

INSTITUT NATIONAL DE LA STATISTIQUE ET DES ÉTUDES ÉCONOMIQUES

*Série des documents de travail
de la Direction des Études et Synthèses Économiques*

G 2004 / 09

Affiliating versus Subcontracting: The Case of Multinationals

Sébastien **RASPILLER*** and Patrick **SILLARD****

DÉCEMBRE 2004

An earlier version was presented
at the "Journées de Microéconomie Appliquée" in May 2004,
at the annual meeting of the European Economic Association in August 2004,
and at the OECD's special session on economic globalization in November 2004.
The authors wish to thank Clotilde L'Angevin, Claude Mathieu
and Sébastien Roux for helpful comments.

* Département des Études Économiques d'Ensemble - Division « Marchés et Stratégies d'Entreprise »
Timbre G230 - 15, bd Gabriel Péri - BP 100 - 92244 MALAKOFF Cedex - France

** Département des Études Économiques d'Ensemble - Division « Croissance et Politique
Macroéconomiques » Timbre G220 - 15, bd Gabriel Péri - BP 100 - 92244 MALAKOFF Cedex - France

Affiliating versus Subcontracting: The Case of Multinationals

Abstract

An aspect of globalization that has attracted increased attention in recent years is intra-firm trade. Actually, an intra-firm trading relationship indicates that an affiliate is present in the partner country. Hence, distinguishing intra- and extra-firm dimensions gives us access to the boundaries of multinationals and consequently to their policies of development. More precisely, the paper aims at determining factors of the trade-off faced by multinationals between affiliating and subcontracting a relocated segment of production or distribution, using microdata on intra- and extra-firm bilateral trade of affiliates located in France. First, a microeconomic model is developed. The idea is to compare the profit made by a multinational if trade occurs within it with that made if trade occurs with another firm. On the one hand internalization may generate additive fixed costs, on the other it may enable the multinational to keep its comparative advantage gained through the development of firm-specific assets. The model is then empirically validated. The advertising intensity and the technological level of production are notably associated with intra-firm trade and thus with internalization. Actually, both brand and quality are shown to be profit accelerators in the event of affiliating. Essential means of product differentiation, these two factors are enough for multinationals to cover the additive fixed costs generated by internalization when the market becomes sufficiently large.

Keywords: boundaries of multinationals, intra-firm trade, product differentiation

Filialisation ou sous-traitance ? Le cas des groupes multinationaux

Résumé

Le développement du commerce international intra-groupe est un des aspects importants de la globalisation. La réalisation d'un échange intra-groupe indiquant la présence d'une filiale dans le pays concerné, séparer les dimensions intra- et extra-groupe permet d'appréhender le contour des groupes multinationaux et donc d'analyser leur politique de développement. Plus précisément, l'objet de cet article est de déterminer les facteurs intervenant dans l'arbitrage entre filialiser et sous-traiter - à l'international - un segment de production ou de distribution. Un modèle microéconomique est d'abord élaboré. L'idée est de comparer le profit réalisé par le groupe en cas de filialisation à celui réalisé en cas de sous-traitance. Si l'internalisation engendre vraisemblablement un coût fixe plus élevé, elle peut en revanche permettre au groupe de conserver un éventuel avantage comparatif acquis grâce au développement d'actifs spécifiques. Ce modèle est ensuite validé sur le plan empirique, à l'aide de données sur les échanges intra- et extra-groupe réalisés par les filiales de groupes multinationaux situées en France. Le niveau technologique de la production et l'effort publicitaire sont en particulier corrélés positivement avec le commerce intra-groupe et, par voie de conséquence, avec l'internalisation. La qualité et la marque jouent en fait un rôle d'accélérateur de profit en cas de filialisation. Moyens essentiels de différenciation des produits, ces deux facteurs permettent alors de contrebalancer le surcroît de coût fixe engendré par l'internalisation, du moment que le marché dépasse une certaine taille critique.

Mots-clés : contour des multinationales, commerce intra-groupe, différenciation des produits

Classification JEL : F12, F23

Introduction

Over the past few decades, international trade has increased markedly. This trend is a visible facet of the increasingly strong integration of the goods and services markets. Multinationals have contributed to this general movement in a prominent way. According to the figures given by the Industrial Statistical Survey Department (*SESSI*), they now account for about three quarters of French foreign trade. Analyzing their strategy of development is therefore a prerequisite for understanding the most important patterns of international trade.

Firms can fragment their production around the globe in order to benefit from lower factors-costs or other locational advantages. Firms can also set up abroad in order to conquer new markets. Both strategies induce an increase in the number of trading relationships between affiliates¹. When the first strategy is pursued, intra-firm trade in intermediate goods occurs. Indeed, materials or components pass through a sequence of plants located in different countries before a finished product is delivered to consumers. Affiliates are thus vertically linked through trade in intermediate inputs. When the second strategy is pursued, intra-firm trade in intermediate or finished goods occurs. Firms may conquer new markets either by replicating production lines or by setting up commercial plants there. Affiliates are thus horizontally linked through trade in complements of range.

Distinguishing intra- and extra-firm dimensions when analyzing international trade is important for two reasons. First, intra-firm trade often represents a consequent share of foreign trade for a given country. In the French case, a third of exports and a quarter of imports go on inside the same firm. Second, intra-firm trade is far more "captive" than extra-firm trade, since it stems from investments and technical or commercial choices that the firm cannot call into question overnight (Hannoun and Guerrier, 1996). Intra-firm trade is thus less sensitive to the variations of economic variables such as exchanges rates or customs duties².

Moreover, an intra-firm trading relationship indicates that an affiliate is present abroad, in the country involved. Distinguishing intra- and extra-firm dimensions gives us access to the structure of multinationals and consequently to their policies of development. More precisely, it allows us to analyze the trade-off faced by multinationals between affiliating and subcontracting the relocated segment of production or distribution. This method of analysis enriches the usual empirical approach based on foreign direct investment data³.

Theoretical research on multinationals emphasizes the idea that production or distribution will be internalized for goods that embody specialized or proprietary knowledge. Actually, repeated studies have found that the development of multinationals is associated with the existence of knowledge-based, firm-specific assets (Horstmann and Markusen, 1989). These notably include technical expertise gained through research and development (*R&D*) expenditures and product reputation or identification gained through advertising expenditures. Such assets constitute essential means of product differentiation and may consequently give multinationals some monopoly advantage. Consider now a firm wishing to sell goods embodying knowledge-based assets in a foreign market. The transaction can certainly be done at arm's length. But in this case the firm may have to transfer some of its knowledge to a foreign distributor, thereby losing - at least in part - its monopoly advantage (Ethier, 1986).

¹ In this paper, the word "affiliate" describes equally well a parent or a subsidiary company. This word is thus applied here to all elements of a multinational.

² See Clausing (2002) for an econometric evidence for the case of exchanges rates.

³ See Caves (1982) for a survey of the usual approach.

Empirical research on intra-firm trade provides general support for the idea described above that transactions will be internalized for goods that embody specialized or proprietary knowledge (Borga and Zeile, 2003). Intra-firm trade is indeed found to be strongly associated with the R&D intensity of industries or firms in many studies⁴. Moreover, goods differentiated through technology are first intended for markets where consumers enjoy a high standard of living. Intra-firm trade in such goods is therefore positively related to the per-capita income of the host country (Anderson and Fredriksson, 2000).

In this paper, microdata from SESSI's 1999 "globalization" survey are used in order to analyze the trade-off faced by multinationals between affiliating and subcontracting a relocated segment of production or distribution. Section 1 provides an overview of these data. The remainder of the paper is as follows. Section 2 presents a microeconomic model formalizing the main determinants of the trade-off. Broadly speaking, the idea is to compare the profit made if trade occurs within the firm with that made if trade occurs with another firm. On the one hand internalization may generate additive fixed costs, on the other it may enable the firm to keep its monopoly advantage gained through the development of specific assets. The model is then empirically put to the test. Section 3 provides the results and concludes. These confirm the economic intuitions embodied in the model. The standard of living of consumers, the technological level of production and the advertising intensity are notably associated with intra-firm trade and thus with internalization. Actually, the structure of multinationals is molded first by their will to get into position on market niches, through product differentiation.

⁴ See Lall (1978) for the U.S. case, and Zejan (1989) for the Swedish case.

