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**CENTRE FOR RESEARCH ON GLOBALISATION AND LABOUR MARKETS**



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**Research Paper 99/10**

# **The Impact of European Integration on FDI: the UK Food Industry in the 1990s**

**by**

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The Centre acknowledges financial support from The Leverhulme Trust under  
Programme Grant F114/BF

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**Acknowledgements**

The authors gratefully acknowledge financial support from The Leverhulme Trust under Programme Grant F114/BF.

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# **The Impact of European Integration on FDI: the UK Food Industry in the 1990s**

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## **Abstract**

The main objective of this study is to assess the impact of European integration on foreign direct investment (FDI). It focuses in particular on inward investment in the UK food industry over the last ten years from other EU Member States and from the rest of the world. FDI in the food industry, defined both in terms of total real assets and employment in foreign-owned firms, has increased considerably from other EU countries whilst stagnating from non-EU sources. An empirical model for the determinants of FDI is tested on 48 5-digit sectors in the food industry. We find price convergence in the EU to be an important factor in influencing FDI from both within and outside the EU. In addition, FDI from the rest of the EU appears to be determined by the level of firm-specific assets and skills in the sector and to be relatively cost-insensitive; it also takes place in sectors with a low propensity to export. Non-EU FDI is influenced by comparative advantage factors such as low costs and capital intensity, and by the effective tariff rate.

## **Outline**

1. Introduction
2. FDI and European Integration
3. The UK Food Industry
4. The Empirical Model
5. The Results
6. Conclusions

## 1 Introduction

The main objective of this study is to assess the impact of European integration on foreign direct investment (FDI). It focuses in particular on inward investment in the UK food industry over the last ten years. This industry has seen a dramatic rise in FDI from other EU countries recently, while FDI from non-EU sources has stagnated, reflecting an economy-wide pattern of increased FDI from the rest of Europe. This has coincided with a step change in integration among European countries, and it is our aim to evaluate if this has been an important determinant of FDI. The key mechanism for integration has been the Single Market Programme (SMP) which aimed to create a unified market within the EU through the dismantling of trade barriers, including the harmonisation of standards among countries, and the removal of barriers to FDI. Although the SMP has been associated with the year 1992, it has been an ongoing process over much of the last ten years.

There has been little empirical work on the impact of EU integration on FDI, partly due to the difficulty of measuring the process of integration, and partly due to the lack of consistent data in the EU on FDI (Clegg, 1998). The evidence that does exist tends to be highly aggregated and does not show how the different speeds of integration across sectors have influenced the pattern of FDI. We have tried to overcome these obstacles in two ways. First, we use detailed data on the change in the variation of prices for different goods across the EU countries over the period under consideration in order to measure price convergence. Second, we use a firm-level data set with information on foreign-ownership to construct the level of employment and total assets in foreign firms at the 5-digit level.

The food industry provides an interesting case study as it has relatively high levels of FDI (above the median for manufacturing in the UK), yet it is not a high-technology sector. Rather than technology providing the firm-specific advantages associated with FDI (Dunning, 1977; Buckley and Casson, 1976) in the case of the food industry it is branding that is of key importance. Differences in tastes across countries and the importance of local brands may therefore reinforce market fragmentation. It is therefore interesting to investigate whether economic integration in the EU, combined with a common external tariff, have had a positive influence on FDI in this sector.

The remainder of the paper is set out as follows. The next section gives an overview of the existing evidence on the impact of European integration and the formation of the single market on FDI from both within and outside the EU. Section 3 presents some descriptive

information on the UK food industry, including the importance and distribution of FDI within the sector. Section 4 outlines the empirical model to be tested and sets out our hypotheses concerning the determinants of FDI. Section 5 briefly describes the data to be used and Section 6 presents the results. The last section gives a summary and some suggestions for future research.

## **2 FDI and European Integration**

### *2.1 FDI from Outside the EU*

The creation of an integrated European market with a common external tariff was widely expected to have a positive impact on FDI from outside the EU for a number of reasons. First, the potential market is now larger, allowing European subsidiaries to reach minimum efficient scale. Second, there were concerns over 'Fortress Europe'. An increase in outside protection, or the threat of protection, may act to encourage FDI in the EU. The recent use of anti-dumping legislation as a form of protectionism is one example; it has been shown that this has had a positive impact on FDI from Japan in a number of cases (Girma, Greenaway and Wakelin, 1999; Belderbos and Sleuwaegen, 1998). One counterbalancing factor that may reduce the level of FDI, however, is that existing affiliates may restructure to take advantage of the larger market, where previously they aimed to serve a series of fragmented national markets. This could lead to a process of rationalisation of existing affiliates within the EU (Pearce and Papanastassiou, 1997). This may be particularly relevant for US investment, which is generally of an older vintage than FDI from other sources. Nevertheless, despite this anticipated rationalisation, the existing evidence indicates that European integration has had a positive impact on FDI from outside the EU (Baldwin, Forslid and Haaland, 1996).

