FOREIGN DIRECT INVESTMENT AND PROCESSED FOOD TRADE

Edited By

Shida Rastegari Henneberry

Papers Presented at the
Conference of NCR-182 "Organization and
Performance of World Food Systems"
Arlington, Virginia
March 9-10, 1995

Sponsored by NCR-182 Committee and Farm Foundation

Published in Cooperation With the Department of Agricultural Economics, Oklahoma State University

March, 1997

FOUR

INTRA EUROPEAN TRADE AND INVESTMENT IN PROCESSED FOOD PRODUCTS, 1980-1991: CHANGING DETERMINANTS AND CHARACTERISTICS[1]

Joao Gomes da Silva

During the 1980's, changes in the process of economic integration in the EC represented major changes in the strategic environment of the food processing industries. As an answer to those changes, strategies developed by companies in the food industries led to growth in trade and international production in processed food products. To analyze these changes, a gravity equation type of model is developed, based on the eclectic paradigm of international production and on Porter's theory of national competitive advantage . Estimations are made for the beginning and end of the 1980s for both trade and FDI. It is found that economic integration had an impact on the responsiveness of FDI to its determinants. Results also show that the nature of FDI activity has changed with the developments in the Community and that the major gains from economic integration in this period may have been attributable to FDI and not trade.

Introduction

The level and composition of international involvement in the Food, Drink and Tobacco Industries (FDT) have shown important changes in the last 15 years. This is specially true of Intra-European operations of firms in the food industry. Foreign direct investment has traditionally been the dominant form of internationalization. Recent estimates for 1991 (Traill and da Silva 1994), show inwards international production (IPI) in food, drink and tobacco industries in six of the major host countries[2] to be worth 150 billion $US, whereas for the same countries, outward international production (IPO) was evaluated at more than 165 billion $US. Such figures compare with 66.7 and 101.2 $US billion of imports and exports respectively for the same countries.

[1] This paper is part of the author's Ph.D. project. Financial Support from the Science Program of JNICT is gratefully acknowledged. The author is also grateful to Professor Bruce Traill for his suggestions and support throughout, as well as to the participants at the Spring meeting to the NCR-182 project for their useful comments.

[2] These countries include France, Germany, Italy, The Netherlands, UK and USA.

According to the same source, both International Production and Trade have grown rapidly, the former consistently expanding faster (average annual nominal growth in the period 78-91 was an estimated 12% for trade and 17% for FDI). Other forms of internationalization of the non equity type, have also experienced important developments, particularly towards the end of the period.

If the (geographical) structure of international trade in FDT products has remained relatively stable (Dayton and Henderson 1992), the same did not happen with FDI. Europe became the largest source of investment and Japan emerged as a major investor. At the same time investments from Japan and Europe shifted from LDCs to the US (first) and EC (after). This activity has been associated with strategic options from food MNCs, namely the will to explore sophisticated markets responding more to competitors pressures than to cost structures or the need to expand by acquisition in order to grow fast in brand-dominated mature markets.

The changes can then be seen as responses to new strategic environments. Among them, are those associated with developments in the process of **positive** economic integration represented by the European Union. The implementation and expectations generated by the Single European Market program (SEM), have been by far the most discussed in the literature (Strak 1989, Yannopoulos 1991a, 1991b, Young 1993). Less popular but also important, are the successive enlargements of the community which represented an opportunity for expansion and restructuring of European firms in markets structurally different from the initial EC-9 (Buckley and Artisien 1987).

The impact of increasing integration between European economies can determine the type of investment. The traditional (Behrman 1972) strategic asset and capacity seeking, efficiency seeking and market seeking motivations, were amplified in the tradition of Kindleberger (1966), by Yannopoulos (1989) and Dunning (1990). They suggested that following the static and dynamic impacts of economic integration, different types of investment will correspond to different determinants. Reorganization Investment will take place in the areas, within the single market, where new comparative advantages are developed, corresponding to the option for specialization with fewer production locations where lower costs are

expected. Rationalized investment corrects the previous one if changes in comparative (cost) advantages between different areas occur resulting from the dynamic gains of the process. It is a medium to long term effect unless one assumes strong expectation effects on the investment decision. Finally, offensive import-substituting investment occurs as a reaction to changed demand conditions, created by market growth effects due to non fragmented markets and income multiplier effects.

Finally, these changes in the structural conditions for firms operating in the EU were part of a move towards globalization which, favored by the revolution in information technology and the liberalization of capital markets which dominated economic activity in the second half of the decade.

Existing Results

The analysis of these phenomena in the literature is made difficult by the separate branches of theory within which economic integration, trade and foreign investment have been developed. Quantitative analysis is made particularly difficult by severe data problems with regard to foreign investment.

Hence, research and evidence on the process of international involvement in the food processing industries is recent and still limited. Apart from Horst (1974), no research can be found before the early 1980s. Such scarcity, despite the importance of the sector for the economy of both the European Community and the United States and the fact that the sector accounts for an important share of the world's total FDI stock has created a gap in research.