I - Overview of the data

Trade of multinationals is analyzed with the help of the “globalization” survey carried out in 1999 by the SESSI. It provides data on the intra- and extra-firm bilateral trade of affiliates located in France, by product, according to the three-digit Economic Summary Classification (*NES 114*)⁵. It compiles data on international industrial firms whose customs flows exceed one million euros. International industrial firms are multinationals having at least one industrial affiliate, whatever its location. The 4,367 respondents are all affiliates located in France. Slightly more than half the affiliates questioned have replied. In the end, the sample covers about 60% of France’s exports of goods and 40% of corresponding imports.

Trade with joint ventures is small compared to intra- and extra-firm trade (see table 1). Hence, from now on, trade with joint ventures is mixed with intra-firm trade.

Table 1: Values and shares of exports and imports handled by the respondents, by type of trade

Type	Exports	Imports
Intra-firm	94.1 (52%)	75.0 (59%)
Joint-venture	5.3 (3%)	6.1 (5%)
Extra-firm	79.3 (45%)	45.0 (36%)
Global value	178.7	126.1

Notes: Values are given in billions of euros. Shares are shown in parenthesis.

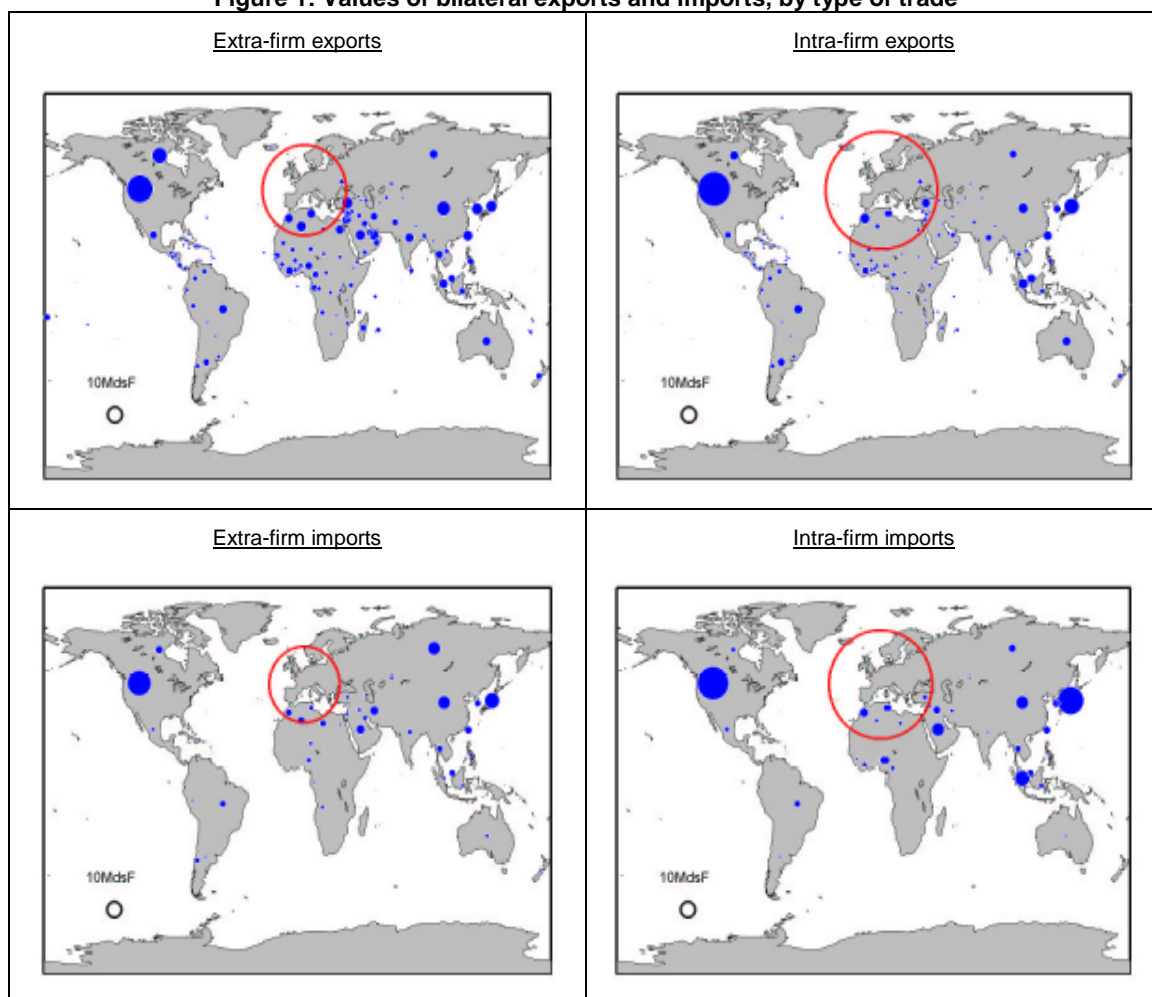
Since business registration numbers (*SIREN*) are given, data compiled in the “globalization” survey can be matched with those of French administrative files. The following yearly databases will be useful later: the exhaustive file of balance sheets (*BRM*), the “business” survey (*EAE*) and the “financial connections” survey (*LIF*). For each company, these contain such information as turnover, number of employees, sector of activity, advertising expenditures and majority interests in other companies.

1.1 Geographical features according to the type of trade

The charts below present the geographical distribution of exports and imports handled by the respondents, by type of trade (see figure 1). Two observations deserve to be mentioned:

- Trade is primarily made with developed countries. This dissymmetry is emphasized for intra-firm trade. In other words, affiliating is more likely to occur in a developed country than in a developing country. The next part examines this point in more detail.
- The share of intra-firm to global trade is slightly higher with European countries (67%) than with the United States (64%). It seems in other words that for a given level of economic development, the closer a country is, the more likely affiliating is. This point is furthermore corroborated when focus is placed on Europe (see figure 2). Trade with Denmark, Portugal or East European countries is equally intra- and extra-firm, unlike trade with closer countries which is mainly intra-firm. Affiliating thus seems to be positively related to proximity and particularly to geographical proximity.

⁵ See appendix 3 for a detailed description of this classification.

Figure 1: Values of bilateral exports and imports, by type of trade

Notes: The area of the circles is proportional to the value of corresponding trade (scale on the bottom left). Trade with European countries has been aggregated and it is represented by a hollow circle.

1.2 Features of traded goods according to the type of trade

For a given traded good, the tables hereafter respectively present the share of intra-firm to global imports and the share of intra-firm to global exports (see table 2). A high value, close to 1, means that the good is mainly traded between two affiliates of a same multinational. Trade in high value-added, finished products (for instance video, radio, television or computer and related activities) is more likely to be intra-firm than trade in raw materials (mining of coal and lignite), foodstuffs (beverages or meat), intermediate products (man-made fibres) or low value-added, finished products (wood or glass products).

Affiliating thus seems to be positively related to value-added. The latter usually increases with production technology. Arguably, goods traded with developing countries embody less technology on average than goods traded with developed countries. This point therefore corroborates the observation made in the preceding part, and attests a differentiation of commercial strategies according to the nature of traded goods. Trade in intermediate goods may arise from a strategy of vertical integration, whereas trade in finished goods may arise from a strategy of horizontal integration.

Figure 2: Values of exports and imports with European countries, by type of trade

