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How Foreign Direct Investment Affects International Trade and Competitiveness: an Empirical Assessment

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RÉSUMÉ

L'analyse micro-économique des stratégies d'internationalisation des firmes considère généralement l'investissement direct à l'étranger (IDE) et l'exportation comme deux formes alternatives de pénétration des marchés étrangers. Pourtant, la prise en compte dans ces modèles de stratégies de fourniture simultanée de plusieurs marchés, ou encore de l'incertitude, relativise cette conclusion traditionnelle. La théorie classique du commerce international, de son côté, voit dans l'argument de Mundell le fondement d'une possible substitution IDE-commerce. A nouveau, les développements récents en concurrence imparfaite ont montré les limites d'une telle analyse. Les séries macro-économiques soulignent quant à elle une forte complémentarité des deux modes d'internationalisation.

Un certain nombre de questions relatives à la compétitivité sont concernées par ce débat : si l'IDE est substitutif au commerce international, les exportations seront remplacées au moins pour partie par des ventes locales des affiliées implantées à l'étranger, au détriment de l'industrie du pays d'origine de l'investissement. Au contraire, pour peu que commerce international et IDE s'avèrent être des compléments, l'implantation à l'étranger sera gage de compétitivité, au bénéfice des exportations et de l'activité industrielle du pays d'origine.

Nous proposons ici une approche empirique bilatérale et sectorielle, susceptible d'éclairer les termes du débat. Le travail est basé sur la mise en cohérence de données de commerce et d'IDE ayant une double dimension secteur et partenaire. Cette stratégie de recherche permet de contrôler les déterminants communs des deux formes d'internationalisation, telles que la taille des marchés, le revenu par tête, ou l'intégration régionale ; réciproquement, l'importance des économies d'échelle, que l'on peut contrôler dans un modèle ayant une dimension sectorielle, devrait avoir un effet opposé sur l'investissement direct et le commerce. Les estimations sont basées sur des données à différents niveaux d'agrégation, cohérents entre eux, pour la France, les Etats-Unis, la Suède, l'UE12, le Japon, l'Italie et les Pays-Bas.

Au niveau de désagrégation le plus fin, sur données françaises, l'existence d'une relation de complémentarité entre flux d'IDE et commerce international est confirmée pour un panel de 19 industries. L'IDE sortant est associé à des exportations et des importations additionnelles, dans l'industrie considérée, vis-à-vis du partenaire considéré. Mais comme l'impact sur les exportations est plus profond, l'IDE est finalement associé à un excédent commercial net. En toute logique, l'investissement entrant est associé en retour à un déficit commercial bilatéral supporté par le pays d'accueil. On met également en évidence d'importants effets de débordement. Lorsque ces derniers sont pris en compte, l'impact de l'IDE sur le commerce est beaucoup plus marqué, mais cela ne remet en question ni l'existence d'un excédent commercial net induit pour le pays investisseur, ni l'ordre de grandeur de ce dernier. Nous parvenons à la conclusion selon laquelle la relation de complémentarité observée au niveau macro-économique transite largement par ces effets de débordement.

Une comparaison entre la France et les Etats-Unis souligne que l'excédent commercial net associé à l'IDE sortant est proportionnellement de même ampleur dans les deux pays, alors même que l'IDE américain a des effets de complémentarité beaucoup plus

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marqués que l'IDE français. Sans surprise, il apparaît que l'investissement entrant aux Etats-Unis est d'abord attiré par la taille du marché intérieur américain, ce qui débouche sur des effets de complémentarité IDE-commerce beaucoup plus limités que pour un pays comme la France, susceptible de servir de base d'exportation pour le Marché unique.

Les résultats obtenus sur données manufacturières suédoises ne sont pas satisfaisants. Par contre, si l'on considère globalement l'IDE suédois, tous secteurs confondus, la complémentarité est avérée, mais relativement modeste.

Dans les analyses précédentes, les effets de complémentarité apparaissaient toutefois asymétriques entre pays d'origine et d'accueil, en raison de l'insuffisante couverture géographique du modèle. Un pooling de 14 pays déclarants face à 15 partenaires, dans un secteur et sur la période 1984-1993, permet d'aboutir à une symétrie satisfaisante des effets d'excédent et de déficit commercial net pour les pays investisseurs et d'accueil des IDE.

Nous menons de façon complémentaire une analyse sur les stocks d'IDE français et américains. En ce qui concerne la France, la complémentarité entre IDE-sortant et exportations est clairement validée. Au contraire, nous parvenons à un diagnostic de substitution concernant les importations. Concernant l'IDE entrant en France, au contraire, la complémentarité est avérée avec les exportations et les importations. Le résultat de ces différents effets est clairement une amélioration des positions compétitives de la France, en cas d'investissement direct français à l'étranger, mais non en cas d'IDE entrant.

Concernant les Etats-Unis, la complémentarité entre stocks d'IDE américain à l'étranger et exportations américaines est avérée. Mais à la différence de la France, il apparaît que les importations américaines sont également associées positivement à l'implantation étrangère des firmes américaines, traduisant l'importance des délocalisations. Ainsi, au contraire de la France, l'IDE américain sortant n'est pas associé à un excédent commercial net, mais à un déficit. A l'opposé, les implantations étrangères aux Etats-Unis, ici le stock d'IDE entrant, sont clairement un substitut au commerce international, probablement en raison des stratégies développées par les firmes étrangères pour contourner les barrières commerciales érigées dans certains secteurs par les Etats-Unis.

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SUMMARY

The analysis of microeconomic agents' internationalisation choices generally refers to trade and Foreign Direct Investment (FDI) as alternative strategies. This substitution can nevertheless be called into doubt when the necessity to compete on multiple foreign markets or under uncertainty is taken into account. Concerning the theory of international trade, Mundell's classical conclusion has been challenged on the basis of imperfect competition. Moreover, macroeconomic series of trade and FDI highlight that these two modes of internationalisation are clearly complements.

This debate has shed light on issues related to competitiveness: if FDI displaces trade, exports will be at least replaced by local sales on foreign markets, detrimental to the domestic industry of the investor. On the contrary, if trade and FDI are confirmed as complements, investing abroad might lead to greater competitiveness in foreign markets, which is beneficial to exports from the investing country and thus to its industry. In order to clarify these relationships, a bilateral and sectoral empirical approach is proposed based on a matching of trade and FDI data authorising a break down by industryand partner country. It permits 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 having an opposite impact on both forms of internationalisation. Estimates are based on data of different, even though coherent, levels of disaggregation for France, the US, Sweden, the EU12, Japan, Italy and the Netherlands.

Using the most disaggregated data (French data), the diagnosis of complementarity between trade and FDI *flows* is validated for a panel of 19 industries. Outward FDI is associated additional exports and imports, in the industry considered, *vis-à-vis* the country of investment. But since the former increase more than the latter, investment abroad is associated with a trade surplus. Conversely, inward investment is associated with a trade deficit of the host country. Spillovers between industries are sizeable. The impact of FDI on trade is much higher when these spillovers are accounted for, even if the global trade surplus remains comparable with the one estimated at the "industry of investment" level. We conclude that a large share of the complementarity between trade and FDI at the macroeconomic level can be explained by large spillovers between industries. A comparison between France and the US highlights that the net trade surplus is roughly identical, even if US investment abroad has much stronger complementarity effects. As expected, the impact on trade is much weaker when inward FDI into the US is accounted for, given the difference in domestic market sizes. Results for the Swedish industry taken as a whole are unsatisfactory.

Turning to FDI taken as a whole: the complementarity is confirmed, but these complementarity effects are much smoother than for France or the US. Pooling the data for 14 declaring countries facing 15 partners, in one sector over 1984-1993, the asymmetry between the trade surplus associated with outward FDI flows and the trade deficit associated with inward FDI vanishes: the symmetry in parameter estimates is magnified by the enlargement of the country coverage. In addition, estimates have been made for French and US FDI *stock*s. Concerning France, outward FDI is clearly a complement for bilateral exports, but a substitute for imports. In contrast, inward FDI is a complement for both French exports and imports. Thus, French assets abroad boost bilateral exports and are associated with depressed French bilateral imports. The net impact on competitiveness is therefore clearly positive. Symmetrically, inward FDI is associated with a net trade deficit. Turning to the US,

the complementarity between outward FDI stocks and bilateral trade is confirmed: what is striking is the fact that US imports are boosted as a result of relocation of activities abroad. Thus, in contrast to France, US foreign assets are associated with a net trade *defici*t. In contrast, foreign assets in the US are substitutive to trade, potentially due to previous tariff jumping strategies of foreign companies.

How Foreign Direct Investment Affects International Trade and Competitiveness:
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Lionel Fontagné[1], Michaël Pajot

1. INTRODUCTION[2]

The analysis of microeconomic agents' internationalisation choices generally refers to trade and Foreign Direct Investment (FDI) as alternative strategies (Barlet, 1992). This is confirmed by the classical theory of international trade, specifically by the seminal Mundell-paper :

"*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*"[3].