Work developed so far has treated the two forms of involvement separately. This implicitly assumed that FDI and trade activities are separate areas in the food industries, *i.e.*, that food MNCs do not enroll to any great extent in trade as both manufacturing and marketing take place locally (Rutenberg 1982). The same argument has been produced, based on the domestic market orientation of most food and drink MNCs, by Rama (1992) who argues that the food industries should hence be characterized as multidomestic[3] and not as global industries. This orientation, which would imply the dominance of

[3] The author uses the term "multidomestic" as originally defined by Porter (1986), i.e. an industry that being present in many countries has its competitive game played country by country.

market seeking FDI activities in the FDT industries, is implicitly used by McCorriston and Sheldon (1990) to explain the US position in the world trade in FDT products. This is also supported by Pearce (1990) who obtained negative significant statistical relations between the importance of multinational activity and intra or extra group exports for the case of the multinational food firms (US as well as non-US), and by Ning and Reed (1994a) who found the same negative relation for US food MNCs. Connor (1983) however, found that the degree of processing was positively related to the intensity of intra-firm trade, reaching (for the US) 64% of total trade in the case of finished foods and beverages.

Studies which investigate the nature, extent and determinants of trade in processed food products, have reached a fairly homogenous set of conclusions. Trade is dominated by developed countries. The most important trading unit is the European Community which takes a very strong lead over the US and whose trade represents an estimated 78% of world total, of which an average of 54% is of intra-EC nature (McCorriston and Sheldon 1990, Dayton and Henderson 1992). According to the same studies, trade by the EC in food processed products is essentially of intra-industry nature (IIT). This result receives further support in Hirschberg, Sheldon and Dayton (1992), who identified the determinants of IIT for the total world trade in processed food products. Their results support the standard theory and identify GDP *per capita*, GDP *per capita* similarities, EC membership and Common borders, as positive determinants.

These results on the IIT nature of EC trade on processed food products come in line with theoretical expectations. In fact, European FDT and its markets possess the characteristics which theory recognizes as affecting the level of IIT , *i.e.*, taste similarity, product differentiation, scale economies, number of firms in differentiated goods markets, oligopolistic interdependence in homogeneous goods markets, technological factors (vertical differentiation), proximity to markets, extent of tariff and non-tariff barriers to trade and extent of FDI (Greenaway and Milner 1986).

Existing studies on FDI in the FDT have focused on either the UK or the US. The emphasis was justified by the weight of these countries as sources and hosts of MNC activity and the quality of their data. Nevertheless, this restricts the analysis and the conclusions drawn,

and ignores the fact that the relative importance of the US and the EC in this area has radically changed in recent years.

Evidence on FDI in the FDT can be found in industry specific studies or in cross industry studies of FDI in the manufacturing industries. Both types reach results which identify FDI activity in these industries as having different characteristics if compared to the expectations of the general theory.

Earlier studies of the first group (Connor 1981, 1983 and Pagoulatos 1983) were mainly concerned with the effects of FDI activity either in the US or by US firms. Their results pointed to industrial organization variables, as predominant determinants of FDI activities both in and by US firms. Ownership advantages seemed to prevail over location advantages.

Recently Reed and Ning (1994 and 1994b), investigated both ownership and location advantages for US outward FDI. Their conclusions point in the same direction as previous research but are more detailed and give a better account of host country characteristics affecting the location of US FDI. Their research identifies as ownership advantages (at the firm level): capital intensity, degree of diversification, low R&D involvement and advertising intensity. Testing for location advantages but now at the industry level, the authors found better statistical support for the model where the dependent variable was of stock nature (as opposed to flow measures of FDI). Their interpretation was that the stock variable expressed more accurately the long run nature of the FDI involvement, and hence was better explained by location factors. Market size, relative market growth, psychic distance, real effective exchange rate and membership of a trade block were all found positive determinants of location of US FDI. Relative wage rate, interest rate differentials and level of foreign income tax, were identified as negative location factors.

Papanastassiou and Pearce (1990) in their study of UK outward FDI (may be the only one which considered FDI and trade simultaneously in the food industries), supported the importance of the same set of variables for both servicing options. Hence, market size, psychic distance and the ratio of scientists and engineers (measuring technological capacity in the case of FDI and the extent of demand for differentiated products in the case of exports), proved positive determinants of international involvement through both options.

The Model and Data

In this paper we try to improve on the results of existing research. Not only we can identify host and home country effects by considering a multilateral framework, but also the study of intra-EC involvement can provide a test for the relatively strong results obtained for the US. Given the "new" role of the EC as a source and host for FDI and its major importance as a trade area it becomes particularly important to consider the problem at the European level.

Given the changes described above one can also expect that FDI and trade determinants may have changed during the period. This study should provide a test of the extent to which those changes took place. Finally, to the extent that the degree of international involvement can be associated with the competitive advantage of national industries (for a discussion see Traill and da Silva *op cit.*), the results can be used to explain the competitive advantage of the different countries in FDT.