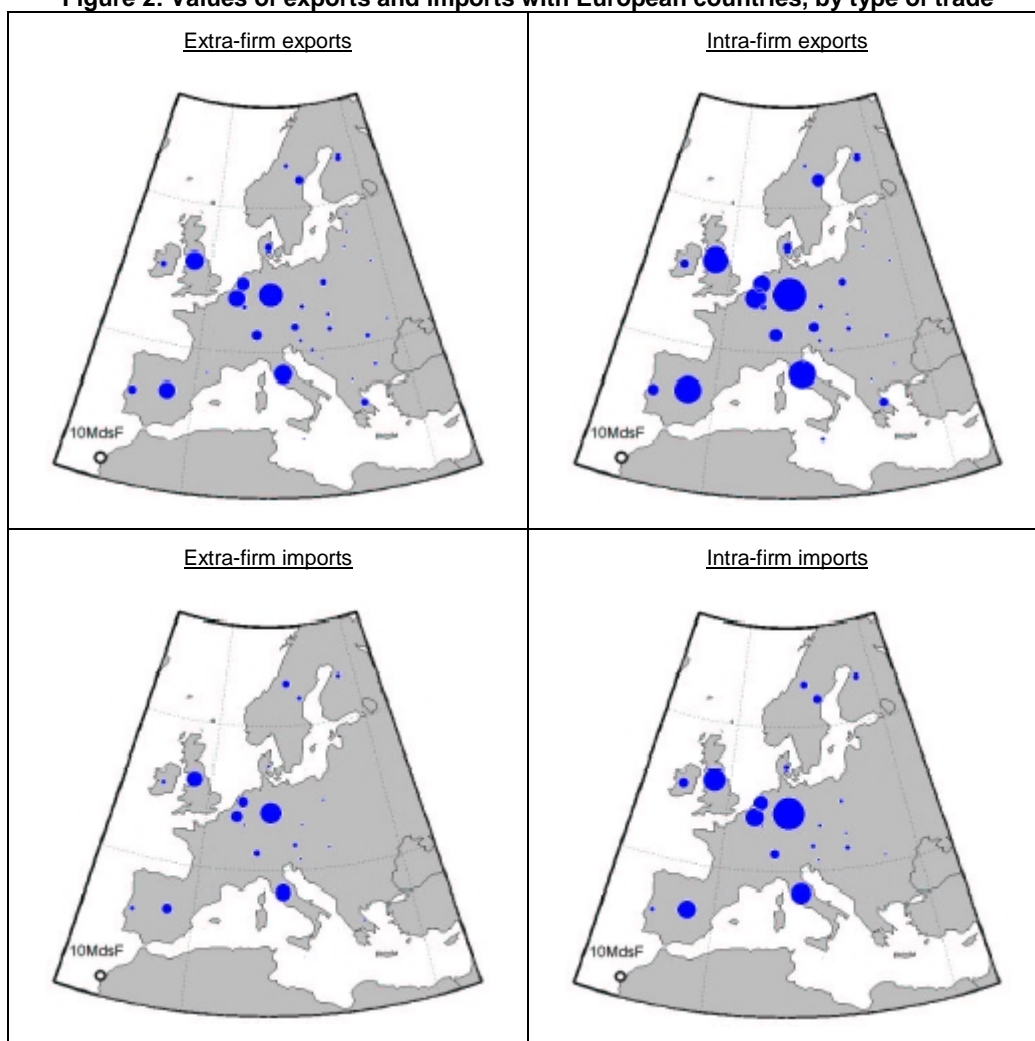


Table 2: Relative shares of intra-firm imports and exports, by product

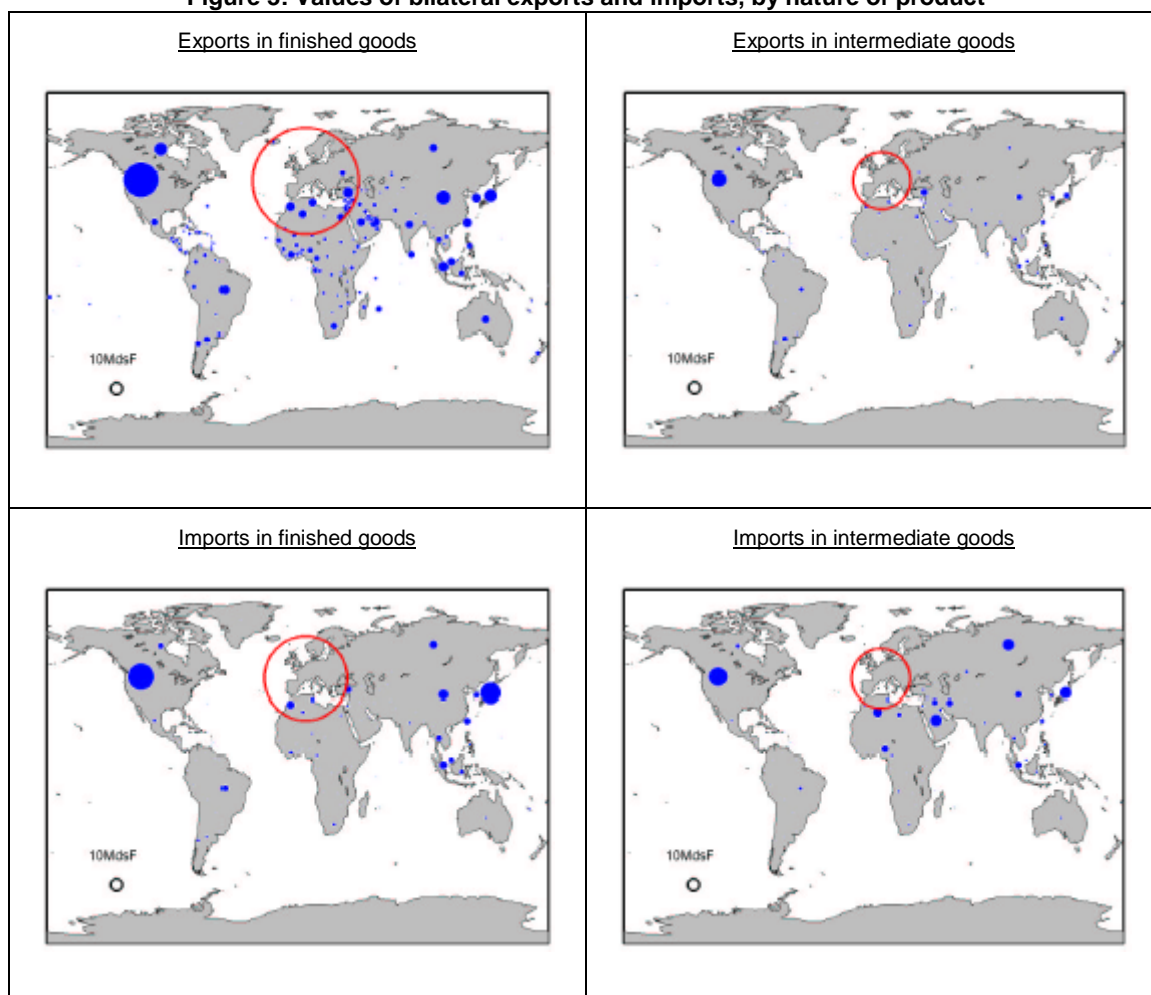
Imports (NES114 classification)	$\frac{\text{intra}}{\text{total}}$	Exports (NES114 classification)	$\frac{\text{intra}}{\text{total}}$
Medical and surgical equipment	0,58	Video, radio, television activities	0,64
Office machinery and computers	0,55	Computer and related activities	0,63
Video, radio, television activities	0,55	Office machinery and computer	0,59
Domestic appliances	0,54	Domestic appliances	0,57
Computer and related activities	0,52	Electronic valves, tubes	0,55
Motor vehicles, bodies and trailers	0,47	Motorcycles, bicycles	0,49
⋮		⋮	
Pulp, paper and paperboard	0,19	Pulp, paper and paperboard	0,24
Man-made fibres	0,19	Beverages	0,23
First processing of iron and steel	0,18	Glass and glass products	0,23
Wood and wood products	0,15	First processing of iron and steel	0,21
Textile fibres	0,13	Man-made fibres	0,19
Mining of coal and lignite	0,09	Meat and meat products	0,18

1.3 Geographical features according to the nature of traded goods

The charts hereafter present the geographical distribution of exports and imports handled by the respondents, by nature of product (see figure 3). Intermediate and finished goods are identified according to the criterion devised by Feenstra and Hanson (1996) and employed by Biscourp and Kramarz (2003). If the respondent is an industrial affiliate, then only the product with which the affiliate achieves most of its turnover is identified as a finished good. If the respondent is a commercial affiliate, then every traded product is identified as a finished good⁶.

Trade is primarily made in finished goods. This dissymmetry is emphasized for exports. Finished goods are exported all over the world, whereas intermediate goods are nearly entirely exported to the European countries and the United States. Imports originate mainly from these two areas as well. However, the oil-producing countries and Southeast Asia respectively account for a quite considerable part of the imports of intermediate and finished goods.

Figure 3: Values of bilateral exports and imports, by nature of product



Notes: The area of the circles is proportional to the value of corresponding trade (scale on the bottom left). Trade with European countries has been aggregated and it is represented by a hollow circle.

⁶ It is thus assumed that all commercial affiliates supply finished goods to local consumers. By the way, it is worth noting that many commercial affiliates belong to the car industry.