Recent studies of US FDI have confirmed a role for trade barriers in attracting FDI (Scarperlanda and Balough, 1983). Grubert and Mutti (1991), using a weighted average tariff in manufactures, found tariffs (and taxes) to be important in determining the allocation of US FDI across countries. They found that tariffs encouraged local sales, but not sales to other countries through exports; in these cases FDI aimed to serve the local market rather than exporting either back to the home country or to a third market. In the presence of tariffs, it appears that FDI may substitute for exports. These results confirm that trade barriers may be one determinant of FDI.

Attempts to assess the role of EU integration on FDI have been hindered by the difficulty in finding a quantitative measure for the process of integration. Culem (1988) considers FDI flows among six industrialised countries – the US and five European countries. He includes a dummy variable for the dismantling of trade barriers over the period, and also finds it to have a positive and significant role in determining FDI flows. Other studies have also relied on either dummy variables, or simple indices to capture the reduction of trade barriers.

There is also evidence to indicate that FDI from Japan has been positively influenced by the level of protection in the EU. Heitger and Stehn (1990) note that as the SMP progresses, dismantling barriers within the EU while maintaining a common external tariff, the potential for trade diversion increases. Trade will be increasingly of an intra-EU nature, as barriers to trade will be almost non-existent within the EU. This provides a large incentive for non-EU firms to base a subsidiary within the EU to gain from this increased integration, and to avoid the common external tariff and other forms of protectionism. They find that the effective rate of protection in the EU is a positive factor influencing Japanese direct investment in the region. Neven and Siotis (1996) also find ‘tariff jumping’ to be an important motive for Japanese and US investments in the EU.

## *2.2 FDI from Within the EU*

The reduction in tariff and non-tariff barriers among Member States lessened the incentive for tariff-jumping FDI *within* the EU, and could have been expected to reduce intra-EU FDI. Firms would now be able to achieve efficient scale within the single market by rationalising production at a single location. However, FDI among EU countries increased considerably in the period from 1982-1993 when the single market was implemented (Sleuwaegen, 1988; Yannopoulos 1990). There are a number of factors contributing to this phenomenon. First, while horizontal investment may have declined with the SMP, the vertical integration of firms across European borders may have increased (Balasubramanyam and Greenaway, 1992). Multinational firms can rationalise production within Europe, locating different parts of the value chain in different countries in order to lower costs by exploiting differences in relative endowments. This could occur within manufacturing, or through separating manufacturing from services and marketing. This type of FDI rather than aiming to serve protected local markets, aims to seek the most efficient location for production across countries.

Second, European markets may remain fragmented through differences in demand rather than trade or investment barriers. Taste differences are likely to be particularly important in the case of final goods in the food industry. Third, and related to point two, the importance of brand names and advertising can lead firms to prefer locating close in the market rather than exporting from the home country. Brands may have national or local significance leading to a fragmented market. They also give firms advantages in the market that they may want to internalise for secrecy reasons, and because effective markets do not exist to protect their interests (Buckley and Casson, 1976). The level of FDI is thus determined by a balance of factors between those leading to concentration within Europe – mainly scale economies – and those favouring proximity to the local market including taste and local brands.

Evidence from the 1980s gives a conflicting picture of the role of integration and tariffs as determinants of FDI. There is evidence that pre-single-market trade barriers among European countries acted as an incentive to FDI (presumably of the tariff-jumping variety), for the period 1969-82 (Culem, 1988). Neven and Siotis (1996), on the other hand, find that the existence of non-tariff barriers acted as a disincentive to intra-EU FDI for the period 1984-89. In this period barriers were still high in some sectors, but this did not seem to lead to internal 'barrier-jumping' FDI but rather acted as a disincentive, perhaps by impeding firms from reaching minimum efficient scale. Other studies indicate that the process of dismantling barriers in the 1980s had a positive effect on intra-EU FDI (Molle and Morsink, 1991; Clegg, 1998). Clegg (1998) found that the reduction in the average tariff of Greece, Spain and Portugal on joining the EU led to a rise in FDI from other EU countries. All these studies suffer from using simple aggregate indicators to capture the process of integration. One explanation for this divergent pattern is that the nature of FDI changed over the period, with earlier FDI aiming to overcome trade barriers and serve the domestic market, and more recent FDI searching for the most efficient location for production and aiming to minimise costs internationally.

