AN INDUSTRY ANALYSIS OF FOREIGN DIRECT INVESTMENT IN SPANISH MANUFACTURING, 1986-1992*

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ABSTRACT

This paper tries to analyse the main features associated with foreign direct investment (FDI) directed to Spanish manufacturing, both across industries and through time. To this end, we will make use of a data set on 20 manufacturing industries for the years 1986-1992, in which Spanish manufacturing industry experienced a sustained period of growth. Then, a relative FDI measure will be related to several industry indicators, as well as to some macroeconomic variables, which will allow us to obtain a general characterization of FDI in Spanish manufacturing over that period.

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1. INTRODUCTION

Foreign direct investment (FDI hereafter) has traditionally played an outstanding role as a driving factor of economic development in Spain. Indeed, the Spanish integration into the European Community (now European Union, EU) after 1986, together with the prospect of the Single European Market, have meant a new episode leading to substantial changes in the strategies of foreign investors. Certainly, this will have some strong implications for the new role to be played by FDI in the evolution of the Spanish economy for the next few years.

On the other hand, the period beginning around 1985 has witnessed what Graham and Krugman (1993) have called a surge in FDI, mainly occurring among industrialized nations, with Southern Europe as one of its most important destinations in relative terms. The increasing importance of FDI at an international level is shown by its higher growth compared to world trade and output in recent years. So, during the second half of the eighties FDI increased at a yearly average rate of 24 per cent, unlike world imports and gross domestic product which grew at rates of 6.5 and 3.5 per cent, respectively. In addition, the globalization of activities by the multinational enterprise (MNE), together with the efforts made by all kind of governments in order to attract FDI, show the role played by FDI not only as a development factor by itself, but also its closed linkages with trade, technology transfer, and financial flows (United Nations Centre on Transnational Corporations, 1991).

As for the case of the Spanish economy, the period of protracted expansion observed during the years 1986 to 1992 means an additional factor leading to the affluence of FDI inflows (Bajo-Rubio and Torres, 1996). These events are reflected in the evolution of the

manufacturing sector, for which some figures appear in Table 1. So, between 1986 and 1992 industrial demand grew in real terms at a yearly average rate of 6.0 per cent, which implies growth rates unseen since the sixties. The lower growth of domestic output (4.4 per cent) led to a remarkable increase in imports (13.8 per cent), higher than in exports (7.9 per cent), which resulted in a worsening in the coverage of exports by imports of 5.9 per cent.

In addition, the recovery in the levels of activity led both to higher productivity and employment. Manufacturing investment grew at a yearly rate of 9.3 per cent, due, firstly, to the necessity of rationalizing productive processes and techniques, and, secondly, to the enlargement of installed capacities to increase current production as well as to develop new varieties (López-Pueyo, 1992). Also, the evolution of wages and productivity led to a small increase in unit labour costs. Notice finally the increased margin of gross value added over production, explained by the beneficial effects derived from the deep investment process of those years.

The above facts have resulted in a change in FDI patterns in recent years, which are illustrated in Tables 2 to 4. As can be seen in Table 2, the GDP share of the gross inflows of FDI, according to balance of payments figures, has grown steadily from 0.5 per cent on average during the sixties and seventies to 0.7 in the first eighties, reaching 1.8 per cent between 1986 and 1992. If we look at its share of gross capital formation (excluding construction), these developments have been even more impressive: from an average of 6 per cent during the sixties and seventies, to 9 per cent in the first eighties, to reach 20.5 per cent between 1986 and 1992 (a period in which gross capital formation grew at a yearly average

rate of more than 8 per cent).

Regarding its sectoral destination (Table 3), manufacturing activities have been the traditional major recipients of FDI inflows accounting for around 70 per cent of total, mainly in the chemicals, motor vehicles and machinery sectors. However, its share has decreased steadily over the last decade and specially after 1986, until less than 50 per cent on average during the period 1986-92, with this decline mainly explained by the rise of FDI in real estate, finance and insurance activities.

Finally, Table 4 shows the geographical origin of FDI. Even though the OECD area has remained as the almost exclusive source of FDI inflows (around 98 per cent of total between 1961 and 1992), there has been a redistribution in their origin during the eighties and specially since 1986: investment from the EU went from 38 per cent of total on average during the sixties to 61.4 per cent after 1986, while the United States' share went from more than 30 per cent in the sixties to 4.6 after 1986. The share of Japanese FDI, on the other hand, is not remarkable. Notice, on the other hand, the increasing importance of FDI by foreign firms already established in Spain, accounting 21.7 per cent of total FDI during the period 1986-92.

