Foreign Direct Investment and International Trade: Complements or Substitutes?

Lionel Fontagné

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FOREIGN DIRECT INVESTMENT AND INTERNATIONAL TRADE: COMPLEMENTS OR SUBSTITUTES?

Lionel Fontagné

The relationships between trade and foreign investment (FDI) are at the core of globalisation. Analytical work has recently been developed by OECD in order to explore the nature of these links in quantitative terms. This report combines the previous more technical work developed over the last three years.

This empirical work revealed the complexity of these links but, at the same time, showed the main and positive influence of foreign direct investment on international trade particularly after the mid–1980s. Empirical results show that foreign direct investment abroad stimulates the growth of exports from countries of origin and consequently this investment is complementary to trade.

L'INVESTISSEMENT ETRANGER DIRECT ET LE COMMERCE INTERNATIONAL : SONT-ILS COMPLEMENTAIRES OU SUBSTITUABLES ?

Lionel Fontagné

Les liens entre les échanges et les investissements étrangers directs sont au coeur du processus de mondialisation. Des travaux analytiques ont été développés récemment par l'OCDE pour explorer la nature de ces liens sur le plan quantitatif. Le présent rapport fait une synthèse des précédents travaux à caractère plus technique qui étaient développés au cours des trois dernières années.

Ces travaux empiriques ont révélé la complexité de ces liens, mais ont également démontré l'influence majeure et positive qu'exerce l'investissement direct sur les échanges, particulièrement après le milieu des années 80. Les données ont montré que les investissements directs à l'étranger stimulent l'accroissement des exportations des pays d'origine et sont par conséquent complémentaires aux échanges.

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MAIN RESULTS

The interaction between trade and foreign direct investment (FDI) is a main feature of globalisation. It provides part of the answer to the question of what globalisation means for the economy and for the general public. Nevertheless, the lack of comprehensive data and the dynamic nature of the relationship -- with different factors coming into play over time, across countries and at different levels of aggregation (economy-wide, sectoral and at the level of the firm) -- have meant that empirical work in this area has been technically complex and the results seemingly inconclusive. The purpose of this report is to synthesise this work, examine it more systematically with a unique database developed by the OECD which links bilateral trade flows and foreign direct investment flows in a common sectoral nomenclature for a sample of countries, and presents the results in a more accessible manner for policy makers.

Key findings from this work include:

♦ The relationship between trade and direct investment, which is one of the main features of globalisation, is complex and cannot be inferred from a purely theoretical analysis.

♦ Empirical work shows that, until the mid-1980s, international trade generated direct investment. After this period, the cause-and-effect relationship seems to have been reversed, with direct investment heavily influencing trade.

♦ In particular, the evidence indicates that foreign investment abroad stimulates the growth of exports from originating countries (investing countries) and, consequently, that this investment is complementary to trade. A analysis of 14 countries demonstrated that each dollar of outward FDI produces about two dollars' worth of additional exports.

♦ Conversely, in host countries, short-term foreign investment most often tends to increase imports, whereas an increase in exports appears only in the longer term. However, in the short term, host countries enjoy many benefits from foreign investment (technology transfers, job creation, local subcontracting, etc.).

♦ Empirical results show that the nature and extent of the relationship (complementarity or substitution) can differ from one country to another. For example, American outward investment has a more pronounced complementary effect than outward investment from European countries

(*e.g.* France, United Kingdom). American investment abroad also has a greater bilateral trade effect for both imports and exports.

♦ Unlike the situation in France, the impact of inward FDI on US exports is not significant. This can be explained by the difference in the size of the respective domestic markets. Foreign companies invest in the United States mainly because of the ample US domestic market. But this lesser complementarity is also observed for imports: whereas each dollar of inward investment is associated with an additional USD 1.40 of imports in France, it is associated with only 60 cents in the United States.

♦ Unlike the predominant situation in most other countries, inward investment in the United Kingdom has a complementary effect on trade. However, given the weakness of certain statistical results, this relationship will need to be confirmed with more detailed data.

These conclusions need to be further examined in the context of individual countries. Therefore, in future work, it would be worthwhile to:

♦ Look more closely at the causalities and factors that account for the differences across countries, and, in some cases, within the same countries during different periods.

♦ Test the soundness of the results obtained by discontinuing the use of data on investment flows and stocks in favour of information about the activities of foreign firms (output, turnover, etc.).

♦ Thoroughly address the role of services.

♦ Consider the form of inward and outward investments (greenfield, merger/acquisition, joint venture, brownfield, etc.), but also their nature (marketing or financial subsidiary, distribution channel, manufacturing subsidiary, etc.), as it is very likely that their effects on trade could be different.

♦ Analyse the role of country size in the bilateral relationship between trade and investment.

♦ Allow for concentration in direct investment, given that a small number of firms in each sector account for the bulk of investment abroad.

♦ Evaluate the nature of the relationship between trade and investment at the level of economic entities and free trade zones (European Union, NAFTA, etc.).

♦ The analysis could also be expanded by considering certain indirect effects of international investment on trade via externalities that influence productivity, growth and technology.

Most of these new studies will not be possible, however, unless the OECD Member countries are prepared to furnish the necessary quantitative information.

1.   INTRODUCTION

The relationships between trade and foreign direct investment (FDI) are at the core of the multidimensional issues of globalisation which have transformed the structure of trade:

♦   First, FDI flows recorded a 19% increase in 1997 and a 10% increase in 1998, to reach roughly USD 440 billion. While this has been dwarfed by even larger flows of portfolio investment, the expansion of FDI and the accompanying restructuring of firms signalled by alliances, mergers, turnkey contracts, etc., indicates a fundamental transformation of production and other economic activities across international borders.

♦   Second, intra-firm trade accounts for an increasing share of world trade, perhaps as much as one-third by the end of the millennium, and the international division of labour is becoming more complex. While increased exchange of goods-in-process signals vertical integration of production in different countries, new forms of horizontally integrated operations are emerging. Economies specialise in novel ways, resulting in new gains, as a wider variety of differentiated intermediate and final goods are produced where they can be done so most efficiently (Fontagné *et al.*, 1996; Hummels *et al.*, 1998).

♦   Third, traditional schemes of specialisation, according to which countries only export products in which they have a comparative advantage, are shrinking. Countries increasingly trade within industries, exporting and importing different varieties or qualities of products of the same industry. Speed, reliability of service, flexibility and ability to respond to the needs of specific customers and counterparts are becoming crucial for competitiveness across a widening industrial spectrum. In this context, technology and knowledge are restructuring the global economy. Education, lifelong learning, R&D and the innovative efforts undertaken by private firms, governments and other institutions, interact in a number of ways which can give rise to virtuous as well as vicious circles of behaviour and economic performance (OECD, 1998*b*).