From a micro-economic point of view this substitution can nevertheless be called into doubt when the necessity to compete on multiple foreign markets (Gara,1997) or under uncertainty (Becuwe, Mathieu-and Sevestre, 1997) is taken into account. More fundamentally, Mundell's classical conclusion has been challenged by Helpman (1984) as well as Markusen and Venables (1995), on the basis of imperfect competition.

Finally, turning to macroeconomic series of trade and FDI, these two modes of internationalisation are clearly complements (Henry, 1994): FDI might induce trade (Yamawaki, 1991) or *vice-versa* (Eaton and Tamura, 1994).

From a methodological point of view, this debate raises the question of factors boosting simultaneously commodity and factor movements, such as market size, the proximity of sources of demand and regionalisation processes. Thus, the diagnosis of complementarity might be based on a pure artefact. From the perspective of economic policies, this debate has shed light on issues related to competitiveness: if FDI displaces trade, exports will be at least replaced by local sales on foreign markets, detrimental to the domestic industry of the investor. On the contrary, if trade and FDI are confirmed as complements, investing abroad might lead to greater competitiveness in foreign markets, which is beneficial to exports from the investing country and thus to its industry. If the latter mechanism is ascertained, inward FDI would be necessarily detrimental to the competitiveness of the country where such investment takes place; which is certainly a conclusion invalidated by most studies. Unfortunately, this is a rather complex mechanism, involving numerous competitors investing in foreign markets.

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[3] Mundell-1957 p. 320.

It has been demonstrated in the literature that local sales partially substitute for previous exports of the investing company. At the same time, local sales, and thus local output, require imported inputs, the latter being largely provided by the parent or by other subsidiaries of the same group, potentially located at least partially in the home country. Adding to these bilateral effects between home 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.

Sweden, with the benefit of the database provided by the Industrial Institute for Economic and Social Science Research (Stockholm), has generally been taken as a good case study[4]. Swedenborg (1979) concludes that FDI has no significant effect on the parent exports, local sales substituting these exports, while new exports are induced (intermediate goods or complements of supply). This result was confirmed in 1982 by a study finalised by the same author: $1 of local sales substitutes only 2 cents of exports but "creates" 12 cents of new exports, the net effect being a positive complementarity of 10 cents. Blomström, Lipsey and Kulchycky (1988) conclude with a limited effect of complementarity. Taking into account that foreign production can replace exports from the home country not only to the host country but also to third markets, however, Svensson (1993) found a trade displacement effect for the 1980s, which can be explained by unfavourable conditions of industry in Sweden in this period. Finally Andersson (1993), and Blomström and Kokko (1994) suggest that the structure of Swedish exports might be more affected than the value of these exports as a result of outward FDI.

In order to clarify these complex relationships, a bilateral and sectoral empirical approach is proposed in this paper, accounting for numerous countries and industries. Spillover effects are highlighted and characterised as the main vector of competitiveness gains associated with outward FDI. In contrast, inward FDI slightly reduces trade performances of the host country *vis-à-vis* the investor. The purpose, here, is not to collect individual data at the firm level, but to tackle the problem at a sectoral level. In addition, local sales are not referred to, the analysis being based on trade flows and FDI flows and stocks only.

2. METHODOLOGY

Existing tests in the literature lead to the formulation of a small number of hypothesis establishing a link between the macroeconomic complementarity and the microeconomic substituability between trade and FDI.

- Exports of inputs and complementary final products to the affiliate more than compensating for partial substitution[5] of local sales in existing exports. The combination of these two mechanisms may lead to a positive net impact of FDI on exports at the sectoral and bilateral level;

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[4] See Andersson et al. [1996]

[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.

- Partial substitution of parent's previous exports to third countries by subsidiary's exports;

- Enhanced imports from the host country, due to the re-importation of final products (specialisation of subsidiaries along the range of final products), or simply due to a relocation of an activity abroad.

- Inward FDI has *a priori* a symmetrical impact. The host country reduces its imports from the investing country, to the benefit of local production, but imports intermediate inputs, professional goods or final products from the latter. The host country also exports to the investing country, and potentially to third countries, specifically if it participates a regional integration scheme. Finally, an induced bilateral trade deficit *vis-à-vis* the investing country may be observed, partially or totally offset by an induced surplus *vis-à-vis* third countries[6].

In addition to these impacts (generally referred to in the literature) *spillover effects* are suggested by our analysis: bilateral trade and FDI relationships are deeply rooted in the production system. Subcontracting or procurement practices lead to an overall impact of FDI on the investing country's competitiveness: this deserves longer developments for FDI in the service sector, as long as wholesale trade is referred to. But, even for FDI in the manufacturing sector, the potential impact of investing abroad surpasses the boundaries of the investing sector. The methodology developed here aims, *inter alia*, at characterising such spillovers.

In accordance with the arguments referred to here, the database and the estimates are strictly bilateral, each country facing each partner. In addition, relationships with third countries taken as a whole for each declaring country are considered. Given this bilateral dimension, it is 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 having an opposite impact on both forms of internationalisation.

In addition, it is necessary to take into account the sectoral dimension of the problem: 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 transport costs (Brainard, 1995).

The first difficulty is to collect bilateral FDI data at the industry level; as a result our database is actually a long way from covering all industrial countries. The United States and France have provided the best data. Sweden has also tried to provide disaggregated data. For other European countries, the Eurostat database has been used and complemented by OECD data for some countries. The second difficulty is to finalise a data set in a common nomenclature for differing declaring countries. The third difficulty is that a data set in the same nomenclature for bilateral trade flows has to be matched. CEPII has provided trade data (CHELEM database).

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

Concerning US investment abroad, we have information on flows and stocks for 1982-1995. Foreign investment in the US is available over 1980 -1994. Finally, after having solved different problems the following database has been implemented:

- 45 countries (or country groups);
- 16 years : 1980 to 1995 ;
- 22 industries aggregated into 12 sectors when merging the files.

This leads to:

- 5089 observations for FDIIN (flows);
- 8787 observations for FDIOUT (flows);
- 5216 observations for FDIIN (stocks);
- 9217 observations for FDIOUT (stocks).

Turning to French data, the Balance of Payments Appendices have been collected over 1984-1995 for flows, and 1989-1995 for stocks. Contrary to US data, reinvested earnings are not accounted for.

The sectoral breakdown being more detailed than in the US, French data can be used at its finest level of disaggregation or reaggregated in order to come back to the 22 sectors referred to above. Only 39 partners are taken into account in order to match the CHELEM-CEPII trade database.

Finally the database for French FDI flows entails 10296 observations:

- 39 countries;
- 22 sectors;
- 12 years: 1984 to 1995.

And the database for French FDI stocks entails 5676 observations:

- 43 countries;
- 22 sectors : see Table 2 ;
- 6 years: 1989 to 1994.

Turning to Eurostat data, reinvested earnings are excluded due to missing data. There are two types of information in this database. First, for 1992/93, the sectoral and country disaggregation is interesting. Sectors are disaggregated along the CITIrev3, for some 50 industries. But only 4 partners face the 12 declaring countries: EU12, Third countries, USA, Rest of the World. Second, over 1984-1993, a less disaggregated database is available for only 10 declaring countries and 2 partners (EU/third countries), and a smaller number of industries.

OECD data has been used as a complement. Notably, sectoral information for Italy and the Netherlands has been introduced in the database. This addition is affected by a large number of missing data: a "corrected" database has been implemented, using partners declaration to fill the gap. As such declarations are generally asymmetric, we will explicitly mention below when this data is introduced in the estimates.

Finally, Sweden has kindly provided data disaggregating services and industry, but not within industries. This data has been introduced in the database.

Table 1– Nomenclature for the data base "Trade + FDI"

1- All industries
2 – Mining
3 – Petroleum
4 - Total manufacturing
5 - Food
6 – Chemicals
7 – Metals
8 - Machinery except electric
9 - Electric and electronic
10 – Machinery
11 - Transportation eqpt
12 - Other manufacturing
13 - Trans eqpt and other manuf
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

Note: There are over 22 sectors in the FDI database, but only 13 match trade data.
These are reaggregated in the 6 sectors in bold characters.

Concerning FDI, the identified sector refers to the sector of inward investment flows (stocks) and the sector of outward investment flows (stocks).