The Model

In order to identify the determinants of intra EC trade and investment in the FDT industries, we specified a model adapted from the gravity equation models (GE) of international trade.

The GE model was first used by Tinbergen (1962). According to Deardoff (1984) the success of the GE is due to its ability to explain empirical facts which cannot be accounted for by the traditional theories of international trade. The great usefulness of this formulation in modeling bilateral trade flows and its adequacy to particular situations has led to the development of different theoretical foundations by Linneman (1966), Anderson (1979) and Bergstrand (1985), who proposed a generalized GE derived from a general equilibrium model of world trade. This generalized formulation allowed for the inclusion of prices, tariffs and exchange rates which were not considered in the classic formulation. To the best of our knowledge, the study by Molle and Morsink (1991) provides the only example of this model applied to FDI, but using total national stocks.

The basic GE formulation is given by equation (1), and expresses the bilateral trade flow from **a** to **b**, as a function of supply conditions in **a**, demand conditions in **b**, and a factor of trade resistance between **a** and **b**

(where M is the gross trade flow, Y is output, L is population and D is the distance between **a** and **b**, used as a proxy for transport costs).

[1] $$M_{ab} = AY_a^{\beta_1} Y_b^{\beta_2} L_a^{\beta_3} L_b^{\beta_4} D_{ab}^{\beta_5} e^{u_{ab}}$$

We extend (1) and consider trade and FDI in the context of the eclectic paradigm of international production (Dunning 1977 & 1993a) and Porter's national competitive advantage (Porter 1990).

The eclectic paradigm considers that the existence of location (L), ownership (O) and internalization (I) advantages, will determine the option for the mode of international involvement by firms. Location and ownership advantages are required for trade in differentiated products. Market failures, within cross border transactions, will generate internalization advantages which added to the existence of ownership advantages leads to FDI. Dunning further recognizes that, although L and O advantages are necessary but not sufficient conditions to determine the final solution (trade vs. FDI vs. Non Equity forms), they can still determine the direction of such flows, much in the tradition of classical trade theories.

Porter's diamond of competitive advantage, groups the various forces which according to the theory enhance an industry's capacity to compete successfully in international markets. It stresses the role of rivalry between the firms in the industry, the importance of demanding consumers, the clustering of related industries and the pooling of skilled labor and infrastructure in enhancing competitive advantage of national industries. In our model, these components are interpreted as determinants of both trade and international production. Although a free interpretation of the theory, this is founded on Porter's own measure of competitive position as being (the existence of) "...substantial and sustained exports ...and or significant outbound foreign investment" (Porter 1990, 283).

The dependent variables used are TRD_{ab} - exports from **a** to **b**, and IP_{ab} - the value of international production due to the stock of FDI from country **a** in country **b**. In the eclectic paradigm, trade in differentiated goods requires the existence of location advantages in the home country together with the possession of ownership advantages by its exporting firms. Location (L) characteristics relevant for the food industry trade are identified in table 1:

Table 1. Food Industries Location Characteristics - Trade

LOCATION CHARACTERISTICS	Expected Influence
Market size - OUTa	+
Relative Unit Labor Costs - ULCab	+/-
Relative Cost of Capital - CCab	-
Agricultural Sector Performance - AGCa	+
Bilateral Exchange Rate Level - ERab	+
Bilateral Exchange Rate Uncertainty - VERab	+/-
Transport Costs - TRPab	-
Level of Integration - INTab	+

As characteristics which confer ownership (O) advantages to food firms, we have the following variables listed in table 2:

Table 2. Food Industries Ownership Characteristics - Trade

OWNERSHIP CHARACTERISTICS	Expected Influence
Size of Firms - SFa	+/-
Retail Sector Concentration - RCRa	+
Cultural Differences - CULTab	-
Investment Links - INVab	+
Research and Development - RDa	+
Related Industry's Performance - RICa	+

Where the variables in italic are those which can be interpreted also as location characteristics. In dealing with bilateral flows, it is still possible to identify the factors which condition a certain country as the destination of trade. We can then identify the following factors which are listed in table 3:

Table 3. Host Country Dimensions - Trade

HOST COUNTRY DIMENSIONS	Expected Influence
Market Size - Mb	+
Non Tariff Barriers - NTBb	+
Retail Sector Concentration - RCRb	+/-

The Foreign Direct Investment specification requires the identification of host country location advantages together with the home country's firms ownership advantages (table 4 and 5). Hence we have, as location characteristics listed in table 4:

Table 4. Food Industries Location Characteristics - FDI

LOCATION CHARACTERISTICS	Expected Influence
Market Size - Mb	+
Relative Unit Labor Costs - ULCab	+/-
Relative Cost of Capital - CCab	+/-
Agricultural Sector Performance - AGCb	+
Bilateral Exchange Rate Level - ER	-
Bilateral Exchange Rate Uncertainty - VERab	+/-
Transport Costs - TRPab	-
Non Tariff Barriers - NTBb	+
Level of Integration - INTab	+
Research and Development - R&Db	+
Retail Sector Concentration - RCRb	+/-

And as ownership characteristics listed in table 5:

Table 5. Food Industries Ownership Characteristics - FDI

OWNERSHIP CHARACTERISTICS	Expected Influence
Size of Firms - SFa	+
Retail Sector Concentration - RCRa	+
Research and Development - R&Da	+
Cultural Differences - CULTab	-
Trade Links - INVab	+/-
Related Industry's Performance - RICa	+

Where again the variables in italic are those which can be interpreted also as location characteristics.