The empirical evidence about FDI in the Spanish economy is scarce but increasingly growing [see Bajo-Rubio (1991) for an early survey]. Bajo-Rubio and Torres (1996) provide an overview of the main trends in FDI inflows after the Spanish integration with the EU, whereas Bajo-Rubio and Sosvilla-Rivero (1994) analyse FDI determinants over the period

1964-1989. Regarding inter-industry studies in manufacturing, we can quote Martín and Rodríguez-Romero (1983), Bajo-Rubio (1991), Egea-Román and López-Pueyo (1991a), Martínez-Serrano and Myro (1992), and Ortega (1992), in which several industry characteristics are linked to the degree of FDI penetration. More recently, Martín and Velázquez (1993), and Alonso and Donoso (1994) rather concentrate on the relationship between trade and FDI making use of data on firms. However, the above mentioned studies usually analyse FDI in a particular year or, when focusing on a several years period, they do it by means of descriptive statistics or multivariate analysis (such as discriminant, or cluster analysis). Hence, this previous evidence invites to perform a new econometric test of FDI in Spanish manufacturing using panel data, something which had not been made yet.

The objective of this paper is to examine the main features related to FDI directed to Spanish manufacturing by means of econometric methods, both across industries and through time. To this end, we will make use of a panel data set on 20 manufacturing industries for the period 1986-1992, in order to try to find the main explanatory factors behind the huge increase in FDI inflows during those years, a rather homogeneous period in which Spanish manufacturing industry experienced a sustained period of recovery after more than a decade of slump. In addition, the Spanish case could be of particular interest for those formerly communist Eastern European countries trying to follow strategies of sustained growth in the context of an increasing external opening.

The rest of the paper is organized as follows. In Section 2 we sketch a simple industrial organization model to illustrate the role played by the main FDI determinants. The

empirical specification of the model, together with the econometric results, are presented in Section 3. Section 4 concludes, and the industry classification and data sources are shown in the Appendix.

2. THEORETICAL FRAMEWORK

We will outline along this section a simple industrial organization model, in which the FDI decision can be embodied. Notice that a first decision a MNE must take involves the suitability of building a plant in a foreign market instead of choosing an alternative way of supplying that market, such as exporting. As illustrated, e. g., by Hirsch (1976) or Smith (1987), that decision should be made in terms of a comparison between the profits earned from both alternatives to the firm.

Following Smith (1987), and assuming the MNE faces no threat of competition[1], its export level would be obtained from the maximization of $p(X)\ X - (c + s + t)\ X$, where p, c, and X denote the price, unit cost, and output level, and s and t are the costs associated with exporting, namely, transport costs and tariffs. On the other hand, the output level when producing abroad would maximise $p(X)\ X - c\ X - G$, where G is a plant-specific cost incurred by the MNE in the host country. Denoting by X_E and X_H the maximization output levels when exporting and producing abroad, respectively, it is immediate that $X_E < X_H$.

In this way, the firm would choose to invest abroad rather than exporting if and only

[1] If a domestic firm would also choose to enter the market, the firm's decision would get complicated, but this is beyond the scope of this paper; see Smith (1987) or Motta (1992).

if:

$$p(X_H)\ X_H\ - c\ X_H\ - G\ >\ p(X_E)\ X_E\ - (c\ + s\ + t)\ X_E$$

being a sufficient condition for FDI to be preferred:

$$G\ \leq\ (s\ + t)\ X_E$$

Once the decision of producing abroad has been made, the MNE would choose the level of FDI as a function of the rate of return on that investment, which is proxied by the rate of profit abroad. So, omitting the plant-specific cost G, and denoting profits of a typical firm i at the destination market (e. g., Spain) by π_i, we have:

$$\pi_i\ = p_i(X_i)\ X_i\ - c_i(X_i)\ X_i \qquad (1)$$

where p, c, and X are again the price, unit cost, and output level of the firm, and now unit costs are made a function of the level of output.

From here, the profit maximization price can be found as:

$$p_i\ = \frac{(1\ + \gamma_i)}{(1\ - \frac{1}{\varepsilon_i})}\ c_i \qquad (2)$$

where

$$\varepsilon_i\ = -\frac{dX_i}{dp_i}\ \frac{p_i}{X_i} \qquad (3)$$

is (minus) the price elasticity of demand, and

is the elasticity of unit costs with respect to the level of production. Defining now the profit

$$\gamma_i = \frac{dc_i}{dX_i}\,\frac{X_i}{c_i} \tag{4}$$

rate r_i as the ratio of profits to sales, this can be written after replacing (2) as:

$$r_i = \frac{\pi_i}{p_i X_i} = 1 - \frac{(1 - \frac{1}{\varepsilon_i})}{(1 + \gamma_i)} \tag{5}$$

Finally, an index of economies of scale, denoted by Θ_i, can be constructed as the ratio of unit to marginal cost [see, e. g., Helpman and Krugman (1985)] which, in terms of (4), becomes:

$$\theta_i = \frac{1}{1 + \gamma_i} \tag{6}$$

Hence, the equation for the profit rate can be written in an alternative way:

$$r_i = 1 - \theta_i\,(1 - \frac{1}{\varepsilon_i}) \tag{7}$$

where r_i is negatively related to both economies of scale and the price elasticity of demand.