♦   Fourth, there is an increasingly rapid process of creative destruction; incomes and opportunities are redistributed and the winners and losers are not the same. Overall, the OECD and the world economy are experiencing a period of growing income differences within, as well as between, different economies. The general public remains suspicious of globalisation, especially as regards foreign investment, its most tangible manifestation.

The relationships between trade and investment have attracted economic and policy attention for many years. This was recently underscored by the establishment of a WTO working group on the relationship between trade and investment at the Singapore Ministerial Conference of late 1996. This group had a four-item agenda, covering: the implications of the relationship between trade and FDI for development and economic growth; the economic relationship between trade and FDI; existing international arrangements and initiatives on trade and investment; and issues relevant to the design of future initiatives. The group submitted its report in 1998 (WTO, 1998).

The report concluded that the relevant relationship between trade and FDI is not limited to the strict issue of whether they are complementary or not. Among other things, the presence of externalities and technology transfers has to be taken into account:

> *"(...) the point was made that [members] converged in respect of their assessment of the positive contribution of FDI to economic development and growth. (...) [To be noticed:] the shift in attitudes of many developing countries toward the recognition of the positive contribution of FDI; (...) the growing importance of FDI to host economies as a vehicle for the transfer of intangible assets (...); the complementarity relationship between trade and FDI (...)." (WTO, 1998, pp. 7-8)*

The impact of FDI on trade has been much debated and studied in the literature since it provides an indication of how the international specialisation of countries is affected by globalisation and, hence, holds a clue to understanding the welfare effects. As already indicated, however, the measurement of the relationship between investment and trade gives rise to a range of issues. The OECD's construction of a detailed sectoral database (OECD, 1997; 1998a) has provided a tool for the Statistical Working Party of the Industry Committee's Session on Globalisation to explore these issues statistically.

Against this background, this paper seeks to provide an analytical foundation for characterising the relationship -- complementarity or substitutability -- between trade and FDI. Following a synthesis of the existing literature analysing the behaviour at the firm (micro) and the country-wide (macro) level, the detailed sectoral database assembled by the OECD is used to provide insights into the evolving, dynamic nature of the relationship between FDI and trade and into some of the differences that exist across countries (OECD, 1996b; 1997; 1998b).

The paper is organised as follows. Section 2 reviews the potential economy-wide effects of FDI, including the financial, technology transfer and competition effects. Section 3 explores the interaction between FDI and trade and examines alternative strategies to identify these relationships. It also seeks to provide insights into the differences found between micro- and macroeconomic analyses. Empirical evidence at the industry level is presented in Section 4. Section 5 concludes and addresses the main policy issues associated with the mechanisms identified.

2.   POTENTIAL ECONOMY-WIDE EFFECTS OF FDI

        The dramatic increase in FDI over the last decade has had at least three sources. First, technological improvements in communications, information processing and transportation, coupled with new organisational structures, have enabled firms to become more effective in existing firms. Second, the changing framework of international competition has led to the liberalisation of capital flows among developed countries, deregulation of key sectors such as telecommunications, and further steps towards integration in Europe. Third, developing countries are increasingly liberalising their regimes for inward foreign investment. These countries accounted for 37% of total FDI flows in 1997, an increase of 20 percentage points since 1990. At present, one-third of the world's FDI *stock* is located in developing countries, although it remains heavily concentrated in a few of them.

        One interesting indicator is the *ratio of international to domestic investment* (Table 1). On average, the ratio of inward FDI to domestic investment has changed little in the recent period for developed economies, with the exception of France. In contrast, the ratio of outward flows to domestic investment has increased disproportionately; doubling in the United States, for example. In the United Kingdom, outward FDI now represents one-fifth of domestic investment. In the developing countries, the increase in inward flows has been very sharp, notably in Central Europe where inward FDI accounts for one-fifth of domestic investment. Albeit starting from a much lower level, outward flows have increased in the Asian developing countries as well. The current financial crisis has tempered the flow of foreign investment into and out of some developing countries while at the same time providing new opportunities which may lead to an acceleration of investment (for more on this, see OECD, 1999).

        However, flows or even stock data on FDI provide only a very sketchy indication of what is occurring. In contrast to portfolio investment, the expansion of FDI directly affects the control and characteristics of economic activities. In fact, international production is to a large extent becoming internal to transnational corporations (TNCs). Around 50 000 parent companies and 450 000 affiliates currently operate worldwide (UNCTAD, 1998). These affiliates now account for 6% of world GDP, compared with 2% in 1982 (Hummels *et al.*, 1998). They account for one-third of world exports and their sales are growing faster than world exports. The global exports of foreign affiliates reached USD 2 trillion in 1997, out of sales of USD 9.5 trillion.

        FDI has different kinds of potential effects on national economies. Following Stevens and Lipsey (1992), it has become common practice to distinguish between the financial and the production implications. The impact of the former on trade flows is rather indirect, whereas that of the latter is of a more direct nature.

Table 1: Inward and outward FDI flows as a percentage of gross capital formation: selected countries

	1986-91	1996		1986-91	1996
World					
In	3.6	5.6			
Out	4.1	5.5			
Developed			**Developing**		
In	3.5	3.6	In	3.4	8.7
Out	4.5	5.2	Out	1.3	3.3
United States			**Africa**		
In	6.5	7	In	3.9	7.3
Out	3.4	6.9	Out	1.4	0.4
Canada			**Latin America + Caribbean**		
In	5.3	6.2	In	5.3	12.8
Out	5.3	8.2	Out	0.7	0.7
United Kingdom			**CEECs**		
In	13.6	14.6	In	0.4	19.9
Out	17.1	19.1	Out	.	1.8
France			**Asia**		
In	4.5	8.2	In	2.8	7.4
Out	8.7	11.3	Out	1.5	4.3

Source: UNCTAD (1998), Appendices.

The main concern with financial interactions focuses on *possible substitution effects between domestic and foreign investment*. In the presence of budget constraints arising from limited access to own funds and/or because the cost of borrowing increases with indebtedness, the decision to invest abroad may to some extent foreclose the possibility of investing at home, although a firm's domestic and foreign activities need not necessarily be substitutes. The empirical evidence is conclusive on this point. Stevens and Lipsey (1992) found that substitution dominates for US firms, a result confirmed by Berderbos (1992) using Dutch data, and by Svensson (1993) using Swedish data. Since FDI to some extent displaces domestic investment, there are potential implications for trade. For instance, the comparative advantage of the (capital-intensive) investor country may diminish over time. A decline in investment reduces the expansion of output, variety and quality, leading to a reduced market share and potentially declining non-price competitiveness (Erkel Rousse *et al.*, 1999).