II - Microeconomic method of analysis

This section is devoted to the microeconomic modeling of the trade-off faced by multinationals between affiliating and subcontracting a relocated segment of production or distribution. First, a theoretical model is developed, taking into account the stylized facts shown in the preceding section. The model is inspired by those developed by Antràs (2003) and Helpman and al. (2003). It is conditional on the existence of a trade flow. In other words, the model does not explain why there is a trade flow, but why the latter is intra- or extra-firm. Second, a concrete example is given in order to show how to use the model. The focus is on a French firm wishing to supply a finished good entirely produced in France to a foreign market. Third, a reduced form of the model is developed, ready for an econometric validation. The dependent variable is a binary variable, identifying either an intra-firm or an extra-firm trade flow. The explanatory variables relate to characteristics of the partner country, the traded good and the multinational involved in a given trade flow.

II.1 A theoretical model

Consider an economy where a finished good Y is produced in quantity y . The demand function is assumed to be as follows:

$$y^*(p) = \kappa^\varepsilon R p^{-\varepsilon},$$

with R , p and ε respectively representing the income of consumers, the price of good Y and the elasticity of substitution between the latter and an alternative good. Finally, κ represents preference given by consumers to good Y in comparison to the alternative good.

Consider now a firm having a monopoly on the production of the good Y . The firm knows the inverse demand function $p(y)$ and hence is able to maximize its profit. It should be noted that fixed costs of production FC may occur. However, they do not affect the maximization. Thus, only the profit, excluding fixed costs, is considered for the moment:

$$\pi^*(y^*) = \frac{1}{\varepsilon} \kappa^\varepsilon R \left(\frac{\varepsilon}{\varepsilon - 1} a \right)^{1-\varepsilon},$$

with a representing the marginal cost of production. This cost can be explicitly specified as a function of the costs of the production factors. Assume that the finished good Y is produced from n inputs used in quantity (z_1, \dots, z_n) at the exogenous prices (z_1, \dots, z_n) and that the production follows a Cobb-Douglas function with constant returns to scale:

$$y = f(z_1, \dots, z_n) = A \prod_{i=1}^n z_i^{\omega_i}, \text{ where } \sum_{i=1}^n \omega_i = 1.$$

The marginal cost is then independent of the produced quantity y :

$$a = \frac{1}{A} \prod_{i=1}^n \left(\frac{r_i}{\omega_i} \right)^{\omega_i}.$$

Finally, the profit earned by the firm, excluding fixed costs, is as follows (**profit function**):

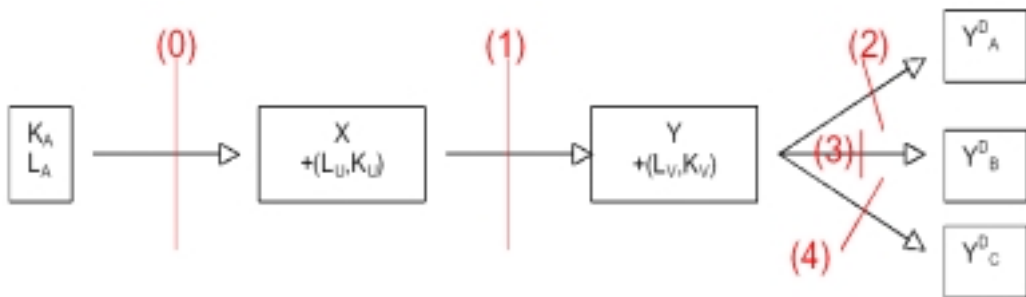
$$\pi(R, \varepsilon, \kappa, A, r_i) = \frac{1}{\varepsilon} \kappa^\varepsilon R \left(\frac{\varepsilon - 1}{\varepsilon} \right)^{\varepsilon - 1} \left[A \prod_{i=1}^n \left(\frac{\omega_i}{r_i} \right)^{\omega_i} \right]^{\varepsilon - 1}.$$

This profit is an increasing function of the preference κ given to good Y , the income R of consumers and the technology level A of the firm. On the other hand, the profit is a decreasing function of the costs r_i of the production factors. Overall, the effect of an additive investment in R&D on the profit, including fixed costs, is ambiguous. If the investment may increase the technology level A , it may increase fixed costs FC as well.

II.2 A concrete example of use

From now on, three production factors are considered: capital K , labor L and an intermediate input X . The entire sequence of production and distribution of the finished good Y is described in the diagram hereafter (see figure 4). Since the “globalization” survey only gives information about trade flows recorded by the French Customs service, no flow of capital or labor can be observed. A trade flow must furthermore link two different countries, one of them being France. A trade flow observed in (1) indicates the conversion of the intermediate input X into the finished good Y . A trade flow observed in (2), (3) or (4) indicates the place where the finished good is supplied. Actually, eight cases must be distinguished. They are identified according to the following criteria: the direction of the trade flow (import or export), the nature of the traded good (intermediate or finished) and the nationality of the firm involved (French or foreign). Fortunately, analyzing only one of these eight cases is enough.

Figure 4: Entire sequence of production and distribution of the finished good



Notes: The indices A , B and C denote three different countries. The indices U and V denote two countries belonging to $\{A, B, C\}$. The exponent D - for distribution - denotes that the final good Y is ready to be sold.

Each arrow indicates a factor flow. The latter can go in, come out or stay within the firm.

Consider the case of a French firm wishing to supply the finished good Y to a foreign country. Let A and B denote France and the foreign country respectively. The good Y is assumed to be entirely produced in France:

$$U = V = A = \text{France}.$$

A trade flow is thus observed in (3). Remember that the model is conditional on the existence of this trade flow. In other words, the model does not explain why the firm has decided to conquer this foreign market, but how the firm attempts to conquer it, either by subcontracting the marketing of the finished good to a local firm or by setting up a commercial affiliate there. The resulting export is extra-firm in the first case, intra-firm in the second.

The idea is to compare the profit made by the French firm when marketing is affiliated with that made when marketing is subcontracted. The firm should then choose the conquest strategy that gives the highest profit. On the one hand, internalization may generate additive fixed costs, because of an increase in overheads⁷. On the other, it may enable the firm to keep its comparative advantage gained through the use of specific assets. The firm may indeed take advantage of a finer knowledge of the local demand to better meet the requirements of consumers or to reduce the delivery time (**quality effect**). The firm may also benefit from returns to scale as regards advertising or marketing expenditures (**brand effect**). Actually, three supplementary parameters have to be introduced:

- τ denotes the total transport cost of the traded good. It includes the freight and insurance costs and the customs duties paid to country B . The marginal production cost is assumed to increase proportionally to the total transport cost. Let us thus divide the technology level A of the firm by the total transport cost τ .
- ξ denotes a quality factor arising from internalization. In the case of a relocated segment of production, the affiliate may for instance benefit from the technical expertise gained by the firm. Let us thus multiply the technology level A of the firm by the quality factor ξ .
- γ denotes a brand factor arising from internalization. In the case of a relocated segment of production, the affiliate may for instance benefit from the product reputation gained by the firm. Let us thus multiply the preference κ given to good Y by the brand factor γ .

When marketing is subcontracted, the sum of the profits earned by the firm and the subcontractor amounts to:

$$\pi_E + \pi_{ST} = \pi \left(R^B, \varepsilon^B, \kappa^B, \frac{A}{1+\tau}, r_K^A, r_L^A, r_X^A \right) - FC_E.$$

The exponents A and B are referring to the countries the parameters relate to. When marketing is affiliated, the firm may keep its comparative advantage gained through brand and quality. On the other hand, its profit is cut down by the cost of purchase of the subcontractor. The latter is assumed to be equal to π_{ST} ⁸. Finally, the profit earned by the firm amounts to:

$$\pi_I = \pi \left(R^B, \varepsilon^B, (1+\gamma)\kappa^B, \frac{(1+\xi)A}{1+\tau}, r_K^A, r_L^A, r_X^A \right) - \pi_{ST} - FC_I.$$

⁷ This increase is likely to depend on the openness to foreign direct investment of the partner country.

⁸ The cost of purchase is thus equal to the discounted sum - over one period - of the present and future profits of the subcontractor.

Hence, the firm should decide to affiliate the relocated segment of distribution when **(trade-off equation)**:

$$\pi_I \geq \pi_E \Leftrightarrow \frac{(1+\gamma)^{\varepsilon^B} (1+\xi)^{\varepsilon^B-1} - 1}{(1+\tau)^{\varepsilon^B-1}} \pi(R^B, \varepsilon^B, \kappa^B, A, r_K^A, r_L^A, r_X^A) \geq FC_I - FC_E.$$

Arguably, the parameters ξ and γ should be positive as well as the difference between the fixed costs FC_I and FC_E ⁹. If the latter is held true, then the preference κ given to good Y , the income R of consumers and the technology level A of the firm are positively related to the decision of affiliating. On the other hand, the total transport cost τ and the costs r_i of the production factors are positively related to the decision of subcontracting. The paper aims precisely to prove these results. Hence, no restriction on the sign of the parameters ξ , γ and $FC_I - FC_E$ is assumed.

