FACULTY OF APPLIED ECONOMICS

DEPARTMENT OF BUSINESS ECONOMICS AND MANAGEMENT

SUBSTITUTION VERSUS COMPLEMENTARITY BETWEEN TRADE AND FOREIGN DIRECT INVESTMENT
A Cover-ratio Analysis of OECD Countries

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RESEARCH PAPER 99-035
December 1999

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ISBN D/1999/1169/035

Substitution versus complementarity between trade and Foreign Direct Investments: a cover-ratio analysis of OECD countries.

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Summary

This paper addresses the substitution effects between trade and foreign direct investment. After a theoretical overview, a comprehensive chart is developed which is implemented by means of a cover-ratio approach both for trade flows and for investments. The relation between the two cover-ratios proves substitution effects as well as the influence of countries (e.g.currencies and specific evidence on complementarity / substitution).

1. Background

Trade and investment share many similarities . They are both partial descriptions of flows and events that take place in a continuous value-chain decision process. On the one hand, trade statistics are mere snapshots along this long chain from an often unknown place of origin to a final market. On the other hand, investments are movements of capital. They either reflect the building of 'new' production capacity (replacement or additions) or they evidence gross capital mobility through mergers and acquisitions. This wide range of observations hides a conceptual link. Trade is predominantly a spatial business; though it is observed over time. Investment is a time business; though it is often observed over space. They may both complement and substitute for each other as traditional theory indicates.

2. Relevant theoretical developments on foreign direct investment and multinational strategies of firms.

The 1997 U.N. "World Investment Report" emphasized the driving force and growth of foreign direct investment (FDI) and multi-nationalization of firms in the globalized market. This paper analyses these FDI in relation to international trade with the European Union between 1987 and 1992 (i.e. the deadline period of pending unification). Some relevant theoretical developments in relation to international trade and FDI flows are briefly presented and revisited in order to support the study.

a) Competitive advantages

The first theoretical studies on FDI and MNE addressed the question: why do firms transfer their activities to foreign locations in spite of the relocation costs of entering

these new and distant markets. HYMER (1968) benchmarked the relation between the success of FDI and the existence of "unique competitive advantages of firms".

Multinational firms may indeed dispose of specific transferable advantages. These produce competitive gains and must exceed the implementation costs in order to be competitive in international markets. The competitive advantage of firms relate to market imperfections, product differentiation and availability, factor prices (such as labor, capital and resources), technological innovation, and finally, scale economies or government policies (such as trade barriers or fiscal incentives).

b) Vernon's "Product life cycle"

Another valuable explanation is given by VERNON' s (1979) "Product Life Cycle Theory", which is based on the market evolution of a product; against the technological, innovative capacities of a firm. The consecutive locations of the production activities are related to the stages of product life-cycle and its respective characteristics related to trade and FDI. A new product is initially produced and sold in its home market. During the growth stage, it is gradually exported to near and then more distant foreign markets until it reaches its stage of maturity. At this point, the product is standardized. Thus, in order to avoid imitation by local firms in these export markets, the MNE will prefer to produce its own product directly in the foreign market, where it invests in local affiliates. This strategy adds competitiveness to the firm through a variety of factors: reduced transportation and production costs, advantageous labor costs, better adaptation to local demand, as well as the effective prevention of new entries into the market.

Employing this strategy, the initial competitive advantage is removed; but is replaced by other competitive advantages with respect to costs and product differentiation, so that the leader's place in the foreign market is preserved. In the first stage of the product cycle, competition tends to be based on, price factors. Then the production is eventually transferred (by means of licenses or subcontracts) to less developed countries which provide lower labor costs and a new sales market.

c) "Transaction Cost Theories"

Transaction cost theories, like those developed by WILLIAMSON (1979), COASE (1994) and BUCKLEY (1997), explain the choice of different modes of foreign market penetration by focusing on the relative transaction costs which are related to these international strategies. These theories show that the higher the relative transaction costs of a "market entry", the more interested it will be to invest directly in the foreign market in order to produce locally. They distinguish between the various types of foreign modes, such as: exports, licenses, joint ventures, strategic alliances and subcontracting up to 100% of FDI. Each of these is related to specific transaction costs.

d) Dunning's OLI (Ownership, Location & Internationalization)

The eclectic OLI paradigm of Dunning (1988 & 1995) explains the international strategies of firms through the simultaneous presence of three types of advantages. First, the MNF should dispose of the strong "Ownership-specific" advantage which is unique to the firm and rely on firm specific characteristics such as technological advantages, scale economies and the specific qualities or properties of the product. Second, the "location advantage" explains the choice of a particular geographic location for the foreign activities, because of such things as: the presence of important sales markets, fiscal incentives, the availability of labor, natural resources or other inputs. Finally, the "internationalization advantage" explains why firms benefit from organizing their activities on an international scale, within one multinational firm, rather than by acting through the international market.

e) Mucchielli's Scheme

Recently Mucchielli (1985, 1991 & 1992) developed a relevant and complete scheme which will be revisited in our analysis in order to include intra-European trade as well. The scheme offers a complete choice of eight relevant strategies and explains foreign entry modes (both trade and FDI) by the relative concordance/discordance of the comparative advantages of countries and the competitive advantages of firms. Table #1 identifies these modes.

Table 1 : FDI entries versus comparative and competitive advantages of firms

Trade or FDI Entry mode	Competitive advantages		Comparative advantages	
	factor demand	product supply	factor supply	Product demand
1.National sales & production	+	+	+	+
2. outgoing DIA	+	+	-	-
3. outgoing DIA with re-imports	+	+	-	+
4. exports	+	+	+	-
5. incoming FDI	-	-	+	+
6. imports	-	-	-	+
7. incoming FDI with re-exports	-	-	+	-
8. foreign sales & production	-	-	-	-

The table distinguishes between eight specific strategic options for penetrating international markets, relative to the presence (+) or absence (-) of comparative and competitive advantages, and demand and supply conditions. Simple direct investments will take place (cases 2 & 5) when both competitive advantages of the firm have opposite signs compared to the comparative advantages of the country. In case 2, a national firm invests directly abroad where is will benefit from cheaper production factors and more interesting outlets for its products. In the opposite case (5), the foreign firm invests in the national country for similar reasons. Two other situations (cases 3 and 7) imply foreign investments with re-entry. In case 3 , national firms invest abroad in search of better production-factor conditions in order to sell in their markets. This relocation strategy is often registered in trade statistics as "inward procession" (IP) from the side of the beneficiary country. In the opposite case (7), foreign firms invest in the national territory in order to re-export production to their own "home" market (or other markets). This situation is also called outward processing (OP) or "defensive" FDI or DIA.

Cases 4 and 6 portray pure international trade. Firms dispose of both competitive and comparative advantages in factor supply in the home country but, there, they lack home demand; they produce locally and export. In the opposite case (6) local firms have neither competitive nor comparative advantage in factor supply; then, they import foreign products to meet local demand. Finally, cases 1 and 8 are situations where production is not exported nor relocated, but locally produced and sold . There is no trade at all.

3. Comprehensive FDI Registrations within European Trade

The European setting requires an additional consideration in that "foreign" trade can be either extra-EU or intra-EU. Since the advent of the unified market, a number of EDC (European Distribution Centers) act as inbound FDI. They serve as a foothold ("pied à terre") in the Union from whence the other EU members are served.. In the outbound setting the European DIA (Direct Investments Abroad) are either defensive or offensive:

a) Defensive (outbound DIA with re-imports)

Defensive investments evade local high labour costs, often with the aim to re-import the finished goods after their "outward processing"(OP) in the value chain. Apparently, the notion "defensive" applies to the investment, whereas the term "outward processing" applies to the trade flow. Nevertheless, OP trade spans a wider variety of situations than defensive FDI only. A foreign OP subcontractor may act without a defensive DIA. For instance, in countries which restrict repatriation of capital, capital gains or windfall profits. In a logistical context, this subcontracting is likely in secondary production (SCS), such as assemblying or any labour intensive value-chain component.