The relationship between FDI and domestic investment also raises issues for the host country. FDI inflows may crowd out domestic investment in the host country since foreign firms have an initial advantage both in product and financial markets. On the other hand, there may be positive spillover effects emanating from, *e.g.* technological transfers or increased competition in factor and product markets, enhancing the returns to capital in the host economy and promoting investment. The empirical evidence marshalled by Borenzstein and de Gregorio (1995) points to a "crowding in" effect: FDI tends to promote domestic investment in the host country. The total increase in investment has been estimated as one-and-a-half to two times the inward FDI inflow.

Indeed, the prime impacts of direct investment are found outside the financial sphere and concern the structure and properties of the underlying industrial activities. One important channel for impacts is that of competition. While there is evidence of FDI having taken advantage of weak competition by increasing monopoly rents (Moran, 1985), the overwhelming evidence points to multinational firms

spurring intensified competition in host countries, *e.g.* by contesting the monopolistic positions of domestic firms or previously established foreign firms. There are also many examples of "herd behaviour", where firms enter markets at the same time as their competitors, with the effect of further increasing competition. Mergers and acquisitions, which accounted for one-half of FDI flows in 1997 (with banking, insurance, pharmaceuticals, telecommunications as the leading sectors), may be less conducive to intensifying competition in the short term -- compared to the establishment of new ventures -- but that stimulus may be equally strong in the long term.

According to what has become mainstream theory, FDI is motivated by the gains derived from the internalisation of firm-specific assets transferred to other economies, which essentially emanate from transaction costs in the use of technology and knowledge. It should be noted that trade represents an important channel for spillovers of technology and knowledge. Using country-level data for trade flows, Coe and Helpman (1995) found that small countries that trade intensively with large partners obtain the greatest spillovers. More generally, developing countries benefit from large technological spillovers owing to the significance of OECD countries in their total trade (Coe *et al*., 1996).

In an endogenous growth model, in which the pace of technical progress determines the long-term growth rate, the introduction of new varieties of capital goods enhances productivity. Multinational firms, by investing abroad, help to widen the variety of this type of goods (Borenzstein and de Gregorio, 1995). Technology is concentrated in multinational firms, and their affiliates generally use more advanced technology than do domestic firms in host countries.[1] Because of market failures, intra-firm technology transfer is in fact the fastest way to transfer new technology. FDI is therefore the best way to fill the technological gap in inefficient sectors.[2] At the same time, foreign firms typically cannot appropriate all the gains that emanate from their technology transfers, since technology is only partially excludable.

A distinction can be made between horizontal and vertical benefits from spillovers, which may be intra- or interindustry:

♦ *Horizontal spillovers* arise because foreign affiliates tend to hire more qualified workers and manage more efficiently. They help to train the domestic labour force and to spread high standards of management throughout the production system. They also require better infrastructure and communications, which are public goods.

♦ *Vertical spillovers* arise since foreign affiliates need efficient suppliers. The affiliates train local firms upstream or induce cascading investments. In addition, local producers can use the production of the foreign affiliate as an input and improve productivity. The foundation for this benefit is the greater variety of inputs due to the presence of this foreign producer or to a better quality of intermediate inputs.

On this basis, FDI can be expected to contribute to the rate of technological progress in the host country (Findlay, 1978). Positive spillovers to host countries have been empirically demonstrated both within the sector of investment and between sectors (Blomström, 1991). Using a sample of 69 developing countries over the two decades 1970-79 and 1980-89, Borenzstein and de Gregorio found that the positive impact of FDI on growth in the host country is dependent on the endowment of human capital.[3] The host country's capacity of absorption stands out as a limiting factor -- there must be a minimum threshold of endowment in human capital for spillovers to take place.

In recent years, the potential technology transfers associated with inward FDI have provided a strong motivation for governments around the world to attract FDI. Strategies have also been established by developing countries to increase their absorptive capacity, not only through educational programmes but also through public procurement projects and encouragement of local suppliers or competitors coupled

with performance requirements or trade policies that seek to entice local R&D activities. At the same time, multinational companies tend to transfer more technology to relatively advanced host countries in order to get a match between the intangible assets to be exploited abroad and the absorptive capacity of the recipient country. Furthermore, when investing abroad, a multinational firm aims to exploit its technological rents on a wider scale, without letting the technology diffuse too quickly or broadly. For such reasons, the WTO group on trade and FDI notes that *less advanced countries may forego the transfer of technology*:

> *"Developing countries [have] encountered problems in regard to the role of FDI as a channel for the transfer of technology (...) the monopoly acquired by multinational enterprises on account of owning critical technology in fact allowed them to restrict the effective transfer of technology to developing countries." (WTO, 1998)*

The diffusion and exploitation of technology, along with the increasing importance of innovation, raises a number of issues for home countries as well. Most fundamentally, outward FDI is a primary means for firms to expand the scale of their operations, and thereby provides a greater basis for fixed-cost investment in knowledge and R&D, much of which has tended to be located in the home country. This is partly the reason why a number of relatively small industrialised countries belong to the most R&D-intensive countries in the world, *i.e.* Sweden, Switzerland, Finland and the Netherlands. As part of their global knowledge management, however, firms now extensively undertake FDI in research and development as well (Mowery and Teece, 1993; OECD, 1998). Calculating the respective impact of foreign and domestic R&D on the growth rate of total factor productivity, Bernstein and Mohnen (1994) found that sizeable international spillovers made foreign R&D improve productivity by a larger amount than domestic R&D. At the same time, there are strong indications of complementarity, in the sense that firms that invest extensively in own technology become more able to absorb technology on a global basis (Pack, 1982). The consequences, which are likely to be particularly pronounced for small developed home countries, will depend on whether R&D is internationalised in order to overcome transfer costs, adapt processes or products to foreign markets, strengthen the knowledge-creating activity itself, or acquire foreign firms or foreign technology (Åkerblom, 1994; Andersson, 1998).

To sum up, FDI tends to fuel economic growth in host countries primarily through spillover effects associated with the transfer of technology and knowledge. At the same time, there are interactions between different kinds of effects, including those on competition and technological spillovers. The development level of host countries, and the policies they pursue, influence their ability to absorb technology. The home country perspective also raises various issues. In order to better understand the economic impacts of FDI on different countries, it is important to examine the relationships between FDI and trade.