It should be noted that profit taxation is assumed to play no role in the trade-off equation. Actually, the trade-off between affiliating and subcontracting is easily shown not to depend on profit taxation, assuming that the latter occurs in the country where multinationals originate from (residence based taxation). Unfortunately, although in many countries the legal basis of taxation is on a residence basis, in practice the vast bulk of the international taxation of company equity income is on a source basis (Devereux, 2004). In other words, tax is generally levied according to some notion of where the profit is generated. In this case, the trade-off between affiliating and subcontracting is again shown, under reasonable assumptions, not to depend on profit taxation (see appendix 1).

II.3 An econometric method of validation

In order to empirically validate the trade-off equation, a set of econometric tests is developed. Remember that eight cases must be distinguished. They are identified according to the direction of the trade flow (import or export), the nature of the traded good (intermediate or finished) and the nationality of the firm involved (French or foreign). The common expression of the eight corresponding tests is as follows **(econometric equation)**:

$$\Pr(\theta_i^{j,k}) = \Phi \left(\sum_{j=1}^p a^j NESFG^j + \alpha_1 LGDPPC_i + \alpha_2 TECH_i \right. \\ \left. + \alpha_3 LDIST_i + \alpha_4 TARIFF + \alpha_5 ADPE^k_i \right).$$

Before specifying notation, it is worth noting that the unit of observation is the triplet (firm involved, partner country, traded product). Indeed, the decision of affiliating or subcontracting a relocated segment is certainly made at the firm level. However, the "globalization" survey compiles data at the company level. It is thus necessary to aggregate the registered trade flows at the firm level.

Consider a given international industrial firm. If several of its affiliates located in France export the same good to the same country, then the corresponding trade flows are aggregated. Such an aggregation sometimes leads to mixed observations, i.e. observations mixing intra- and extra-firm trade flows. Actually, a fifth part of observations is mixed.

⁹ By the way, it is worth noting that the total transport cost τ affects the trade-off provided that the fixed costs FC_I and FC_E are not equal.

Since the trade-off faced by the firm is only between affiliating and subcontracting, mixed observations have to be allocated amongst intra- and extra-firm observations. From now on, all mixed observations are assumed to be intra-firm. A mixed observation indeed indicates the existence of an affiliate in the partner country¹⁰.

Finally, the dependent variable is a binary variable, identifying either an intra-firm or an extra-firm trade flow:

- $\theta_i^{j,k} = 1$ if intra-firm trade is strictly positive (**affiliating**),
- $\theta_i^{j,k} = 0$ if intra-firm trade is null (**subcontracting**).

The following explanatory variables are supposed to replicate at best the parameters of the trade-off equation. They can be classified in three categories.

1. Those relating to the partner country i ¹¹:
 - $LGDPPC_i$, the logarithm of the GDP per capita,
 - $TECH_i$, an index of its technological development,
 - $LDIST_i$, the logarithm of distance between it and France,
 - $TARIFF_i$, the average customs duties it applies for the manufacturing sector.
2. Those relating to the finally produced good j :
 - $NESFG^j$, its dummy according to the three-digit classification NES 114.
3. Those relating to the firm k involved¹²:
 - $ADPE^k$, the ratio of the advertising expenditures to the number of employees in France.

¹⁰ An other method could have been to allocate mixed observations to intra-firm observations only if the share of intra-firm to global trade flows was higher than 0.5. However, this method is arbitrary because of the pricing difference between intra- and extra-firm trade flows. The former is priced through transfer pricing, the latter through market pricing.

¹¹ Except distance data, these variables are taken from the World Development Indicators published by the World Bank. The index of technological development is the share of high technology to global exports.

¹² Advertising expenditures and the number of employees are compiled at the company level respectively in the "EAE" and "BRN" databases. Their aggregation at the firm level is made with the help of the "LIFI" database (see section 1).

III - Results and findings

The table below gathers the results of the eight econometric tests (see table 3). Overall, the results validate the trade-off equation. Indeed, all correlations either have the expected sign or are not significative. The interpretation of these results focuses on the crucial role played by product differentiation in the trade-off faced by multinationals between affiliating and subcontracting a relocated segment of production or distribution. Robustness of the correlations is tested in the appendix 2.

Table 3: Results of the econometric tests

Flow Good Firm	Import				Export			
	Interm.		Finished		Interm.		Finished	
	Foreign	French	Foreign	French	Foreign	French	Foreign	French
$(10^2 \times)$ LGDPPC	-3.56	-10.2	9.81	ns	10.3	6.36	6.94	ns
$(10^3 \times)$ TECH	6.20	2.77	5.91	3.18	3.88	ns	4.22	2.20
$(10^2 \times)$ LDIST	ns	-2.86	-11.6	-10.6	-4.37	-8.36	-5.46	-9.09
$(10^2 \times)$ TARIFF	-2.30	-1.56	-3.26	-2.72
$(10^3 \times)$ ADPE	1.11	1.49	ns	0.40	1.27	1.30	1.24	1.26
N[depend-1]	8,295	2,982	11,096	2,110	9,775	7,064	14,884	8,825
N[depend-0]	13,865	9,584	4,996	4,266	7,017	6,885	12,815	10,149
Modified R^2	0.21	0.48	0.26	0.24	0.25	0.25	0.16	0.17
% concordance	68.5	75.0	64.8	67.1	72.8	75.0	69.7	70.1

Notes: If the correlation is positive, then the higher the variable is, the more likely affiliating is. If the correlation is negative, then the higher the variable is, the more likely subcontracting is. "ns" means that the correlation is not significative at the 5% threshold.

The crucial role of product differentiation

In the case of exports, it can be assumed that the GDP per capita is a proxy of the income R of consumers inhabiting the partner country. Affiliating is thus associated with the income of consumers: the higher the GDP per capita is, the more likely affiliating is. This relation is predicted by the trade-off equation provided that the joint effect of quality and brand factors is positive:

$$(1 + \gamma)^\epsilon (1 + \xi)^{\epsilon-1} > 1.$$

In the case of imports in intermediate goods, it can be assumed that the GDP per capita is a proxy of the labor cost r_L . Indeed, since there is little differentiation on the market of intermediate goods, firms seek as a priority to be supplied with intermediate inputs at the lowest cost. Subcontracting is thus associated with the labor cost: the higher the GDP per capita is, the more likely subcontracting is. This relation is predicted by the trade-off equation provided that the preceding inequality is true. The case of imports in finished goods is analyzed at the end of the section.

It can be assumed that the geographical distance with the partner country and, in the case of exports, the average customs duties applied by the latter for the manufacturing sector are a proxy of the total transport cost τ . Subcontracting is thus associated with the total transport cost: the higher the geographical distance or the customs duties are, the more likely subcontracting is. Since the joint effect of quality and brand factors is shown to be positive, this relation is predicted by the trade-off

equation provided that the fixed costs in the event of affiliating are heavier than those in the event of subcontracting:

$$FC_I > FC_E.$$

Hence, internalization generates additive fixed costs, presumably because of an increase in overheads. By the way, it is worth noting that the preceding relation is weaker for trade in intermediate goods than for trade in finished goods. Actually, it can be assumed in the former case that the cost r_X of the intermediate input - instead of the marginal production cost - increases proportionally to the total transport cost. Let us thus multiply the cost r_X of the intermediate input by the total transport cost τ . The trade-off equation is then as follows:

$$\pi_I \geq \pi_E \Leftrightarrow \frac{(1+\gamma)^\varepsilon (1+\xi)^{\varepsilon-1} - 1}{(1+\tau)^{\omega_X(\varepsilon-1)}} \pi(R, \varepsilon, \kappa, A, r_K, r_L, r_X) \geq FC_I - FC_E,$$

$$\text{with } 0 < \omega_X < 1.$$

Since the exponent associated with the total transport cost is now smaller, the correlation is smaller as well. This is particularly visible for imports.

The index of technological development of the partner country indicates the technology level its inhabitants are accustomed to. In the case of trade in finished goods, it can be assumed that this index is a proxy of the "country" dimension of the technology level A of the firm. Affiliating is thus associated with the technology level of the firm: the higher the index of technological development is, the more likely affiliating is. This relation is predicted by the trade-off equation provided that the quality factor is positive:

$$\xi > 0.$$

In the case of trade in intermediate goods, the preceding interpretation is certainly still valid, but it is not so straightforward. The corresponding correlations are lower for that matter.