Table 2. Outward processing (DIA versus SCS)

INVESTMENT	KEYWORD	TRADE FLOW
D I A	Defensive DIA	OP (outward processing)
Local	SCS	With imports

Defensive inbound FDI in the European Union flows from a number of localization advantages which start with a mixture of reasonable salaries, environmental pressures and proceed to the mere fact of operating within a common tariff wall (the latter not very defensive on its own, but rather offensive). Specialized locational research highlights the advantages of certain areas within the same trade-region (transportation, real estate, living conditions or expatriates, etc.).

b) Offensive (Outbound DIA without re-import)

DIA may enter a foreign market in which local production or assembly seems inevitable, the flow acts, initially as a purely outbound investment without further consequences to the trade map. The recent Renault Mégane assembly plant in Russia is meant for the local market, but nothing prohibits the eventual re-export to Europe after the plant takes off.

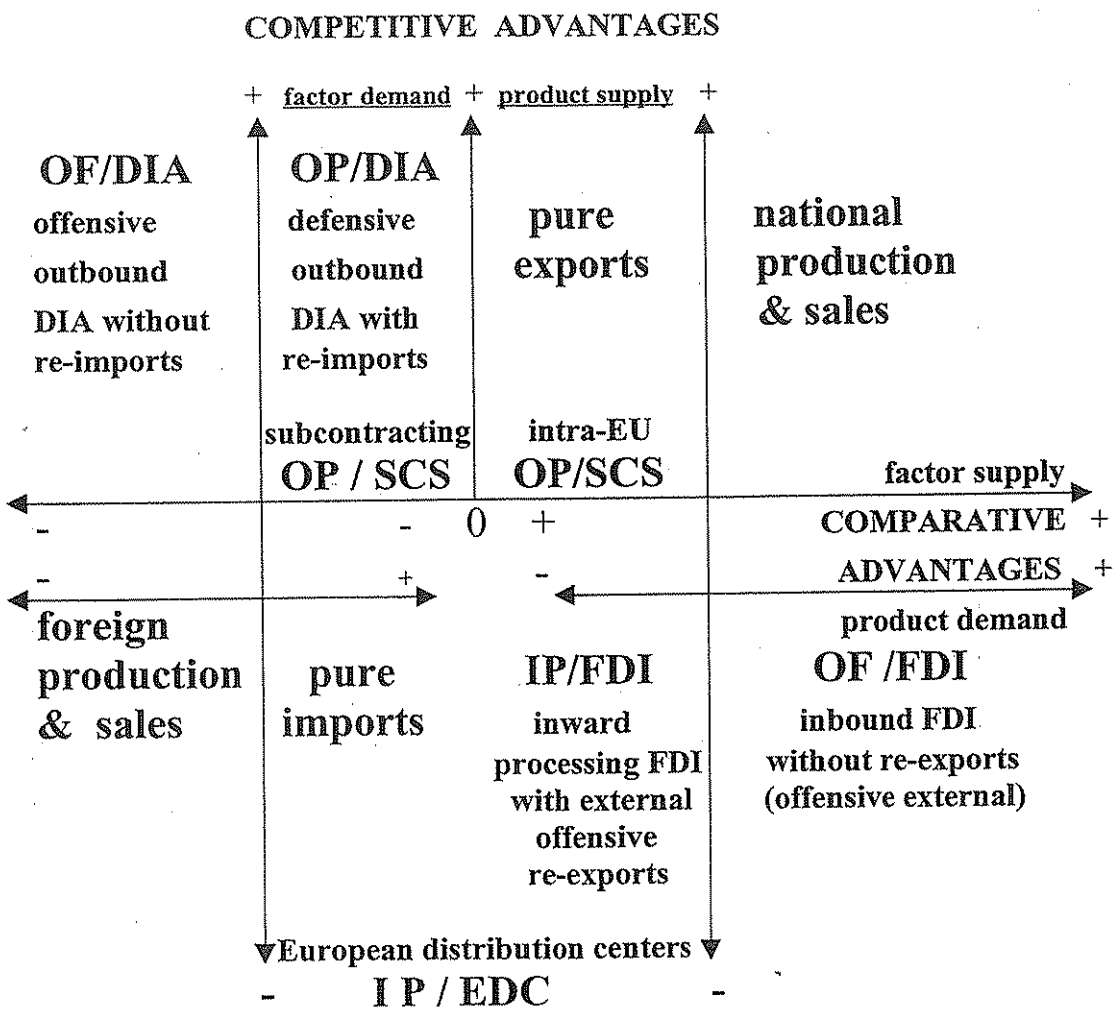
Within the European market, most inbound FDI may qualify in full or in part for this description . They aim to capture the world's largest single market within the setting of a trade union, and to include some of the last stages in the production process. This limited secondary production acts in connection with trade barriers against high-end imports. Examples are: rice milling activities (after husked rice has been imported, textiles and a variety of other mechanical and electronic industries).

In principle, this is inward processing (IP) when export follows. When intra-EU exports follow EU-imports from a third country, the IP story becomes less clear, since detailed intra-EU records are not available anymore after 1992 (the unified market). Recent literature tends to identify most of those activities as "European Distribution Centres" (EDC), in spite of the fact that secondary production and EDC are separate successive activities in the literature of both value-added logistics and supply-chain management.

c) Value chains and EU Trade

These considerations indicate that a pure distinction between offensive and defensive can hardly be held. A rather comprehensive approach may be more realistic, such as a wider (and even vaguer) value-chain concept in which defensive and offensive components succeed each other. Figure 1 generalizes and revisites the previous Mucchielli format for a number of statistical considerations, set out before. Trade statistics are not a mere "data guzzling activity"; but rather they are geared to specific observational and regulatory purposes.

Figure 1 : FDI and DIA related to extra-EU and intra-EU trade



abbreviations:

DIA : (outbound) direct investments abroad
FDI : (inbound) foreign direct investments
DIS : direct investments in secondary production
IP : inward processing (see also RT)
OP : outward processing (see also RT)
OF : offensive FDI/DIA
DF : defensive FDI
RDT: regional distribution and trade of which:
EDC: European Distribution Centers (intra-EU)
RT : reversed trade: re-imports (OP) or re-exports (IP)
SCS : subcontracting in secondary production & assembly

Source : reworked from MUCCHIELLI (entries of table 1)

The graph features two inner and two outer diagonals each with its own specific meaning:

1. The top-left, bottom-right diagonal features DIA/FDI with or without the "reversed trade" option (i.e. without re-imports or re-exports).

2. The top-right, bottom-left diagonal addresses the anti-thesis between pure trade versus autarky (local production and local consumption) or in traditional terms, "trade creation versus trade destruction" (see e.g., annual PANORAMA, EU former DG III).

3. The central block covers the trade-intensive flows, viz.:
   - Pure trade (top-right, bottom left), compared to
   - IP/OP alternative (top-left, bottom right).

4. Within the central block, the ongoing Outward Processing may distinguish between real ownership (OP/DIA) and simple subcontracting (OP/SCS). They are put together here since real ownership does not enter the matrix (see, central block, top left corner).