If intra-EU FDI is mostly of a vertical nature we would expect the main determinants of FDI in the UK to be related to the UK's comparative advantage, and to be associated with an increase in trade flows. Horizontal FDI on the other hand, is more likely to be related to the parent firm's specific assets (such as brands, product-specific knowledge, patents etc.) and the tastes of the domestic market rather than comparative advantage. In addition,

horizontal FDI takes place mainly in sectors in which scale economies are relatively unimportant, and is likely to substitute rather than complement trade. In our empirical model we will include the UK's comparative advantage, the importance of firm-specific assets in the sector, scale economies and the propensity to export as potential determinants of FDI in the food industry. We cannot directly test the hypothesis of vertical versus horizontal investment, as we are unable to decompose FDI into these categories. Nevertheless, in our empirical model we can test which characteristics are of greater importance in explaining the pattern of FDI in the food industry.

To capture the effect of European integration we will include both the effective tariff rate (as a determinant of extra-EU FDI) and an indicator of price convergence in different sectors in the EU. We expect both protectionism and integration to have a positive impact on FDI, with the former influencing only FDI from outside the EU.

### **3 The UK Food Industry**

FDI is generally high in sectors where firm-specific advantages are an important determinant of commercial success. In many cases this corresponds to high technology sectors in which firms have access to their own knowledge base. This is not the case in the food industry<sup>1</sup>, which undertakes only a small amount of R&D expenditure; instead firm-specific assets are based on the importance of brand names within the sector<sup>2</sup>.

Many papers in the general field of FDI tend to focus on the aggregate level rather than on specific disaggregated sectors. This paper seeks to redress this imbalance by providing a case study of the food processing sector in the UK. There are two main reasons for this; first, it is a key sector within the UK economy and second it is characterised by a relatively high foreign presence as will be outlined shortly.

#### *3.1 The UK Food, Drink and Tobacco Processing Sectors*

The food and drink processing sector contributes approximately £16bn to the UK economy annually or about 2.5% of GDP and employs some 500,000 people or 13% of manufacturing employment. The sector's total trade bill is some £24bn with a net deficit of £7bn. As such, food and drink manufacturing forms a sizeable sub-sector of manufacturing and is comprised of some of Europe's largest food processing firms leading to a high degree

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<sup>1</sup> The food industry is used as shorthand for the food, drink and tobacco industries throughout the paper.

<sup>2</sup> Horst (1974) confirmed the importance of proprietary assets in the food-processing industry in the US.



of concentration in many sub-sectors. Indeed, the top two companies<sup>3</sup> in the Financial Times Top 30 UK Food and Drink companies have market capitalisation of over £16bn in 1998 while the largest had sales of over £17bn. The top three<sup>4</sup> in the sector are ranked 9<sup>th</sup>, 13<sup>th</sup> and 30<sup>th</sup> in the FT Top 500 UK firms and are the 38<sup>th</sup>, 85<sup>th</sup> and 297<sup>th</sup> largest firms globally.

Within the food and drink sector, market structures show a great deal of divergence between sub-sectors with some being highly concentrated (e.g. sugar refining) while others are apparently more competitive (e.g. fruit and vegetable processing). Not surprisingly, as a result of these different market structures, the degree and type of competition also varies. In particular, the presence of branded goods in some sub-sectors, such as soups, breakfast cereals and coffee, is highly significant and is reinforced by high levels of advertising<sup>5</sup>.

To get a more rounded and accurate picture of the food and drink-processing sector in the UK, it is crucially important to understand its position in the food chain. Specifically, the processors serve the retailers and in the UK the food retailing sector is highly concentrated with the top four firms having some 70% of the total market (EuroPA, 1998; Strak and Morgan 1995). While initially the rise of the major retail chains has meant that the processors had fewer outlets for their goods, it has also more recently been accompanied by a growing use by the retailers of own-label products. This has served to reduce the power of the private brands in some sub-sectors and it is now the case that own-label sales are the largest part of many markets. The impact of the changing nature of the manufacturer and retailer relationship cannot be underestimated and may give some indication as to why some sub-sectors of the processing sector have been more prone to FDI than others.

### *3.2 FDI in the UK Food and Drink Sector*

The second reason for studying the food-processing sector is related to the amount of FDI that has occurred in the last 15 years. Given the historically high level of FDI it is interesting to see how this has been affected by the implementation of the SMP. From 1987 to 1996 there has been a three-fold increase in FDI from the rest of the EU in the manufacture of food, drink and tobacco in the UK and this has been accompanied by a rise

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<sup>3</sup> Daigeo and Unilever (source: UK 'FT-500' March 1999).