3.   APPROACHES TO IDENTIFYING TRADE AND INVESTMENT RELATIONS

The three approaches to analysing the relationship between foreign direct investment and international trade correspond to levels of aggregation: the microeconomic or firm level, the macroeconomic or economy-wide level, and the sectoral or industry level. Each level of analysis has its own strengths and weaknesses, and provides different insights into the relationship between trade and investment. By combining all three perspectives, through a "bottom-up" approach, the dynamics of the relationship are better understood. This section starts by outlining some of the hypothesises about the relationship between trade and investment and then looks at the empirical findings at the micro, macro and industry level.

Hypotheses and observations about the links between FDI and trade

The relationships between investment and trade are typically viewed from the perspective of the investing or home country, the recipient or host country and third-party countries which may be affected by this relationship.

From the perspective of the *investor country*, FDI can been seen as substituting for trade as exports are replaced by local sales on foreign markets, particularly in the form of finished goods. This could be detrimental to the investing country's domestic industry, hurting production and employment. On the other hand, FDI and trade can be seen as complementary since investing abroad leads to greater competitiveness in foreign markets, and trade in intermediate goods (inputs) and complementary final products to the affiliate. This type of relationship would be beneficial to exports from the investing country and thus to its industry.

For *host countries*, the relationship between FDI and trade can be seen to be symmetrical to that of the investing country. Foreign affiliates' local sales and local procurement substitute for imports from the investing country improving the current account, domestic production and employment. If inward FDI results in the importation of inputs, this might imply a weakening of the host country's current account -- a conclusion reached by some studies. For example, as inflows in Latin America and the Caribbean grew by 28% in 1997, mainly to Brazil and Mexico, current-account deficits deepened throughout the whole region. For the *World Investment Report 1998* (UNCTAD, 1998) and for the Economist Intelligence Unit this is, in fact, the case:

> *"Trade liberalisation, along with the emergence of regional trading blocs, has allowed TNCs to integrate Latin American operations into their global networks. NAFTA and Mercosur have already given rise to regional production platforms, notably for cars. (...) However, the so-called export propensity of foreign affiliates in Latin America remains low compared to that of their counterparts in Asia. (...) Throughout the region, current-account deficits are swelling in tandem with FDI inflows. This is due to the fact that investment projects tend to draw in imports, particularly in their initial stages".[4]*

Nevertheless, many economists hypothesise that host countries will benefit from positive long-term spillover effects in terms of technology, job training and management practices which will increase competitiveness.

The relationship with *third countries* can play an important role in determining the nature of trade associated with investment. As affiliates of the group located in third countries supply intermediate inputs to the host country affiliate, non-affiliated firms in the third country begin to benefit from FDI in the host country, or the host country increases exports to third countries, offsetting the parent's previous exports to this market. This last impact could be particularly true if the affiliate is part of a regional market.

On net, exports from the home country may more than compensate for partial substitution[5] of local sales in existing exports. An induced bilateral trade deficit of the host country *vis-à-vis* the investing country may be observed, which may be partly or totally offset by an induced surplus *vis-à-vis* third countries.[6] In addition, indirect effects of FDI on trade have to be considered. Given that FDI is efficiency-enhancing, there should be an overall expansion in the market-share of the investing firm to the benefit of both home and host countries, strengthening the argument for an overall complementary effect between FDI and trade. Indeed, spillovers between industries in the manufacturing sector provide additional opportunities for complementarity. Hence, total FDI, whether belonging in the manufacturing sector or in services, is potentially subject to large complementarity effects on trade: an investment in the retail sector may lead to increased manufactured exports, whereas production abroad, at the level of the individual firm, may substitute for previous or potential exports.

The impacts of FDI on trade are, however, likely to partly depend on the organisation of international business activities (Caves, 1982). In particular, vertical integration involves specialisation, as different units complement each other, and requires intra-firm trade in intermediate products. Hence, operations are concentrated in a relatively small number of large plants which trade with each other. Trade liberalisation, dissimilar technologies at different stages of production, variation in factor prices and economies of scale at the plant level, favour this kind of organisation. In contrast, horizontal integration means that operations resemble those of the parent company. The rationale lies in the potential gains to be realised from internalising markets for proprietary assets such as, *e.g.* a patent or a trademark, superior management techniques or greater access to financial resources (Markuson, 1995; Brainard, 1993; Carr *et al.*, 1998). Foreign production is motivated by the need for proximity to the local market, and less exports are expected. In this case, an affiliate's sales compete with the parent's arm's-length exports, without any off-setting increase in parent exports of intermediate goods. However, if the affiliate manufactures only a certain fraction of the firm's full range of products, imports of complementary finished goods can benefit from economies of scope in distribution. Although these different modes are neither mutually exclusive nor exhaustive, it is possible on this basis to explain variations in the trade behaviour of individual affiliates, *e.g.* as regards their size and structure of imports or exports (Andersson and Fredriksson, 1996).

Traditionally, trade and FDI have been characterised as alternative strategies (Barlet, 1992). Firms can either produce at home and export, or produce abroad and substitute local sales of foreign affiliates for exports. Economies of scale and transportation costs are key elements in the decision process. Increasing returns to scale limit the number of efficient plants, whereas transportation costs and, more generally, trade barriers act in the opposite direction. The so-called "proximity-concentration trade off" (Brainard, 1993) is therefore helpful for explaining when FDI can be expected to substitute for trade. An additional view is given by introducing firm–specific fixed costs as opposed to plant-specific fixed costs. When the former are high and the latter are low, FDI spreads widely if transportation costs are not negligible: multinationals would locate subsidiaries near their different markets and local production would be expected to displace trade (Markusen and Venables, 1995).[7]

However, whether or not FDI and trade are complementary cannot be determined theoretically -- the nature of the relationship is essentially an empirical matter. Factors that may be unobserved, such as

the organisation of firm activity, or the size and income of host countries, or proximity, transport costs and tariffs, influence outcomes. So far, the relationship has never been addressed in the literature in a systematic manner using data broken down by sector, country and partner for a wide range of countries. The following sections assess arguments and studies at the micro and macro levels respectively.

Micro-level evidence

It is primarily at the firm level that relationships between trade and investment can be studied effectively. On the other hand, there are problems with data availability and the ability to cover all relevant aspects of the relationship. Most firm-level studies have been undertaken on US firms, due to the prevalence of better and more accessible data than can be found for other countries.

Examining US investment in foreign markets, Lipsey and Weiss (1981 and 1984) found positive impacts on US exports, as well as a positive correlation between total exports of the parent and the local production of the affiliate. Later studies used more aggregated data that controlled for intra-firm trade. Sachs and Shatz (1994) examined US bilateral trade with 40 countries as a function of per capita income of the trading partner, its population, the geographic distance from the United States and the share of TNCs in US bilateral trade with this country. They estimated that *a 10% increase in the share of intra-firm bilateral trade leads to a 40% increase in trade with the country considered*. Hence, for the United States, there is microeconomic evidence of a complementary impact of outward FDI on exports.

