *Research Policy* 33, 997-1018.
- Bloningen, B., 2005, *A Review of the Empirical Literature on FDI Determinants*, NBER Working Paper 11299, April.
- Bloningen, B., R. Davies and K. Head, 2003, "Estimating the Knowledge-Capital Model of the Multinational Enterprise : Comment", *The American Economic Review*, June, 980-994.
- Braconier, H., P-J. Norbäck and D. Urban, 2005a, "Reconciling the Evidence on the Knowledge-capital Model", *Review of International Economics*, 13(4), 770-786.
- Braconier, H., P-J. Norbäck and D. Urban, 2005b, "Multinational enterprises and wage costs: Vertical FDI revisited", *Journal of International Economics* 67, 446-470.
- Buch, C., J. Kleinert, A. Lipponer and F. Toubal, 2005, "Determinants and effects of foreign direct investment: Evidence from German firm-level data", *Economic Policy* 41, January.
- Chung, W., and J. Alcacer, 2002, "Knowledge Seeking and Location Choice of Foreign Direct Investment in the United States", *Management Science*, 48, 1534-54.
- Dosi, G., P. Llerena, et M. Sylos Labini, 2005, *Evaluating and comparing the innovation performance of the United States and the European Union*, Report prepared for the TrendChart Policy Workshop, 29 June.
- Doz, Y., Santos, J., Williamson, P., 2001, *From Global to Metanational: How Companies Win in the Knowledge Economy*, Boston: Harvard Business School Press
- Dunning, J., 1981, *International Production and the Multinational Enterprise*, Allen & Unwin, London.
- EFPIA, *Year in Review*, November 2002
- EIU, 2004, *Scattering the seeds of invention. The Globalisation of R&D*, The Economist Intelligence Unit.
- Feenstra, R., 1998, "Integration of Trade and Disintegration of Production in the Global Economy", *Journal of Economic Perspectives*, Vol. 12, 4.
- Florida, R., 1997, "The globalization of R&D: results of a survey of foreign affiliated R&D labs in the US", *Research Policy*, 85-103.
- Franke, P., 2005, "Global FDI flows – an update", Economic briefing, Commerzbank Economic Research, 01/03.
- Frost, T., 2001, "The geographic sources of foreign subsidiaries' innovations", *Strategic Management Journal*, Vol. 22,101-13.

- Fukao, K., H. Ishido and K. Ito, *Vertical intra-industry trade and FDI in East Asia*, Hitotsubashi University, 01-2003.
- Gerybadze, A., Reger, G., 1999, "Globalization of R&D: Recent changes in the management of innovation in transnational corporations", *Research Policy*, Vol. 28, N° 2-3, p. 251-274
- Goldman Sachs, 2003, "Dreaming with BRICS: The Path to 2050", *Global Economic Papers* n°99.
- Hanson, G., R. Mataloni and M. Slaughter, 2001, *Expansion Strategies of U.S. Multinational Firms*, NBER Working Paper 8433, August.
- Havlik, P., L. Podkaminer and V. Gligorov, 2005, *Accelerating GDP Growth, Improved Prospects for European Integration*, WIIW Research Reports, March.
- Heckman, J., 2002, "Flexibility, job creation and globalization: The Case of Italy", Third Millennium Colloquia, Instituto di Studi Economici et per l'Occupazione, Venice, 2-3 dec.
- Hennart, J-F. and Y-R. Park, 1994. Location, Governance and Strategic Determinants of Japanese Manufacturing Investment in the United States. *Strategic Management Journal*. 15: 419-36.
- Heymann, E., 2004, 'The automobile market in Eastern Europe', *Deutsche Bank Research*, July 7.
- Hymer, S. , 1960, *The International Operations of National Firms*, Ph.D thesis (published by M.I.T Press)
- Iwasa, T. and H. Odagiri, 2004, « Overseas R&D, knowledge sourcing and patenting : an empirical study of Japanese R&D investment in the US », *Research Policy* 33
- Kaiser, R. And H. Prange, 2004, "The reconfiguration of national innovation systems: The example German biotechnology", *Research Policy* 33.
- Kaminski, B. and B. Smarzynska, 2001, '*Foreign Direct Investment and Integration into Global Production and Distribution Networks: The Case of Poland*', Working paper 2646, *World Bank*, Washington DC.
- Kleinert, J., 2001, *The Role of Multinational Enterprises in globalization: An Empirical Overview*, Kiel Working Papers n°1069, August.