In order to control for country and industry effects, three sets of explanatory variables are introduced in the estimates:

- Country variable : the size of markets, proxied by the average GDP of the declaring country and its partner (*AVRGDP*), the difference in size (*DIFFGDP*), the demand for variety and the level standard proxied by the average income per capita of the declaring country and its partner (*GDPPC*), the economic distance and the difference in human capital endowment both proxied by the difference in income per capita between the declaring country and its partner (*DIFFGDPPC*), transportation costs proxied by the geographical

> distance (*DIST*), regionalisation proxied by the existence of preferential commercial schemes (dummy *CPOL*);
> - Turning to sectoral variables, which have no country dimension, the concentration, the economies of scale, the share of white-collar workers in employment, the capital intensity, or the capital ratio (barriers to entry) can be used. Given the high level of industry aggregation, it has been decided to introduce economies of scale only. 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;
> - Finally, FDI is disentangled into outward and inward flows, in bilateral relations between the declaring country k and its partner k' and relations of k with all other countries: thus the notations will be OUT and IN, OUTOTH and INOTH.

As referred to above, the database includes data of different, even though coherent, levels of disaggregation. This authorises six types of estimates:

- In the French case, at a highly disaggregated level;
- In the French case, using the American nomenclature, in order to authorise a comparison with the US;
- In the US case;
- In the Swedish case, which does not authorises a disaggregation of the manufacturing sector;
- Using a pooling of French, US and Swedish data, considering the industry as a whole;
- Using a pooling of French, US, Italian, Dutch and Swedish data, in cross-section (1994)[7].

Finally, our research is synthesised in Table 2. Each type of estimate will be referred to below using the letters A to F. Estimates A and B are available for FDI flows and stocks, whereas C to F are available for flows only. The first five cases are referred to in the text below. As the sixth one is a cross-section, parameter estimates cannot be compared with panel estimates. Results are therefore given in the Appendix for the interested reader.

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[7] In the Swedish case, the manufacturing sector is not disaggregated at this stage, contrary to other countries mentioned.

Table 2– The six types of estimates

Country	France	USA	Sweden	Fr. – USA – Sweden	EU12 - Japan - USA	USA - France- Sweden - Italy - Netherlands
Period	84-94	84-94	82-94	84-94	84-93	94
Indus or indus manuf + scale	nom. F	-	-	-	-	
	nom. base	-	-	-	-	nom. base (excl.Sweden)
Total indus						
	nom. base	nom. base	nom. base	nom. base	-	nom. base
Total						
	nom. base	nom. base	nom. base	nom. base	nom. base	nom. base
Context	A	B	C	D	E	F

Note: nom F.: French nomenclature (Balance of payments); nom base: nomenclature specific to our database (seeTable 1).

3. THE FRENCH CASE (A)

Following our methodology, French exports (imports) to (from) each trade partner are explained by four FDI variables, controlling for country and industry variables:

- Outward French FDI to the partner (OUT) ;
- Inward FDI in France from the partner (IN) ;
- Outward French FDI to third countries (OUTOTH) ;
- Inward FDI in France from third countries (INOTH).

Concerning exports and outward FDI, for example, the following logic is applied:

- In a first step, industries' exports are explained by outward FDI in the corresponding industries. This answers the question: "How does \$1 of French investment in the automobile industry in Brazil affect French exports of automobiles to Brazil?"
- Then, the same model is re-estimated excluding the variable of economies of scale in order to authorise a comparison with the two following steps that necessarily exclude such a variable. We take this opportunity to reintroduce sectors for which information on returns to scale is not available.
- In a third step, spillovers between industries are identified. This answers the question: "How does French investment in the Brazilian manufacturing industry affect the French exports of manufactures to Brazil?" Thus, we take into account the fact that an investment in the automobile industry might also concern French exports of electrical parts to Brazil.
- Finally, we tackle potential spillovers between FDI in services and exports of manufactured products as a whole.

Table 3: data for France

	FDI Data : APE (NAP73)	Chelem Data		Partenaires	
1	1 - AGRICULTURE	JA, JB, JC	1	ALGERIA	alg
	2 - ENERGY		2	ARGENTINA	arg
3	Coal, petroleum, gas	IA, IB, IC	3	AUSTRALIA	aus
	Refined products		4	AUSTRIA	aut
5	Other energy	II	5	U.E.B.L.	blx
6	3 - MANUFACTURED PRODUCTS	sub-total	6	BRASIL	bra
7	Ferrous and non ferrous	sub-total	7	BRUNEI	bru
	- Mining and carrying	HA, HB	8	BULGARIA	bul
	- Transformation	CA, CB, CC	9	CANADA	can
10	Non met. Minerals	sub-total	10	SWITZERLAND	che
	- Extraction	HC	11	CHILE	chl
	- Transformation	BA, BB, BC	12	CHINA	chn
13	Chemicals	GA, GB, GC, GD, GE, GF, GG	13	COLOMBIA	col
14	Iron and steel	FA, FB	14	TCHECOSLOVAQ	cze
15	Ind. and agric. machinery	FC, FD, FE, FF, FG, FH	15	GERMANY	deu
16	Office machinery, precision instr.	FI, FJ, FK, FO	16	DANMARK	dnk
17	Electronic and electrical equipment	FL, FM, FN, FP, FQ, FR	17	EGYPT	egy
18	Transport equipment	FS, FT, FU, FV, FW	18	EQUATOR	equ
19	Food, bev., tob.	KA, KB, KC, KD, KE, KF, KG, KH, K	19	SPAIN	esp
20	Textiles and apparel	DA, DB, DC, DD, DE	20	FINLAND	fin
21	Paper, wood	EC, ED	21	GABON	gab
22	Rubber and plastic	GH, GI	22	UNITED-KINGDO	gbr
23	Other manuf.	EA, EB, EE, IG, IH, NA, NB, NV	23	GREECE	grc
24	4 - BUILDING		24	HONG-KONG	hkg
25	5 - SERVICES		25	HUNGARIA	hun
26	Recycling, maintenance, wholesale trade		26	INDONESIA	idn
27	Hotels and restaurants		27	INDIA	ind
28	Domestic transports		28	EIRE	irl
	Sear and air transport		29	ISRAEL	isr
30	- Sea transport		30	ITALY	ita
			31	JAPAN	jpn
32	- Air transport		32	SOUTH KOREA	kor
33	Related services		33	MOROCCO	mar
34	Communications		34	MEXICO	mex
35	Banking		35	MALAISIA	mys
36	Insurance		36	NIGERIA	nig
	Ohter private services		37	NETHERLAND	nld
38	- Health, culture.		38	NORWAY	nor
39	- Other		39	NEW ZEALAND	nzl
40	6 - Public administration		40	PAKISTAN	pak
41	7 - Real estate		41	PERU	per
42	8 - HOLDINGS		42	PHILIPPINES	phl
43	9 - INDETERMINATE		43	POLAND	pol
44	**TOTAL**	sub-total	44	PORTUGAL	prt
			45	ROMANIA	rom
			46	SINGAPOUR	sgp
			47	SWEDEN	swe
			48	THAILAND	tha
			49	TUNISIA	tun
			50	TURKEY	tur
			51	TAIWAN	twn
			52	EX-USSR	urs
			53	ETATS-UNIS	usa
			54	VENEZUELA	ven
			55	YUGOSLAVIA	yug
			56	EU12	eur12
			57	TOTAL	tot

Note: a CHELEM nomenclature is given in Appendix 4.

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. There is only one problem with the average size of markets in the equation embodying economies of scale.

Finally, the core of estimates can be summarised as follows:

Table 4– parameter estimates associated with FDI variables in the equations of French bilateral trade

Context A	Exports				Imports			
Level of analysis	Total	Total Indus.	Indus.	Indus. Manuf + scale	Total	Total Indus.	Indus.	Indus. Manuf + scale
OUT	2.41	2.28	0.55	0.59	2.51	1.85	0.27	0.24
IN	4.42	3.52	0.39	0.22[a]	4.46	4.34	0.53	0.34[a]
OUTOTH	-0.9[a]	-0.14[b]	0.04	0.07	-0.07[b]	ns	0.05	0.05
INOTH	-0.36	-0.47[a]	0.15	0.09	-0.45	-0.59[a]	0.08	0.04[a]
n	473		8987	7095	473		8987	7095

Note:
"Indus. manuf. + scale": trade and FDI for 15 manufacturing industries, controlling for economies of scale
"Indus": trade and FDI for 15 manufacturing industries + 3 industries (energy) + agriculture = 19 industries. No economies of scale.
"Total indus": 19 industries taken as a whole for trade and for FDI.
"Total": 19 industries taken as a whole for trade; FDI in industry and services taken as a whole.
Parameters significant at the 1% level, with the exception of (a): 5% and (b): 10% ; ns : not significant

Clearly, the diagnosis of complementarity between trade and FDI is validated. Let us consider this result in detail, bearing in mind that country determinants of trade are controlled for, and that we have a panel of 19 industries.

Considering the "indus. + scale" estimates, $1 of outward FDI is associated with a 59 cents of additional exports and with only 24 cents of additional imports, in the industry considered, *vis-à-vis* the country of investment. Thus, each $1 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 deficit for each $1 of inward investment into France.