The United States need not be representative of other countries, however. Helleiner and Lavergne (1980) observed that intra-firm trade is much more important in US trade with other countries than in other bilateral trade relations. Furthermore, micro evidence suggests that the relationship varies over time. Studying variation among US firms, Bergsten *et al*. (1978) found that an initial complementary effect between investment abroad and exports is turned into a substituting impact as internationalisation advances to a high degree and, hence, operations in host countries become more competitive. Pearce (1982) further concluded that trade between affiliates in different host countries will gradually replace trade between the home country and affiliates, thus marginalising the role and the development of the home base.

Such impacts appear more likely for home countries which are smaller than the United States. The lack of firm-level data has limited the analysis of this issue, with the main exception of a database set up by the Industrial Institute for Economic and Social Science Research (Stockholm).[8] Examining outward Swedish FDI, Swedenborg (1979, 1982) found that the induced exports of intermediate goods, or complementary supply of finished goods, outweighed the substitution effect on exports of finished goods. While these results prevailed in the 1970s, however, Svensson (1996) found that the complementary relationship was overturned in the 1980s. This was not visible in the bilateral trade relationship between the parent firm and the host countries, however, but emerged when consideration was given to replacement of home exports to other third markets by exports from affiliates to those markets. This impact may stem from the advanced stage of internalisation of Swedish MNCs, but is also likely to have been strongly influenced by the economic policies pursued in Sweden during the 1980s and the country's position outside the integrating European Market at that time. Blomström and Kokko (1994) and Andersson *et al*. (1996) concluded that such conditions have impacted on the structure of Swedish production and, hence, the observable relations between FDI and home country exports.

Another observation is that *foreign affiliates in the United States typically export as much and import more than domestic US firms* (OECD, 1994). The benchmarking study recently completed by the French Ministry of Industry reaches the same conclusion for France. In addition, data on individual French and US firms show that a large share of intra-firm trade concerns final products for sale. Even if local sales partly substitute for previous exports of the investing company, local production and sales require imported inputs. The latter are largely provided by the parent or by other subsidiaries of the same group, some of which may be located in the investing country. In addition to bilateral effects between investing and host countries, trade between the latter and third countries may be diverted as a result of the investment. Third-country competitors may lose market shares in the host country to the benefit of the investing country.

Macro-level evidence

Even to the extent that FDI displaces trade at the firm level (foreign affiliates' local sales substitute at least partly for exports), this need obviously not apply at the industry or macroeconomic level. FDI may lead to additional exports from other firms, and the overall impact on trade may be adjusted through general equilibrium effects. Furthermore, inward and outward FDI need not have a symmetric impact on trade. Although increased exports from the home country tend to be reflected in increased imports for the host country, at least in the short term, enhanced competitiveness through technology transfers, increased competition, etc., is likely to boost the host country's overall exports in the long term.

The classic theory of international trade viewed the mobility of goods and factors as opposing forces. As part of the integration process, trade in goods leads prices and thus factor rewards to converge. Alternatively, this outcome can be understood as the result of factor mobility: migration or FDI leads factor rewards, and hence product prices, to converge. This is the so-called Mundell principle.

> *"Commodity movements are at least to some extent a substitute for factor movements (...) an increase in trade impediments stimulates factor movements and (...) an increase in restrictions to factor movements stimulates trade." (Mundell, 1957 p. 320)*

If one examines macroeconomic series on trade and FDI, these two modes of internationalisation are, however, clearly complements (Henry, 1994): FDI may induce trade or *vice versa*. From a methodological point of view, this raises the question of factors that boost commodity and factor movements simultaneously, such as market size, the proximity of sources of demand and regionalisation processes. Thus, a diagnosis of complementarity might arise as a pure artefact. While the macroeconomic relationship between trade and FDI is generally addressed in terms of correlation, correlation is not proof of causality. Identifying causality presents a formidable challenge at the macro level.

Among the available macro studies, Eaton and Tamura (1994) used a model that controlled for country determinants, but with no industry dimension, to explain either bilateral exports or bilateral FDI flows between Japan and the United States and about 100 other countries over the period 1985-90. Each variable (exports, imports, inward FDI, outward FDI) was explained by the population of the partner country, its per capita income, its endowment in human capital, and dummies accounting for "natural regions" of integration. Some factors were found to jointly determine trade and FDI. For example, FDI and trade flows increased with the per capita income of the partner country, while regionalism also exerted a positive impact on trade and FDI bilateral relationships. The conclusion was a *large and positive relationship between outward FDI and exports, as well as imports, for both Japan and the United States*. This was not obtained in the case of inward FDI.

The OECD (1998) addressed the macroeconomic relations between FDI and trade by estimating import and export equations[9] for 21 OECD countries[10] over the period 1980-95. Bilateral FDI flows were

integrated, and simulated trade flows with FDI relationships driven to zero. A comparison of simulated bilateral trade flows (corresponding to a world without FDI) with observed bilateral trade flows provides a clear picture of the magnitude of "FDI-induced" trade flows.[11] The largest increase in FDI-induced trade is associated with the United States and Japan. Japanese exports to the United States "increase" by 150%. The next closest bilateral relationships are the United States and the United Kingdom, the United States and Canada, the United Kingdom and the Netherlands, the United States and France, and Sweden and the Netherlands.[12] The value of these studies is limited by the causality problem, however. Attempting to resolve this problem and using French data, Henry (1994) made it plausible that the causality does hold at the macro level. There may yet be large differences between countries because of the specificity of the relationship. Altogether, the available evidence suggests the prevalence of eight possible causal effects:

♦ *Exports may cause outward FDI*, with exports serving as the first stage in an internationalisation process.

♦ Symmetrically, *imports may cause inward FDI*, with foreign firms establishing affiliates in the home market.

♦ *Imports may also cause outward FDI*, as long as natural resources are imported. An alternative explanation is that declining competitiveness causes a relocation of domestic firms abroad when the national disadvantage becomes too large. Thus, imports cause FDI from a statistical point of view, but it is more likely that the lack of competitiveness cause imports and relocation.

♦ *Exports may cause inward FDI* by foreign firms seeking to benefit from the externalities on which domestic firms base their competitiveness: for example, foreign firms locate in the Silicon Valley because this is the place for exporting electronics.

♦ *Outward FDI will cause imports* in case of backward vertical integration and/or relocation abroad of labour-intensive activities from a capital-intensive country.