On the demand side, we assume a Dixit and Stiglitz (1977) framework in which there are n varieties of the good X, each one produced by a particular firm, so that the representative consumer will maximize a CES utility function such as:

$$U = (\sum_{i=1}^{n} X_i^{\beta})^{1/\beta} \qquad \beta = (1 - \frac{1}{\sigma}),\ \sigma > 1 \tag{8}$$

where σ is the elasticity of substitution among varieties.

Given the budget constraint:

$$\sum_{i=1}^{n} p_i X_i \leq E \tag{9}$$

where E denotes total expenditure, the consumer's problem gives the following demand function for each variety i:

$$X_i = E \frac{p_i^{-\sigma}}{\sum_{i=1}^{n} p_i^{1-\sigma}} \tag{10}$$

From here, we can obtain the price elasticity of demand for variety i as:

$$\varepsilon_i = \sigma + (1 - \sigma)\frac{p_i^{1-\sigma}}{\sum_{i=1}^{n} p_i^{1-\sigma}} \tag{11}$$

which will always be greater than one since $\sigma>1$, and tend to σ when n is large. Notice that both (10) and (11) embody Chamberlin's (1933) assumption that an increase in the number of varieties n available to consumers shifts to the left and makes more elastic the demand curve for each variety.

On the other hand, elasticity can be made a function of the exchange rate in the following way [see, e. g., Dornbusch (1987) or Baldwin (1988)]. Suppose that some of the n varieties of the good X are produced by foreign firms, denoted by j, so that (11) can be written as:

Then, the profit-maximization price of a foreign firm j would be:

where c_j^* denotes the unit cost of firm j measured in foreign currency, and e is the exchange

$$\varepsilon_i = \sigma + (1 - \sigma)\frac{p_i^{1-\sigma}}{\sum_i p_i^{1-\sigma} + \sum_j p_j^{1-\sigma}} \qquad (11')$$

$$p_j = \frac{(1 + \gamma_j)}{(1 - \frac{1}{\varepsilon_j})} c_j^* e \qquad (2')$$

rate (units of domestic currency per unit of foreign currency). Therefore, an exchange rate depreciation would increase the domestic price of the varieties produced by foreign firms, which would lower the price elasticity of the varieties produced by domestic firms.

Now we can combine the supply and demand sides of the model. We have seen from (7) that the profit rate of a firm i in the destination market depends negatively on both scale economies and the elasticity of demand. We also know from (11), (11') and (2') that the latter depends positively on the number of varieties available to consumers (or, in other words, the number of firms operating at the market) and negatively on the exchange rate. Hence, we can write:

$$r_i = r(\theta_i, n, e) \qquad r_{\theta_i}<0,\ r_n<0,\ r_e>0 \qquad (12)$$

and, since FDI (denoted by I) would be a positive function of r:

$$I_i = I(\theta_i, n, e) \qquad I_{\theta_i}<0,\ I_n<0,\ I_e>0 \qquad (13)$$

In this way, we have obtained a relationship between, on the one hand, the level of FDI in a particular market and, on the other hand, some possible determinants, i. e., the degree

of economies of scale, the number of firms operating at that market (both of them proxying the characteristics of market structure), and the exchange rate (a macroeconomic variable, common to all industries). In the next section we will provide some econometric estimates of a model based on equation (13), making use of Spanish data for the period 1986-1992, in which several proxies for the structural characteristics of Spanish industries have been included.

3. EMPIRICAL MODEL AND RESULTS

There are several theories addressed to explain the internationalization of the firms' operations or, in other words, the emergence of the MNE [see Agarwal (1980) or Cantwell (1991) for surveys]. Among them, Dunning's (1977) "eclectic theory" has become increasingly popular, on putting together several hypotheses in which could be thought as the starting point of a general theory of FDI. According to Dunning, there are three conditions or groups of advantages, which a firm (or, alternatively, an industry or a country) must satisfy in order to undertake any FDI:

a) Ownership advantages: the firm must possess some comparative advantages over their competitors in the host country, such that they outweigh the potential disadvantages for that firm from operating in a foreign environment.

b) Internalisation advantages: it must be more profitable for the firm internalising those advantages by means of FDI rather than exploiting them by licensing.

c) Locational advantages: the host country must possess some particular advantages over the investor's country making more profitable for the firm undertaking FDI rather than exporting.