From a policy point of view, this result leads to the conclusion that outward FDI enhances the competitiveness of the investing industry. Concerning inward FDI, this result may be simply interpreted as the higher propensity of inefficient French industries to be contested by imports and by inward FDI of foreign competitors. In addition, it must be borne in mind that inward FDI also has potential benefits in terms of domestic employment and technology.

The expected result concerning third countries is captured by our estimates, but it is rather negligible.

It is necessary to re-estimate the model without economies of scale in order to compare results for individual industries with results for the industry taken as a whole and so capture spillovers. The net trade surplus is robust to this change (28 cents as opposed to the previous 30), as is the trade deficit associated with inward FDI (13 cents as opposed to 12).

Are spillovers sizeable? Our estimates lead to a positive answer, since the impact on trade is much higher in the equations for "Total indus.". Here, $1 of outward FDI is associated with $2.3 of additional exports and $1.9 of additional imports. The global trade surplus remains comparable with the one estimated before, but the complementarity between trade and FDI is much higher. Thus, we conclude that a large share of the complementarity between trade and FDI at the macroeconomic level can be explained by large spillovers between industries. In contrast, turning to inward FDI, the trade deficit raises to 82 cents for each $1 of investment. Thus, balanced FDI *flows* would be associated with a net trade deficit for the French industry taken as a whole. This pessimistic result will be reassessed below, taking into account data for FDI stocks.

Here, the role of third countries is better captured: as advocated before, these effects are rather substitutive. Let us consider "Total indus." Equations. Concerning outward FDI to third countries, this is perfectly compatible with the general principle of complementarity. When France invests in Brazil (OUT) this increases its exports and imports to and from Brazil. In contrast, French FDI directed towards other countries (OUTOTH) reduces, other things being equal, both French exports (imports) to (from) Brazil.

Symmetrically, inward FDI is also substitutive to trade, but following another explanation: when Germany invests in France, this increases French imports from Germany, and to a lesser extent French exports to Germany. But if other countries invest in France (INOTH), this leads to a reduction of imports from Germany (59 cents for each $1 invested in France by third countries) but also French exports to Germany (resp. 47 cents). Thus, if Germany invests $1 in France and its third countries' competitors $1 also, this will be associated with a trade deficit limited to 70 cents[8] *vis-à-vis* Germany. Thus, the competitiveness of foreign competitors on the French market is enhanced by their investment in France; but they partially neutralise their gains of competitiveness mutually.

Finally, the estimates integrating services, including holding companies, confirm the previous results. But the disappointing result is that it is impossible to assess the spillovers of investment in services on industry by this method. This must be due to the presence of holding companies, which introduce noise.

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[8] =(82-(59-47))

4. A COMPARISON BETWEEN FRANCE, SWEDEN AND THE UNITED STATES (A, B AND C)

The database has 21 120 observations for 1984-1994, of which 4 884 can be used for the matching Trade to FDI. The principle of estimates is identical to the one developed for France.

Let us start by comparing the results for France with those obtained previously: here the nomenclature is more aggregated, and it is expected that a share of previous spillovers will be "internalised" in industries, as a result of this re-aggregation. A comparison of parameter estimates is given in the Table below.

Table 5- The impact of FDI flows on French bilateral trade1984-1994

	X		M	
	16 indus	6 indus	19 indus	6 indus
OUT	0.588	0.486 (a)	0.244	0.239 (b)
IN	0.224	0.793	0.338	1.404

Parameter significant at the 1 % level, with the exception of:
(a) 5 %
(b) Not significant at the 10 %

Firstly, it must be noticed that the performances of the model are smoothed by this re-aggregation, in particular for outward investment flows. The results are better for inward investment, and confirm the change in parameters due to a partial internalisation of spillovers.

Let us turn now to the comparison between France and the US.

Table 6- The impact of FDI flows on trade in industries (France and United States) for1984-94 (economies of scale controlled)

	INDUS + SCALE			
	X		M	
	IN	OUT	IN	OUT
USA	ns	2,563	0,586	2,264
France	0,793	0,486	1,404	ns

Parameter significant at the 1% level; ns: not significant

The first important result is that US investment abroad has much stronger complementarity effects than French investment. $1 of US investment abroad is associated with respectively $2.6 and $2.3 additional, bilateral exports and imports within industries. This is six time more than in the French case. But notwithstanding this difference, the net trade surplus remains around 30 cents for each $1 invested abroad, as is also true for France.

Even more interesting, the impact on trade is much weaker when inward FDI into the US is accounted for. The impact on exports is not significant, in contrast with France: this can be explained by the difference in domestic market sizes. Foreign investors

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consider France as a location in Europe, whereas the US domestic market attracts foreign investors first of all. But this lesser complementarity is also observed for imports: each $ of inward investment is associated with an additional $1.4 of French imports, compared with respectively only 60 cents in the US. This may be explained by the greater availability of local procurement in the US, due to the size of the domestic market. Alternatively, it may be explained by cascading investments in the US, foreign suppliers following the investment in the US of downstream firms.

Turning to spillovers, the model has first to be re-estimated without economies of scale, as was done previously. The gain in significance is large, which permits a good comparison of the two countries to be made.

Table 7 – The impact of FDI flows on trade within industries
(France and the United States)

	INDUS			
	X		M	
	IN	OUT	IN	OUT
USA	0,332 [(a)]	2,664	0,790	2,472
France	0,988	0,774	1,446	0,624

Parameters significant at the 1 % level, excluding:
(a)   Significant only at the 5% level.

Then, the model has to be re-estimated for industry taken as a whole, in order to capture potential spillovers. Compared with the French case, the results are rather disappointing for the US. IN looses in significance in the equation of exports and is not significant in the import equation.

Once again, the introduction is far from satisfactory, at least for outward FDI flows. But for inward flows, and for the US, the complementarity between trade and FDI is reinforced to the benefit of activities by wholesale trade subsidiaries located in the US. The net deficit is 60 cents for each $1 of inward investment into the US, when taking into account such service activities. Foreign investors in the service sectors seem to be attracted firstly by the domestic market for goods. In contrast, US investment abroad in services is based on a comparative advantage in services, which has no impact on trade in goods.

Results for the Swedish industry[9] taken as a whole are unsatisfactory: variables associated with bilateral FDI are not significant in the export and import equations. Parameters are significant only for FDI relationships with third countries. In addition, data is not available on an industry basis. Thus, it is necessary to turn to FDI taken as a whole: the complementarity is confirmed, with the exception of outward Swedish FDI (positive parameter, but non significant), but these complementarity effects are much smoother than for France. The stylised fact concerning the bilateral net trade surplus associated with outward FDI flows is once again confirmed: 30 cents for each $1 invested abroad. Reciprocally, inward FDI is associated with a net bilateral trade deficit of 18 cents.

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[9] Notice that for these regressions it has been necessary to consider Sweden as a part of EU, prior to its accession, as this country was *de facto* integrated (variable CPOL2).

6. TWO POOLINGS (D AND E)

The database entails information on FDI and trade flows for the US, France and Sweden over 1984-1994, in a common nomenclature. The corresponding 800 observations can be pooled (context D) in order to check the complementarity at the level of the industry, taken as a whole or for all the sectors (industry and services).

At the industry level, the results confirm the previous estimates on individual countries. Here, the complementarity is high, since all industries are aggregated. Turning to potential spillovers between FDI flows in services and trade in goods, the complentarity is confirmed only for inward FDI. Finally, the substitution effect observed for third countries in the previous estimates is confirmed, but the estimate is statistically weak.

More interestingly, it is possible to pool the data for 14 declaring countries (11 European countries, the US, Japan, and the EU12) facing 15 partners (the 14 previous ones and the world), in one sector (trade in goods as a whole) over 1984-1993. FDI is considered globally, adding trade in goods and services. All externalities referred to above are internalised here, 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. If all countries were in the database, and if the same FDI flow was registered by the two sides using the same principles, then the symmetry would be perfect.

The complementarity is confirmed, once again, and as expected the symmetry in parameter estimates is magnified by the enlargement of the country coverage.

Table 8- Parameter estimates for FDI flows in the E pooling (14 countries 1984-93)

	Database		Corrected database	
	IN	OUT	IN	OUT
Exports	0.430	2.166	0.484	2.203
Imports	2.025	0.311	2.045	0.359

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

On the whole, around $2 additional exports are associated with each $1 of outward FDI. This induces reciprocally around $2 of additional imports for the host country, the latter declaring an inward FDI.

Reciprocally, the host country exports around 30 to 40 cents, whereas the investing country imports around 40 to 50 cents from the former country.

Finally, the bilateral trade surplus associated with a $1 investment abroad is around $1.7, given all externalities. The inward FDI leads to a net trade deficit of roughly the same amount.

7. RESULTS FOR FDI STOCKS

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The estimates presented so far have been based on FDI flows. Nevertheless, it can be argued that FDI stocks are a better choice in order to address the issue considered here. Thus, estimates have been made for FDI stocks for the two countries publishing data for stocks: France and the US.