<sup>4</sup> Diageo, Unilever and Cadbury Schweppes

<sup>5</sup> For example, the breakfast cereals market has an advertising to sales ratio of some 10% based on sales of approximately £1bn in 1997 (EuroPA (1998) and Advertising Statistics Handbook (1998)).

in EU FDI in the food retail sector<sup>6</sup>. A similar pattern cannot be noted for the other major investing country in this sector: the US has stocks of FDI twice that of the EU in the UK food industry, but these stocks have remained remarkably stable over the same period. Second, within manufacturing the level of inward FDI in the UK food sector is second only to electrical engineering at the 2-digit level. Collectively, the US and the rest of the EU commit 16% of their inward manufacturing investment in the UK to this sector.

The food industry is thus characterised by a high level of foreign ownership, with a rising share originating in the rest of the EU. This raises the question of why intra-EU FDI has increased so much in the food industry, while FDI from other sources has remained remarkably stable. From our firm-level data set it seems that foreign firms account for just over 20% of employment and total assets in the sector.

Table 1 provides some summary statistics on the firms that are under foreign ownership.

**Table 1: Descriptive statistics for foreign ownership<sup>7</sup>**

	<b>Foreign firms</b>	<b>EU firms</b>	<b>Non-EU firms</b>
<b>Number of employees 1996</b>	2,139 (3,738)	549 (1,194)	1,590 (3,371)
<b>Total assets £ '000 1996</b>	141,366 (264,632)	25,532 (45,730)	115,834 (251,256)
<b>Value added £ '000 1996</b>	68,067 (143,998)	13,676 (25,060)	54,392 (138,125)
<b>Total sales £ '000 1996</b>	375,151 (777,916)	98,211 (211,884)	276,940 (717,900)
<b>Growth of real fixed assets 87-96</b>	2.85%	7.82%	2.32%
<b>Growth of employment 87-96</b>	0.62%	2.34%	0.37%
<b>Share of employment 1996</b>	100%	26%	74%

Source: Onesource

The first feature to note is the large proportion owned by non-EU firms, approximately 75% of the total. Across the food sectors, on average, the assets of non-EU firms far outstrip their EU counterparts, as does value added. However, what is perhaps more informative is the growth in real fixed assets and employment over the 1987-96 period. Both total assets and employment in EU firms are growing more rapidly than from non-EU firms although from a lower base. Fixed assets in EU firms have grown three times faster

<sup>6</sup> The data presented in this paragraph are aggregate FDI data from the Office of National Statistics. They may diverge from the firm-level data set used in the empirical study as they are based on different criteria.

<sup>7</sup> The figures give the means across the 48 sectors of the food industry. Standard errors are in brackets.

than in non-EU firms and employment over six times as much, due to the virtual stagnation of employment in non-EU firms. All the growth of employment in foreign firms in the food industry has been as a result of FDI from other EU countries.

### 3.3 *The Distribution of FDI Within the Food Industry*

Table 2 highlights the proportion of assets, employment and sales accounted for by foreign-owned firms in the UK food, drink and tobacco processing sectors in 1996. While accepting that aggregation to the three-digit level implies some loss of detail, it is quite clear that the distribution of foreign investment is unevenly spread across the sectors<sup>8</sup>. The most striking example is the tobacco sector (160), where non-EU firms not only dominate the total foreign effect they also dominate the domestic market accounting for some 92% of total sales.

**Table2: Foreign Contribution to Food, Drink and Tobacco-Processing (1996)**

Sector	Fixed Real Assets			Employment			Sales		
	Total	EU	Non-EU	Total	EU	Non-EU	Total	EU	Non-EU
151	0.22	0.14	0.08	0.22	0.13	0.09	0.30	0.21	0.09
152	0.24	0.02	0.22	0.20	0.01	0.19	0.18	0.02	0.17
153	0.13	0.09	0.04	0.13	0.09	0.04	0.18	0.11	0.07
154	0.44	0.13	0.31	0.67	0.02	0.65	0.31	0.15	0.16
155	0.47	0.18	0.29	0.44	0.11	0.33	0.46	0.17	0.29
156	0.41	0.07	0.34	0.50	0.15	0.35	0.49	0.09	0.40
157	0.27	0.24	0.04	0.16	0.13	0.03	0.21	0.18	0.03
158	0.26	0.02	0.23	0.14	0.02	0.12	0.26	0.03	0.24
159	0.18	0.03	0.15	0.16	0.07	0.09	0.18	0.06	0.12
160	0.74	0.00	0.74	0.87	0.00	0.87	0.92	0.00	0.92

Source: Onesource

The sectors with the lowest foreign investment are the manufacture of beverages (159), and the processing of fruit and vegetables (153). These are characterised by more competitive market structures than generally seen in the food industry. Moderate levels can be seen in meat and fish production (151 and 152) prepared animal feeds (157) and other food products (158). For three sectors, 154, 155 and 156 (oils and fats, dairy products and grain mill products respectively) foreign firms account for nearly 50% of fixed assets and on average 40% of employment and sales. These sectors can be characterised by national taste

<sup>8</sup> Our empirical model is estimated at the 5-digit level. We have aggregated the information presented here for clarity.

differences (especially in the case of dairy and grain products) and a need to be close to the market due to the perishable nature of many of the products.