Therefore, and since all the variables we are going to handle are referred to Spanish manufacturing industries, our aim in this section is not to test a model following the above lines but rather to study the characteristic features of those sectors in which MNEs operate in the Spanish economy. So, only locational advantages (according to Dunning's terminology) could be strictly tested, unlike the other two sources of advantages (ownership and internalisation), which could be tested only to the extent that our variables for Spanish manufacturing industries proxied those of the investors' countries (which, on the other hand, and since most of the FDI received by the Spanish economy comes from industrial countries, would not be a too unrealistic assumption).

The variables used in the empirical counterpart of equation (13) have been grouped under three main headings: economies of scale and barriers to entry, locational advantages, and macroeconomic factors. Notice that the first two groups would proxy market structure characteristics, and would fit in a broad sense, according to Dunning's terminology, with ownership and internalisation, and locational conditions, respectively. Next we will go through the variables used in the empirical model.

A) Economies of scale and barriers to entry

A.1) Economies of scale

In Section 2 a negative relationship has been derived between economies of scale and FDI, since a higher degree of scale economies would be associated with a lower elasticity of unit costs with respect to output, and hence with a lower price and a lower rate of profit. Alternatively, the relationship between FDI and economies of scale might be founded according to Porter's (1986) characterization of industries as being global (i. e., those industries "in which a firm's competitive position in one country is significantly affected by its position in other countries or vice versa"; see Porter, 1986, p. 18), for which the presence of scale economies would lead to concentrate that industry in a few locations, not favouring FDI, or multidomestic (i. e., those industries for which competition in a country is independent of competition in other countries), which would be reflected in a lower degree of scale economies and hence in a negative relationship between the latter and FDI.

Notice that, to the extent our hypothesis on product differentiation were true and production from foreign-participated firms were directed mainly to the Spanish market (see below), one might think that reaching scale economies would not be the main objective of MNEs when investing in Spain. Scale economies have been proxied by

SCALE = value added per establishment

and

MECH = degree of mechanization of the productive processes, measured by gross fixed capital formation per employee

and the expected sign of their relationship with FDI would be assumed to be negative.

A.2) Product differentiation

Another type of barriers to entry can arise from the presence of product differentiation. So, firms carrying out product differentiation would tend to locate production as close as possible to consumers, in order to satisfy their liking for variety. On the other hand, MNEs possess certain advantages in product differentiation activities with respect to the host country firms, coming mainly from two sources (Caves, 1974a): first, product differentiation implies developing some marketing skills, which eventually will become "public goods" for the firm and reduce the expected cost of FDI; and, second, there are spillovers derived from advertising activities, which spread from the home market of the MNE to the host country market where FDI is undertaken. So, these considerations suggest an expected positive relationship between FDI and product differentiation, measured by

ADS = advertising expenditures as a percentage of sales

Together with advertising differentiation, we have included a measure of "complexity" or technological differentiation [see Caves and Williamson (1985) for a theoretical statement], for which the expected sign of the relationship with FDI is also positive: a certain technological advantage enjoyed by a firm would mean an ownership advantage to be exploited by some kind of internalization. However, transaction costs implied by licensing would make preferable its exploitation by means of FDI. Technological differentiation has been proxied by

RDS = research and development expenditures as a percentage of sales

<u>B) Locational advantages of the host country</u>

B.1) Labour skills

Given the large scale of their operations and their need for worldwide coordination, MNEs must develop a high level of skill resources. Hence, FDI would arise as a way to give employment to some underutilized skills (in marketing, management, technical efficiency, etc.) within the firm, to the extent that they are transferable abroad (Caves, 1974b). This would lead to an expected positive influence of skills on FDI.

We have proxied labour skills by a relative measure of the number of employees devoted to highly specialized tasks

SKILL = research and development related personnel as a percentage of the industry's value added

B.2) Trade performance

The influence of this variable can change according to the strategy followed by MNEs. On the one hand, a higher export performance in a particular industry would mean a higher level of competitiveness of domestic producers in that industry, which might attract higher FDI inflows in order to capture those competitive advantages. On the other hand, a higher import penetration would reveal a lack of competitiveness of domestic producers, which would mean an incentive for MNEs to undertake FDI in that industry. So, in principle, both a higher export performance and a higher import penetration would be associated to a higher FDI.

In any case, the sign of this relationship would be related to the kind of strategy pursued by MNEs when settling in a foreign country, that is, whether supplying a potentially important domestic market, or rather using it as an exporting platform to third markets. Trade

performance has been measured by both export and import propensities

EXP = exports as a percentage of sales

IMP = imports as a percentage of apparent consumption (i. e., sales, plus imports, minus exports)

and also by a relative measure of the industry's trade balance

TBS = exports minus imports as a percentage of sales

B.3) Labour costs

It is commonly assumed that a MNE would invest in a foreign country only if costs (and in particular labour costs) of producing in that country are relatively lower than those prevailing in the home country of the MNE. However, as pointed out by Maki and Meredith (1986), this would be true only if the technological advantages (in the broad sense of ownership advantages) enjoyed by such MNE are not portable: so, if a MNE enjoys lower costs in its home country and can make use of these advantages also in the host country (that is, if technology is "portable"), then the firm might choose investing abroad despite the higher relative costs in the host country. Indeed, as Porter (1986) notes, when choosing a country to locate their investments, MNEs would tend to give a higher value to the availability of skilled labour and advanced infrastructure, rather than to cheap unskilled labour or natural resources.