♦ *Inward FDI causes exports* if foreign firms locate in the host economy to export back home or to provide a regional market.

♦ *Outward FDI causes exports* owing to enhanced competitiveness on foreign markets or reduces exports if the opposite applies.

♦ *Inward FDI causes imports* owing to the enhanced competitiveness of foreign firms on the domestic market but may give rise to exports when the host country gains competitiveness.

The OECD (1998) analysed these causal relationships between trade and FDI at the aggregate level for a sample of nine countries. Quarterly FDI flows by country were matched with quarterly trade data. These were in both cases total flows, aggregating all industries and all partners for each declaring country. After correcting trade data for seasonality and correcting quarterly FDI flows for negative values, quasi-stocks of FDI were built by cumulating FDI quarterly flows over three years.[13] Finally, causality relationships were addressed using alternative lags (one to 12 periods). Due to a break in the time series, it is necessary to divide the total sample at the mid-1980s.

The macroeconomic evidence produced varying results across countries. For the United States, the only causal relationship identified is imports causing inward FDI: this may be due to restrictive trade policies in sensitive sectors such as automobiles' voluntary export restrictions (VERs) leading to relocation of foreign competitors in the United States. It is surprisingly difficult to establish a causal relation between trade and outward FDI in the Japanese case, while causality is identified with inward FDI. There is good evidence of export-induced outward investment for Germany. A causal relationship between imports and outward investment also appears clear for Germany. In the latter case, it may be a case of relocation abroad of industries losing competitiveness. However, all these relationships are affected by a turning point in the mid-1980s. *Before the mid-1980s*, there is evidence of many cases in which *trade caused investment* (the United Kingdom is the main exception, as outward FDI is found to have caused an increase in imports). In contrast, *since the mid-1980s*, two causal linkages seem to have dominated. First, outward FDI is caused by exports. This is verified for France, the United States, Japan, Sweden and Korea. Second, FDI causes trade for all countries with the exception of the United States and Korea.

It should further be noted that different measures of investment lead to different outcomes. In particular, studies of FDI *stocks* show less complementarity effects with trade than those of FDI *flows*. Pain and Wakelin (1998) recently challenged the evidence of complementarity for 11 OECD countries over the period 1971-92. They use FDI "stocks" series derived from FDI flows in numerous cases. Their estimates do not rely on *bilateral* exports and imports, but on total exports, controlling for world demand. The results, while more indicative of substitution effects than those of studies based on flows, again vary across countries and over time. However, inward FDI is found to be "pro-competitive" within the panel, in contrast to outward FDI which benefits the host country.

The OECD (1998) tested the impact of the use of stocks or flows for the United Kingdom, France and the United States. In the British case, a *positive* relationship was found between inward FDI stocks and exports, and a *negative* relationship between outward FDI stocks and exports. In France, significant differences in elasticities for exports and imports reflect the presence of foreign firms, with a large increase in imports, and a small increase in exports, in the industries concerned. For the United States, s*tocks* of inward investment have a very weak impact on US exports. Foreign companies substitute local sales for previous exports of the parent. In contrast, US foreign investment stocks appear detrimental to the US trade balance as a result of a *relocation strategy* leading to additional imports.

4.   EMPIRICAL EVIDENCE AT THE INDUSTRY LEVEL

The findings at micro- and macroeconomic-level are complementary. A certain degree of heterogeneity remains in the results at any level. The relations between trade and investment cannot be taken for granted. What is observed in an individual case, whether at the firm level or at the macro level, will be influenced by other confounding variables, including the policies pursued by governments. Under conditions leading to a general de-industrialisation and a weakening in industrial performance, outward FDI is likely to compound these effects, although it could also serve to cushion an economy against even worse outcomes if such adjustment could not take place. Conversely, given that adequate business conditions and policies are in place, FDI has the potential to serve as a source of increased competitiveness, higher growth and increased welfare for all countries.

In order to further examine this dynamic associated with different levels of analysis and to gain more insight into the nature of "spillovers", an original database that associates bilateral trade and FDI flows in a common nomenclature for a sample of countries has been constructed by the OECD (OECD, 1997). The bilateral dimension makes it possible to control for joint determinants of trade and FDI, such as market size, per capita income or regional integration, or, conversely, for economies of scale that have an opposite impact on both trade and FDI. Previous work (OECD, 1997 and 1998a) has estimated the relationship between trade and FDI at the industry level, then for the aggregate manufacturing sector and finally in the economy as a whole. Hence, the sectoral dimension of the problem can be addressed at the "bottom level": trade and FDI relationships are affected by the technology embodied in the product (which will spread differently according to the type of internationalisation), by economies of scale and by transport.

This is done to estimate equations explaining bilateral exports and bilateral imports on the basis of three outcomes: bilateral FDI flows, the bilateral macroeconomic context, and industry effects. In addition, FDI relationships *vis-à-vis* third countries were tentatively introduced. Box A describes the specification of the model employed in this analysis.

Results from industry-level analysis

This analysis was conducted for three of the 14 countries for which data exist: France, the United Kingdom and the United States. This subset was chosen because of the availability of complementary data and to illustrate the similarities and differences that exist between countries and the dynamic nature of the relationship which exists between foreign direct invest and international trade.

The *United Kingdom* has a relatively specific relationship between trade and FDI. Whereas there is *complementarity with exports and imports* for both inward and outward investment flows, *the net impact on trade is negligible*, since the increases in exports and imports are roughly similar (80 to 90 cents per dollar invested).

BOX A

The model constructed for this analysis incorporates four dimensions: investor country, host country, industry and time. It is preferable -- but more difficult -- to estimate the relationship at the bilateral level, since many factors are likely to promote simultaneous commodity and factor movements: market size, proximity of sources of demand, and regionalisation processes. Thus, the diagnosis of complementarity can be based on a pure artefact. For example, France invests in and trades with Germany because they are neighbours and both countries have narrow and big economies. This does not mean that German-French trade and FDI are complements.

The first macroeconomic variable with an obvious simultaneous impact on trade and FDI is market size, *i.e.* the average GDP of the declaring country and its partner. Difference in size also has to be introduced, in accordance with the recent literature stressing the role of externalities. Consumers' and producers' demand for variety is proxied by the average per capita income of the declaring country and its partner. The intensity of the comparative advantage is proxied by the difference in per capita income between the declaring country and its partner. Transportation costs are simply a combination of geographical distance and proximity. Common partnerships of countries in regionalisation agreements (notably the existence of preferential commercial schemes) is addressed using a dummy variable.