Three issues on the specification of the determinants are worth noting. The first is the difficulty in classifying some of the variables according to their location or ownership nature[4], in which case the variables are given in *italic* (tables 2 and 5) and the fact that the same determinant may have different expected impacts according to the different theories. The second concerns the possibility of using a common set of determinants in both the trade and FDI regressions, and to include all variables as home and host dimensions. Although interesting, this possibility is not feasible due to acute problems of multicollinearity. Finally, one should note the absence of some determinants which are identified by the theory of competitive advantage, notably a measure of industry concentration and one of consumer sophistication. These are not considered due to lack of appropriate data (concentration) and/or multicollinearity (both).

Data

The model is estimated for the years of 1980 and 1991. The first year was chosen to reflect the situation prior to the economic changes in European strategic environments mentioned at the beginning. The last is assumed to incorporate at least part of the consequences of such developments. Data gaps and inadequacies precluded the use of full panel data.

[4] This arises from the nature of the eclectic paradigm itself but also from some competing interpretations that the same variable may have under a Porter type of analysis. The discussion would take too long, namely due to the large number of variables. A full discussion of the determinants and its "a priori" expectations can be obtained from the author.

The dependent variables data set consists of a sample of the total matrix of intra-EU positions in both trade and FDI. The choice of this sample is mainly conditioned by data availability on FDI, but it covers all EC-12 countries both as home and host countries. The value of the international production (IP) is obtained by multiplying the stock of FDI by the inverse of the capital output ratio of US outwards FDI in FDT. This transformation is required in order to convert FDI into an output-based measure. To ensure comparability, in the same year, both Trade and IP regressions use the same sample. Table 6 presents the sample statistics for the dependent variables in the two years.

Table 6. Summary Sample Statistics for Dependent Variables, 1980 and 1991, in Constant Million US Dollars

	N	MEAN	ST.DEV.	MAX.	MIN.	ZEROS
1980						
TRADE	56	432.20	681.55	3450.40	0.3	0
IP	56	239.80	542.07	2744.20	0.0	28
1991						
TRADE	60	816.71	1044.70	5023.90	1.9	0
IP	60	613.21	1009.20	4849.20	0.0	8

Model Specification

Adapting the classical specification of equation (1), our initial model can be expressed as:

$$[2] \qquad F_{ab} = A.X_a^{\alpha} Y_b^{\beta} .W_{ab}^{\gamma} e^{u}ab$$

Where:

- **F** is the value of trade from **a** to **b**, or the value of international production of **a** in **b**;
- **X** is a set of L\O advantages of the home country **a**;
- **Y** is a set of L\O advantages of the host country **b**;
- **W** is a set of variables pertaining to both **a** and **b**, and which constitute either L/O advantages of one of them or friction factors;
- **e** is an error term with the usual properties.

Although research using GE models has traditionally used (2) with a log-linear specification; Sanzo, Cuairan and Sanz (1993) provided evidence that the optimal functional form might be slightly, yet statistically different from the log-linear form. Tests using a Box-Cox transformation on all endogenous and exogenous variables in the

trade model, did not confirm such findings[5]. Wald tests performed on the estimated values of the Box-Cox parameter λ against the alternative hypothesis of a log linear specification (*i.e.*, λ=0), yielded the following results (table 7):

Table 7. Test Results, Functional Form for Trade Equations

	Estimated λ	Wald Test Value ($X^2_{(95\%)} = 3.84$)
TRADE 1980	.070	4.0
TRADE 1991	.075	4.5

Given the size of the parameters and the level of significance we chose to report the results of the log-log specification (see tables 8 and 9). The option for the tobit model in FDI regressions was justified by the large number of zero positions in the FDI matrix (particularly so in 1980).

Results

The results identify the variables which are found significant in determining the pattern of interdependence between European food processing industries. Furthermore, we concentrate the discussion on the identification and changes in those determinants and the impact of economic integration on the pattern of interdependence.

To help organizing the discussion, the results are discussed from two distinct angles. First we focus on the extent to which they conform with the expectations and the implications this has in terms of the role of the theory in the determination of competitive positions, in particular the relations through the food chain. Secondly, we look at the results from the point of view of the process of economic integration and assess the changes which have occurred with its development, namely in terms of the nature of the process of international involvement.