Hence, in a strict sense there would not be theoretical a priori reasons to expect necessarily a negative sign for the relationship between FDI and labour costs measured by

WAGE = hourly labour compensation, in real terms

B.4) Labour productivity

A similar reasoning than before can be applied to productivity if we argue in terms of unit costs. That is, the expected relation between FDI and

PROD = hourly value added per employee, in real terms

would be positive unless the technological advantages enjoyed by MNEs were portable, in which case it would be negative.

B.5) Industry growth

The importance of market size on the decision of producing abroad has been emphasized in some contributions to the FDI literature [see, e. g., Rowthorn (1992)]. Also, the role of product demand is one of the main factors affecting the location decisions of manufacturing firms, as shown in the recent models on economic geography [see, e. g., Krugman (1991)]. So, FDI in a particular industry would tend to increase with the growth of that industry

IGROWTH = percentage yearly growth of domestic market, in real terms

C) Macroeconomic factors

Unlike the other two groups of variables, which would take a different value for each industry and year, those we have termed "macroeconomic" would only change through time, being common to all industries. Macroeconomic factors include:

C.1) The exchange rate and exchange-rate expectations

The effects of the exchange rate on FDI have been traditionally discussed in the

context of models of portfolio selection [see, e. g., Aliber (1970) or Froot and Stein (1991)]. Only recently the exchange rate has been introduced in industrial organization models [see, e. g., Dornbusch (1987) or Baldwin (1988)], which could be taken as a starting point in the explanation of FDI flows at an industry level, as shown in Section 2.

In principle, an exchange rate depreciation is expected to be accompanied with higher FDI inflows. For example, in Section 2's model an exchange rate depreciation would increase the domestic currency price of the imported varieties, so lowering demand elasticity for the varieties produced at home, and then increasing their price and profit rate, and enhancing FDI inflows. From another point of view, an exchange rate depreciation should increase the domestic currency value of foreign wealth, thus increasing FDI in the domestic country (Froot and Stein, 1991). In general, however, the effect of the exchange rate on FDI would not be fully unambiguous, depending on the configuration of the foreign investor's activities (Caves, 1988).

Several possible measures of the peseta's exchange rate have been tried: both nominal and real, against the EU and the OECD, and (in the case of real exchange rates) using both industrial prices and manufacturing labour costs. The best results (and the ones reported below) were obtained with

EXRATE = nominal effective exchange rate of the peseta against the OECD

and the expected sign for its relationship with FDI would be negative (since a decrease in the index would mean a depreciation of the exchange rate).

Regarding exchange rate expectations, and by a similar reasoning, an expected exchange rate appreciation should be accompanied with FDI inflows: if the value of the domestic currency is "low" and is expected to appreciate, then the expected return on domestic assets would rise, as does the demand for them. Following Caves (1988), we have proxied exchange rate expectations using two alternative methods, for all the exchange rates considered: by taking the exchange rate actually prevailing in the next year, and by taking the mean of the current and one-year lagged exchange rates (which assumes that half of this year's change in the exchange rate will be reversed next year). The best results were obtained with the latter

EREXP = (EXRATEt-1 + EXRATEt)/2

and the expected sign for its relationship with FDI would be positive (since an increase in EXREXP would mean an expected appreciation of the exchange rate).

C.2) Growth differential

A higher overall growth of the host country's economy would be a locational advantage leading to an increased level of sales in the whole domestic market, and hence to a higher expected profitability. In this way, a positive relationship should be expected between FDI and

DGROWTH = difference between Spain and the EU's growth rates in real gross domestic product

C.3) Inflation differential

We take inflation as a proxy of macroeconomic instability, reflecting the presence of internal economic pressures and unability to balance the budget or restrict money supply.

Hence, FDI would be favoured by a lower inflation rate in the host country, relative to that prevailing in the source countries, measured by

DINF = difference between Spain and the EU's rates of change in gross domestic product deflator

Finally, the dependent variable are FDI inflows as a percentage of sales, for 20 manufacturing industries during the period 1986-1992 (see the Appendix for the industry classification and data sources). Notice that our dependent variable refer to investment projects reported to the Spanish Administration by statistical reasons. Also, our sample period stops at 1992 since the change in the Spanish National Classification of Economic Activities from 1993 on makes impossible to obtain some of our variables at the same level of sectoral disaggregation[2].