The positive relation between the probability of affiliating and the technology level of production is borne out by the analysis of the coefficients associated with the product dummies. The latter are generally higher when associated with finished goods with high value-added than when associated with finished goods with low value-added¹³. Finally, the quality factor is shown to play an accelerator role: the profit, excluding fixed costs, earned by the firm increases more with the degree of product differentiation gained through technology in the event of affiliating.

For a given firm, the ratio of the advertising expenditures to the number of employees in France indicates its advertising intensity. It can be assumed that this ratio is a proxy of the preference κ given to the good Y the firm produces. Affiliating is thus associated with the preference given by consumers to the firm: the higher the advertising intensity is, the more likely affiliating is. This relation is predicted by the trade-off equation provided that the brand factor is positive:

$$\gamma > 0.$$

¹³ The coefficients associated with the product dummies are given in the appendix 3.

The preceding interpretation holds equally true for both trade in finished goods and trade in intermediate goods. Indeed, there is a specific form of advertising intended for firms, through notably trade fairs (Genthon, 2001). Finally, the brand factor is shown to play an accelerator role: the profit earned by the firm, excluding fixed costs, increases more with the degree of product differentiation gained through advertising in the event of affiliating.

Brand and quality are essential means of product differentiation, gained through the development of knowledge-based, firm-specific assets. The use of such assets may allow multinationals to strengthen their market share on segments with high value-added. Multinationals would then rather internalize the sequence of production or distribution. Indeed, both brand and quality are shown to be profit accelerators in the event of affiliating. Now, these two factors are enough for multinationals to cover the additive fixed costs generated by internalization when the market becomes sufficiently large. In other words, the structure of multinationals is molded first by their will to get into position on sufficiently large market niches.

Such market niches can only be reached through product differentiation. In the case of imports in finished goods, the GDP per capita has to be interpreted in this way. If the imported good is produced by a foreign firm, then its degree of differentiation on the French market is positively related to the economic development of the partner country. Awareness given by consumers to this feature may play a crucial role (Horst, 1972). On the other hand, if the imported good is produced by a French firm, then the feature has no more grounds to play such a crucial role. The preceding relation is therefore weaker. Actually, the GDP per capita denotes - in this case - a demand effect existing among the French consumers: the appeal of product differentiation for them.

References

- Anderson T. and T. Fredriksson (2000), "Distinction between Intermediate and Finished Products in Intra-firm Trade", *International Journal of Industrial Organization* 18: 773-92.
- Antràs P. (2003), "Firms, Contracts, and Trade Structure", Working Paper 9740, National Bureau of Economic Research.
- Biscourp P. and F. Kramarz (2003), "Internationalisation des entreprises industrielles et emploi : une analyse sur la période 1986-1992", *Economie et Statistique* 363-64-65.
- Borga M. and W. Zeile (2003), "International Fragmentation of Production and the Intrafirm Trade of U.S. Multinational Companies", DSTI/EAS/IND/SWP 3, OECD.
- Caves R. (1982), *Multinational Enterprise and Economic Analysis*, Cambridge: Cambridge University Press.
- Clausing K. (2002), "Intrafirm Trade in a Gravity Equation Model", Working Paper, Reed College.
- Devereux M. (2004), "Debating Proposed Reforms of the Taxation of Corporate Income in the European Union", *International Tax and Public Finance*: 71-89.
- Ethier W. (1986), "The Multinational Firm", *Quarterly Journal of Economics* 101 (4).
- Feenstra R. and G. Hanson (1996), "Globalization, Outsourcing and Wage Inequality", *American Economic Review* 86 (2).
- Genthon V. (2001), "Les entreprises industrielles et la publicité : la marque des grandes", *4 Pages des Statistiques Industrielles* 155, SESSI.
- Hannoun M. and G. Guerrier (1996), "Les échanges intragroupes dans la mondialisation industrielle", *Chiffres Clés Référence* 164, SESSI.
- Helpman E., M. Melitz and S. Yeaple (2003), "Exports versus FDI", Working Paper 9439, National Bureau of Economic Research.
- Horst T. (1972), "Firm and Industry Determinants of the Decision to Invest Abroad: An Empirical Study", *Review of Economics and Statistics* 54 (3).
- Horstmann I. and J. Markusen (1989), "Firm-specific Assets and the Gains from Direct Foreign Investment", *Economica* 56 (1).
- Lall S. (1978), "The Pattern of Intra-firm Exports by U.S. Multinationals", *Oxford Bulletin of Economics and Statistics* 40: 209-22.
- Zejan M. (1989), "Intra-firm Trade and Swedish Multinationals", *Weltwirtschaftliches Archiv* 125 (4).

Appendix 1: Taxation and the trade-off

This appendix is devoted to the role taxation plays in the trade-off between affiliating and subcontracting. Consider as in section 2.2 the case of a French firm wishing to supply a finished good, assumed to be entirely produced in France (country A), to a foreign country B . The before tax profit earned by the firm is as follows:

- $\pi_E^0 = \Pi - \pi_{ST} - FC_E$ in the event of subcontracting,
- $\pi_I^0 = \rho\Pi - \pi_{ST} - FC_I$ in the event of affiliating,

where $\Pi = \pi\left(R^B, \varepsilon^B, \kappa^B, \frac{A}{1+\tau}, r_K^A, r_L^A, r_X^A\right)$ and $\rho = (1+\gamma)^{\varepsilon^B} (1+\xi)^{\varepsilon^B-1}$.

A. Residence based taxation

Let us assume that profit taxation occurs in the country where the firm originates from. The after tax profit earned by the firm then amounts to¹⁴:

- $\pi_E^1 = (1-TR_A)(\Pi - \pi_{ST} - FC_E)$ in the event of subcontracting,
- $\pi_I^1 = (1-TR_A)(\rho\Pi - \pi_{ST} - FC_I)$ in the event of affiliating,

where TR_A is the French statutory tax rate¹⁵.

Hence, the firm should decide to affiliate the relocated segment of distribution when:

$$\pi_I^1 \geq \pi_E^1 \Leftrightarrow (1-TR_A)(\rho-1)\Pi \geq (1-TR_A)(FC_I - FC_E) \Leftrightarrow \pi_I^0 \geq \pi_E^0.$$

In other words, the trade-off between affiliating and subcontracting does not depend on profit taxation provided that the latter is residence based. However, most often, international taxation of company equity income is on a source basis, i.e. tax is generally levied according to some notion of where the profit is generated.

B. Source based taxation

Let us assume that profit taxation occurs in the countries where the profit is generated. When marketing is affiliated, the total profit of the French firm is therefore partly taxed

¹⁴ For the sake of simplicity, let us assume from now on that all profits are positive.

¹⁵ It is worth noting that the cost of purchase of the subcontractor remains equal to π_{ST} or, in other words, that it does not depend on taxation. Actually, the after tax profit earned by the subcontractor is equal to $(1-TR_B)\pi_{ST}$. The French firm has thus to pay π_{ST} in order to buy the subcontractor. In this case, the after tax profit earned by the former owner is indeed equal to $(1-TR_B)\pi_{ST}$ as well.

in the foreign country B , at the statutory tax rate TR_B . In this case, the after tax profit earned by the firm is as follows:

$$\pi_I^2 = [(1-\eta)(1-TR_A) + \eta(1-TR_B)](\rho\Pi - \pi_{ST} - FC_I), \text{ i.e.}$$

$$\pi_I^2 = (1-TR_A)\pi_I^0 + \eta(TR_A - TR_B)\pi_I^0.$$

On the other hand, the profit of the French firm remains entirely taxed in France when marketing is subcontracted:

$$\pi_E^2 = (1-TR_A)(\Pi - \pi_{ST} - FC_E).$$

Since the French statutory tax rate is among the highest in the world, consider only the case where $TR_A > TR_B$. The difference between the after tax profit earned by the firm in the event of affiliating and that in the event of subcontracting is as follows:

$$\pi_I^2 - \pi_E^2 = (1-TR_A)\pi_I^0 + \eta(TR_A - TR_B)\pi_I^0 - (1-TR_A)\pi_E^0, \text{ i.e.}$$

$$\pi_I^2 - \pi_E^2 = (1-TR_A)(\pi_I^0 - \pi_E^0) + \eta(TR_A - TR_B)\pi_I^0.$$

Therefore, the additional gain stemming from the opportunity the firm is given to shift part of its profit from France to the country B in the event of affiliating amounts to:

$$\eta(TR_A - TR_B)\pi_I^0.$$

Two scenarios can then be considered:

- The firm decides, *ex-ante*, whether to affiliate or to subcontract marketing on the basis of the before tax difference $\pi_I^0 - \pi_E^0$. Hence, the trade-off does not depend on taxation. Nevertheless, in the event of affiliating, the firm has an opportunity, *ex-post*, of increasing its after tax profit π_I^2 by shifting part of its profit to the partner country.
- The firm decides whether to affiliate or to subcontract marketing direct on the basis of the after tax difference $\pi_I^2 - \pi_E^2$. In other words, the firm takes into account, *ex-ante*, the opportunity it is given to shift part of its profit to the partner country in the event of affiliating. If $\pi_I^2 - \pi_E^2 > 0$ and $\pi_I^0 - \pi_E^0 < 0$, then marketing is affiliated only because of this opportunity. Since tax legislations may always be changed, this scenario seems quite risky and is thus unlikely¹⁶.