Trade Regressions

In both periods, trade regression results generally agree with the expectations. Consequently, the set of location and ownership characteristics derived from international production theory is able

[5] The Box-Cox transformation of the dependent variable of the tobit model is not unusual (Yen 1993, Burton *et al.* 1995). To the best of our knowledge, however, there is no example in the literature of the full (dependent and independent variables) transformation of the model.

to explain the pattern of intra-European international trade in the food industries. Furthermore, to the extent that it is possible to infer from the variables considered, it is possible to identify the influence of certain elements of the national diamond of competitive advantage as defined in Porter's paradigm of national competitive advantage. This support is not uniform in both periods, however, the results suggest the sources of competitive strength in 1991 to be more in accordance with the theory than they were in 1980.

So far as trade is concerned, the set of selected determinants is found particularly appropriate in explaining the pattern of competitive advantages in 1991, as indicated by the number of significant parameters with the theoretically expected signs. In both periods the set of location characteristics are generally found to be positive and significant determinants of competitive positions, as measured by exports. Ownership characteristics are found to be less important, with only size of firms reaching statistical significance and even that only in 1991. Those factors which can simultaneously be considered as ownership or location characteristics also perform as expected, and particularly well in 1991. Figures 1, 2 and 3 below, show the performance of the different determinants and their evolution from 1980 to 1991, in terms of their significance as well as the direction of their influence (the arrows indicate the direction of changes).

Figure 1. Location Characteristics - TRADE, 1980 & 1991

	Expected Sign	Non-Expected Sign
Significant	CCab $^{-}$ ERab $^{-}$ INTab $^{+}$ OUTa $^{+}$ TRPab $^{-}$	
Non-Significant	**VERab** $^{-/+}$ ULCab $^{+}$	**AGCa** $^{-/+}$

(NOTE: bold style indicates those variables which have changed from 1980 to 1991)

Figure 2. Ownership/ Location Characteristics - TRADE, 1980 & 1991

	Expected Sign	Non-Expected Sign
Significant	*INVab* $^{+}$ *RDa* $^{+}$	***RICa*** $^{-/+}$
Non-Significant	**Sfa** $^{-}$ **CULTab** $^{-}$ RCRa $^{-}$	

(NOTE: **bold** style indicates those variables which have changed from 1980 to 1991; *italic* style indicates variables with mixed O/L interpretation)

Figure 3. Host Country Characteristics - TRADE, 1980 & 1991

	Expected Sign	Non-Expected Sign
Significant	Mb $^{+}$ **RCRb** $^{-}$	
Non-Significant	**NTBb** $^{-/+}$ →	→

(NOTE: **bold** style indicates those variables which have changed from 1980 to 1991)

The results support that in 1980, large home markets (with the corresponding gains in terms of economies of scale), favorable capital costs and a central location, together with the participation in the European Community, favored firms' exports from a country. Investment connections with the target market would further enhance these positions, as well as the firms' technological capability.

The main change in 1991, refers to the role of other sectors in the agro-food chain. In fact, apart from the factors identified in 1980 which all kept their influence, the export performance of the food industry is now also positively influenced by the performance of both related industries (RICa) and agriculture (AGCa). Fragmented retail sectors (RCRa), which constituted a significant push factor in 1980, lost their significance in 1991, apparently signaling an adaptation of food firms to the new organization of the distribution sector. In the home country, concentration in the retail sector is negative but not significant in either period . Also relevant in the evolution over the time is the role of Size of Firm (SFa) and Exchange Rate Uncertainty (VERab) variables. In fact the former seems to indicate the importance of small firms in terms of export performance (in opposition to the result found for FDI, as discussed below), a factor which became significant for 1991. The latter indicates the predominance of behavioral patterns which support the approach of Option Pricing theory.

Finally, it is important to consider the lack of support for labor costs as a determinant of international trade performance. This parameter is non-significant in both periods and is in fact virtually zero for 1991. The importance of cultural similarities for international trade activities does not receive support which, as we

shall see ahead, is an interesting result in the light of the evidence provided by the FDI regressions.

FDI Regressions

The results of FDI regressions are consistent with prior expectations. The vast majority of coefficients show the predicted signs as well as being significant in the determination of the patterns of investment. Once again the results are particularly strong for 1991 which together with the results for trade, seem to indicate that both international production theory and the paradigm of national competitive advantage are well suited to explain international involvement by firms in the beginning of the 90s.

The results for the FDI regressions also give some support to the idea of Porter's diamond of competitive advantage, but not in the same way trade results do. In fact, the elements of the paradigm covered in the analysis (technology, related industries and demand), seem to influence the capacity to attract investment rather than to generate it. This is specially so in the case of the relations through the agro-food chain. Without wishing to discuss the meaning and measurement of competitiveness at the industry level (see Traill and da Silva *op cit.*), this is an important result, specially in countries which depend on the attraction of FDI to improve the competitive strength of their industry.