Concerning France, the estimates are based on the context A, which is the most disaggregated (11970 observations). France faces 57 partners (55 countries, EU12 and the world), in 35 sectors, for FDI over 1989-1994. As often noticed, complementarity is questioned when stocks of FDI are considered: for example, with estimates controlling for economies of scale (row "indus manuf+scale"), outward FDI is clearly a complement for French bilateral exports, but a substitute for French imports. In contrast, inward FDI is a complement for both French exports and imports.

Thus, each $1 invested abroad by French companies in the past, currently boosts bilateral exports (8 cents) and cuts French bilateral imports (18 cents). The impact on competitiveness is therefore clearly positive. Symmetrically, inward FDI is detrimental to the trade balance (20 cents per $1 invested in France).

An illustration can be given for 1994, using our parameter estimates: at the industry and bilateral level, more than $ 10 billion of net exports were associated with the French involvement abroad.

Table 9- Parameter estimates associated with FDI stocks : France 1989-94

equation	X		M	
	Indus manuf +scale	indus manuf	indus manuf +scale	indus manuf
OUT	0.077	0.060	-0.183	-0.188
IN	0.493	0.456	0.683	0.721

Parameter significance level: 1% with the exception of X/OUT: 5%.

Results obtained for industries aggregated in a single sector, and for FDI as a whole are less interesting, or lead to misleading conclusions (see the parameter estimate for the industry as a whole), which supports our disaggregated approach.

Turning to the US, the complementarity between outward FDI stocks and bilateral trade is confirmed, whereas inward FDI is substitutive to trade at the industry level, but complementary when spillovers between investment in services and trade in goods are taken into account.

For industries considered individually, and controlling for economies of scale, each $1 of the US FDI stock abroad is associated with 70 cents of additional, bilateral, exports. But what is more striking is the fact that US imports are boosted too. Each $1 of foreign assets is associated with an additional $1.3 of US bilateral imports. Clearly, this is the result of relocation of activities abroad.

Thus, in contrast to France, US foreign assets are associated with a net trade deficit.

Turning to foreign assets in the US, the net effect is substitutive to trade. Each $ of inward FDI leads to a 16-cent cut in US imports from the investor country. At the same

time, the 10-cent cut in US exports is the result of a lack of competitiveness of US industries concerned by foreign FDI *vis-à-vis* the investor country.

Taking into account spillovers between industries, the net trade deficit *vis-à-vis* the host country associated with outward US FDI is magnified. Symmetrically, inward FDI in the US is largely oriented towards the domestic market, local sales largely substituting previous imports (50 cents for each $1invested). This is beneficial to the US trade balance.

Finally, when FDI in services is taken into account, the negative impact of outward FDI on the US trade balance vanishes. The positive impact of inward FDI also disappears, for the same reason: FDI in services concerns subsidiaries in wholesale trade.

8. CONCLUSION

Lipsey (1991) has noticed that foreign affiliates export less and import more than US firms. The benchmark study recently realised by the French Ministry of Industry reaches the same conclusion for France. Such a stylised fact should be a component of the relationship between trade and FDI. In addition, French and US individual firm data highlights that a large share of intra-firm trade is simply in final products to be sold. Thus, inward and outward FDI may have a symmetric impact on trade. But, at the same time, previous exports of the parent company are, at least partially, substituted for by local sales of their foreign subsidiaries, while the latter import inputs. Lastly these subsidiaries gain market shares, detrimental to third countries' competitors.

These mechanisms, confirmed by our results, were also obtained with differing methodologies by Lipsey and Weiss (1981) and (1984), Eaton and Tamura (1994).

Lipsey and Weiss (1981) consider 44 foreign markets in which US firms compete against 13 other exporting countries. Without US FDI, US exports to these markets would have been smaller: $1 of local sales leads to 2 cents to 78 cents of additional exports to the corresponding market (depending of the industry). In addition, the diversion effect detrimental to third countries' competitors is large: between 23 cents and $3.8 in developed countries.

Using individual data, Lipsey and Weiss (1984) highlight that $1 of local production induces a 9 to 25 cents of additional exports. It has to be noted that the elasticities linking trade and local output are three times larger for industry statistics than for individual firms data. This confirms the existence of externalities between firms within industries, a phenomenon observed among industries in our study.

Eaton and Tamura (1994) use a model controlling for country determinants having no industry dimension, in contrast to what has been done here. They highlight, for Japan and the US, a large and positive relationship between outward FDI and exports, as well as imports. This relation is not verified for inward FDI.

Finally, the main findings of our tentative empirical research are the following:

- Outward French industrial assets are complementary to trade but substitutive to imports: this highlights that the competitiveness of industries is a general determinant at the level of aggregation chosen here: exports, foreign

involvement and strong positions on the domestic market are one and the same thing.

- Foreign assets in France are complementary to both imports and exports since foreign investors look for an entry into the European market when locating in France.

- US assets abroad are characterised more by a relocation strategy, leading to additional imports. In contrast, foreign investors in the US are first of all motivated by an entry in this huge domestic market: they substitute local sales for previous exports of the parent.

- Turning to disaggregated data for FDI flows, the striking result is that a sizeable share of the complementarity between trade and FDI flows is the result of spillovers between industries. This phenomenon is clearly captured in the estimates for France, due to highly disaggregated data.

- The symmetry in impacts of FDI increases with the number of countries introduced in the estimates. With 14 countries, we have rather complete symmetry. Finally, outward FDI reinforces the competitiveness of the investor, whereas foreign investment in a country induces a bilateral trade imbalance *vis-à-vis* the investor.

- The spillovers between FDI flows in services and trade in goods are not observed, contrary to the intuition: this can be explained by the structure of FDI in services. Consider the French case for example: from a total of around $4 billion FDI in private services (1995), only 10% were in wholesale trade. In addition, one fifth of FDI is related to holding companies, which introduces noise in the estimates.

- A last result concerns the diversion effects detrimental to third countries. They are captured by our methodology but seem rather limited, compared with bilateral effects.

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Table A1 – Estimates for France (A: flows) 1984 1994

	Exports				Imports			
	Total	Total indus.	Indus	indus manuf + scale	Total	Total indus.	indus	indus manuf + scale
OUT	2.405***	2.277***	0.551***	0.588***	2.509***	1.854**	0.272***	0.244***
	(7.808)	(3.489)	(7.663)	(7.729)	(6.705)	(2.239)	(3.074)	(2.594)
IN	4.416***	3.519***	0.387***	0.224**	4.462***	4.339***	0.529***	0.338**
	(8.765)	(3.048)	(3.625)	(2.037)	(7.288)	(2.96)	(4.028)	(2.498)
OUTOTH	-0.087**	-0.136*	0.039***	0.068***	-0.074*	-0.096	0.047***	0.052***
	(-2.393)	(-1.768)	(4.295)	(6.797)	(-1.667)	(-0.981)	(4.206)	(4.133)
INOTH	-0.358***	-0.470**	0.148***	0.086***	-0.450***	-0.588**	0.079***	0.042**
	(-4.231)	(-2.343)	(9.735)	(5.330)	(-4.383)	(-2.309)	(4.244)	(2.108)
AVRGDP		0.002***	0.0002***	0.0003***		0.002***	0.0002***	0.0003***
		(3.772)	(30.081)	(26.750)		(3.502)	(27.847)	(21.797)
DIFFGDP	-0.575***	-0.574***	-0.019***	-0.025***	-0.679***	-0.677***	-0.023***	-0.027***
	(-7.884)	(-7.594)	(-17.054)	(-13.903)	(-7.666)	(-7.067)	(-16.623)	(-11.413)
AVRGDPPC	0.572***	0.436***			0.659***	0.487***		-0.004***
	(10.547)	(8.278)			(9.988)	(7.274)		(-3.307)
DIFFGDPPC	0.258***	0.142***			0.280***	0.134***		-0.002**
	(7.127)	(4.192)			(6.354)	(3.087)		(-2.015)
ADJ			489.357***	527.363***			523.291***	662.882***
			(34.650)	(31.366)			(30.129)	(31.268)
DIST			-0.003***	-0.005***			-0.002**	-0.003**
			(-3.572)	(-4.701)			(-2.030)	(-1.999)
ADIST	-0.223***	-0.279***			-0.234***	-0.303***		
	(-5.954)	(-6.976)			(-5.148)	(-5.958)		
CPOL			245.946***	259.054***			294.486***	347.087***
			(22.509)	(19.676)			(21.915)	(21.088)
SCALE				25.503**				47.084***
				(2.208)				(2.915)
Obs	473	473	8987	7095	473	473	8987	7095
R2 Ajust	0.72	0.60	0.48	0.53	0.67	0.54	0.42	0.50
F valeur	152.9	80.7	912.9	799.1	120.7	61.7	713.8	580.9
Prob > F (%)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Condition nb	13	12	4	10	14	12	4	10

Student in brackets; ***<1% ; **<5% ; *<10%.