5. In the bottom cells of the central block, inward processing (IP) flows may further distinguish between extra-EU re-exports and intra-European Distribution Centers (EDC). Within this setting only the comparative advantages of product demand, and the location of the eventual entry-gate within the European Union, decide the difference between pure imports: IP/FDI (within the Union or in transit) and IP/EDC. It is indeed clear that the EDC-importer has some logistical factor in his favor, but not enough product demand, and therefore distributes across Europe. This discussion is only relevant if the logistical and commercial capacity of: seaports, airport business centers or inland (dry-) ports, enters the discussion.

   In the case of the EDC, it eventually becomes difficult to determine empirically whether the relevant product demand should be traced on the national or the EU level.

This comprehensive scheme is informative by its simultaneous analysis of comparative advantages and competitive advantages of firms on both demand and supply sides. It follows the previous Mucchielli scheme which is expanded to the eight international strategies. Firms tend towards outbound DIA when they feature competitive advantages, but lack the presence of comparative advantages of their country in the sector. Conversely, inbound FDI takes place in countries with comparative advantages in factor supply, but without a competitive advantage over national firms in the industry.

A firm, which only invests abroad in view of re-importing the finished product in order to sell in the home market, follows a defensive, outward processing strategy. This defensive strategy aims at the product demand in the home market (DIA-OP), but not in the foreign country of investment. When the investment is motivated by local demand and sales-opportunities in the foreign market, the firm has an offensive strategy without commercial re-flow to the home country.

Some interesting remarks may conclude this conceptual analysis. The four central quadrants of the scheme represent all strategies which are related to trade flows. The four peripheral quadrants represent strategies without trade flows. Finally, the top-left, bottom right diagonal contains the four strategies with direct investments in foreign affiliates.

4. Empirical results on DIA and FDI of OECD countries

Recent trends in DIA and FDI between sectors and countries can be studied on the basis of OECD data from the "annual statistics of International Direct Investments". This data represents the yearly DIA and FDI in terms of stocks and flows by country and sector. Our analysis is based on the "stock data" which represents the cumulative value of investment in the foreign country in two years 1987 and 1992. These stock values represent the realistic long term value of DIA and FDI compared to the often erratic flow data. Since the OECD data follow national currencies, the DIA and FDO by sector are reproduced in country weights, which allow comparison among countries. Other results (growth rates or DIA/FDI cover ratios) produce relative data and so they allow easy inter-country comparisons.

a) Diversification versus consolidation (agglomeration)

A first series of graphs analyze the relation between the weights of both the FDI and DIA in total and their growth between 1987 and 1992 (the "deadline period" before the impending unification). This approach allows one to distinguish between consolidation and diversification in the evolution of the FDI and DIA structures between countries and sectors. A positive relation between growth and country (or sectorial) weights indicates a consolidation trend (or agglomeration effect with higher weights grow faster); whereas a negative relation (i.e. lower weights grow faster and vice versa) reveal a diversification in the structural evolution of DIA and FDI (with "first move" symptoms). These graphs are presented in appendices 1 through 4.

The overview of appendix #1 shows that the DIA growth tends towards diversification, especially in the expanding sectors, such as: services, publications & printing, and transportation. For (inbound) FDI in appendix # 2, a similar diversification trend appears for the expanding sectors, but also for other sectors such as food. The graph shows that the spatial structure of foreign investments tends to alter considerably for most industries. Only the inbound FDI of the chemical industry shows a clear consolidation. This may result from (sunk) costs which concentrate FDI in specialized countries such as Germany, the USA and Japan (Belgium joins this club but does not publish OECD statistics). The location of FDI in these countries keeps attracting a growing share of FDI over time, and legitimizes the hypothesis of a considerable "agglomeration effect".

The structural impact on the evolution of DIA and FDI between sectors in each particular countries is presented in Appendices 3 and 4. They reveal a general tendency toward diversification in the evolution of FDI. Austria is an exception. Looking at the DIA, the diversification trend is less clear for France, Germany and Japan.

In summary, the structure of DIA and FDI between countries and sectors considerably changed between 1987 and 1992. The results show that international investment changes rapidly with strategies, in order to adapt to, or take advantage of, new market conditions. These "dynamics of market conditions" refer to the changes in availability of production factors, fiscal incentives, product demand and general competitive conditions.

The conceptual scheme of the dynamics involved in the comparative advantages of countries and competitive advantage of firms explains the diversification in international investments. Only heavily capital intensive industries, featuring excessive scale factors, such as the chemical industry, keep concentrating their FDI growth in countries where it adds cost efficiency to effective agglomeration effects. The country graphs confirm the diversification thesis with some major exceptions. In terms of industrial strategy, industries appear to act more homogeneously across countries; than country aggregates could act "en bloc" across industries. This supports the globalization thesis!

b) Cover ratios (Appendix 5)

The DIA/FDI cover ratio of countries and industries, presenting the net outflow of foreign capital in particular industries, is analyzed in relation to the EU-trade cover-ratio X/M. The graphs of appendix 5 present the relation between net EU trade (X/M) and net foreign investment (DIA/FDI). A logarithmic scale represents the case of Japan, the USA and Canada. Thus, X/M is the net export surplus from these countries to the European Union.

The statements of Table 3 produce a few one-liners between the conceptual graph of Figure 2 and the scatters of American, Canadian and Japanese trade relations with the European Union.

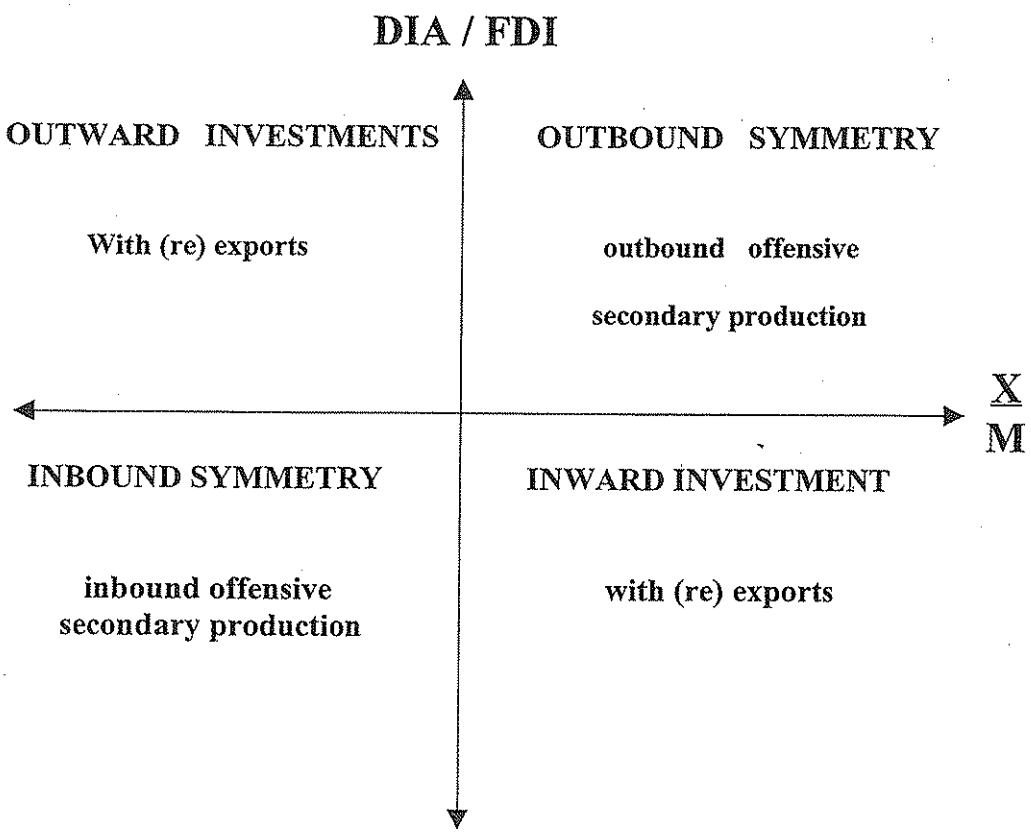
Table 3 : Summary statements of Appendix 5, according to the basic scheme of Figure 2 ; (DIA / FDI versus X / M).