Perhaps what is of most interest though is the split between EU and non-EU firms. Table 2 shows that, apart from sectors where foreign investment is a low proportion of total output, there is a clear difference between EU and non-EU levels of investment. For example in the oils and fat production sector (154) the proportion of employment accounted for by non-EU firms is 65% whereas EU firms account for 2%; yet the sales proportions are quite similar. Non-EU FDI is clearly in a labour-intensive sub-sector of this industry.

#### **4 The Empirical Model**

We are interested in estimating an empirical model of the determinants of FDI in the food industry. For this purpose FDI is defined in two ways: as employment and real fixed assets in foreign-owned firms. While the latter corresponds more closely to the aggregate definition of FDI as a stock of capital, employment is an important variable in terms of the impact of FDI on the domestic economy and is therefore of interest to policy makers. We also subdivide FDI according to country of ownership - from the rest of the EU and from outside the EU<sup>9</sup>. As we saw earlier, FDI from within the EU has increased at a much faster rate than non-EU FDI in the last ten years. There is also evidence that intra-EU FDI is determined by different factors than FDI originating outside the EU. For instance, tariff jumping cannot be a motive for intra-EU FDI while it may be important for FDI from other sources.

The main explanatory variable of interest to us is an indicator of the level of integration that has occurred in the EU market. We measure this using the change in the coefficient of price variation across EU countries (SMP). This variable has a number of advantages over indicators used in other studies. First, it is based at the product level and therefore gives detailed information on the variation of price convergence across sectors. Second, instead of measuring the dismantling of trade barriers that are assumed to lead to market integration, it is a direct measure of market integration through price convergence. Third, it varies over time indicating the speed at which different sectors are experiencing price convergence.

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<sup>9</sup> The country of the ultimate holding company is used for this purpose. Thus a firm owned by a holding company in the Netherlands with an ultimate holding company in the Cayman Islands would be classified as non-EU.

A decrease in this indicator shows convergence in prices within the EU; we assume this represents the effectiveness of the single market programme in creating a unified market. The index is available for 1985, 1990 and 1993 from the European Commission, and we calculate the change between periods. Most sectors have seen a process of price convergence over the 1990s. We expect the integration variable to have a negative impact on FDI from both outside and within the EU i.e. as prices converge across the EU more FDI is attracted.

Another implication of European integration is that locating production in any EU country provides access to the rest of the single market. We cannot directly test the relationship between FDI and exports within the EU, as we do not have information on the destination of UK firm exports<sup>10</sup>. As a result we can only include the propensity to export of a sector with all partner countries as an explanatory variable (PX). This is not a direct test of the hypothesis as it gives the propensity to export to the rest of the world rather than within Europe. Nevertheless, it provides some evidence on the relationship between the export orientation of the sector and FDI. A positive relationship would indicate that foreign firms are interested in using the UK as an export base and exporting part of their output. A negative relationship on the other hand, indicates that foreign firms aim to supply the domestic market rather than export.

The EU also has a common external trade policy; protection – both actual and threatened – may be an additional motivation for FDI from outside the EU. In order to capture this determinant the effective tariff rate for the EU in each sector is included (TARIFF). That is taken from Greenaway (1988) and Ennew, Greenaway and Reed (1990) and is for 1986<sup>11</sup>. We expect the effective tariff rate to have a positive impact on FDI from outside the EU as firms chose to locate subsidiaries in the EU rather than export.

In addition to the indicators of EU protection and integration and the propensity to export, other explanatory variables that reflect the characteristics of the 5-digit sectors are included. They are the size, average scale, average unit labour costs and capital intensity in the sector. The size of the sector indicates the size of the domestic market; we expect this to be positively related to the level of FDI partly because the dependent variable is not scaled by

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<sup>10</sup> See Pain and Wakelin (1998) for evidence on the relationship between FDI and exports.

<sup>11</sup> More recent entrants to the EU such as Greece, Spain and Portugal may still be converging to the common external tariff at the beginning of our estimation period. However, given their low levels of FDI in the UK, we do not believe this is a serious problem for our model.

sector size, and partly because well developed markets may attract FDI through agglomeration and demand effects. Skilled labour may already be available, along with input suppliers and a developed final market. We proxy sector size using value added in the sector (VADD). Scale is included, as sectors with a large average scale are likely to have lower levels of inward investment, and there is a strong incentive to concentrate production in one country. Average firm employment in the sector is taken as an indicator of scale (SCALE).