Table A2- – Estimates for France and the US (B: flows) 1984 1994: EXPORTS

	USA				France			
	Total	Total indus	Indus	Indus manuf + scale	Total	Total indus	Indus	Indus manuf + scale
OUT	0.095	1.587***	2.664***	2.563***	2.313***	1.958***	0.774***	0.486**
	(0.450)	(2.569)	(8.244)	(8.025)	(7.050)	(2.848)	(3.362)	(2.420)
IN	0.594***	0.424*	0.332**	0.236	4.208***	3.064**	0.988***	0.793***
	(4.378)	(1.79)	(2.167)	(1.549)	(7.812)	(2.536)	(2.918)	(2.688)
OUTOTH	-0.107***	-0.237**	0.207***	0.217***	-0.094**	-0.146*	-0.049	0.011
	(-3.582)	(-2.247)	(4.615)	(5.002)	(-2.247)	(-1.677)	(-1.301)	(0.329)
INOTH	-0.028	0.017	0.064**	0.036	-0.418***	-0.5439**	0.383***	0.421***
	(-1.156)	(0.434)	(2.181)	(1.224)	(-4.318)	(-2.422)	(7.371)	(9.287)
AVRGDP	0.008***	0.007***	0.0008***			0.002***	0.0005***	0.0007***
	(13.427)	(11.336)	(9.415)			(3.999)	(9.060)	(12.518)
DIFFGDP	-1.537***	-1.526***	-0.292***	-0.462***	-0.697***	-0.677***	-0.107***	-0.060***
	(-9.485)	(-10.373)	(-8.818)	(-10.807)	(-7.860)	(-7.502)	(-10.795)	(-5.645)
AVRGDPPC					0.641***	0.467***	0.052***	-0.020***
					(10.345)	(8.108)	(11.180)	(-3.579)
DIFFGDPPC					0.308***	0.194***	0.015***	-0.010***
					(7.239)	(5.001)	(4.173)	(-3.079)
ADJ	35072***	42303***	5629.458***	5230.065***				1460.285***
	(16.636)	(23.907)	(11.303)	(10.595)				(18.599)
DIST								
ADIST					-0.232***	-0.305***	-0.054***	
					(-5.251)	(-6.446)	(-10.301)	
CPOL	21451***		6048.467***	6461.541***				539.337***
	(7.148)		(7.759)	(8.422)				(9.359)
EXCH		-2.934**						
		(-2.338)						
SCALE				3026.107***				171.755**
				(10.888)				(2.217)
Obs	253	240	1004	1004	407	407	2442	2442
Adjust R2	0.894	0.885	0.538	0.55	0.728	0.621	0.388	0.54
F value	268.2	231.1	147.2	154.7	137.3	75.1	173.2	257.6
Prob > F (%)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Condition nb	11	12	6	8	14	12	8	13

Student in brackets; ***<1% ; **<5% ; *<10%.

Table A3- – Estimates for France and the US (B: flows) 1984 1994: IMPORTS

	USA				France			
	Total	Total indus	Indus	Indus manuf + scale	Total	Total indus	Indus	Indus manuf + scale
OUT	-1.308***	3.879***	2.472***	2.264***	2.419***	1.385	0.624**	0.239
	(-3.1)	(2.7)	(3.873)	(3.588)	(6.024)	(1.57)	(2.004)	(0.818)
IN	1.176***	-0.910	0.790***	0.586**	4.266***	3.904**	1.446***	1.404***
	(4.35)	(-1.461)	(2.608)	(1.948)	(6.467)	(2.518)	(3.158)	(3.276)
OUTOTH	-0.227***	-1.431***	0.240***	0.284***	-0.079	-0.102	-0.007	0.069
	(-3.797)	(-5.163)	(2.712)	(3.317)	(-1.537)	(-0.912)	(-0.138)	(1.447)
INOTH	0.003	0.250**	0.142**	0.075	-0.516***	-0.714**	0.381***	0.382***
	(0.072)	(2.43)	(2.425)	(1.281)	(-4.356)	(-2.477)	(5.42)	(5.807)
AVRGDP	0.015***	0.020***	0.002***			0.003***	0.0006***	0.0006***
	(12.838)	(12.416)	(12.315)			(3.778)	(7.484)	(8.319)
DIFFGDP	-3.401***	-3.989***	-0.763***	-1.147***	-0.795***	-0.797***	-0.129***	-0.172***
	(-10.531)	(-10.257)	(-11.679)	(-13.590)	(-7.317)	(-6.879)	(-9.554)	(-12.418)
AVRGDPPC					0.727***	0.527***	0.061***	-0.019**
					(9.577)	(7.129)	(9.709)	(-2.393)
DIFFGDPPC					0.328***	0.205***	0.015***	-0.018***
					(6.292)	(4.115)	(3.050)	(-3.757)
ADJ	39722***		6188.591***	5233.243***				
	(9.452)		(6.294)	(5.366)				
DIST								
ADIST					-0.242***	-0.348***	-0.062***	-0.021**
					(-4.473)	(-5.745)	(-8.764)	(-2.569)
CPOL	27975***		6752.466***	7832.711***				1180.866***
	(4.676)		(4.388)	(5.167)				(13.278)
EXCH		-8.186**						
		(-2.477)						
SCALE				7395.614***				853.073***
				(13.468)				(7.347)
Obs	253	240	1004	1004	407	407	2442	2442
Adjust R2	0.807	0.645	0.385	0.40	0.675	0.555	0.314	0.40
F value	133.1	63.3	79.7	85.0	106.4	57.5	124.9	148.6
Prob > F (%)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Condition nb	11	12	6	8	14	12	8	14

	STOCK							
	Exports				Imports			
	Total	Sect. Manuf.	Sect.communs	Sect.communs	Total	Sect. manuf.	Sect.communs	Sect.communs
OUT	-0.521***	-0.993***	0.060**	0.077**	-0.783***	-1.945***	-0.188***	-0.183***
	(-3.857)	(-4.068)	(2.198)	(2.553)	(-5.104)	(-6.688)	(-6.521)	(-5.264)
IN	1.044***	2.376***	0.456***	0.493***	1.317***	3.653***	0.683***	0.721***
	(6.200)	(7.346)	(11.664)	(11.112)	(6.887)	(9.616)	(16.494)	(14.318)
OUTOTH			-0.006**	0.019***			-0.005	0.010**
			(-1.984)	(4.993)			(-1.611)	(2.340)
INOTH			0.029***	0.003			0.019***	-0.007
			(5.753)	(0.459)			(3.488)	(-1.094)
AVRGDP	0.0025***	0.0015**	0.0001***	0.0002***	0.004***	0.002**	0.0003***	0.0003***
	(3.822)	(2.290)	(7.597)	(8.497)	(4.725)	(2.557)	(15.222)	(13.201)
DIFFGDP	-0.634***	-0.650***	-0.061***	-0.069***	-0.652***	-0.707***	-0.024***	-0.052***
	(-6.383)	(-7.380)	(-21.933)	(-21.621)	(-5.784)	(-6.764)	(-7.648)	(-15.891)
AVRGDPPC	0.157***	0.179***	0.027***	0.021***	0.123**	0.134***	-0.003*	0.004**
	(3.317)	(4.265)	(22.203)	(9.553)	(2.279)	(2.824)	(-1.948)	(2.147)
DIFFGDPPC	0.106***	0.125***	0.009***	0.006***	0.089**	0.106***	0.002**	
	(3.428)	(4.384)	(9.885)	(4.269)	(2.545)	(3.253)	(2.098)	
ADJ							799.623***	
							(26.679)	
DIST							-0.0034**	
							(-1.945)	
ADIST	-0.145**	-0.113**	-0.029***	-0.032***	-0.132**			-0.012***
	(-2.570)	(-2.230)	(-19.455)	(-19.142)	(-2.061)			(-6.028)
CPOL	7849.636***	7312.745***			9102.483***	9646.059***	383.115***	674.217***
	(10.486)	(11.246)			(10.708)	(13.464)	(16.818)	(25.432)
SCALE				131.810***				122.507***
				(4.333)				(4.400)
Obs	306	306	4896	3978	306	306	4896	3978
R2 Ajust	0.75	0.76	0.43	0.49	0.74	0.75	0.52	0.51
F valeur	118.4	123.5	414.8	381.2	103.4	128.9	478.6	418.4
Prob > F (%)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Condition nb	10	9	9	17	10	9	11	12

Student in brackets; ***<1% ; **<5% ; *<10%.