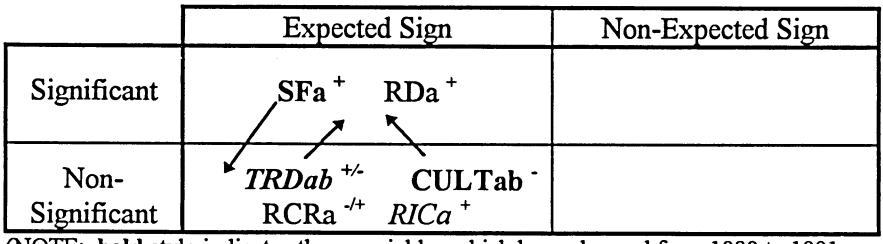
The results of the regressions are summarized in figures 4 and 5, where the arrows again indicate those parameters which change from 1980 to 1991.

Figure 4. Location Characteristics - FDI, 1980 & 1991

	Expected Sign	Non-Expected Sign
Significant	Mb $^{+}$ VERab $^{+}$ ULCab $^{-}$ **CCab $^{+}$ TRPab $^{-}$ ERab $^{+/-}$**	NTBb $^{-}$ **INTab $^{-/+}$**
Non-Significant	**RCRb $^{+}$ AGCb $^{+}$ RDb $^{+}$**	

(NOTE: **bold** style indicates those variables which have changed from 1980 to 1991)

Figure 5. Ownership/ Location Characteristics - FDI, 1980 & 1991



(NOTE: **bold** style indicates those variables which have changed from 1980 to 1991; *italic* style indicates variables with mixed O/L interpretation)

First to note is the evolution of the results. The determinants of FDI activity show much more pronounced changes than the ones observed for trade, confirming the importance of this period in changing the face of multinational activities of European food firms. Furthermore, as shown in table 8, FDI activity shows larger response to all but two of the determinants which are significant in both periods or in the second period, as measured by the absolute value of elasticities. This is an important result in that it supports the idea that during 1980 the European economies converged into a more integrated economic area, and confirms the role of foreign direct investment in the process of real convergence of the European economies.

Table 8. Evolution of Elasticities, FDI, 1980 to 1991

	91/80
Mb	3.79
TRDab	3.12
ULCab	**0.95**
RDa	1.24
RDb	1.50
INTab	1.99
CULTab	11.0
TRPab	2.65
RCRb	5.61
AGCb	22.5
RICb	**0.92**
NTBb	1.88
ERab	1.45
VERab	1.43

The absence of such result for trade, where a mixed evolution is observed, suggests that the gains from the process of

economic integration in Europe during this period were obtained more through FDI than through trade.

The structure (size) and technological capabilities of firms, appear as the main ownership characteristics identified by the model, although being a large firm, looses importance in 1991. The importance of being identified with the target market is revealed by the results on cultural distance (CULTab) which is a negative factor in both periods, although only significant in 1991. This finding is reinforced by the positive sign and high significance level of the host market size determinant (Mb), the negative and significant impact of transport costs (TRPab).

The results above and the ones obtained for unit labor costs (ULCab) indicate that, in both periods, FDI activity has been of a predominantly market seeking type (this is discussed in detail in the next section) and which could help explaining the reversal of the sign of trade links (TRDab) from being a positive determinant into being negatively related with FDI activity.

In fact, similar to trade it is relative capital costs (CCab), not labor costs, which seems to be determinant of the choice of location. Although the loss of significance in 1991, could mean that multinational firms are increasingly sourcing their capital globally; which would turn local capital costs irrelevant and provide them with an advantage vis-à-vis "local sourcing firms".

In what concerns the connections with the rest of the agro-food chain, neither related industries performance (RICa) nor the structure of retail trade (RCRa) show a significant influence in the generation of FDI activity. The importance of the linkages to the agro-food chain is yet revealed in the role as pull factors of host country related industries (RICb) and agriculture (AGCb) as well as retail trade structure (RCRb). The first two thus constitute important attraction factors, which coupled with the positive sign and significance of their home equivalents in the trade regressions for 1991, give the linkages through the agro-food chain an important role in the determination of international competitive strength to the food industries. The latter, again coupled with the negative result of RCRb in the trade regressions, points to the relevance of this factor in the choice of international entry

strategies. Higher retail concentration seems to favor FDI over trade, as if implying a higher commitment of resources by the firm.

Again the results on the exchange rate, although highly significant in both periods, are not totally clear which may reflect an unresolved debate in the literature. Two clear indications seem to emerge: the first, against some views in the literature (Caves 1989) is that the exchange rate matters in the determination of FDI. The second is that, similarly to trade, exchange rate instability favors international involvement which is consistent with the option-price theory interpretation.

Exchange rate level, although confirming the theoretical expectations in 1980, presents a negative relation between appreciation of the exchange rate and investment which is difficult to justify.

Economic Integration in Europe and the Pattern of Interdependence

The importance of the process of economic integration to the pattern of interdependence, is not expressed solely by the results on the coefficient of the variable measuring the level of integration (INTab). In fact more than the highly significant and positive influence of the degree of integration on trade, predicted by the theory of customs unions, it is interesting to note the role of the level of integration on FDI activity.

Though significant in both periods, its negative sign in 1980 (a result of the particular position of the UK and also Ireland in this sector) indicates that market integration through FDI in the food processing industry anticipated the positive integration movements of the 1980s.