OUTWARD (defensive) INVESTMENT - Outbound investment - Import penetration - Japan, USA, EU	OUTBOUND SYMMETRY : - Exports dominate imports - as DIA dominates FDI - Japan, USA (1992 only)
INBOUND SYMMETRY - Inbound symmetry - Inbound trade - Canada	INWARD (offensive) INVESTMENT - Inbound investment - Export intensity - NIC's & NEC's (Canada partial)

Japan and the United States feature a negative relation between both cover ratios in trade and foreign investments in 1987, which supports the trade-substitution thesis. The USA-EU relation features a net decrease in DIA by 1992, and a further diversification towards different industries.

The Canadian data show a positive relation, which flattens by 1992. Canada thus changes its inbound symmetry towards an export intensive inward investment. This means that net trade does complement net DIA, suggesting offensive investment, probably in secondary production or distribution. Although all this is not sufficiently proven, and interesting trend is indicated.

Figure 2 : a simplified cover-ratio representation



c) Cover ratios and currency evolution (Appendix 6)

During the period 1987-1992, the US dollar was subject to a major devaluation in relation to the ECU. The cover ratio graphs allow one to check the trade-investment substitution against the currency evolution:

- in a graphical way in which cross sectional data are plotted in some years. Thus, it can be observed that in the 1988-1992 period, a time in which the US dollar tended to drop, the inbound FDI tended to increase against the outbound DIA, and, consequently, net exports increased, all of this from the point of the USA.
- In the dynamic way in which incremental changes are tested against the hypothesis. Here, appendix 6 shows that in most cases, the previous hypotheses tested in both ways (i.e. increasing net DIA over FDI, with decreasing net X over M) were for the most part confirmed. The only exceptions were three non confirmed and five indefinite cases.

5. Summary and Conclusions

This paper addressed three empirical issues related to foreign direct investment (outbound DIA and inbound FDI), both to and from the main EU partners in the OECD.

First, the recent evolution tends towards diversification of direct investment across countries and industries. Only the chemical industry consolidates its DIA in existing national clusters

Second, the ancient hypothesis of substitution between trade and investment needs clarification. This research established a cover-ratio matrix, which compared the balance of visible trade with the net DIA/FDI ratio. The OEECD country profiles (industrial cross sections) show that the application of the aforementioned hypothesis is at best uneven. For instance, the USA reveals a clear substitution between investment and visible trade. Canada tends toward complementarity, with investments apparently supporting the visible net exports. Japan tends toward the US model.

Third, there is the clear influence of currency rates. The lower US dollar rates tend to drop American DIA/FDI balance in favor of new visible exports. Also Canadian complementarity weakens the corollary of the substitution thesis.

The first two issues are sufficiently supported by the available evidence, especially in view of data paucity on the matter. The third currency thesis, though appearing to be self evident, invites further, more detailed, research on a sectorial basis.

In general,the research supports the spatial thesis of comparative advantage, set against the entrepreneurial dictum of competitive advantage. Nevertheless, complementarity should not be dismissed too easily. Service industries, and the like, are mostly complementary; but because of their subcontracting environment (downsizing, core business, etc.) they appear to be less related to trade flows in the activities at stake. Therefore, the warning remains that the evidence might be self-sustained and/or self-fulfilling. Even though the methods employed traditionally appear to remain appropriate, More precision and more cross-sectional detail is needed.

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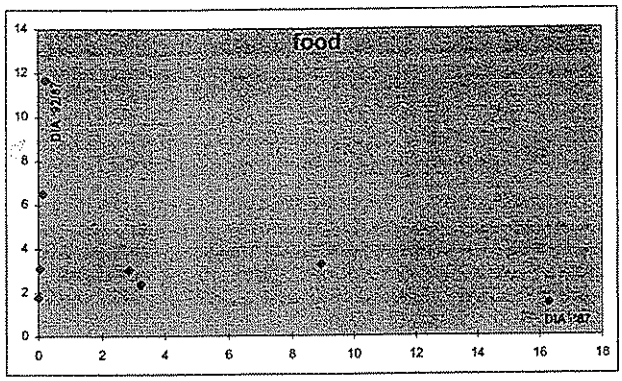
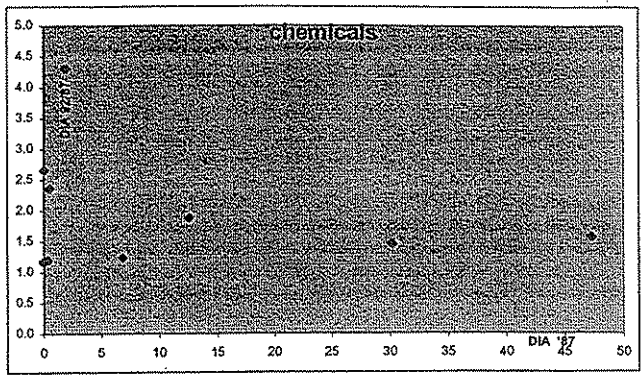
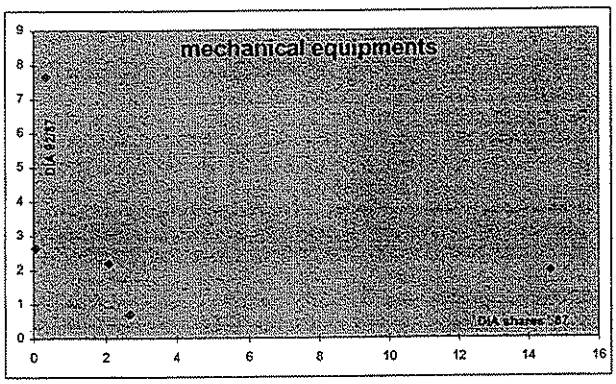
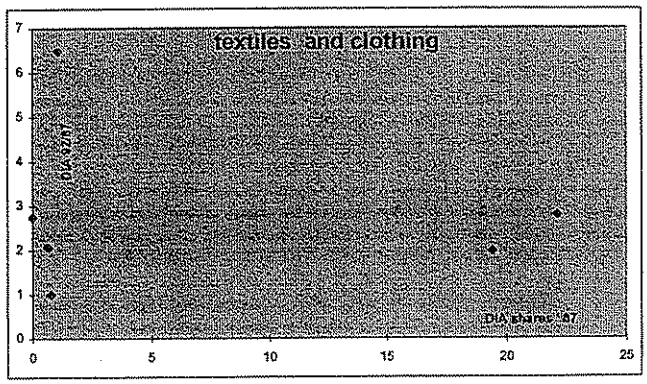
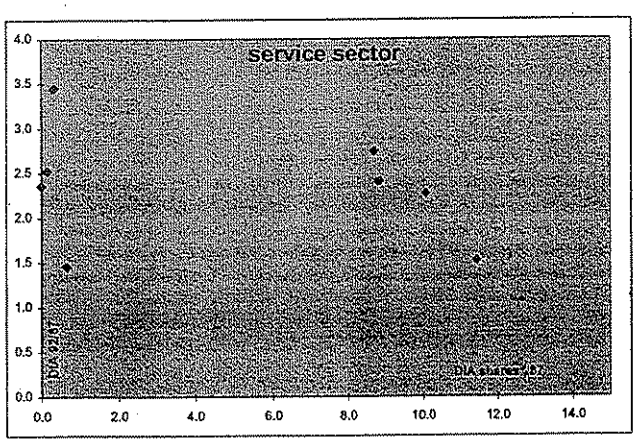
DIA shares of countries in specific sectors in '87 and their relative growth between '92 and '87. Annex 1