Table A5- estimates for France, context B (Stocks) -

	Exports				Imports			
	Total	Total indus	Indus	Indus+scale	Total	Total indus	Indus	Indus+scale
OUT	-0.369**	-1.054***	0.199**	0.163**	-0.454**	-1.270***	-0.054	-0.148
	(-1.879)	(-3.987)	(2.517)	(2.253)	(-2.277)	(-3.326)	(-0.517)	(-1.474)
IN	1.154***	2.399***	0.859***	0.882***	1.131***	3.063***	1.370***	1.388***
	(4.671)	(6.951)	(8.165)	(9.093)	(4.481)	(5.969)	(9.824)	(10.530)
OUTOTH			0.041**	0.019			0.068***	0.032
			(2.121)	(1.126)			(2.609)	(1.432)
INOTH			0.060***	0.065			0.043	0.056**
			(2.939)	(3.459)			(1.590)	(2.237)
AVRGDP	0.005***	0.001*	0.0002**		0.002*	0.0006	0.0003**	0.0002*
	(6.421)	(1.799)	(2.247)		(1.777)	(0.580)	(2.182)	(1.867)
DIFFGDP	-0.197	-0.918***	-0.165***	-0.178***	-1.087***	-1.209***	-0.186***	-0.201***
	(-1.527)	(-8.165)	(-10.791)	(-12.487)	(-6.183)	(-7.296)	(-9.174)	(-10.294)
AVRGDPPC		0.211***	0.036***		0.464***	0.509***	0.037***	
		(4.695)	(4.611)		(7.306)	(8.577)	(3.567)	
DIFFGDPPC	0.118**	0.120***	0.014**	-0.008*	0.235***	0.268***	0.012*	
	(2.511)	(3.781)	(2.562)	(-1.916)	(4.661)	(5.478)	(1.681)	
ADJ								
DIST								
ADIST	-0.374***		-0.06	-0.014	-0.456***	-0.421***	-0.071***	-0.020*
	(-4.073)		(-7.997)	(-1.640)	(-4.895)	(-4.764)	(-6.727)	(-1.760)
CPOL		7756.157***		997.417***				1236.279***
		(11.933)		(10.393)				(9.585)
SCALE				590.529***				463.466***
				(5.294)				(2.614)
Obs	234	234	1404	1404	234	234	1404	1404
R2 Ajust	0.586	0.783	0.479	0.53	0.65	0.647	0.41	0.46
F valeur	56.2	121.5	144.2	179.7	63.1	62.4	109.6	135.2
Prob > F (%)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Condition nb	8	9	17	15	9	8	17	16

Student in brackets; ***<1% ; **<5% ; *<10%.

Table A6- estimates for the US, context B (Stocks) -

	Exports				Imports			
	Total	Total indus	Indus	Indus+scale	Total	Total indus	Indus	Indus+scale
OUT	0.083*	0.349***	0.751***	0.717***	-0.406***	1.491***	1.299***	1.282***
	(1.792)	(3.103)	(10.869)	(10.416)	(-4.854)	(6.674)	(9.998)	(9.840)
IN	0.120***	0.119**	-0.084*	-0.102**	0.395***	-0.567***	-0.157*	-0.163*
	(3.243)	(1.983)	(-1.743)	(-2.129)	(6.195)	(-3.386)	(-1.676)	(-1.740)
OUTOTH			0.059***	0.058***			0.099***	0.097***
			(6.363)	(6.230)			(5.454)	(5.320)
INOTH			-0.046***	-0.050***			-0.103***	-0.099***
			(-3.501)	(-3.894)			(-4.021)	(-3.918)
AVRGDP	0.005***	0.004***	0.0004***		0.011***	0.010***	0.001***	
	(8.624)	(8.938)	(3.189)		(10.540)	(7.415)	(5.304)	
DIFFGDP	-1.480***	-1.193***	-0.186***	-0.314***	-3.197***	-3.335***	-0.491***	-0.695***
	(-6.657)	(-7.264)	(-4.254)	(-5.687)	(-8.441)	(-6.924)	(-5.751)	(-6.393)
AVRGDPPC								
DIFFGDPPC								
ADJ	46049***	22443***	3483.859***	3357.928***	27639***		5670.092***	5535.570***
	(19.130)	(7.606)	(4.407)	(4.286)	(4.590)		(5.623)	(5.498)
DIST								
ADIST								
CPOL		27380***	4683.127***	4833.971***	56855***			
		(7.455)	(4.753)	(4.949)	(7.363)			
SCALE				1965.159***				4292.654***
				(4.888)				(5.433)
Obs	166	165	715	715	166	165	715	715
R2 Ajust	0.892	0.933	0.621	0.63	0.846	0.68	0471	0.47
F valeur	275.5	383.9	147.5	152.0	153.6	88.7	91.9	92.3
Prob > F (%)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Condition nb	8	10	10	11	8	8	10	11

Student in brackets; ***<1% ; **<5% ; *<10%.

Table A7- estimates for Sweden

	Exports		Imports	
	Total	Total indus.	Total	Total indus.
OUT	0.484**		0.188	
	(2.319)		(0.832)	
IN	0.578*		0.719**	
	(1.801)		(2.047)	
OUTOTH	0.128***	0.176***	0.151***	0.221***
	(4.429)	(3.537)	(4.804)	(3.545)
INOTH	0.112**	-0.115*	0.104*	-0.167**
	(2.105)	(-1.770)	(1.822)	(-2.032)
AVRGDP	0.001***	0.002***		0.002***
	(8.525)	(6.227)		(4.645)
DIFFGDP		0.424***	0.347***	0.773***
		(6.554)	(7968)	(9.545)
AVRGDPPC		0.093***		0.091***
		(12.509)		(9.324)
DIFFGDPPC	-0.067***		-0.080***	-0.059**
	(-4.492)		(-5.023)	(-2.467)
ADJ				
DIST				-1.504***
				(-12.970)
ADIST	-0.046*	-0.968***	-0.069***	
	(-1.957)	(-11.325)	(-2.639)	
CPOL2	1589.889***	555.817***	1248.942***	594.289**
	(9.703)	(3.434)	(6.456)	(2.508)
Model	33	34	35	36
Obs	261	131	261	131
R2 Ajust	0.71	0.93	0.64	0.89
F valeur	79.9	250.1	58.5	136
Prob > F (%)	0.0001	0.0001	0.0001	0.0001
Condition nb	4	10	5	11

Student entre parenthèses; ***<1% ; **<5% ; *<10%.

Table A8- estimates for France, United States and Sweden 1984-94

	Exports		Imports	
	Total	Total indus.	Total	Total indus.
OUT	0.822***	4.294***		1.603**
	(4.091)	(9.397)		(2.059)
IN	0.900***	0.846***	1.964***	1.505***
	(7.091)	(3.707)	(10.364)	(3.859)
OUTOTH	-0.034	-0.103	-0.058	-0.227**
	(-1.496)	(-1.541)	(-1.579)	(-1.998)
INOTH	-0.042**	-0.053	-0.048	-0.051
	(-2.157)	(-1.502)	(-1.559)	(-0.854)
AVRGDP	0.005***	0.004***	0.007***	0.008***
	(12.835)	(10.826)	(12.789)	(13.020)
DIFFGDP	-0.485***	-0.491***	-1.069***	-1.194***
	(-5.485)	(-6.084)	(-8.337)	(-8.815)
AVRGDPPC				
DIFFGDPPC	0.101***	0.061*	0.106**	0.098*
	(3.182)	(1.927)	(2.263)	(1.807)
ADJ	14360***	12388***	14755***	14119***
	(16.489)	(14.244)	(10.852)	(12.420)
DIST	-0.145***			
	(-2.636)			
ADIST				
CPOL	1271.499*	1375.467*	2713.782**	
	(1.784)	(1.864)	(2.441)	
Model	37	38	39	40
Obs	879	759	879	759
R2 Ajust	0.68	0.68	0.60	0.55
F valeur	188.2	180.5	165.0	118.0
Prob > F (%)	0.0001	0.0001	0.0001	0.0001
Condition nb	8	8	7	8

Studen in brackets; ***<1% ; **<5% ; *<10%.

Table A9- estimates for the pooling 1984/93

	Exports		Imports	
	database	corrected base	database	corrected base
OUT	2.166***	2.203***	0.311**	0.359***
	(17.997)	(19.777)	(2.421)	(3.025)
IN	0.430***	0.484***	2.025***	2.045***
	(3.420)	(4.182)	(15.087)	(16.575)
OUTOTH	0.072**	0.069***	0.108***	0.108***
	(2.377)	(2.715)	(3.181)	(3.969)
INOTH	-0.140***	-0.142***	-0.085***	-0.081***
	(-6.147)	(-6.891)	(-3.478)	(-3.668)
AVRGDP	0.009***	0.008***	0.008***	0.008***
	(18.929)	(20.885)	(16.454)	(18.596)
DIFFGDP	-1.298***	-1.174***	-1.376***	-1.253***
	(-17.369)	(-19.049)	(-17.246)	(-19.055)
AVRGDPPC	-0.146***	-0.124***	-0.133**	-0.133***
	(-2.876)	(-2.881)	(-2.463)	(-2.885)
DIFFGDPPC		0.051**	-0.099***	-0.074***
		(1.988)	(-3.027)	(-2.707)
ADJ	8568.884***	8653.722***	8848.751***	9022.744***
	(14.753)	(16.715)	(14.242)	(16.339)
DIST	-0.361***	-0.336***	-0.257**	-0.273***
	(-3.317)	(-3.909)	(-2.212)	(-2.983)
ADIST				
CPOL	6934.181***	6275.279***	6957.581***	6405.842***
	(11.131)	(12.135)	(10.449)	(11.613)
Model	41	42	43	44
Obs	1153	1389	1153	1389
R2 Ajust	0.77	0.77	0.74	0.73
F valeur	396.4	415	305.5	349.8
Prob > F (%)	0.0001	0.0001	0.0001	0.0001
Condition nb	12	12	12	12

Student in brackets; ***<1% ; **<5% ; *<10%.