Capital intensity and unit labour costs are also included to reflect the advantages of the UK market in terms of endowments. We expect FDI to be negatively related to unit labour costs (ULC) being attracted to efficient low costs sectors. Capital intensity (capital over sales - KINT) will be positively related to FDI assuming the UK has a comparative advantage in capital intensive production (and that FDI in turn is attracted to sectors in which the UK has an existing comparative advantage). These determinants may be particularly important in explaining vertical ‘efficiency-seeking’ FDI.

As well as controlling for costs and capital intensity we wish to test whether foreign firms are attracted to sectors in which skills are important. To this end we include an average salary variable (AS) which we expect to increase with the skill level of the sector.

Indicators for technology are not included as the food sector undertakes little R&D expenditure. Instead, a variable reflecting the importance of advertising in each 5-digit industry is used. ADVSALES gives the intensity of advertising expenditure in each sector. We expect sectors in which advertising expenditure is important to have a higher share of foreign ownership, reflecting the likelihood that firm-specific advantages are particularly important in sectors in which advertising and hence branding are key characteristics.

The dependent variable is zero for a number of sectors (some of the 48 sectors have no foreign employment or fixed assets) raising questions about the correct estimation procedure. FDI in a sector  $i$  at time period  $t$  is assumed to be determined as:

$$y_{it}^* = X_{it}\beta + \varepsilon_{it} \quad (1)$$

where  $X$  is a vector of exogenous variables which includes the variables outlined above as well as time dummies, and  $\varepsilon$  is an error term.  $y_{it}^*$  is a latent dependent variable which is not directly observable. We observe instead  $y_{it} = \max(0, y_{it}^*)$ . It is well known that Equation

(1) cannot be estimated by OLS because of the non-linearity caused by the limit observations. One useful strategy is to employ the Tobit estimator (Greene, 1993)<sup>12</sup>. Time dummies are included to capture omitted variables that vary over time such as exchange rate movements and the UK business cycle that may influence the timing of investment and which are not included in our model.

We have data on all UK firms in the food, drink and tobacco-manufacturing sector, for 1987 to 1996 inclusive. Within this panel of firms the country of the ultimate holding company is known, so we can identify whether firms are subsidiaries of domestic or foreign firms or independent. The primary source of data is the OneSource database of private and public companies in the UK. The coverage reflects all economically active firms in the UK. From this database we selected the firms in the food industry based on the SIC 1992 code of their primary line of business<sup>13</sup>. Firms defined as holding companies are dropped from the sample, leaving around 1300 firms in 1996, of which around 200 are foreign owned. We assume this represents the population of UK firms in the food industry. Aggregating these data to the 5-digit level gives the level of foreign ownership in the 48 sectors. The other sector-level variables - such as value added and unit labour costs - are created by either aggregating or averaging across all active UK firms in the sector regardless of ownership status. The final data set covers 48 sectors for 10 years giving 480 data points. This database is supplemented by information on the SMP, effective tariff rates and advertising intensity from other sources.

## 5 The Results

The results for the Tobit model using real fixed assets as the dependent variable are presented in Table 3. They are shown for total foreign assets, foreign assets in EU-owned firms, and foreign assets in non-EU firms<sup>14</sup>.

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<sup>12</sup> We also estimated a Tobit model with random effects to take account of the panel structure of our data. However, some of our variables such as ADVSALES vary only a little over the ten year period, as a result some of the standard errors could not be computed reliably and we chose to use a pooled Tobit model with time dummy variables. In addition, we would need to drop TARIFF which has no variation over time.

<sup>13</sup> The food industry is defined as SIC92 15000 and 16000 i.e. including tobacco. More detail on data sources is given in the appendix.

<sup>14</sup> The number of observations is less than 480 as the explanatory variables are missing for some sectors in some years.

**Table 3: Results for real fixed assets in foreign firms**

	<b>Y=FDI</b>	<b>Y= FDI EU</b>	<b>Y= FDI non-EU</b>
<b><math>\alpha</math></b>	-198053 (73016)***	-57650 (15525)***	-197586 (90444)*
<b>ULC</b>	-138379 (58549)**	33833 (12156)***	-165719 (67822)**
<b>KINT</b>	70737 (13519)***	-2835 (3072)	80079 (15728) ***
<b>AS</b>	6885.4 (3652.9)*	3337.4 (772.6)***	-3151 (4605)
<b>VADD</b>	0.345 (0.028)***	0.05 (0.005)***	0.34 (0.03)***
<b>ADVSALES</b>	8870.9 (4859.1)*	2343.3 (963.4)***	8312.4 (5939.8)
<b>SMP</b>	-1646.7 (546.7)***	-372.6 (115.6)***	-2889.6 (749.3)***
<b>SCALE</b>	-33.4 (7.67)***	-8.71 (1.58)***	-21.5 (9.0)***
<b>PX</b>	69016.5 (74580)	-47973.6 (16537.1)***	96398 (93777)
<b>TARIFF</b>	308511 (161019)**		742844 (225460)***
<b>N</b>	400	404	400
<b>Pseudo R<sup>2</sup></b>	0.02	0.03	0.02
<b>LL</b>	-4116.3	-2863.6	-3337.9

\*\*\* significant at 1%; \*\* significant at 5%; \* significant at 10%.