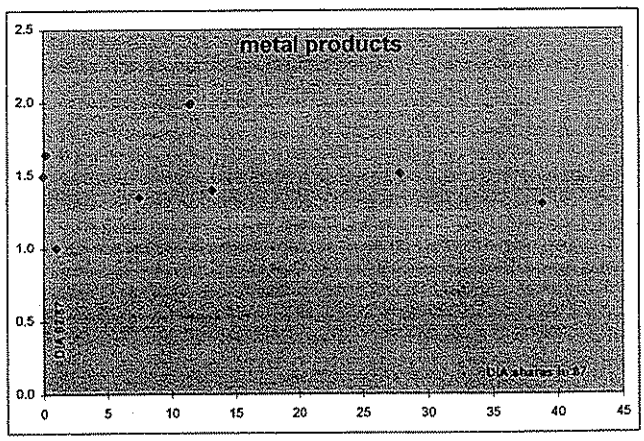


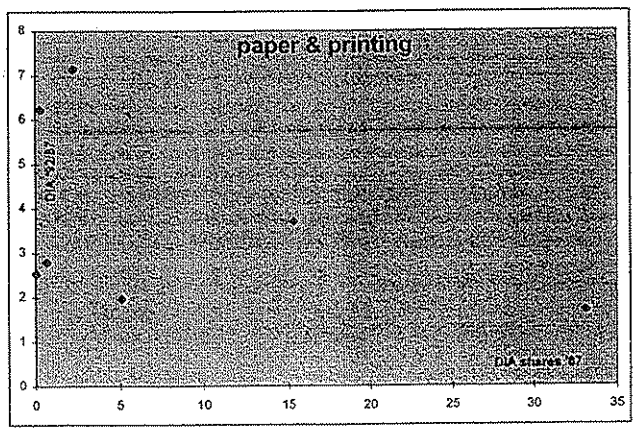


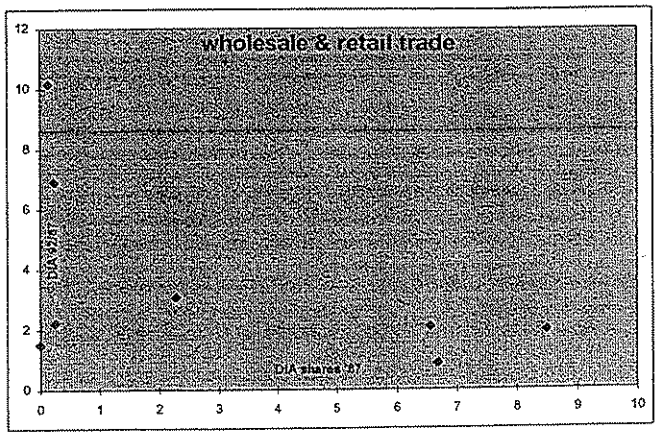






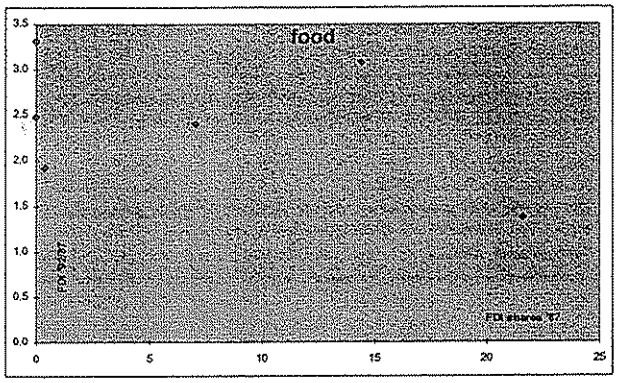


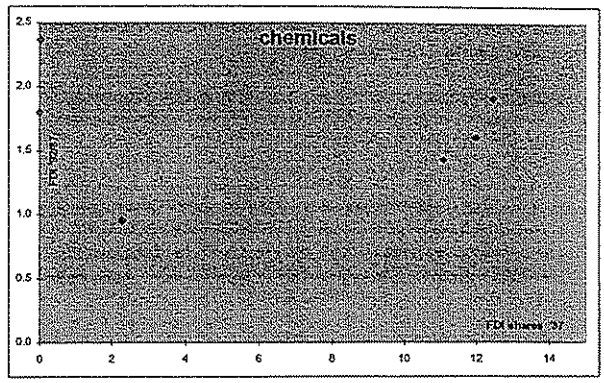


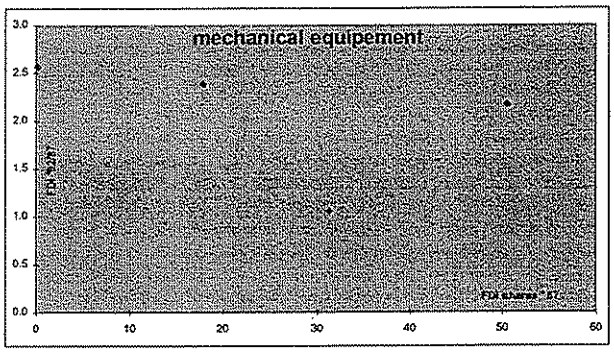


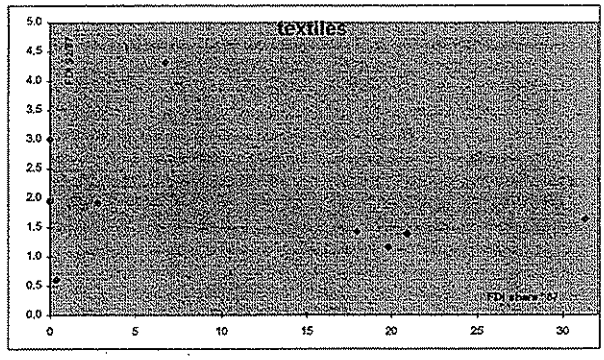
The DIA shares are based on country DIA stocks converted in US $ at the respective average annual exchange rate.
Source: OCDE, 1995, *Annuaire Statistique des Investissements Directs Internationaux*.