Table 5 shows some selected coefficient estimates from our empirical model, together with the standard error of the regression (ó), coefficient of determination (R2), sum of squared residuals (SSR), and F-statistic. The method of estimation is ordinary least squares including fixed effects for every industry (i. e., the coefficients in Table 5 would be within-group estimates). Notice that some variables have not been included together in the equations to estimate, given the high degree of collinearity between them; in particular, this was the case of the two proxies of scale economies, technological differentiation and labour skills, the trade performance indicators, and labour costs and productivity.

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[2] In a previous version of this paper we used data for the period 1986-1990 (see Bajo-Rubio and López-Pueyo, 1996).

Looking first at the different proxies of scale economies, value added per establishment appears with a positive but non significant coeffcient, unlike the degree of mechanization, which always shows a negative and significant relationship with FDI. This results agrees with that found in Bajo-Rubio (1991) in a cross-section for the year 1980, and would support our previous hypothesis on this variable.

The results for the product differentiation variables are also supportive of our hypotheses. On the one hand, technological differentiation consistently appears as one of the more characteristic features of those sectors receiving higher FDI inflows. On the other hand, a positive and generally significant coefficient is found for advertising differentiation. Taken together, these results would point to the relevance of firm-specific advantages in explaining MNEs behaviour [see also Brainard (1993)].

Turning now to the effects from the next group of variables, those collected under the heading of locational conditions of the host country, notice first that our skill variable show a clear significant association, of a positive sign, with the degree of FDI. This is a common feature to other similar studies for other countries (Caves, 1974b; Lall, 1980; Meredith, 1984; Ray, 1989; Mann, 1993), and agrees with some previous results for the Spanish case (Bajo-Rubio, 1991; Egea-Román and López-Pueyo, 1991b; Alonso and Donoso, 1994).

According with the trade performance indicators, those manufacturing industries receiving higher FDI inflows would simultaneously enjoy higher export and import propensities, at the same time that their relative trade deficit would be higher. This result

would reflect the more active behaviour shown by both exports and imports in those industries (Bajo-Rubio and Torres, 1996), and would agree with those from some recent studies (Martín and Velázquez, 1993; Alonso and Donoso, 1994) which found higher export and import propensities for foreign-participated firms (even though in the case of the former it would be actually lower for foreign majority-owned firms), together with a worse trade balance than Spanish firms.

On the other hand, we did not find a significant role for lower labour costs (and the same was true when unit labour costs, computed as the ratio between labour costs and productivity, were used instead), which maybe could be interpreted so that inter-industry variability of wages is not great enough to lead to any significantly different FDI behaviour; in any case, this result agrees with previous findings by several authors (Martín and Rodríguez-Romero, 1983; Bajo-Rubio, 1991; Egea-Román and López-Pueyo, 1991a; Martínez-Serrano and Myro, 1992), and is also consistent with the international evidence on the subject [see, e. g., the recent paper by Aitken, Harrison and Lipsey (1996)]. However, productivity appears with a positive and significant coefficient, which might reflect the more solid and complex managerial structure characterizing foreign-participated firms (Alonso and Donoso, 1994).

Finally, the coefficient on industry growth always shows a positive sign but is only marginally significant, giving only moderate support to the hypothesis of the importance of the domestic market for FDI, at an industry level [see, e. g., Meredith (1984) or Ray (1989), and Martínez-Serrano and Myro (1992) for the Spanish case]. It can be thought that MNEs

care about the growth of their domestic market from a longer term perspective, rather than from a year-to-year one (which might reflect cyclical developments).

Regarding macroeconomic variables, higher FDI inflows seem to be associated with a depreciated exchange rate [as in Caves (1988), Ray (1989) or Mann (1993)] and, specially, with appreciation expectations [as in Mann (1993), but unlike Caves (1988)]. We also found the expected signs for the effect from both output and inflation differentials against the EU (the main source of FDI inflows), although non significant at the conventional levels, providing again only mild support to previous findings with aggregate data (Bajo-Rubio and Sosvilla-Rivero, 1994). It would seem that a growing and stable economy would be a prerequisite for a country to guarantee a continuous FDI inflow, rather than a guide to MNEs decisions at the industry level.

4. CONCLUSIONS

We have examined along this paper the main features related to FDI directed to Spanish manufacturing during the years 1986-1992. This was a rather homogeneous period in which Spanish manufacturing industry experienced a sustained period of growth, at the same time that the whole Spanish economy registered great amounts of FDI inflows, being one of the favourite destinations of FDI during those years. Also, our results might reveal some interesting facts for such countries involved in processes of external opening, in particular those in Eastern Europe.