Appendix 2: Disaggregation of French FDI data

Trade (CHELEM)	FDI classification of the model	French FDI classification (APE)	CHELEM/French FDI
	1 - All industries		
HA, HB, HC	2 - Mining	Quarrying of ferrous and non-ferrous metal	HA, HB
		Quarrying of non-metallic minerals	HC
IA, IB, IC, IG, IH	3 - Petroleum	Coal, lignite, crude oil, natural gas	IA, IB, IC
		Refined petroleum	IG, IH
	4 - Total manufacturing	Manufacturing	
KA, KB, KC, KD, KE, KF, KG, KH, KI	5 - Food and kindred products	Food, beverages and tobacco	KA, KB, KC, KD, KE, KF, KG, KH, KI
GA, GB, GC, GD, GE, GF, GG	6 - Chemicals products	Chemical products	GA, GB, GC, GD, GE, GF, GG
CA, CB, CC, FA, FB	7 - Primary and fabricated metal	Ferrous and non-ferrous metal products	CA, CB, CC
		Foundry and forging metals	FA, FB
FC, FD, FE, FF, FG, FH, FO	8 - Machinery except electric	Industrial and agricultural machinery	FC, FD, FE, FF, FG, FH
		Manufacture of office, computing, precision instr.	FI, FJ, FK, FO
FL, FM, FN, FP, FQ, FR	9 - Electric and electronic	Electrical and electronic equipment	FL, FM, FN, FP, FQ, FR
	10 - Machinery		
FS, FT, FU, FV, FW	11 - Transport equipement	Transport equipment	FS, FT, FU, FV, FW
BA, BB, BC, DA, DB, DC, DD, DE, EA, EB, EC, ED, EE, FI, FJ, FK, GH, GI, NA, NB, NV	12 - Other manufacturing	Manufacturing of non-metallic minerals	BA, BB, BC
		Manufacture of textiles, wearing apparel	DA, DB, DC, DD, DE
		Paper, paperboard articles, printing, publishing	EC, ED
		Rubber and plastics products	GH, GI
		Other manufacturing	EA, EB, EE, NA, NB, NV
	13 - Transp eqpt and other manuf.		
II, JA, JB, JC	22 - Other industries	Agriculture	JA, JB, JC
		Other energy	II

Appendix 3: Estimates for the pooling France, US, Sweden, Italy and the Netherlands (Context F)

	Exports				Imports			
	Total	Total indus..	Indus.	Indus manuf + scale	Total	Total indus..	Indus.	Indus manuf + scale
OUT	4.600***	7.039***	4.687***	4.622***	6.357***	5.360***	6.353***	6.561***
	(5.222)	(4.860)	(8.431)	(8.334)	(4.493)	(2.802)	(6.740)	(6.731)
IN	1.304**		0.709*	0.721*	2.371***		1.060	0.961
	(2.488)		(1.713)	(1.746)	(2.752)		(1.509)	(1.325)
OUTOTH		-0.195	0.333***	0.325***			0.506***	0.509***
		(-1.161)	(3.552)	(3.475)			(3.189)	(3.107)
INOTH			-0.135	-0.123			-0.147	-0.133
			(-1.503)	(-1.376)			(-0.973)	(-0.848)
AVRGDP	0.002***	0.004***	0.0007***	0.0007***	0.003**	0.007***	0.0008***	0.0008***
	(2.902)	(3.357)	(4.237)	(4.473)	(2.523)	(6.335)	(3.983)	(3.239)
DIFFGDP	-0.553**	-1.033***	-0.093*	-0.155***	-0.855**	-1.758***	-0.309***	-0.436***
	(-2.125)	(-2.857)	(-1.814)	(-2.606)	(-2.095)	(-4.618)	(-4.376)	(-4.342)
AVRGDPPC		0.311***	-0.040**	-0.094***				
		(4.153)	(-2.112)	(-2.889)				
DIFFGDPPC		0.181*						
		(1.821)						
ADJ	14544***		3200.997***	3245.257***	17368***	13056***	3120.583***	
	(5.529)		(6.531)	(6.640)	(4.678)	(3.153)	(3.848)	
DIST								
ADIST		-0.573***						-0.124**
		(-2.792)						(-2.195)
CPOL	4439.011***		1524.509***	1311.701***			6263.875**	1256.861**
	(2.628)		(4.187)	(3.475)			(2.404)	(2.278)
SCALE				1188.207**				1780.283***
				(2.034)				(3.851)
Obs	109	118	414	414	109	118	414	414
R2 Ajust	0.76	0.57	0.51	0.52	0.64	0.58	0.39	0.35
F valeur	59.0	23.8	48.7	45.5	40.4	33.7	33.4	28.3
Prob > F (%)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Condition nb	5	10	8	16	5	5	5	7

Student in brackets; ***<1% ; **<5% ; *<10%.

1	**BA**	Cement and derived products
2	**BB**	Ceramics (including manufactured mineral articles n.e.s.)
3	**BC**	Glass (flatware and hollow-ware)
4	**CA**	Iron and steel-making (including pig iron and sheet steel)
5	**CB**	Tubes and first-stage processing products
6	**CC**	Non-ferrous metals
7	**DA**	Yarns and fabrics
8	**DB**	Clothing (with fabrics as the main input)
9	**DC**	Knitwear (made directly from yarns)
10	**DD**	Carpets and textile funishings
11	**DE**	Leather furskins and footware
12	**EA**	Articles in wood
13	**EB**	Furniture (made of wood or other materials)
14	**EC**	Paper and pulp
15	**ED**	Printing and publications
16	**EE**	Toys, sports equipment and miscellaneous manufactured articles
17	**FA**	Large metallic structures
18	**FB**	Miscellaneous hardware
19	**FC**	Engines, turbines and pumps
20	**FD**	Agricultural equipment
21	**FE**	Machine tools
22	**FF**	Construction and public works equipment
23	**FG**	Specialized machines
24	**FH**	Arms and weaponary
25	**FI**	Precision instruments
26	**FJ**	Watch and clockmaking
27	**FK**	Optics and photographic and cinematographic equipment
28	**FL**	Electronic components
29	**FM**	Consumer electronics
30	**FN**	Telecommunications equipment
31	**FO**	Computer equipment (including office equipment)
32	**FP**	Domestic electrical appliances
33	**FQ**	Heavy electrical equipment
34	**FR**	Electrical apparatus (including passive devices)
35	**FS**	Vehicle components
36	**FT**	Cars (including motorcycles)
37	**FU**	Commercial vehicles and transport equipment (including public transport vehicles and railway equipment)
38	**FV**	Ships (including oil rigs)
39	**FW**	Aeronautics
40	**GA**	Basic Inorganic Chemicals
41	**GB**	Fertilizers
42	**GC**	Basic Organic Chemicals
43	**GD**	Paints, colourings and intermediate chemical products n.e.s.
44	**GE**	Toilet products, soaps and perfumes (including chemical preparations n.e.s.)
45	**GF**	Pharmaceuticals
46	**GG**	Plastics, fibers and synthetic resins
47	**GH**	Plastic articles
48	**GI**	Rubber articles (including tyres)
49	**HA**	Iron ores and scrap

50	**HB**	Non-ferrous ores and scrap
51	**HC**	Unprocessed minerals
52	**IA**	Coal (including lignite and other primary energy products)
53	**IB**	Crude Oil
54	**IC**	Natural gas (including all petroleum gases)
55	**IG**	Coke
56	**IH**	Refined petroleum products
57	**II**	Electricity
58	**JA**	Cereals
59	**JB**	Other edible agricultural products
60	**JC**	Non-edible agricultural products
61	**KA**	Cereal products
62	**KB**	Fats (of vegetable or animal origin)
63	**KC**	Meat and fish
64	**KD**	Preserved meat and fish products
65	**KE**	Preserved fruit and vegetable products
66	**KF**	Sugar products (including chocolate)
67	**KG**	Animal foodstuffs
68	**KH**	Beverages
69	**KI**	Manufactured tobaccos
70	**NA**	Precious stones, jewellery, works of art
71	**NB**	Non-monetary gold
	NV	Not elsewhere specified
	TT	Total

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