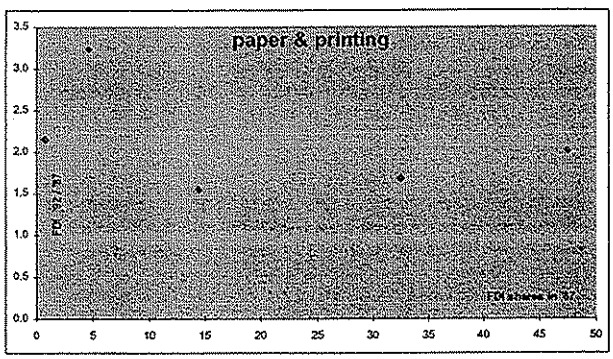
FDI shares of countries in specific sectors in '87 and their growth '92/ '87 Annex 2

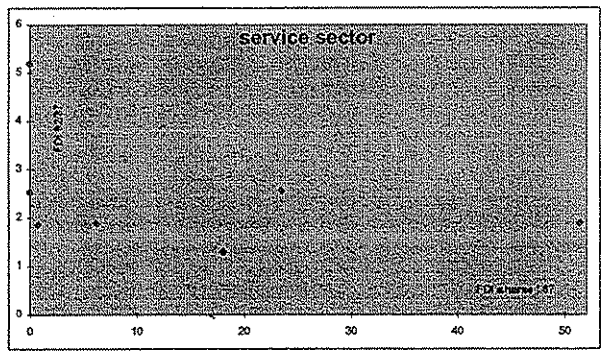


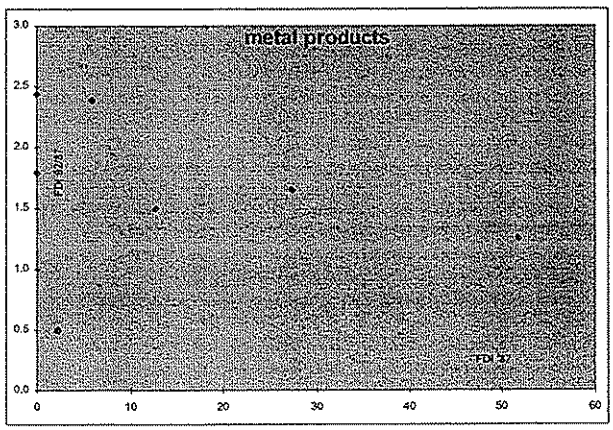


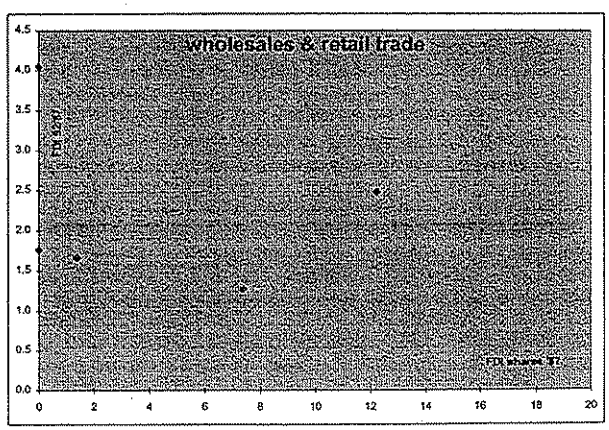






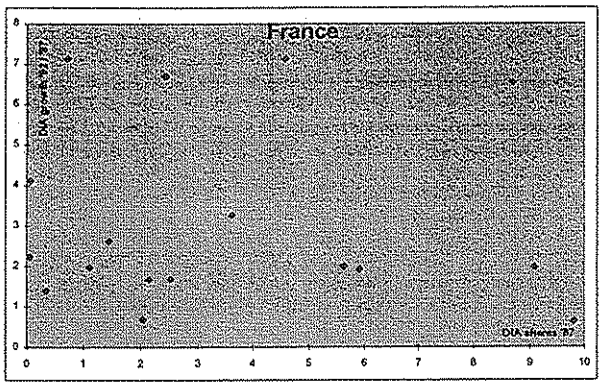


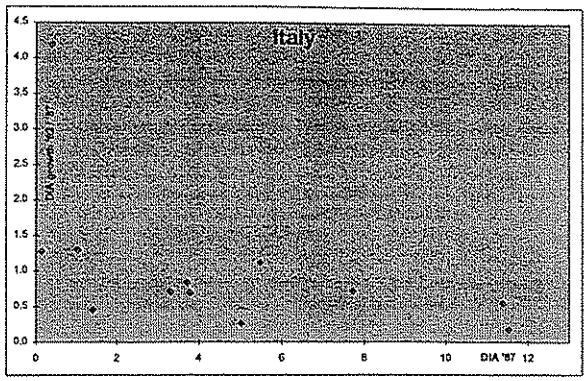


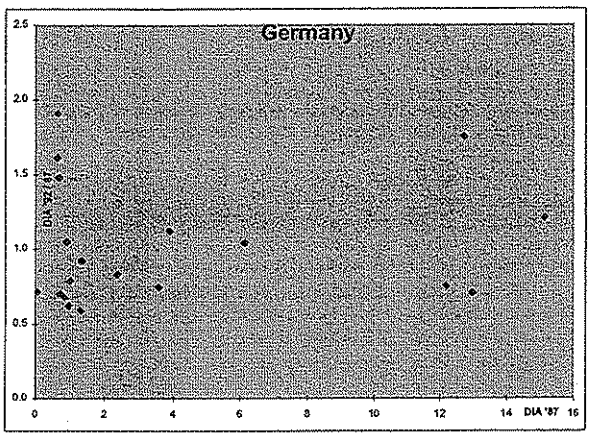


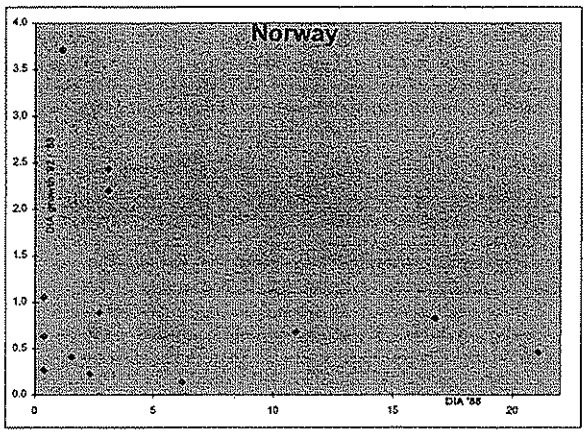
The FDI shares are based on FDI stocks of countries, converted in US $ at the average annual exchange rates, IMF.
Source: OCDE, 1995, *Op. cit.*

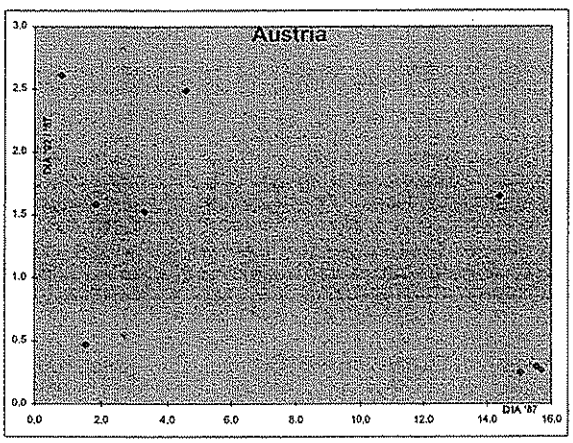
Relation between sectoral DIA shares of countries in '87 and their growth '92/ '87 Annex 3