Our main conclusions can be summarized as follows:

a) Higher technological expenditures and the availability of a skilled labour force seem to be the main characteristic features of those Spanish manufacturing industries receiving higher FDI inflows during the period 1986-1992.

b) FDI also appears associated with a lower degree of scale economies (proxied by the extent of mechanization) and higher advertising differentiation, suggesting that MNEs in Spain would operate at a relatively small scale to produce non-standardized goods, more adapted to tastes and other conditions prevailing in the domestic market.

c) Industries receiving higher FDI inflows would be characterized by higher export and import propensities, with a higher trade deficit in terms of sales.

d) Lower labour costs do not show a significant effect on FDI, in the line of previous findings by several authors. However, those industries receiving higher FDI inflows would enjoy higher productivity levels, which might reflect a better managerial organization on the side of foreign-participated firms.

e) Finally, we also obtained some results backing the hypothesis that higher FDI inflows would be associated both with a depreciated exchange rate and an expected appreciation.

Regarding the policy implications of the paper, it should be stressed again that macroeconomic growth and stability remain as necessary conditions to keep a high level of FDI inflows over the next years (Bajo-Rubio and Sosvilla-Rivero, 1994). On the other hand, our results point to the importance of technological and skill advantages, as opposed to traditional advantages based on labour costs, in order to explain the industry allocation of FDI. Indeed, a strong orientation towards the domestic market and a developed managerial structure also seem to be outstanding features of those industries with a higher presence of FDI.

These results tend to support the view about FDI as a crucial factor in the modernization of the Spanish industrial structure, as well as the importance of an adequate institutional framework aimed to encourage technological research, a better labour training, as well as the development of modern managerial methods.

The greater internationalization of those industries receiving higher FDI inflows, as shown by their higher export and import propensities, casts some doubts on its influence on the Spanish overall trade deficit. This in turn raises issues such as the compensating role of capital inflows with respect to the trade deficit; or if, on the contrary, a policy of promoting exports or a higher competitiveness by domestic manufacturing should be called for.

Finally, the role of the exchange rate expectations on FDI would seem to reflect the influence of favourable prospects on the evolution of the Spanish economy, stressing again the importance of a rigorous and credible macroeconomic policy in order to attract FDI inflows.

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APPENDIX. INDUSTRY CLASSIFICATION AND DATA SOURCES

The definition of industries, and its correspondence with the *Encuesta Industrial* (Industrial Survey) published by the Ministry of Industry, as well as the 1974 CNAE (National Classification of Economic Activities) is as follows:

	Encuesta Industrial	CNAE
1. Ferrous metals	10,11	22
2. Non-metallic mineral industries	13 to 18	24
3. Chemicals	19 to 30	25
4. Metallic products	31 to 35	31
5. Mechanical equipment	36, 37	32
6. Office and data process	38	33
7. Electrical machinery	39	34
8. Electronic material	40	35
9. Motor vehicles	41	36
10. Shipbuilding	42	37
11. Other transportation equipment	43 to 45	38
12. Precision instruments	46	39
13. Food, beverages and tobacco	47 to 64	41, 42
14. Textiles	65 to 68	43
15. Leather	69, 70	44
16. Footwear and clothing	71 to 74	45
17. Timber and cork	75 to 79	46
18. Paper and publishing	80 to 82	47
19. Rubber and plastics	83, 84	48
20. Other manufacturing	85 to 89	49

Notice that the change in the CNAE occurring at 1993 entailed a deep transformation into the *Encuesta Industrial*, which prevented us from using those variables

coming from that source, at our original sectoral disaggregation after that year.

Regarding the data sources, most of the industry variables are taken from the *Encuesta Industrial*, published by the Ministry of Industry and Energy, except for the data on:

- R&D expenditures and personnel, taken from the *Encuesta sobre actividades de I+D*, published by the National Institute of Statistics.
- Exports, imports and FDI, obtained from the State Secretariat for Trade, of the Ministry of Economy and Finance.

Finally, the macroeconomic variables come from the *Boletín Estadístico* of the Bank of Spain.

TABLE 1 - Performance of the Spanish manufacturing industry, 1986-1992

(Yearly average growth rates)

1. Real domestic demand	5.99
2. Real production	4.41
3. Real gross value added	4.86
4. Employment	0.84
5. Productivity (3-4)	4.02
6. Real labour cost per worker	5.27
7. Real unit labour cost (6-5)	1.25
8. Gross fixed capital formation	9.29
9. Real exports	7.88
10. Real imports	13.79
11. Coverage rate (9-10)	-5.91
12. Imports over apparent consumption (10-1)	7.80
13. Exports over output (9-2)	3.47
14. Gross value added over output (3-2)	0.45

Source: Own elaboration

TABLE 2 - FDI in Spain: Overall trends

	Yearly average value(1)	% of GDP(2)	% of GFCF(3)	% in Manufac-turing
1961-65	3.80	0.35	3.20	54.60
1966-70	12.70	0.60	6.50	73.50
1971-75	22.70	0.54	6.10	79.30
1976-80	55.60	0.47	6.40	71.00
1981-85	151.70	0.69	9.00	62.00
1986-92	826.50	1.77	20.50	46.80