For sectoral variables, concentration, economies of scale, share of white-collar workers in employment, capital intensity, or capital ratio (barriers to entry) could be used. Given the high level of industry aggregation, only economies of scale[14] were introduced.[15] An alternative way of modelling is to encapsulate all the unobserved impact of the sectoral dimension in a fixed effect.

Following this methodology, US exports (imports) to (from) each trading partner are explained by macroeconomic variables, sectoral variables[16] and four FDI relationships: outward and inward US FDI to and from the partner, outward US FDI to and from third countries. Concerning exports and outward FDI, for example, the "bottom-up" logic is as follows. First, US exports, broken down by industry, are explained by FDI in the corresponding industries. Considering the variable "outward FDI", this answers the question: "How does one dollar of US investment in the automobile industry in Brazil affect US exports of automobiles to Brazil?" Second, spillovers between industries are identified using US total manufacturing exports and (outward) FDI. This answers the question: "How does US investment in the Brazilian manufacturing industry affect US exports of manufactures to Brazil?" Finally, spillovers between industries and services are addressed, using total FDI (industry and services) and total manufacturing exports.

The complementarity issue can be tackled using different information on FDI: flows or stocks. It is difficult to obtain bilateral FDI data broken down by sector for flows but, for many countries, it is impossible for stocks. There is traditionally less complementarity with the latter (see Appendix).

For *France*, outward and inward FDI flows are complementary with exports and imports. The potential *negative* impact of inward investment on the trade balance is assessed by the high sensitivity of imports and low sensitivity of exports *vis-à-vis* inward investment. It was found that each dollar of French investment abroad is associated with a 35-cent trade surplus in the industry of the investment, *vis-à-vis* the country of investment. Conversely, there is a 12-cent trade deficit for each dollar of inward investment into France.

The magnitude of spillovers can be seen using the same panel of 19 French industries. One dollar of outward FDI is associated with USD 2.3 of additional exports and USD 1.9 of additional imports if manufacturing industry as a whole is considered. The global trade surplus[17] remains comparable with that estimated at the industry level, but the *complementarity between trade and FDI is much higher.* This suggests that a large share of the complementarity between trade and FDI flows at the macroeconomic level *can be explained by large spillovers between industries.*

In contrast, for inward FDI, the trade deficit rises to 82 cents for each dollar of investment. Finally, the estimates integrating services, including holding companies, confirm these results. It is disappointing, however, that it is impossible to assess the spillovers of investment in services on industry using this method.[18]

Investment by *US* firms abroad has much stronger complementarity effects than French investment abroad, although the impact on trade is much weaker when inward FDI into the United States is taken into account. Unlike France, the impact of inward FDI on US exports is not significant; this can be explained by the difference in the size of the domestic market. Foreign companies invest in the United States because of the huge US domestic market. But this lesser complementarity is also observed for imports: where each dollar of inward investment is associated with an additional USD 1.4 of imports in France, it is associated with only 60 cents in the United States.

It is possible to pool the data for 14 European countries, the United States and Japan in one sector (trade in goods as a whole) over the period 1984-93. FDI is also considered globally. All externalities referred to above are thus internalised, but the main interest of such an estimate is to address the issue of asymmetry between the trade surplus associated with outward FDI and the trade deficit associated with inward FDI.

On the whole, around two dollars of additional exports are associated with each dollar of outward FDI (Table 2). This induces symmetrically around two dollars of additional imports for the host country, which declares an inward FDI. In turn, the host country exports around 30 to 40 cents, whereas the investing country reports these exports as 40 to 50 cents in imports. *In total, the bilateral trade surplus associated with each dollar of investment abroad is around USD 1.7, given all externalities, to the benefit of the investing country.*

Table 2. Parameter estimates for FDI flows in the pooling of 14 countries (1984-93)
In US dollars

	Inward FDI flows	Outward FDI flows
Exports	0.484	2.203
Imports	2.045	0.359

Parameter significance level: 1%, with the exception of M/OUT: 5.
Missing FDI data replaced by partner's declarations.

Hence, the impact of FDI on the trade balance is negative for the host country. In addition, there is no, or weak, empirical evidence of relationships involving third countries. The host countries may -- in the short to medium term -- have limited possibilities to balance a bilateral trade deficit *vis-à-vis* the investing country with additional exports to third countries.

In total, there is evidence that *the short-term direct effects of FDI flows on the trade balance tends to be detrimental to the host country.* Again, in the long run, the impact may well vanish as a result of spillovers, technological progress and growth. This is all the more likely since, as Drabek (1998) points out, the short-term impact is associated with induced imports of intermediate and capital goods, which is the source of much of the spillovers. Still, the ultimate outcome will depend on relevant policies and other framework conditions.

5.   CONCLUSION AND POLICY ISSUES

The "bottom-up" perspective of combining results from micro-, industry- and macro-level studies underscores the dynamic nature of the relationship between trade and FDI. It shows that the relationship between trade and investment is not a constant, but is influenced by various conditions and evolves over time. This relationship brings important information about the impacts of investment on individual countries, but understanding those effects requires due consideration to the competitiveness-enhancing spillover effects associated with FDI, which potentially cascade far beyond the borders of individual firms and industries.

A thorough understanding of the causes and consequences of FDI requires work on firm behaviour and restructuring at the micro level. Although the availability of firm-level data poses considerable problems, the available studies point towards notable differences in the effects of FDI on trade depending on the nature of investment, the characteristics of countries and framework conditions. At the macroeconomic level, the work that has been done to date tends to suggest a complementary relationship between trade and FDI. Capturing causal linkages remains an issue, however, although attempts have been made to deal with the problem, particularly in a cross-country study of nine countries. The sample may be separated into two sub-periods, with a turning point in the mid-1980s. The *first sub-period,* can be roughly described as one during which *trade causes investment*, whereas *the reverse seems to hold for the second period, starting in the mid-1980s*.

Work at the sectoral level also tends to point towards a complementary relationship between trade and investment, but also verifies its temporal nature. In the short term, the *trade effects of FDI act in opposite ways for the investing and for the host country*. They improve in the former, and this can be interpreted as a positive impact of outward FDI on the competitiveness of the investing country; while they worsen in the host country.   This short-term impact is associated with enhanced exports of intermediate and capital goods from the investing country. The host country is unlikely to compensate the bilateral trade effect *vis-à-vis* the investing country by expanding compensating exports to third countries.