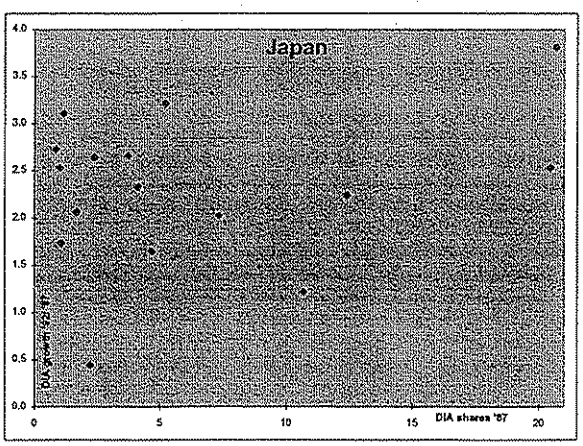


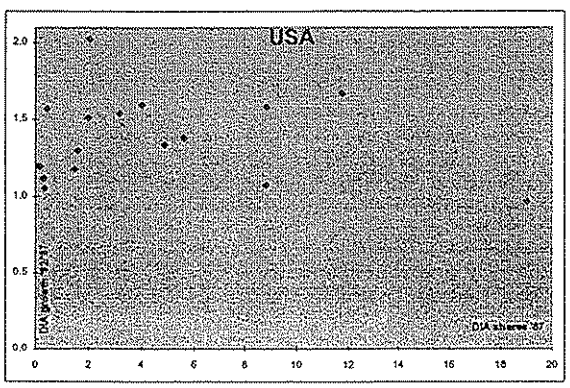


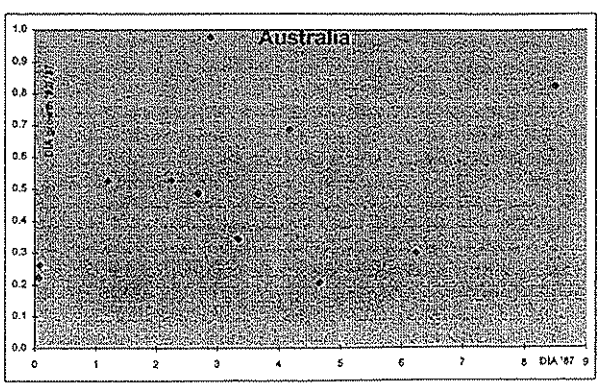






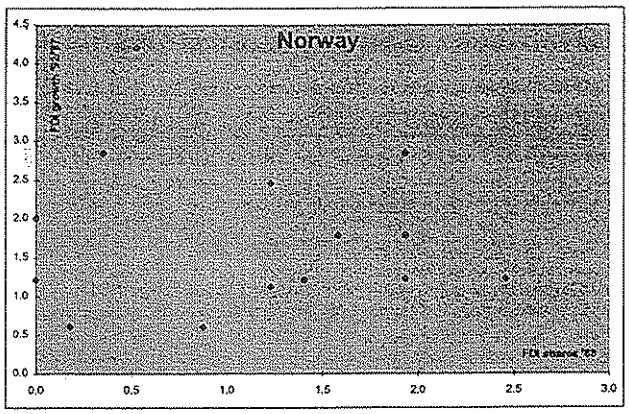


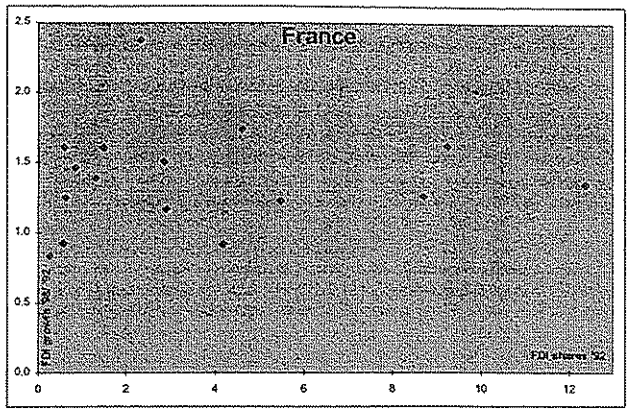


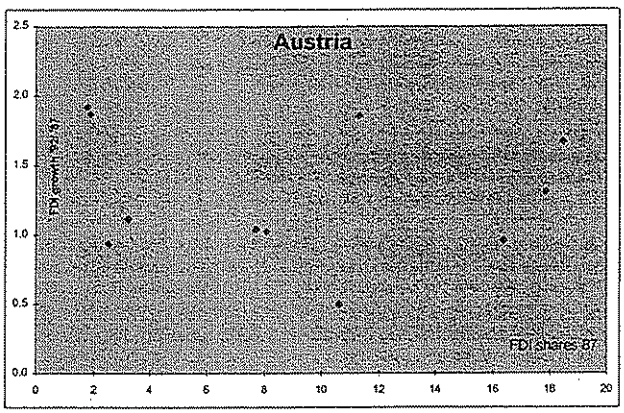


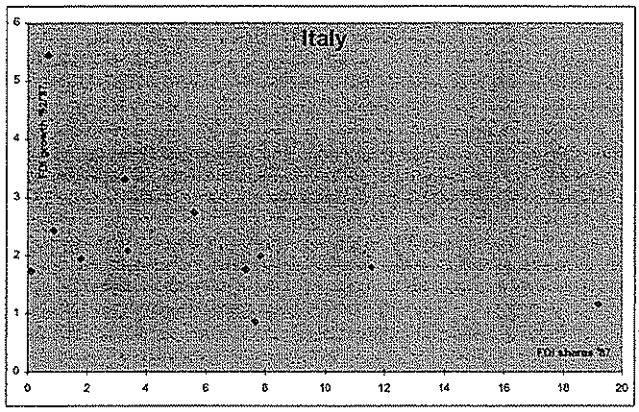
Source: OCDE, 1995, *Annuaire Statistique des Investissements Directs Internationaux.*

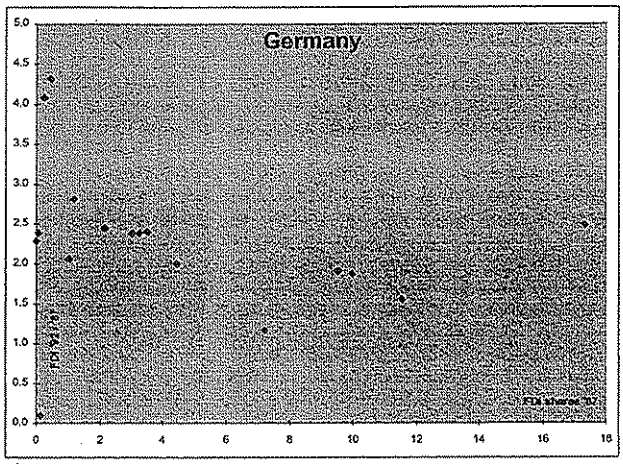
Relation between sectoral FDI shares of countries in '87 and their growth '92 / '87 Annex 4