If we look at the basic model for all foreign fixed assets most of the variables have the expected signs and are generally significant. FDI seems to be attracted to sectors with low unit labour costs, high capital intensity and skills (to a limited extent) reflecting the UK's comparative advantage. As we expected larger sectors have more FDI, and scale acts as a disincentive to undertaking FDI. Advertising sales has a positive and significant impact on total FDI (but only at 10%). FDI is attracted to sectors in which firm-specific assets are important. The propensity to export is not significantly related to total FDI. It appears to be a combination of comparative advantage factors and some firm-specific assets that influence FDI in the food industry, with the former dominant.

The variable for European integration also has the expected sign and is significant. FDI appears to be attracted to sectors experiencing price convergence, supporting the hypothesis that European integration is making the EU a more attractive location for FDI. The effective tariff rate also has a positive impact on total FDI, indicating that at least part of the FDI can be explained by tariff-jumping motives. However, as some of the FDI originates from other EU countries to which the common external tariff does not apply, we shall pay more attention to this variable for the non-EU FDI alone.

As we wish to understand the different factors affecting FDI from the rest of the EU and FDI from non-EU countries we have split FDI according to the source region. The results highlight a number of differences. In the case of FDI from the rest of the EU advertising intensity (ADVSALES) is positive and significant. EU firms seem to be attracted to sectors



in which firm-specific advantages are important. In addition, they do not seem to be sensitive to costs, with ULC having a positive relationship to FDI, and the average salary variable also having a positive and significant coefficient indicating that skills are another sector characteristic attracting FDI from the rest of the EU. This is consistent with other evidence (Neven and Siotis, 1996) showing that intra-EU FDI is concentrated in technology intensive sectors. Capital intensity is no longer significant indicating that EU FDI may not be based on the UK's comparative advantage. The only other difference with the basic model is that the propensity to export appears to be inversely related to FDI from EU sources. This indicates that EU firms are interested in producing for the UK market rather than exporting their output.

The European integration variable, market size and scale all have the expected signs. From this it appears that EU integration has had a positive impact on intra-EU FDI, with higher FDI occurring between European countries in sectors with price convergence. Despite this EU firms do not appear to be using the UK as an export base (see the result for the PX variable) but rather to serve the local market.

The results for FDI from non-EU sources are closer to the results for all FDI (unsurprisingly as it is a higher proportion of the total). Comparative advantage factors such as low costs and high capital intensity appear to be important, in contrast to the results for the EU countries. The average salary variable is no longer significant, the skill effect noted for total FDI, appears to come from FDI from the rest of the EU. The effective tariff rate (TARIFF) is also positive and significant. The UK market is thus attractive partly because of its market characteristics, and partly because of the level of protection given by the common external tariff leading to tariff-jumping FDI.

As the earlier section showed, different patterns can be seen for real fixed assets and employment over this period in the food industry. As Table 1 indicated, real fixed assets have grown faster than employment, particularly for FDI from the rest of the EU. However, it seems that all foreign firms are becoming more capital intensive over the period with real assets growing faster than employment. As a result, we have repeated the estimations using employment as the dependent variable, once again split into the three categories. The results are presented in Table 4.

**Table 4: Results for employment in foreign firms**

	<b>Y=FDI</b>	<b>Y= FDI EU</b>	<b>Y= FDI non-EU</b>
<b><math>\alpha</math></b>	-980.7 (1528.1)	-1124.9 (400.6)***	826.1 (1897.7)
<b>ULC</b>	-1671.3 (1244.9)	950.4 (315.3)***	-2440.3 (1418.9)*
<b>KINT</b>	654.3 (292.8)***	-105.13 (81.31)	879.3 (336.3)***
<b>AS</b>	-159.6 (76.5)**	36.28 (19.62)*	-409.4 (98.6)***
<b>VADD</b>	0.006 (0.0006)***	0.0012 (0.0001)***	0.006 (0.0007)***
<b>ADVSALES</b>	497.9 (102.2)***	78.59 (24.58)***	467.9 (124.9)***
<b>SMP</b>	-38.7 (11.5)***	-14.37 (3.06)***	-65.88 (16.52)***
<b>SCALE</b>	0.23 (0.15)	-0.20 (0.04)***	0.59 (0.18)***
<b>PX</b>	-2232.4 (1568.9)	-1213.8 (421.2)***	-1908.9 (2034.7)
<b>TARIFF</b>	14170 (3405)***		28457.8 (5187.4)***
<b>N</b>	400	404	400
<b>Pseudo R<sup>2</sup></b>	0.03	0.04	0.04
<b>LL</b>	-2935.2	-2015.43	-2322.9

\*\*\* significant at 1%; \*\* significant at 5%; \* significant at 10%.