Also important is the impact of this period's events on the nature of FDI activity. Unfortunately the evidence provided by the results is somewhat contradictory. As referred in the previous section, the results of the FDI regressions seem to point to the prevalence of a dominant market seeking strategy in FDI activity in both periods. However, if the coefficient of INTab in the trade regressions is taken to indicate the presence of classic trade creation, diversion, or expansion effects; the positive coefficient of INVab in the same regressions should mean that throughout this

period offensive import-substituting investment increasingly replaced reorganization investment between European countries in spite of the developments in European integration.

What are the implications of these findings in terms of the relations between trade and investment proposed by the theory?

Far from proving the theory wrong, the results suggest that the developments of the 1980s had profound implications for the nature of the process of interdependence between Europe's food processing industries. Thus, in 1980 we find a "theoretically expected" effect on trade and a corresponding reaction from firms in terms of reorganization and/or rationalizing investment activities. European firms were working in a settled environment, achieved by the establishment of the European Community over twenty years before, with the effect of the first enlargement being largely anticipated by the new members' firms[6].

The southern enlargements of the community and the anticipation of the effects of the single market, together with the new possibilities for international business opened by technological and institutional developments, provided a totally new framework for business in the 1980s. The need for firms to establish themselves in this new environment, has led to a renewed wave of investment, with a strong component of strategic asset seeking, and where objectives of rationalization were only attainable after time consuming restructuring processes. Hence, the results not only justify the wave of international mergers and acquisitions (M&A) of the mid to late 80s but indicate that the new developments may have brought a temporary halt to a rationalization process which was thought of in a totally different economic and business environment.

The events that took place in Europe have apparently, as far as the food processing industry is concerned, interrupted (even if temporarily) the "normal" cycle form resource-based to local market-oriented to internationally integrated production as identified in the literature (Cantwell 1994).

Furthermore the evidence also supports the proposition that restructuring processes which occurred after 1991, may have been

[6] It should be noted that UK based multinationals, by and large the most important investing country in this sector had long been established in continental Europe.

aiming at rationalizing acquired assets. Hence, were data available, the results of the model in a more recent period would probably have resembled those of 1980. If this is correct, it could also partially explain the short run problems which have been a characteristic of many M&A processes.

A natural question to raise would be the implications of these results to the "new" southern members of the European Union. An initial hypothesis that the accession of these countries would change the sources of competitive advantages in European competition is not confirmed. This represents both a threat and an opportunity to these countries' food processing industries. A threat in the sense that natural resource endowments and low labor costs, the two typical competitive strengths of these countries, are not the key to generate and attract internationally competitive firms. An opportunity because the need to change is imposed by the new "global" competitive environment and, if succeeding in acquiring the necessary technological basis, economic integration represents the best opportunity for specific products to reach a much broader market. Finally, to the extent that integration across the agro-food chain becomes more important, this would inevitably be reflected on the corresponding areas of the agricultural sector.

Conclusions

The analysis shows the importance of the process of positive economic integration to the international activities of food firms. It confirms and supports the usefulness of considering two apparently separate lines of theory in the analysis of the process of economic interdependence in the European food industries, and it pinpoints some important determinants of that activity. Special relevance should be given to the increasing connection across the agro-food chain.

In terms of the interpretation of the events of the last 15 years, this paper suggests the apparent paradox that the efforts to deepen and widen the effort of economic integration may have in fact halted (even if temporarily) the consolidation of Europe's food firms' European operations.

The extremely fast pace with which events develop in this area, the importance of strategic variables and the serious data

problems with which one is faced when dealing with foreign direct investment at the present level of aggregation, all point to the importance of carrying out further research at a more disaggregated level.

References

Anderson, J.E. "A Theoretical Foundation for the Gravity Equation." *American Economic Review* 69 (1)(1979).

Bergstrand, J.H. "The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence." *Review of Economic and Statistics* 67 (1985): 474-481.

Behrman, J.N. *The role of International Companies in Latin America: Autos and Petrochemicals*. Lexington, MA. (1972).

Buckley, P.J. and P. Artisien. *North South Direct Investment in the European Communities*. MacMillan Press (1987).

Burton, M., R. Dorsett, and T. Young. *The Decision Not to Eat Meat - An Analysis of Changing Preferences*, DP-9505, University of Manchester, School of Economic Studies (1995).

Cantwell, J. "The Relationship Between Trade and International Production." *Surveys in International Trade*, ed. D. Greenaway and A.L. Winters. Oxford: Basil Blackwell (1994).

Caves, R.E. "Exchange Rate Movements and Foreign Direct Investment in the United States." In *The Internationalization of US Markets*, ed. D.B. Audretsch and M.P. Claudon. New York University Press (1989).

Connor, J.M. "Foreign Food Firms: Their Participation and the Competitive Impact on the US Food and Tobacco Manufacturing Sector." *Rural Change: The Challenge for Agricultural Economists,* ed. G. Johnson and A. Maunder. Gower Press (1981).