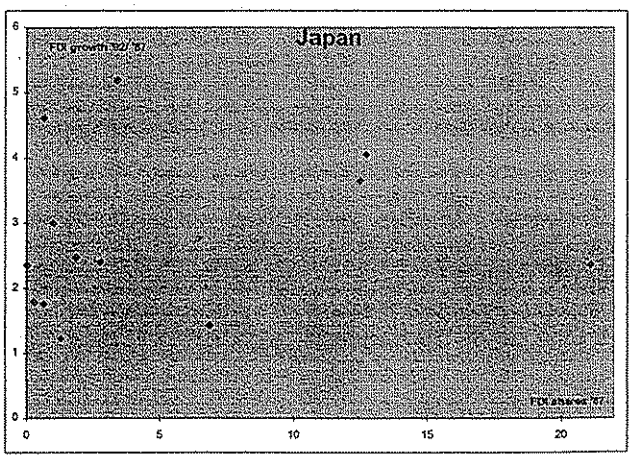


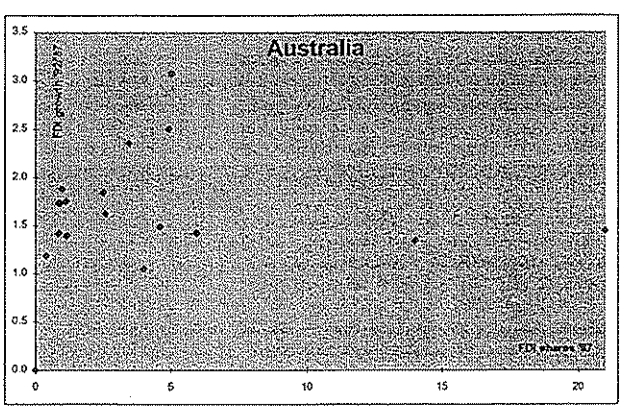


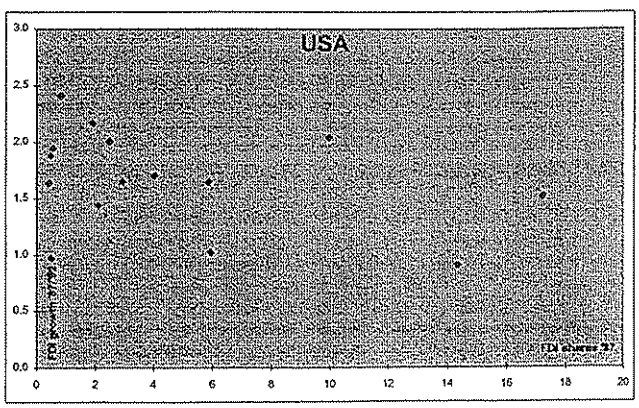








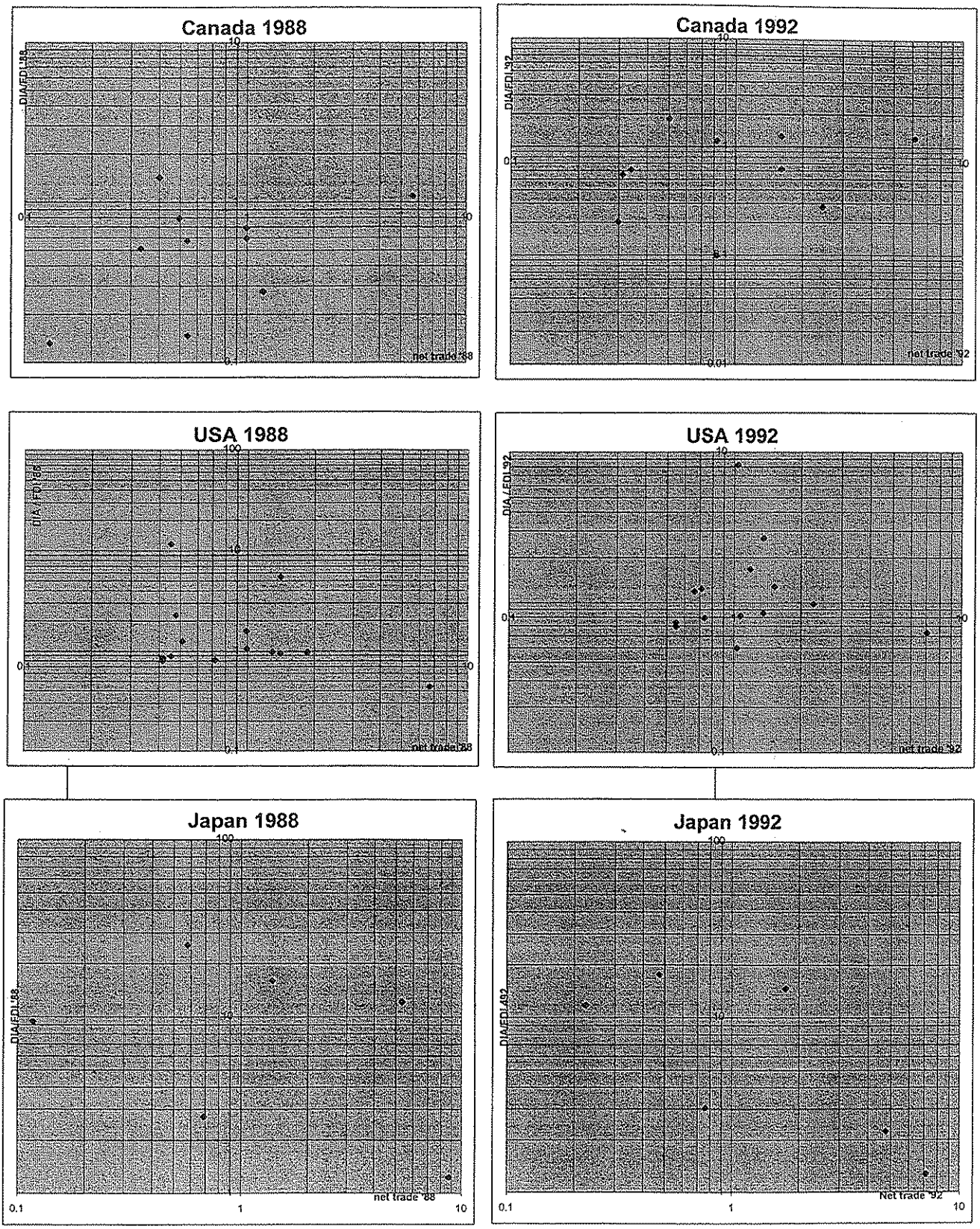




Source : OCDE, 1995, *Annuaire Statistique des Investissements Directs Internationaux.*

Relation between net trade and net foreign investments of sectors in Canada, USA and Japan in 1988 and 1992.

Annex 5



Source : OCDE Statistical Yearbook of Foreign Direct Investments, 1995.

Annex 6 : Testing the effect of the 1987-1992 US dollar devaluation, relative to the ECU, on net trade and foreign investment

hypothesis : the strong devaluation of the US dollar between 1988 and 1992 enhance growth of export performance (Ẋ/M) and a reduction of "DIA/FDI" in the USA

Sector	X/M	DIA/FDI	X/M	DIA/FDI	X/M Up	DIA/FDI down	Hypothesis is conformed ?
Agriculture	6.71	0.44	7.08	0.63	Y	N	No
Mineral	0.42	0.85	0.55	0.69	Y	Y	Yes
Petroleum	0.99	1.58	1.19	1.67	Y	N	No
Food	0.72	0.82	0.74	0.79	Y	Y	Yes
Textil. & Cloth	0.51	1.24	0.67	1.19	Y	Y	Yes
Paper & pulp	1.87	0.97	2.27	0.98	Y	Y	Yes
Chemicals	1.00	1.06	1.07	0.82	Y	Y	Yes
Petrochemical	0.99	1.58	1.19		Y	Y	Yes
Non metal	0.48	2.29	0.72	1.23	Y	Y	Yes
Metal	0.41	0.80	0.55	0.74	Y	Y	Yes
Mechanics	1.42	5.44	1.37	2.69	N	Y	No
Electrical	1.42	0.95	1.37	0.85	N	Y	No
Vehicles	0.45	11.60	1.04	8.23	Y	Y	Yes
Transport mat	0.45	0.89	1.04	0.50	Y	Y	Yes
Other manuf.	1.30	0.98	1.54	1.28	Y	N	N
Consruct		0.72		0.83		N	
Commrce		0.81		0.89		N	
Transport serv		0.82		0.04		Y	
Services		1.65		129.74		N	
Communicat.				0.08			

Y = Yes
N = No

The thesis is conformed in 10 out of the 15 sectors
The non-conformed cases show only small differences
The service sector can only be checked for FDI

Source : OECD/OCDE, 1995, Annuaire statisque des IDE & Eurostat