The results using employment in EU firms as the dependent variable are the same as those using fixed assets. It is for total FDI and for FDI from non-European countries that the results differ. Employment seems less sensitive to unit labour costs, but more sensitive to average salary. Employment in non-EU firms appears to be attracted to sectors with low average salaries and low costs indicating there is no skill effect for FDI from outside the EU. There is more support for the importance of firm-specific advantages, with the advertising intensity ratio being positive and significant in all three estimations. In addition, the scale variable is now positive and significant. As with total assets, employment in foreign-owned firms – both EU and non-EU – appears to be positively influenced by price convergence across the EU. The variable indicating price convergence in the EU (SMP) is once again significant. Overall the results confirm the cost-sensitivity of non-EU investment relative to intra-EU investment, and give additional support for the role of firm-specific assets as a determinant of FDI. The effective tariff variable is once again positive and significant.

## 6 Conclusions

The results from this investigation indicate that the process of EU integration has played a positive role in increasing FDI both from sources within and outside the EU in the food industry. The common external tariff of the EU has also had a positive effect on extra-EU FDI. The evidence indicates that integration has certainly not led to a reduction of FDI through the anticipated rationalisation of subsidiaries in the EU. On the contrary, it has acted as an incentive to increase FDI.

The results also indicate that the determinants of FDI vary according to whether the FDI was intra or extra-EU. Overall, comparative advantage explanations such as capital intensity and low costs appear to be particularly important in the case of FDI from outside the EU. FDI originating in other EU countries appears to be less cost-sensitive, and to be determined by factors such as the importance of branding, skills, and a low propensity to export in the sector. While not being a direct test of whether FDI is horizontal or vertical in nature, these results do not support the hypothesis of greater vertical integration through FDI by the EU countries. At least in the food industry, intra-EU FDI can more easily be characterised as horizontal than vertical, as it is influenced by differences in brands (and presumably tastes), and is inversely related to exporting. The vertical integration of FDI may be more appropriate for FDI originating outside the EU. Non-EU multinational companies may be rationalising their production within the EU in order to minimise costs and tailor production more closely to comparative advantage.

This study has undertaken a more thorough and detailed test of the impact of EU integration on FDI than has previously been possible. It has taken advantage of a detailed sector-level data set, along with highly disaggregated data on price convergence in the EU. The results support the hypothesis that greater integration among the EU countries has acted as a catalyst to FDI from all sources. Future research will aim to extend the model to other sectors – such as the automobile sector – in which foreign production is particularly important to see if the same effects can be found.

### Appendix: Data Sources

Variable Name	Definition	Source
<b>Foreign employment</b>	Number of employees in foreign-owned firms	Onesource
<b>Foreign assets</b>	Real total assets in foreign-owned firms (deflated using an aggregate investment deflator)	Onesource
<b>ULC</b>	Unit labour costs i.e. total remuneration over total sales, computed at the firm level then averaged over the sector	Onesource
<b>SCALE</b>	Average firm size by employment	Onesource
<b>VADD</b>	Value added in the sector	Onesource
<b>KINT</b>	Total assets over total sales for each firm averaged over the 5-digit sector.	Onesource
<b>AS</b>	Total remuneration over total employment for each firm averaged over the 5-digit sector.	Onesource
<b>ETARIFF*</b>	Effective tariff rates: see Greenaway (1988) and Ennew, Greenaway and Reed (1990)	
<b>PX</b>	Total exports over total sales for each firm averaged over the 5-digit sector.	Onesource
<b>SMP</b>	Change in the coefficient of price variation at a sector level across the EU9 between 1985, 1990 and 1993.	<i>The Single Market Review, Subseries V vol 1 Appendix.</i>
<b>ADVSALES</b>	Advertising expenditure over sales in each 5-digit sector.	<i>Advertising Statistics Yearbook, the Advertising Statistics Agency.</i>

\* Rate of effective protection with a single input:

$$e_j = \frac{(t_j - a_{ij}t_i)}{(1 - a_{ij})}$$

Where  $t_j$  – tariff on final good  $j$ ,  $t_i$  – tariff on input  $i$ ,  $a_{ij}$  – proportion of total price accounted for by inputs.

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