Connor, J.M "Determinants of Foreign Direct Investment by Food and Tobacco Manufacturers." *American Journal of Agricultural Economics* 65 (2) (1983).

Dayton, J.R. and D.R. Henderson. "Patterns of World Trade in Processed Foods." OP-32, *NC-194 The Organization and Performance of World Food Systems* (1992).

Deardoff, A.V. "Testing Trade Theories." *Handbook of International Economics* Vol. 1, ed. R.W. Jones and P.B. Kenen. North Holland (1984).

Dunning, J.H. "Trade, Location of Economic Activity, and the MNE: A Search for an Eclectic Approach." *The International Allocation of Economic Activity*, ed. B. Ohlin, P.O. Hesselborn, and P.M. Wijkman. MacMillan (1977).

Dunning, J.H. "European Economic Integration and TNC Activities: The Record Assessed." *UNCTC* (1990).

Dunning, J.H. *Multinational Enterprises and the Global Economy*. Addison Wesley (1993).

Greenaway, D. and C.R. Milner. *The Economics of Intra-Industry Trade*, Oxford: Basil Blackwell (1986).

Hirschberg, J.G., I.M. Sheldon, and J.R. Dayton. "An Analysis of Bilateral Intra-Industry Trade in the Food Processing Sector." OP-37, *NC-194 The Organization and Performance of World Food Systems* (1992).

Horst, T. *At Home and Abroad: A Study of the Domestic and Foreign Operations of the American Food Processing Industry.* Cambridge MA: Ballinger Publishing (1974).

Kindleberger, C.P. "European Integration and the International Corporation." *Columbia Journal of World Business* 1 (1966): 66-78.

Linneman, H. *An Econometric Study of International Trade Flows.* North Holland (1966).

McCorriston, S. and I.M. Sheldon. "Intra-Industry Trade and Specialization in Processed Food Products: The Case of the US and EC." OP-7, *NC-194 The Organization and Performance of World Food Systems* (1990).

Molle, W. and R. Morsink. "Intra-European Direct Investment." *Multinationals and Europe 1992: Strategies for the Future.* ed. B. Burgenmeier and J.L. Mucchielli. Routledge (1991).

Ning, Y. and M. Reed. *Overseas Expansion of U.S. Food Companies.* University of Kentucky, Mimeo (1994a).

Ning, Y. and M. Reed. *The Locational Determinants of U.S. Direct Foreign Investment in Food and Kindred Products*,. University of Kentucky, Mimeo (1994b).

Pagoulatos, E. "Foreign Direct Investment in U.S. Food and Tobacco Manufacturing and Domestic Economic Performance." *American Journal of Agricultural Economics* 65 (2) (1983).

Papanastassiou, M. and R.D. Pearce. "Host Country Characteristics and the Sourcing Behavior of UK Manufacturing Industry." *University of Reading Discussion Papers in International Investment and Business Studies* 140 (1990).

Pearce, R.D. "Overseas Production and Exporting Performance: Some Further Investigations." *University of Reading Discussion Papers in International Investment and Business Studies* 136 (1990).

Porter, M. *The Competitive Advantage of Nations.* MacMillan Press (1990).

Rama, R. *Investing in Food.* OECD Development Center Studies (1992).

Reed, M. and Y. Ning. *Ownership Determinants of Foreign Direct Investment by Food Manufacturers*. University of Kentucky, Mimeo (1994).

Rutenberg. "Multinational Food and Fish Corporations." *New Theories of the Multinational Enterprise,* ed. A.M. Rugman. London: Croom Helm (1982).

Sanzo M., R. Cuairan, and F. Sanz. "Bilateral Trade Flows, the Gravity Equation and Functional Form." *Review of Economics and Statistics* 75 (2) (1993).

Strak, J. "The European Food Industry: From 1992 to 2000+." *Prospects for the European Food System,* ed. B. Traill. Elsevier (1989).

Tinbergen, J. "Shaping the World Economy: Suggestions for an International Economic Policy." *The 20th Century Fund.* New York (1962)

Traill, B. and J.G. da Silva. "Trade, Foreign Direct Investment and Competitiveness in the European Food Industries." *Structural Change in the Food Industries*, DP-1 (1994).

Yannopoulos, G.N. "Foreign Direct Investment and European Integration: The evidence From the Formative Years of the European Community." *University of Reading Discussion Papers in European and International Social Science Research* 35 (1989).

Yannopoulos, G.N. "The Single European Market and Foreign Direct Investment." *University of Reading Discussion Papers in European and International Social Science Research* 41 (1991a).

Yannopoulos, G.N. "Multinational Corporations and the Single European Market." *University of Reading Discussion Papers in European and International Social Science Research* 45 (1991b).

Yen, S.T. "Working Wives and Food Away from Home: The Box-Cox Double Hurdle Model." *American Journal of Agricultural Economics* 75 (1993): 884-895.

Young, S. and J. Hamill. *Europe and the Multinationals.* Edward Elgar (1993).