This detrimental outcome for the current account of the host country has recently been addressed in the case of Latin America. According to the conclusions of the WTO Working Group Report:

> *"It was also stated that, while the effects of FDI for development were on the whole positive, as shown by the empirical evidence of the positive correlation between economic growth and FDI inflows and of the importance of FDI as a vehicle for the transfer of technology, there could also be negative effects, for example with respect to the balance of payments." (pp. 7-8)*

In the long run, however, there is likely to be an improvement in the host country's trade balance, since both FDI and the imported capital goods serve as vehicles for positive externalities that benefit the host country. This is in line with conclusions at the micro level that substitution effects between FDI and outward investment are more probable at advanced stages of internationalisation. For the host country, however, gains in competitiveness will strengthen its long-term trade position *vis-à-vis* third countries as well.

Still, UNCTAD (1998) argues that a negative short-term effect is not only driven by imports of goods which are vehicles for positive externalities. Many of these imports can be consumer goods that fail to carry such benefits:

> *"The immediate effects of trade liberalisation on the balance of payments may well be negative because FDI tends to generate higher imports not only of capital and intermediate goods, but also of final consumer goods, if TNCs begin by establishing sales affiliates and distribution networks." (UNCTAD, 1998, p. XXV)*

FDI serves as a means for firms to overcome transaction costs and become more efficient overall. Individual countries are affected, and able to benefit from this improved efficiency, in their capacity as both home and host to FDI. In most cases, and given favourable conditions and policies, the evidence suggests that trade and investment are complementary, implying that investment abroad tends to translate into increased production at home. But, as this analysis has shown, the relationship between investment and trade is not static, it evolves and responds to changing conditions in a dynamic way. Thus, it is important to consider other attributes associated with the investment, including positive spillovers of technology and management practices which enhance competitiveness. In order to reduce the risk of protectionist backlashes against "globalisation", it will be important that the overall effects be taken into account by both the general public and policy makers in cases where certain trade effects may not appear favourable for a particular country at a particular point in time.

APPENDIX: BUILDING AN ORIGINAL DATABASE

The first step was to collect bilateral FDI data at the industry level; as a result, the database does not cover all the industrial countries. The United States and France provided the best data, followed by the United Kingdom, Sweden and Portugal which all tried to provide disaggregated data. For other European countries, the Eurostat database was used, supplemented by OECD data for some countries.

The second step was to finalise a data set for a common set of countries for both sources of data, a common nomenclature for differing declaring countries, and a common nomenclature for trade and FDI. The best data, which can be matched in a common nomenclature in order to make comparisons, is for the United States and France. Concerning US data, the base comprises 45 countries (or country groups), 16 years (1980-95), 22 industries aggregated into 12 sectors, 5 089 observations for inward flows, 8 787 observations for outward flows, 5 216 observations for inward stocks, 9 217 observations for outward stocks.

In the case of France[19], the sectoral breakdown is more detailed than for the United States. Hence, French data can either be used at its finest level of disaggregation or aggregated so that it can be matched with US data. The database for French FDI flows has 10 296 observations: 39 countries, 22 sectors, 12 years (1984-95). The database for French FDI stocks contains 5 676 observations: 43 countries, 22 sectors, 6 years (1989-94).

The final database uses the following nomenclature (there are 22 sectors in the FDI database, of which only 13 match trade data, aggregated in the six sectors in bold): **1-All industries,** 2-Mining, **3-Petroleum**, **4–Total manufacturing**, **5-Food**, **6-Chemicals, 7-Metals**, 8-Machinery except electric, 9-Electric and electronic equipment, **10-Machinery**, 11-Transportation equipment, 12-Other manufacturing**, 13-Transport equipment and other manufacturing**, 14-Wholesale trade, 15-Retail trade, 16-Banking, 17-Finance (except banking), 18-Insurance, 19-Real estate, 20-Finance (except banking), insurance and real estate, 21-Services, 22-Other industries.

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NOTES

1. Horst (1972) addressed this issue in a pioneering study concerning the impact of the technological leadership of US firms on their strategy concerning the Canadian market. The main result is that trade and local sales are jointly positively determined by this leadership.

2. A firm can not get the right price of its technology without giving full information about it to the potential client. If she does, the client does no longer need to pay for it. Hence, arms length transactions on technology can hardly cope with up-dated technology.

3. However, since their model does not embody any other variable of openness, notably no trade variable, the FDI variable may capture more generally openness effects of growth. The method does not discriminate between benefits of trade and benefits of FDI, two variables being potentially highly correlated.

4. EIU, 12 November 1998.

5. Local sales substitute for *i)* previous exports of the parent company, *ii)* previous exports of third countries competitors to the considered market and *iii)* local sales of local producers on this market.

6. To give an example, a Japanese investment in Spain will "create" Spanish exports to France and Germany.

7. . A substitution effect has been argued to be less likely when consideration is taken to imperfect competition (Helpman, 1984), when firms compete on multiple foreign markets (Gara, 1997) or in the presence of uncertainty (Becuwe *et al*, 1997).

8. See Andersson *et al*. (1996).

9. Estimates were done using fixed effects, a specification validated by appropriate statistical tests.

10. The countries selected are: Germany, Belgium-Luxembourg, Denmark, France, Ireland, Italy, the Netherlands, the United Kingdom, Greece, Sweden, Spain, Portugal, Austria, Finland, Norway, Switzerland, Canada, the United States, Australia, Japan and New Zealand.

11. However, given the transformation adopted for FDI variables, this result must be handled cautiously: *i)* this result is obtained using total FDI flows, including FDI in services; *ii)* potentially diverging results would been obtained using data on foreign subsidiaries' activity.

12. Negative values account for net divestment.

13. Since these quasi stocks and our trade data are not stationary series, we considered the first difference of both variables. Variables become stationary in 103 cases out of 108.

14. A "representative economy" has been constructed, pooling British, French, German and Italian firms, by size. Calculation is carried out at the three-digit level of the NACE. The relative productivity of larger firms (>500 employees) is estimated.

15. In general, variables of control have the right sign. The average size of markets (declaring country and partner), the average income per capita, the economic distance (proxying the comparative advantage,) the adjacency and the regional integration have a positive impact on the value of trade flows; and reciprocally for the difference in market sizes and for transport costs. Finally economies of scale have a positive impact when they can be accounted for, *i.e.* for the 15 manufacturing industries.

16.   It is not necessary to emphasise that sectoral variables are introduced in the "bottom" equation only, addressing the sectoral issue.

17.   More formally, the two equations for exports and imports are not independent since imports are integrated in exported products. Direct estimations of the trade surplus would not change the result and would miss the breakdown of effects we are interested in. Hence the magnitude of the trade surplus is only indicative. What is important is its existence.

18.   This must be due to the presence of holding companies, which introduce noise.

19.   Given the period covered here, and in contrast with US data, reinvested earnings are not accounted for.