Actually, incorporating statutory tax rates into the pool of explanatory variables leads to non significant results. The previous point is therefore corroborated. In the end, the trade-off between affiliating and subcontracting is again shown, under reasonable assumptions, not to depend on profit taxation when the latter is source based.

¹⁶ Indeed, the need to identify prices of goods and services exchanged across borders between affiliates leads to high compliance costs, and may well result in higher taxation if the relevant revenue authorities do not agree on the valuation. Actually, there is evidence that multinationals are increasingly moving towards treating their affiliates as profit centres, in which transfer prices are set to maximize operating profit, rather than to minimize taxes (Devereux, 2004).

Appendix 2: Results obtained from the 1993 survey

This appendix is devoted to the robustness test of the results given in the paper. This test is made with the help of the Sessi's 1993 "globalization" survey. Unfortunately, the latter gives less precise information than the 1999 survey. Some statistical alterations are thus necessary:

- The 1993 survey was carried out on the industrial affiliates and the commercial affiliates separately. For the latter, it provides data on their intra- and extra-firm trade only by geographical areas and only according to a two-digit classification. Therefore, the field of analysis is restricted to the industrial affiliates located in France.
- The industrial affiliates only had to fill in their intra-firm trade flows. The 1993 survey thus gives no detail as regards extra-firm trade. Missing information can be retrieved from the database of the French Customs service. If for a given country and a given good a respondent indicates a non null share of intra-firm trade, then all corresponding flows recorded in the customs database are assumed to be intra-firm. This assumption is of no consequence. Indeed, the trade flows are next aggregated at the firm level and all mixed observations are assumed to be intra-firm again.
- The firm nationality is not mentioned in the 1993 survey. Therefore, only four cases can be distinguished.

The table below gathers the results of the four econometric tests (see table A). Overall, the results bear out the trade-off equation. Indeed, all correlations either have the expected sign or are not significative at the 5% threshold.

Table A: Results obtained from the 1993 survey

Flow Good	Import		Export	
	Interm.	Finished	Interm.	Finished
$(10^2 \times)$ LGDPPC	-12.0	3.98	ns	19.1
$(10^3 \times)$ TECH	10.2	11.7	11.9	12.6
$(10^2 \times)$ LDIST	-7.88	-19.5	-20.4	-37.4
$(10^3 \times)$ ADPE	1.35	1.56	0.93	1.64
N[theta-1]	2,207	1,511	3,519	3,867
N[theta-0]	35,029	5,153	45,239	16,381
Modified R^2	0.82	0.47	0.79	0.59
% concordance	67.0	71.7	69.6	78.5

Notes: If the correlation is positive, then the higher the variable is, the more likely affiliating is. If the correlation is negative, then the higher the variable is, the more likely subcontracting is. "ns" means that the correlation is not significative at the 5% threshold. The average customs duties per country for the manufacturing sector are not available in 1993.

However, a few slight differences deserve to be mentioned. First, the income of consumers and the advertising intensity now impact on the trade-off more for the finished goods than for the intermediate goods. Second, the effect of the explanatory variables relating to the partner country is far greater than in 1999. Third, the structure of the trade flows analyzed is altered. Indeed, the share of intra-firm trade has considerably increased, passing from 9.5% in 1993 to 48.3% in 1999, as well as the share of trade in finished goods, passing from 23.9% in 1993 to 51.4% in 1999¹⁷. Since the field of analysis in 1993 is restricted to the industrial affiliates, the last two results have to be interpreted with caution.

¹⁷ These figures are calculated by dividing the total number of trade flows by the number of trade flows concerned.

Appendix 3: Coefficients associated with the product dummies

This appendix provides the coefficients associated with the product dummies defined in section 2.3. It should be noted as in section 3 that the coefficients are generally higher when associated with high value-added, finished goods. The dummies are defined according to the French Economic Summary Classification (*NES*). The latter is an aggregated double entry classification - economic activities and products - relevant for economic analysis purpose.

Table B: Three-digit French Economic Summary Classification (NES 114)

Code	Heading	Code	Heading
B01	Production, processing and preserving of meat...	E34	Medical and surgical equipment...
B02	Dairy products	E35	Industrial process control equipment...
B03	Beverages	F11	Mining of metal ores
B04	Grain mill products, starches and starch products...	F12	Other mining and quarrying
B05	Other food products	F13	Glass and glass products
B06	Tobacco products	F14	Ceramic goods, products for construction...
C11	Wearing apparel, dressing and dyeing of fur	F21	Preparation and spinning of textile fibres...
C12	Leather and leather products, footwear	F22	Textile articles, except apparel
C20	Publishing, printing [...] of recorded media	F23	Knitted and crocheted fabrics and articles
C31	Pharmaceuticals, medicinal chemicals...	F31	Wood and wood products
C32	Soap and detergents, [...], perfumes...	F32	Pulp, paper and paperboard
C41	Furniture	F33	Articles of paper and paperboard
C42	Jewellery and musical instruments	F41	Basic inorganic chemicals
C43	Sports goods, games, toys and others n.e.c.	F42	Basic organic chemicals
C44	Domestic appliances	F43	Agro-chemical products, paints...
C45	Television and radio receivers...	F44	Man-made fibres
C46	Optical instruments, photographic equipment...	F45	Rubber products
D01	Motor vehicles, bodies and trailers	F46	Plastic products
D02	Parts and accessories for motor vehicles	F51	First processing of iron and steel
E11	Building and repairing of ships and boats	F52	Basic precious and non-ferrous metals
E12	Railway and tramway locomotives and rolling stock	F53	Casting of metals
E13	Aircraft and spacecraft	F54	Industrial services for treatment of metals
E14	Motorcycles, bicycles...	F55	Fabricated metal products
E21	Structural metal products	F56	Recycling
E22	Tanks, reservoirs and containers of metal...	F61	Electrical equipments and apparatus n.e.c.
E23	Machinery for the production and use of [...] power	F62	Electronic valves, tubes...
E24	Other general purpose machinery	G11	Mining of coal and lignite, extraction of peat
E25	Agricultural and forestry machinery	G12	Extraction of crude petroleum and natural gas...
E26	Machine tools	G13	Mining of uranium and thorium ores
E27	Other special purpose machinery	G14	Coke oven products and processing of nuclear fuel
E28	Weapons and ammunition	G15	Refined petroleum products
E31	Office machinery and computers	G21	Electricity, gas, steam and hot water supply
E32	Electric motors, generators and transformers	G22	Collection, purification and distribution of water
E33	Television and radio transmitters...		

Notes: Only relevant economic activities or products are shown. Codes thus go from "B" to "G", corresponding to industrial activities.

The tables hereafter present the coefficients associated with the dummies relating to the finally produced good (see tables C and D). Intermediate and finished goods are identified according to the criterion devised by Feenstra and Hanson (1996). If the respondent is an industrial affiliate, then only the product with which the affiliate achieves most of its turnover is identified as a finished good. If the respondent is a commercial affiliate, then every traded product is identified as a finished good.