(1) Gross inflows according to balance of payments figures, in billion pesetas

(2) GDP = gross domestic product

(2) GFCF = gross fixed capital formation, excluding construction

Source: Bajo-Rubio and Torres (1996)

TABLE 3 - FDI in Spain: Sectoral breakdown

	1960-79	1980-85	1986-92
0. Agriculture	0.5	3.9	1.1
1. Energy & water	0.5	0.3	2.5
2. Mining & chemicals	27.8	16.5	15.5
3. Metal products	33.5	28.8	11.4
4. Other manufacturing	14.4	16.5	14.4
5. Construction	1.6	1.1	1.1
6. Trade services	17.8	15.5	14.0
7. Transport & communication	0.6	1.1	1.3
8. Finance, insurance & real estate	3.4	15.2	37.8
9. Other services	0.0	0.9	1.0
TOTAL	100	100	100
Total (billion pta.)	241.2	1052.1	9213.8

Source: Bajo-Rubio and Torres (1996)

TABLE 4 - FDI in Spain: Geographical breakdown

	1960-79	1980-85	1986-92
EU-12	37.7	40.5	61.4
United States	33.4	17.9	4.6
Japan	0.5	3.6	2.0
Spain	3.0	12.1	21.7
TOTAL	100.0	100.0	100.0
Total (billion pta.)	241.2	1052.1	9213.8

Source: Bajo-Rubio and Torres (1996)

TABLE 5 - FDI determinants in Spanish manufacturing industries, 1986-1992

	(1)	(2)	(3)	(4)	(5)
SCALE	0.0006 (0.26)	-	-	-	-
MECH	-	-3.42[c] (-1.91)	-2.69[c] (-1.66)	-2.52[c] (-1.68)	-3.56[b] (-2.24)
ADS	-	0.50 (0.97)	0.79[c] (1.71)	0.75[c] (1.69)	0.62[d] (1.38)
RDS	1.47[a] (7.48)	-	1.58[a] (8.00)	1.44[a] (7.38)	1.47[a] (7.60)
SKILL	-	5.70[a] (4.72)	-	-	-
EXP	-	0.13[a] (3.11)	-	0.11[a] (3.06)	0.11[a] (3.13)
IMP	0.12[a] (3.26)	-	-	-	-
TBS	-	-	-	-	-
WAGE	1.19 (1.06)	-	-	-	-
PROD	-	2.20[a] (2.79)	1.15[c] (1.73)	-	1.19[c] (1.86)
IGROWTH	0.006 (0.46)	0.002 (0.12)	-	-	-
EXRATE	-	-	-	-	-
EREXP	-	-	-	-	-
DGROWTH	-	-	-	-	-
DINF	-	-	-	-	-
σ	2.12	2.40	2.21	2.16	2.13
R^2	0.61	0.50	0.57	0.59	0.61
SSR	514.68	657.73	568.94	539.92	524.15
F	7.57	4.64	6.73	7.36	7.34

TABLE 5 - (continued)

	(6)	(7)	(8)	(9)	(10)
SCALE	-	-	-	-	-
MECH	-2.80[c] (-1.75)	-3.47[a] (-2.75)	-	-3.33[b] (-2.27)	-2.18[c] (-1.71)
ADS	-	-	-	-	-
RDS	-	1.32[a] (7.26)	1.25[a] (6.52)	-	1.26[a] (6.62)
SKILL	5.94[a] (5.06)	-	-	4.25[a] (4.13)	-
EXP	-	0.11[a] (3.33)	-	0.12[a] (3.08)	-
IMP	0.14[a] (3.66)	-	-	-	-
TBS	-	-	-0.03[a] (-2.76)	-	-0.03[b] (-2.52)
WAGE	-	-	-	-	-
PROD	1.84[b] (2.37)	-	-	-	-
IGROWTH	-	0.02[c] (1.82)	-	-	-
EXRATE	-	-	-0.23[c] (-1.69)	-	-0.33[b] (-2.03)
EREXP	-	0.25[a] (5.04)	0.40[a] (2.83)	0.30[a] (5.10)	0.52[a] (3.19)
DGROWTH	-	-	-	0.26 (1.01)	-
DINF	-	-	-	-	-0.23[d] (-1.45)
σ	2.38	1.99	2.03	2.24	2.01
R^2	0.51	0.66	0.64	0.57	0.65
SSR	654.57	453.15	479.69	576.68	461.69
F	5.19	9.25	8.91	6.24	8.55

Notes:
(i) t-ratios in parentheses
(ii) a, b, c and d denote significance at the 1%, 5%, 10% and 20% levels, respectively