- Kogut, B., Chang S., 1991, Technological Capabilities and Japanese Foreign Direct Investment in the United States, *The Review of Economics and Statistics*, LXXIII, 401-413.
- Koudal, P., 2004, *Growing the Global Corporation. Global Investment Trends of U.S. Manufacturers*, Deloitte Research
- Mataloni, R., 2005, "U.S. Multinational Companies. Operations in 2003", *Survey of Current Business*, July.
- Meyer-Kramer, F., Reger, G., 1999, "New perspectives on the innovation strategies of multinational enterprises: lessons for technology policy in Europe", *Research Policy*, Vol. 28, p. 751-776
- NSF, 2004, *Science and Engineering Indicators 2004*, National Science Foundation.
- Miotti, L., Sachwald, F., 2003, "Cooperative R&D: why and with Whom? An Integrated Framework of Analysis", *Research Policy* 32.
- Miotti, L. and F. Sachwald, 2004, *Growth in France Between 1950 and 2003: The Challenge of Innovation*, IFRI (www.ifri.org).
- Radosevic, S. et F. Sachwald, 2005, *Does Enlargement Conceal Globalisation ? Location issues in Europe*, Note de l'ifri n°58, IFRI/ La Documentation Française

- Reger, G., 2001, "Differences in the Internationalization of R&D between Western European, Japanese and North American Companies", EIBA 27th Annual Conference Paris, December 13-15
- Rhys, G., 2004, "The Motor Industry in an Enlarged EU", *The World Economy*, vol. 2, 877-900.
- Sachwald, F., 2003, "Les migrations de la recherche", *Sociétal*, 4^e trim.
- Sachwald, F., 2004, The Integration of China and East European Countries in Global Networks: Are European Multinationals Different?, Tokyo Club Research Meeting, Brookings Institution, Washington D.C, Feb. 8-9.
- Sachwald, F., 2005a, *The Impact of EU Enlargement on Corporate Strategies and the Location of Production in Europe*, Tokyo Club Research Meeting, Tokyo, Nov. 8-9.
- Sachwald, F., 2005b, « Mondialisation et attractivité de la France pour la R&D des entreprises », P. Larédo and F. Sachwald, *Le système français d'innovation dans l'économie mondiale*, IFRI/IDEP, La Documentation française, downloadable from www.institut-entreprise.org
- Sapir, A., 2005, *Globalisation and the Reform of European Social Models*, Bruegel, Sept., downloadable from www.bruegel.org
- Sapir, A., P. Aghion, G. Bertola, M. Hellwig, J. Pisani-Ferry, D. Rosati, J. Vinals et H. Wallace, 2003, *An Agenda for a Growing Europe: Making the EU System Deliver*, report established on the initiative of the European Commission President Romano Prodi (published by Oxford University Press).
- Serapio, M., and D. Dalton, 1999, *Globalizing industrial research and development*, Office of Technology Policy, Sept.
- SESSI, 2002, « Les échanges internationaux au sein des groupes », *Le 4 Pages* n°167, Ministère de l'économie, des finances et de l'industrie, Paris.
- SESSI, 2003, *Les échanges internationaux intragroupe dans la mondialisation industrielle*, Ministère de l'Economie, des Finances et de l'Industrie, Paris.
- Smarzynska, B. et M. Sptareanu, 2005, « Do Foreign Investors Care about Labor Market Regulations ? », *Review of World Economics*, vol. 141 nb. 3.
- Sturgeon, T., 2002, "Modular production networks: a new American model of industrial organization", *Industrial and Corporate Change*, vol. 11, nb. 3, 451-496.
- UNCTAD, 2005, *World Investment Report 2005*, UNCTAD, Geneva.
- Vernon, R., 1966, "International investment and international trade in the product cycle", *Quarterly Journal of Economics*, Vol. 41.
- Veugelers, R., 2005, "Internationalisation of R&D: Trends, drivers and impact on host and home countries", Background report, OECD Forum on the internationalization of R&D, Brussels 29-30 March.
- Wharton, 2005, "R&D in India: The Curtain Rises, The Play Has Begun...", *Knowledge at Wharton*, August, www.knowledge.wharton.upenn.edu
- Zedtwitz von, M. and O. Gassman, 2002, "Market versus technology drive in R&D internationalization: four different patterns of managing research and development", *Research Policy* 31, 569-588.