Table C: Imports

Intermediate goods				Finished goods			
Foreign firm		French firm		Foreign firm		French firm	
Code	Coeff.	Code	Coeff.	Code	Coeff.	Code	Coeff.
C12	-1.33	B03	-1.43	F21	-0.54	F11	ns
B05	-1.06	C42	-0.96	F12	-0.52	E14	ns
B03	-0.91	B05	-0.64	F32	-0.51	G11	ns
F44	-0.81	F31	-0.61	B05	-0.40	G14	ns
F32	-0.81	E22	-0.59	G15	ns	F12	ns
F51	-0.78	B04	-0.56	F51	ns	E21	ns
E22	-0.76	B02	-0.54	F44	ns	F31	ns
B02	-0.72	G21	ns	F31	ns	F32	ns
C32	-0.64	G12	ns	E14	ns	C42	ns
C41	-0.55	E14	ns	B03	ns	B04	ns
F12	-0.53	F32	ns	F42	ns	F23	ns
C11	-0.53	F23	ns	B02	ns	F55	ns
F21	-0.49	F12	ns	E25	ns	F21	ns
F53	-0.46	C12	ns	E22	ns	B05	ns
F31	-0.36	E28	ns	F52	ns	F22	ns
F55	-0.36	F14	ns	B04	ns	F33	ns
F52	-0.36	C44	ns	F23	ns	E34	ns
B04	-0.33	F55	ns	F41	ns	E23	ns
F33	-0.29	C32	ns	F22	ns	C12	ns
F41	-0.24	F22	ns	C12	ns	F41	ns
E12	ns	F54	ns	E13	ns	F52	ns
F42	ns	F44	ns	E33	ns	F44	ns
C20	ns	F13	ns	F33	ns	E25	ns
E26	ns	E21	ns	C32	ns	F42	0.34
F46	ns	E11	ns	E11	ns	F43	0.35
F13	ns	C31	ns	E21	ns	E24	0.36
F54	ns	E23	ns	C42	ns	E26	0.36
C42	ns	F51	ns	E12	ns	F46	0.37
E25	ns	E32	ns	B06	ns	B03	0.42
E13	ns	E25	ns	E28	ns	F14	0.43
E32	ns	F43	ns	F46	0.27	C11	0.43
F23	ns	C41	ns	E27	0.28	D02	0.47
D01	ns	C20	ns	C43	0.28	C31	0.50
E24	ns	E34	ns	D02	0.30	F51	0.51
F43	ns	E27	0.35	C41	0.33	C41	0.52
E14	ns	C11	0.38	C31	0.36	G15	0.54
C43	ns	F33	0.40	F61	0.36	D01	0.59
F45	ns	E33	0.47	F62	0.39	B02	0.60
E27	ns	D02	0.47	C11	0.39	C44	0.62
C31	ns	F53	0.50	E24	0.39	C20	0.62
D02	ns	E26	0.51	F55	0.39	E27	0.68
G15	ns	F52	0.52	D01	0.39	E35	0.68
F14	ns	F56	0.58	F45	0.39	C32	0.68
E33	ns	E31	0.60	F13	0.40	C43	0.72
F22	ns	E24	0.65	F43	0.40	E33	0.73
E23	0.23	C43	0.66	E35	0.41	F13	0.77
F61	0.27	E35	0.68	E26	0.42	E32	0.78
F62	0.35	F46	0.69	E23	0.42	E11	0.79
E35	0.38	F21	0.69	F14	0.46	C46	0.82
C46	0.66	F61	0.76	E34	0.50	F62	0.84
E34	0.68	F41	0.77	E32	0.53	E31	0.88
F56	0.72	D01	0.79	C46	0.54	E13	0.95
C44	0.77	F42	0.87	C20	0.64	E28	0.98
E21	0.90	E12	1.07	C44	0.74	E22	0.99
C45	1.15	G15	1.08	E31	0.79	F45	1.07
E31	1.19	E13	1.15	C45	0.99	F61	1.09
		F62	1.23	G14	1.12	G21	1.26
		G14	1.29			E12	1.62
		C46	1.58			C45	1.72
		C45	1.76				
		F45	1.84				

Notes: Coefficients associated with the dummies $NESFG^j$ relating to the finally produced good j . Since the grand total of the dummies adds up to 1, the value of the coefficients is of no interest. Only their ranking is informative.

Codes are detailed in table B above. "ns" means that the coefficient is not significant at the 5% threshold.

Table D: Exports

Intermediate goods				Finished goods			
Foreign firm		French firm		Foreign firm		French firm	
Code	Coeff.	Code	Coeff.	Code	Coeff.	Code	Coeff.
E13	-2.67	E22	-1.41	F21	-0.93	F44	-0.94
B03	-2.13	F56	-1.14	G15	-0.88	E22	-0.53
F12	-2.10	C42	-1.03	F51	-0.56	E28	ns
F21	-1.56	E14	-0.92	F31	-0.54	G14	ns
F32	-1.53	E28	-0.82	F32	-0.52	C42	ns
F52	-1.52	F12	-0.70	B05	-0.42	F12	ns
F53	-1.50	F52	-0.68	E21	-0.41	F32	ns
F54	-1.14	F53	-0.65	F33	-0.41	E21	ns
F51	-1.02	E23	-0.63	D01	-0.40	F21	ns
B04	-0.86	E25	-0.63	B04	-0.39	E25	ns
C32	-0.81	F54	-0.62	F41	-0.38	B05	ns
B05	-0.73	B05	-0.60	E22	-0.36	E14	ns
D01	-0.70	B02	-0.57	F12	-0.35	E11	ns
E22	-0.68	E33	-0.50	F22	-0.31	E13	ns
F33	-0.61	B04	-0.47	F52	-0.31	G11	ns
D02	-0.61	E35	-0.47	C32	-0.29	G21	ns
F45	-0.59	E21	-0.45	F55	-0.28	B06	ns
F22	-0.57	E13	-0.40	F13	-0.26	F13	0.19
E23	-0.55	F14	-0.38	C20	-0.25	B03	0.19
F23	-0.53	E32	-0.37	F44	ns	B02	0.21
E24	-0.51	G12	ns	E13	ns	F31	0.30
F46	-0.49	F44	ns	D02	ns	F41	0.33
C11	-0.48	F13	ns	B03	ns	F22	0.35
E35	-0.48	F32	ns	C46	ns	F52	0.35
F42	-0.45	F21	ns	F46	ns	E23	0.39
F55	-0.45	F31	ns	C12	ns	E32	0.40
F41	-0.44	C44	ns	C43	ns	D02	0.41
E27	-0.43	G14	ns	C41	ns	F51	0.42
F44	ns	B03	ns	E27	ns	B04	0.43
C20	ns	F41	ns	F61	ns	F55	0.44
F61	ns	F51	ns	E26	ns	C20	0.45
F31	ns	F46	ns	F14	ns	F46	0.46
C31	ns	F22	ns	C11	ns	F23	0.49
C41	ns	D02	ns	E14	ns	E27	0.49
F56	ns	E34	ns	F45	ns	E24	0.52
C12	ns	F33	ns	F23	ns	E26	0.53
F43	ns	F43	ns	E25	ns	C41	0.58
C44	ns	F55	ns	E34	ns	C11	0.58
F13	ns	E24	ns	F43	ns	C44	0.63
E25	ns	E27	ns	C45	ns	E35	0.63
E26	ns	C45	ns	E33	ns	E33	0.65
E33	ns	C31	ns	E24	ns	E34	0.67
E32	ns	F62	ns	F42	ns	C43	0.72
F62	ns	F23	ns	E23	ns	F14	0.72
E21	ns	C11	0.43	E35	ns	F43	0.75
E12	ns	C41	0.47	F62	ns	C46	0.76
E34	ns	E31	0.51	C42	ns	F33	0.77
E14	ns	F42	0.53	E11	ns	C45	0.82
C43	ns	C20	0.54	E28	ns	C12	0.86
B02	ns	F61	0.57	G14	ns	F42	0.88
G15	ns	E12	0.59	E31	0.26	D01	1.03
E31	0.47	C32	0.65	E32	0.37	G15	1.04
C46	0.60	D01	0.71	C31	0.45	C32	1.12
F14	0.60	E26	0.72	C44	0.48	F62	1.13
C45	0.86	E11	0.75	B02	0.72	F45	1.22
C42	1.07	C43	0.81	E12	1.28	F61	1.29
		F45	0.99			E12	1.30
		C12	1.02			E31	1.30
		G21	1.17			C31	1.48
		G15	1.49				
		C46	1.55				

Notes: Coefficients associated with the dummies $NESFG^j$ relating to the finally produced good j . Since the grand total of the dummies adds up to 1, the value of the coefficients is of no interest. Only their ranking is informative.

Codes are detailed in table B above. "ns" means that the coefficient is not significant at the 5% threshold.

